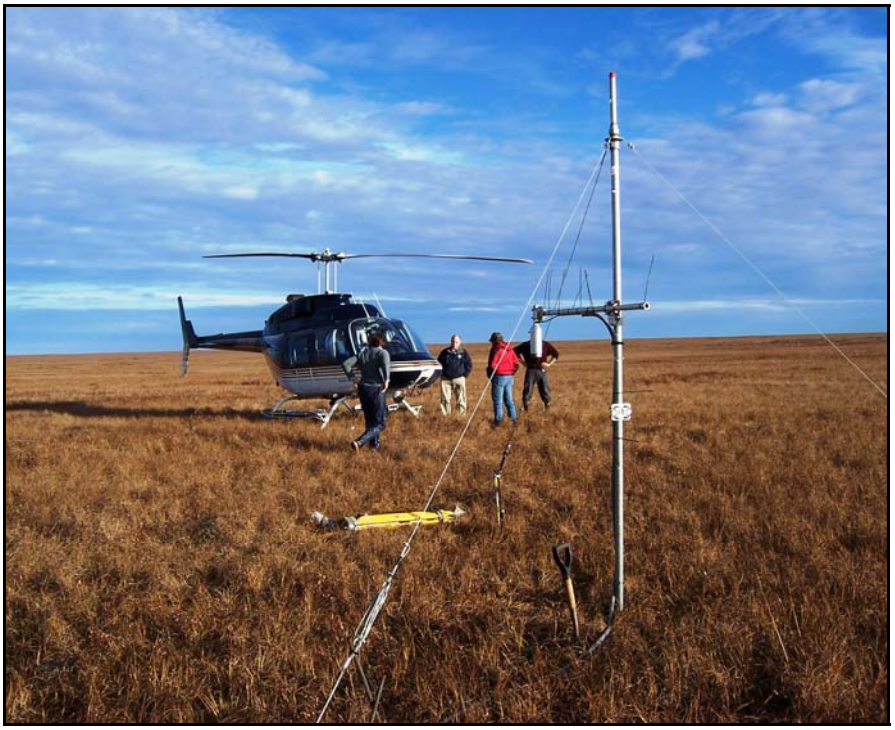
Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: September 2006



Helicopter support at L9817, Photo by D. Reichardt.

by

Colleen Rust, Kristie Holland, Dan Reichardt and Michael Lilly

August 2007

North Slope Lakes Hydrologic Project

Report No. INE/WERC 06.09

Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: September 2006

By:

Colleen Rust[1], Kristie Holland[1], Dan Reichardt[1] and Michael Lilly[1]

A report on research sponsored by:

- U.S. Department of Energy
- National Energy Technology Laboratory
- BP Exploration (Alaska), Inc.
- ConocoPhillips Alaska, Inc.
- Bureau of Land Management
- Geo-Watersheds Scientific

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[1]Geo-Watersheds Scientific, Fairbanks, Alaska

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Fairbanks, Alaska
August 2007

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DISCLAIMER

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CONVERSION FACTORS, UNITS, WATER QUALITY UNITS, VERTICAL AND HORIZONTAL DATUM, ABBREVIATIONS AND SYMBOLS

Conversion Factors

Multiply	By	To obtain
	Length	
inch (in.)	25.4	millimeter (mm)
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
Acre	43559.999	square feet (ft^2)
Acre	0.405	hectare (ha)
Square foot (ft^2)	3.587e-8	square mile (mi^2)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
gallon (gal)	3785.412	milliliter (mL)
Cubic foot (ft^3)	28.317	liter (L)
Acre-ft	1233	Cubic meter (m^3)
	Velocity and Discharge	
foot per day (ft/d)	0.3048	meter per day (m/d)
Square foot per day (ft^2/d)	.0929	square meter per day (m^2/d)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/sec)
	Hydraulic Conductivity	
foot per day (ft/d)	0.3048	meter per day (m/d)
foot per day (ft/d)	0.00035	centimeter per second (cm/sec)
meter per day (m/d)	0.00115	centimeter per second (cm/sec)
	Hydraulic Gradient	
foot per foot (ft/ft)	5280	foot per mile (ft/mi)
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
	Pressure	
pound per square inch (lb/in^2)	6.895	kilopascal (kPa)

Units

For the purposes of this report, both English and Metric (SI) units were employed. The choice of "primary" units employed depended on common reporting standards for a particular property or parameter measured. Whenever possible, the approximate value in the "secondary" units was also provided in parentheses. Thus, for instance, stream flow was reported in cubic feet per second (cfs) followed by the equivalent value in cubic meters per second (m^3/s) in parentheses.

Physical and Chemical Water-Quality Units:

Temperature:

Water and air temperature are given in degrees Celsius (°C) and in degrees Fahrenheit (°F). Degrees Celsius can be converted to degrees Fahrenheit by use of the following equation:

$$°F = 1.8(°C) + 32$$

Specific electrical conductance (conductivity):

Conductivity of water is expressed in microsiemens per centimeter at 25°C (µS/cm). This unit is equivalent to microhms per centimeter at 25°C.

Milligrams per liter (mg/L) or micrograms per liter (µg/L):

Milligrams per liter is a unit of measurement indicating the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For concentrations less than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million.

Millivolt (mV):

A unit of electromotive force equal to one thousandth of a volt.

Vertical Datum:

In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929), a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called *Sea Level Datum of 1929*.

Horizontal Datum:

The horizontal datum for all locations in this report is the North American Datum of 1983 or North American Datum of 1927.

Abbreviations, Acronyms, and Symbols

AC	Actual conductivity
ADOT&PF	Alaska Department of Transportation and Public Facilities
ASTM	American Society for Testing and Materials
atm	atmospheres
C	Celsius
DO	Dissolved oxygen
DVM	digital voltage multi-meter
e-tape	electric tape
F	Fahrenheit (^{o}F).
ft	feet
GWS	Geo-Watersheds Scientific
GWSI	USGS Ground-Water Site Inventory
km^2	square kilometers
kPa	kilopascal
lb/in^2	pounds per square inch
m	meters
mg/L	milligrams per liter, equivalent to ppm
μg/L	micrograms per liter
mi^2	square miles
mm	millimeters
μS/cm	microsiemens per centimeter
mV	Millivolt
NGVD	National Geodetic Vertical Datum
NTU	Nephelometric Turbidity Units
NWIS	National Water Information System
ORP	oxygen-reduction potential
ppm	parts per million, equivalent to mg/L
SC25	specific conductance at 25°C
SWE	Snow Water Equivalent
QA	quality assurance
QC	quality control
UAF	University of Alaska Fairbanks
USACE	U.S. Army Corps of Engineers, Alaska District
USGS	U.S. Geological Survey
WERC	Water and Environmental Research Center
WWW	World Wide Web
YSI	Yellow Springs Instruments

<u>Lake Nomenclature</u>

KDA	Kuparuk Dead Arm (Prudhoe Bay field, serves Prudhoe Bay field operations)
MSB	Mine Site B (Prudhoe Bay field, serves Milne Point and Kuparuk field operations)
L9312	Lake L9312 (Alpine field, serves Alpine field operations)
L9817	Lake L9817 (Alpine field, serves Alpine field operations)
K113	Lake K113 (Prudhoe Bay field, not currently used for field operations)

PROJECT COOPERATORS

The North Slope Lakes project covers a large area of the North Slope and benefits from a number of positive partnerships, all contributing to the overall project objectives.

- BP Exploration (Alaska) Inc.
- ConocoPhillips Alaska, Inc. (CPA)
- Bureau of Land Management
- Alaska Department of Natural Resources
- The Nature Conservancy
- Northern Alaska Environmental Center

ACKNOWLEDGEMENTS

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Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: September 2006

INTRODUCTION

The University of Alaska Fairbanks (UAF) Water and Environmental Research Center (WERC) and Geo-Watersheds Scientific (GWS), together with project cooperators, initiated a study in the Fall of 2002 (Phase One) to obtain baseline information about the physical and chemical characteristics of North Slope tundra lakes. The project was extended in 2005 (Phase Two). The location of the study lakes changed and was expanded to include other reservoirs so as to further develop the understanding and simulation tools necessary for water-source management. K113 is an un-pumped lake in the Kuparuk oilfield and is sampled on selected field trips during the year. L9312 is a natural lake studied in the Alpine operations area. L9817 is a natural lake in eastern NPRA, west of Nuiqsut. L9817 has been used in previous years for ice-road construction, but was not used during winter 2005-06, nor will be used during the winter of 2006-07. Two reservoir systems (mine sites) were added to the study in 2005. Mine Site B, also known as Six-mile Lake, is located near the Milne Point facility at the intersection of the Spine Road with the Milne Point access road and has two cells connected to Milne Creek. The Kuparuk Reservoir System (Kuparuk Deadarm Lakes) has nine reservoirs. The three southernmost reservoir cells (1-3) are included in the study to observe ground-water and surface-water interactions between each cells and the adjacent Kuparuk River.

Water-quality and hydrologic data is collected in the field during monthly visits to the lakes and water samples are collected from priority locations for further analysis at the UAF-WERC chemistry laboratories. The purpose of this publication is to 1) report data collected for the month of September 2006, 2) summarize accomplished field trip objectives.

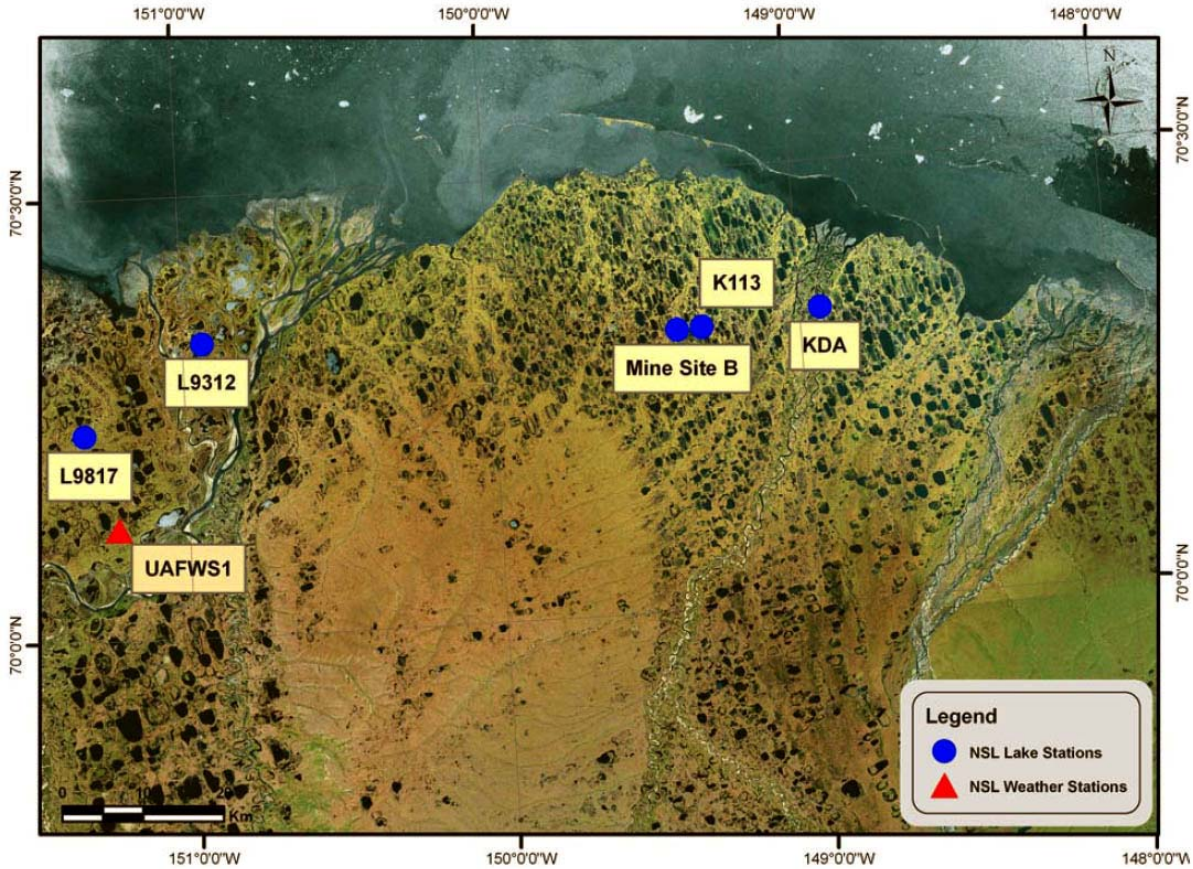

Figure 1. Location of study lakes in the NPR-A, Alpine, Kuparuk, and Prudhoe Bay field operating areas, North Slope, Alaska.

TRIP OBJECTIVES

The goal of each sampling trip is to collect physical and chemical data from each study lake. For each lake, a series of holes are drilled at designated sampling locations. Logistical, personnel, and weather constraints, can limit the amount of time available in the field for sampling. A project workplan was distributed before the trip outlining the sampling schedule (Lilly and others, 2006). In September 2006, we focused on the following locations/tasks:

1. L9312
   - Data collection at a single shoreside monitoring point and Raft B location.
   - Survey water levels to local elevation control.

- Measure field water-quality parameters near the survey control point. This includes vertical profile measurements for temperature, dissolved oxygen (DO), conductivity, pH, turbidity, oxygen reduction potential (ORP) and barometric pressure.
- Collect water samples for field and WERC lab analysis at 0.5 feet below water surface and 0.5 feet above the lake bottom as well as at the raw water port in the Alpine water treatment plant.
- Perform routine maintenance to data station.

2. L9817
   - Data collection at the shoreside location by the meteorological station and Raft location within lake.
   - Survey water levels to local BLM elevation control.
   - Measure field water-quality parameters. This includes vertical profile measurements at each location for temperature, dissolved oxygen (DO), conductivity, pH, turbidity, ORP and barometric pressure.
   - Collect water samples for field and WERC lab analysis at 0.5 feet below water surface and 0.5 feet above the lake bottom.
   - Perform routine maintenance to data station.

3. Misc. Weather Station Sites in NPRA-Alpine Area, Alpine-CP
   - Inspect the automated weather data-collection systems for any problems, remove radiation sensors.

4. K113, Kuparuk Facility
   - Data collection at the previous shoreside and center sampling locations.
   - Survey water levels to local elevation control.
   - Measure field water-quality parameters at chemistry measuring point. This includes vertical profile measurements at each location for temperature, dissolved oxygen (DO), conductivity, pH, turbidity, and barometric pressure.
   - Collect water samples for field and WERC lab analysis at 0.5 feet below water surface and 0.5 feet above lake bottom.

5. Mine Site B, Milne-Point Facility

- Collect data at the center of the North and South Cells as well as the stream.
- Survey water levels to local elevation control.
- Measure field water-quality parameters at chemistry measuring points. This includes vertical profile measurements at each location for temperature, dissolved oxygen (DO), conductivity, pH, turbidity, and barometric pressure.
- Collect water samples for field and WERC lab analysis at 0.5 feet below water surface and 0.5 feet above the lake bottom, as well as 10 feet above the lake bottom.

6. Kuparuk Deadarm Lakes, (Cells 1-3)
   - Collect data at cells 2 and 3.
   - Survey water levels to local elevation control.
   - Measure field water-quality parameters at chemistry measuring points. This includes vertical profile measurements at each location for temperature, dissolved oxygen (DO), conductivity, pH, turbidity, and barometric pressure.
   - Collect water samples for field and WERC lab analysis at 0.5 feet below water surface and 0.5 feet above the lake bottom, as well as 10 feet above the lake bottom.

7. 2M-Pad, Kuparuk-CP
   - Inspect automated weather data-collection system for any problems; add snow depth sensor.

Figure 2. J. Derry and D. Reichardt completing a transect at the stream junction of MSB, Photo by K. Hilton.

PROCEDURES

Water Chemistry Sampling

All field work follows the specified health, safety, and environmental guidelines outlined by BPX and CPA (White and Lilly, 2006 *a*, *b*, *c*). Physical measurements of water depth were taken at each sampling location. Water quality parameters such as temperature, pH, turbidity, oxygen reduction potential (ORP), conductivity, and dissolved oxygen (DO) were obtained by using an In-Situ Troll 9000 (submersible meter), at multiple depths throughout the water column. The precision with which physical measurements were reported takes into account field conditions. The calibration of each parameter was checked before and after each day of sampling using the criteria in Table 1.

Table 1. In-Situ Troll 9000 calibration quality control criteria.

Parameter	Standards used	Acceptable deviation from calibration standard value
Turbidity	Factory calibrated	± 2 (NTU)
pH	4.01, 7.0, 10.0	± 0.2
Conductivity	447 (µs/cm)	within 10%
100% DO	100 % saturated	within 10%
0% DO	0 % saturated solution	within 0.3 mg/L
ORP	In-Situ Quick Cal 224 mV	within 10%

Water samples were also collected at different depths (0.5 ft below surface, 0.5 ft above bottom, and 10 ft above bottom when applicable). Some samples were preserved for further analysis at UAF, while other samples were analyzed with a Hach spectrophotometer while still at the facility. UAF laboratory chemistry analyses are reported separately.

SELECTED RESULTS

Sampling occurred at Kuparuk Deadarm Lakes, K113, Mine Site B, L9817, and L9312 during September field activities. In addition to chemistry sampling, routine maintenance and winter preparation was performed on all of the data stations.

Table 2 summarizes conditions at priority sampling sites. Each lake we visit has one or more locations where we draw water samples from multiple depths for laboratory analysis. These locations have more historical data than other locations on the lakes, and were chosen as representative of the deeper portion of the respective lakes and reservoirs.

Table 2. Median and Max Values for DO Concentration, Temperature, and Actual Conductance in mid-September.

Sampling Site	General Lake Depth	Median & Max Values	Dissolved Oxygen Concentration [mg/L]	Temperature [°C]	Actual Conductivity [uS/cm]
K113-CT	Shallow	Median	12.05	5.73	138.80
		Max	12.06	5.74	139.30
K113-Shore	Shallow	Median	12.14	5.24	140.95
		Max	12.18	5.26	141.00
KDA2-CT	Deep	Median	12.32	5.30	115.9
		Max	12.35	5.30	116.0
KDA3-CT	Deep	Median	14.25	5.39	115.5
		Max	14.60	5.40	115.5
L9312 Raft B	Shallow	Median	12.16	6.61	47.83
		Max	12.41	7.22	48.31
L9312-Shore	Shallow	Median	11.43	6.82	48.16
		Max	11.65	6.86	48.17
L9817 Raft	Shallow	Median	11.82	7.56	196.95
		Max	11.88	7.60	197.40
L9817-Shore	Shallow	Median	11.82	7.74	198.20
		Max	11.84	7.81	198.40
MSBN-CT	Deep	Median	11.92	5.47	214.20
		Max	11.97	5.48	214.20
MSBS-CT	Deep	Median	11.89	5.31	213.00
		Max	11.97	5.33	213.10

There were similarities and differences in DO, temperature, and conductivity patterns between each lake throughout the entire water column. At KDA-3, L9312 (Raft and Shore), L9817 (Raft and Shore), and Mine Site B- North Cell, there was a notable increase in DO towards the bottom. Whereas, at KDA-2 and K113 there was only a slight increase and at Mine Site B- South Cell there was very little change in DO towards the bottom. The water temperature increased towards the bottom at KDA-2 and L9312- Raft, and decreased towards the bottom at L9312- Shore and Mine Site B- South Cell. At K113, KDA-2, L9817 (Raft and Shore), and Mine Site B- North Cell, the temperatures remained consistent or variable between depths, an indication of continued mixing. The conductivity at KDA-2, KDA-3, L9312- Shore, L9817- Shore, and Mine Site B- North Cell, remained consistent throughout the water column, another indication of mixing. However, an increase in conductivity towards the bottom was observed at K113, L9312- Raft,

and L9817- Raft, and there was a decrease towards the bottom at Mine Site B- South Cell. These observations may be used to determine the state of mixing, as well as biological and chemical interactions at various depths within the lake.

SUMMARY

Continuous monitoring of the water quality parameters and spatial distribution of snow cover at North Slope lakes throughout the winter will help in the understanding and development of simulation tools necessary for water resource management. As water levels drop due to freezing and pumping activities in the winter, it is important to identify the changing water chemistry as well as the potential spring recharge. This information is important for permitting agencies as well as the industry professionals who depend on this resource for facility use and ice road/pad construction. Through monthly hydrologic assessments, water chemistry testing, and water sample analysis, we will continue to answer some of the questions brought forth on the effects of mid-winter pumping of North Slope tundra lakes.

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APPENDIX A. WATER QUALITY FIELD SAMPLING FORMS

The following forms report the data collected with the water quality meters during field sampling.

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: Alpine-Water Plant (Raw Water)

Sample Purpose: **Lake Water Quality** Date: 9/15/06 Time: 17:10

FIELD MEASUREMENTS

GPS Coord. Northing: NA Easting: NA Datum: NA

Measurements By: DAR Time: 21:15

Water Depth (ft): NA Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): NA Survey By: NA Date: NA Time: NA

Water Sampling By: Hilton Sample Depths BWS (ft): 1 Tap Date: 9/15/06 Time: 17:10

2 NA

3 NA

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	UAF	In-Situ Troll 9000E	33205	Pass	Pass

Parameters	**Field Measurements**									
Time:	21:15									
Depth BWS (ft):	Tap									
Temp (°C):	14.02									
pH:	7.59									
Barometeric (mmHg):	751.7									
Pressure (kPa):	0.68									
Conductivity (µS/cm):	58.38									
RDO (ppm): (mg/L)	9.17									
Turbidity (NTU):	9.1									
ORP	177									
Hach LDO (mg/L)										
Hach Temp (°C):										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):Tap water**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	23/33	28/35	27/34							Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.19									Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Sample was somewhat aerated while filling sample container for In-Situ measurements.

Turbidity pre-checked 9-12-06, passed; not post cal checked.

Alkalinity values reflect breakpoint/endpoint.

Field-Form Filled Out By: Blackburn Date: 10/13/06

QAQC Check By: Chambers Date: 12/7/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	L9312- Near Shore
Sample Purpose:	**Lake Water Quality**	Date: 9/15/06	Time: 10:30

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 20' 03.0"	Easting:	W150° 56' 53.6"	Datum:	NAD 27 AK
Measurements By:	DAR/KH	Time:	10:30		
Water Depth (ft):	3.09	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL):	7.74'	Survey By:	DAR	Date: 9/15/06	Time: 10:10
Water Sampling By:	DAR/KH	Sample Depths BWS (ft): 1	1.5	Date: 9/15/06	Time: 10:40
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	UAF	In-Situ Troll 9000	33205	yes	yes

Parameters	**Field Measurements**									
Time:	10:54	10:56	10:58							
Depth BWS (ft):	0.5	1.5	2.5							
Temp (°C):	6.86	6.82	6.80							
pH:	7.96	7.91	7.86							
Barometeric (mmHg):	752.9	752.7	752.7							
Pressure (kPa):	0.878	3.70	7.57							
Conductivity (µS/cm):	48.17	48.11	48.16							
RDO (ppm):	11.24	11.43	11.65							
Turbidity (NTU):	0.6	0.7	0.6							
ORP	230	230	231							

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft): 1.5**			**Depth BWS (ft):**			**Depth BWS (ft):**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	17/22	26/29	27/33							Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.07									Hach spec 0.02-3.00 mg/L
Ferrous (II) Iron--F tot Fe (mg/L)	0.04									Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Survey elevation from staff gage. While sampling the boat drifted to a location of 2.48' deep. Held sample depth at 1.5' BWS.

Turbidity cal checked 9-12-06, passed; no post cal check

Alkalinity numbers: breakpoint/endpoint

Field-Form Filled Out By:	Hilton	Date:	9/17/06
QAQC Check By:	Chambers	Date:	12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: L9312-Raft B

Sample Purpose: **Lake Water Quality** Date: 9/15/06 Time: 11:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70° 20' 00.5" Easting: W150° 56' 49.8" Datum: NAD 27 AK

Measurements By: KH/DAR Time: 11:40

Water Depth (ft): 11.6 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): 7.74' Survey By: DAR Date: 9/15/06 Time: 10:11

Water Sampling By: KH/DAR Sample Depths BWS (ft): 1 0.5 Date: 9/15/06 Time: 11:20

2 8

3 11

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	UAF	In-Situ Troll 9000	33205	yes	yes

Parameters	**Field Measurements**									
Time:	11:44	11:45	11:46	11:47	11:49	11:50	11:52	11:54	11:55	
Depth BWS (ft):	11.0	10.0	9.0	8.0	7.0	6.0	5.0	4.0	3.0	
Temp (°C):	6.48	6.49	6.49	6.52	6.54	6.61	6.61	6.64	6.66	
pH:	8.03	7.96	7.93	7.89	7.86	7.86	7.84	7.82	7.80	
Barometeric (mmHg):	753.2	753.2	753.2	753.2	753.1	753.1	753.0	753.0	753.0	
Pressure (kPa):	31.39	27.82	25.13	22.05	18.95	15.90	13.30	9.93	7.10	
Conductivity (µS/cm):	47.60	47.57	47.61	47.64	47.67	47.81	47.84	47.85	47.95	
RDO (ppm):	11.58	11.82	11.95	12.01	12.06	12.14	12.17	12.24	12.25	
Turbidity (NTU):	0.7	0.6	0.7	0.6	0.5	0.5	1.1	0.6	0.8	
ORP	235	237	238	239	240	240	241	243	245	

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___0.5__**			**Depth BWS (ft):___8___**			**Depth BWS (ft):__11____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	24/32	25/33	20/28	28	24/41	24/42	28/42	29/41	29/39	Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.08			0.07			0.07			Hach spec 0.02-3.00 mg/L
Ferrous (II) Iron--F tot Fe (mg/L)	0.04			0.02			0.00			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Survey elevation from staff gage. Measured water quality parameters in reverse (bottom to top) to account for drift while sampling.

Turbidity cal checked 9-12-06, passed; no post cal check

Alkalinity numbers: breakpoint/endpoint

Field-Form Filled Out By: Hilton Date: 9/17/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: L9312-Raft B

Sample Purpose: **Lake Water Quality** Date: 9/15/06 Time: 11:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70° 20' 00.5" Easting: W150° 56' 49.8" Datum: NAD 27 AK

Measurements By: KH/DAR Time: 11:40

Water Depth (ft): 11.6 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): 7.74' Survey By: DAR Date: 9/15/06 Time: 10:11

Water Sampling By: KH/DAR Sample Depths BWS (ft): 1 0.5 Date: 9/15/06 Time: 11:20

2 8

3 11

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	UAF	In-Situ Troll 9000	33205	yes	yes

Parameters	**Field Measurements**									
Time:	11:57	11:58	12:00							
Depth BWS (ft):	2.0	1.0	0.5							
Temp (°C):	6.70	6.78	7.22							
pH:	7.81	7.83	7.83							
Barometeric (mmHg):	752.9	752.8	752.9							
Pressure (kPa):	4.32	2.38	0.81							
Conductivity (µS/cm):	47.97	47.96	48.31							
RDO (ppm):	12.27	12.29	12.41							
Turbidity (NTU):	0.6	0.6	1.0							
ORP	246	244	244							

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Ferrous (II) Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Survey elevation from staff gage. Measured water quality parameters in reverse (bottom to top) to account for drift while sampling.

Turbidity cal checked 9-12-06, passed; no post cal check

Alkalinity numbers: breakpoint/endpoint

Field-Form Filled Out By: Hilton Date: 9/17/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	L9312- PHT-05
Sample Purpose:	**Lake Water Quality**	Date: 9/15/06	Time: 12:20

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 20' 03.6"	Easting:	W150° 56' 59.9"	Datum:	NAD 27 AK
Measurements By:	DAR	Time:	12:20		
Water Depth (ft):	NR	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL):	7.74'	Survey By:	DAR	Date: 9/15/06	Time: NR
Water Sampling By:	NA	Sample Depths BWS (ft): 1	NA	Date: NA	Time: NA
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	UAF	In-Situ Troll 9000	33205	yes	yes

Parameters	**Field Measurements**									
Time:	12:13	12:34								
Depth BWS (ft):	0.5	2.0								
Temp (°C):	7.51	3.59								
pH:	6.67	6.34								
Barometeric (mmHg):	752.8	752.7								
Pressure (kPa):	0.94	5.49								
Conductivity (µS/cm):	110.0	151.3								
RDO (ppm):	7.80	1.38								
Turbidity (NTU):	0.5	7.1								
ORP	210	127								

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Pond is 12' long, 3' wide, and 2' deep (approximately). Small unidentified fish-like organisms (1/2" long).
Turbidity cal checked 9-12-06, passed; no post cal check

Field-Form Filled Out By:	Hilton	Date:	9/17/06
QAQC Check By:	Chambers	Date:	12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	L9312-Survey Control Pt
Sample Purpose:	**Lake Water Quality**	Date: 9/15/06	Time: 12:50

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 20' 2.7	Easting:	W150° 56' 56.2	Datum:	NAD 27
Measurements By:	DAR/KH	Time:	12:50		
Water Depth (ft):	2.8	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL):	7.74'	Survey By:	DAR	Date: 9/15/2006	Time: NR
Water Sampling By:	NA	Sample Depths BWS (ft): 1	NA	Date: NA	Time: NA
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	UAF	In-Situ Troll 9000E	33205	yes	yes

Parameters										
Time:	12:51	12:52	12:53							
Depth BWS (ft):	0.5	1.5	2.5							
Temp (°C):	6.87	6.80	6.71							
pH:	7.55	7.57	7.56							
Barometeric (mmHg):	752.7	752.6	752.7							
Pressure (kPa):	1.06	3.65	6.35							
Conductivity (µS/cm):	48.31	48.21	48.36							
RDO (ppm): (mg/L)	11.67	11.79	11.81							
Turbidity (NTU):	0.7	0.9	0.5							
ORP	174	178	176							
Hach LDO (mg/L)										
Hach Temp (°C):										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Concrete debris below location.

Turbidity pre-cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By:	Blackburn	Date:	10/13/06
QAQC Check By:	Chambers	Date:	12/7/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	L9817- Shore
Sample Purpose:	**Lake Water Quality**	Date: 9/16/06	Time: 15:30

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 14' 05.6"	Easting:	W151° 19' 46.3"	Datum:	NAD 27 AK
Measurements By:	DAR/KH	Time:	15:30		
Water Depth (ft):	6.4	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL):	53.11	Survey By:	DAR	Date: 9/16/06	Time: 15:45
Water Sampling By:	DAR/KH	Sample Depths BWS (ft): 1	4	Date: 9/16/06	Time: NR
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All- GWS RDO	UAF	In-Situ Troll 9000E	33205	yes	yes

Parameters	**Field Measurements**									
Time:	15:33	15:34	15:35	15:36	15:37	15:37	15:38	15:39		
Depth BWS (ft):	0.5	1.3	2.5	3.0	4.0	5.0	6.0	6.4		
Temp (°C):	7.81	7.74	7.71	7.80	7.80	7.71	7.74	7.72		
pH:	7.91	7.92	7.93	7.93	7.92	7.91	7.89	7.84		
Barometeric (mmHg):	747.9	747.9	747.9	747.9	747.9	747.9	748.0	748.0		
Pressure (kPa):	1.165	3.356	5.381	6.696	9.672	12.943	15.485	18.489		
Conductivity (µS/cm):	198.1	197.9	198.1	198.4	198.3	198.2	198.3	198.2		
RDO (ppm):	11.78	11.80	11.82	11.82	11.80	11.84	11.83	11.84		
Turbidity (NTU):	3.7	3.9	2.2	6.5	2.8	3.6	3.8	96.3		
ORP	199	199	200	200	201	202	202	198		

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___4____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	44/52	50/58	46/54							Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.19									Hach spec 0.02-3.00 mg/L
Ferrous (II) Iron--F tot Fe (mg/L)	0.02									Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; no post cal check

Alkalinity: breakpoint/endpoint

Field-Form Filled Out By:	Hilton	Date:	9/17/06
QAQC Check By:	Chambers	Date:	12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	L9817- Raft		
Sample Purpose:	**Lake Water Quality**	Date:	9/16/06	Time:	14:00

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 14' 2.0"	Easting:	W151° 20' 5.4"	Datum:	NAD 27 AK		
Measurements By:	KH/DAR	Time:	14:00				
Water Depth (ft):	6.5	Ice Thickness (ft):	NA				
Freeboard (ft):	NA	Snow Depth (ft):	NA				
Elev. (BPMSL):	53.11	Survey By:	DAR	Date:	9/16/06	Time:	NR
Water Sampling By:	KH/DAR	Sample Depths BWS (ft): 1	0.5	Date:	9/16/06	Time:	14:30
		2	4				
		3	6				

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All- GWS RDO	UAF	In-Situ Troll 9000	33205	yes	yes

Parameters	**Field Measurements**									
Time:	14:18	14:19	14:20	14:21	14:22	14:23	14:24	14:25		
Depth BWS (ft):	0.5	1.5	2.5	3.0	4.0	5.0	6.0	6.5		
Temp (°C):	7.59	7.58	7.60	7.53	7.53	7.53	7.57	7.54		
pH:	8.06	8.00	8.00	8.00	7.99	8.00	7.99	7.77		
Barometeric (mmHg):	748.3	748.2	748.2	748.2	748.2	748.2	748.3	748.3		
Pressure (kPa):	1.561	3.308	5.213	7.201	10.203	13.123	16.079	18.871		
Conductivity (µS/cm):	196.1	196.8	196.9	196.8	197.0	197.3	197.3	197.4		
RDO (ppm):	11.60	11.79	11.81	11.81	11.83	11.84	11.84	11.88		
Turbidity (NTU):	1.7	1.9	1.8	1.9	1.8	2.6	2.0	1276.4		
ORP	193	198	199	200	201	204	204	90		

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___0.5__**			**Depth BWS (ft):__4____**			**Depth BWS (ft):__6____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	47/56	48/56		45/53	46/52	44/51	49/54	49/54	48/54	Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.25			0.18			0.15			Hach spec 0.02-3.00 mg/L
Ferrous (II) Iron--F tot Fe (mg/L)	0.25			0.02			0.02			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Measured water quality parameters in reverse (bottom to top) to account for drift while sampling.
Turbidity cal checked 9-12-06, passed; no post cal check
Alkalinity: breakpoint/endpoint

Field-Form Filled Out By:	Hilton	Date:	9/17/06
QAQC Check By:	Chambers	Date:	12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	K113-CT		
Sample Purpose:	**Lake Water Quality**	Date:	9/19/06	Time:	16:20

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 19.185'	Easting:	W149° 19.315'	Datum:	NAD 83		
Measurements By:	DAR/JD	Time:	17:10				
Water Depth (ft):	6.9	Ice Thickness (ft):	NA				
Freeboard (ft):	NA	Snow Depth (ft):	NA				
Elev. (BPMSL):	5.43	Survey By:	Hilton	Date:	9/19/06	Time:	17:30
Water Sampling By:	DAR, JD	Sample Depths BWS (ft): 1	0.5	Date:	9/19/06	Time:	16:30
		2	4.5				
		3	6.5				

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	UAF	In-Situ mp Troll 9000E	33205	pass	pH fail, ORP fail

Parameters	**Field Measurements**									
Time:	16:50	16:50	16:53	16:54	16:55	16:56	16:56	16:57	16:58	
Depth BWS (ft):	0.5	4.5	1.5	2.5	3.5	4.5	5.5	6.5	bottom	
Temp (°C):	5.72	5.73	5.73	5.72	5.72	5.73	5.73	5.74	5.74	
pH:										
Barometeric (mmHg):	752.5	752.6	752.5	752.5	752.5	752.6	752.6	752.6	752.6	
Pressure (kPa):	0.805	11.560	4.001	5.93	8.59	11.56	14.62	17.71	20.39	
Conductivity (µS/cm):	138.4	138.8	138.7	138.9	138.8	138.8	138.8	138.9	139.3	
RDO (ppm): (mg/L)	12.03	12.05	12.03	12.04	12.04	12.05	12.05	12.06	12.06	
Turbidity (NTU):	1.0	0.7	0.8	1.2	0.7	0.7	0.7	0.8	630.0	
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):__0.5___**			**Depth BWS (ft):___4.5___**			**Depth BWS (ft):__6.5___**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3				
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	76/82	76/81	75/80	80/86	79/85	76/83	73/80	77/84	76/82	Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.07			0.11			0.07			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.03			0.04			0.03			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia dilution										

Remarks: UAF In-Situ w/ GWS RDO Probe "B"

Turbidity pre-checked 9-12-06, passed; not post-cal checked

Field-Form Filled Out By:	Reichardt	Date:	9/19/06
QAQC Check By:	Chambers	Date:	12/1/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: K113- Shore

Sample Purpose: **Lake Water Quality** Date: 9/19/06 Time: 16:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70° 19.309' Easting: W149° 19.376' Datum: NAD 27

Measurements By: Hilton Time: 16:20

Water Depth (ft): 2 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL +/- .02): 5.43 Survey By: Hilton Date: 9/19/06 Time: 17:30

Water Sampling By: Hilton Sample Depths BWS (ft): 1 1 Date: 9/19/06 Time: 17:20

2 NA

WATER QUALITY METER INFORMATION 3 NA

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS/ UAF	In-Situ Troll 9000	33033/ 33205	Yes	Yes

Parameters	**Field Measurements**									
	GWS- 33033				UAF- 33205					
Time:	16:34	16:36			17:14	17:16				
Depth BWS (ft):	1	1			1	1				
Temp (°C):	5.26	5.22			5.53	5.53				
pH:	8.63	8.61								
Barometeric (mmHg):	751.8	751.8			752.5	752.4				
Pressure (kPa):	1.661	1.634			1.022	1.409				
Conductivity (µS/cm):	141.0	140.9			138.6	138.7				
RDO (ppm): (mg/L)	12.09	12.18			12.16	12.16				
Turbidity (NTU):	0.8	2.1			1.1	1.2				
ORP	206	204								

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___1___**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	77/81	77/82	76/82							Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Elevation survey was conducted by measuring water level from known benchmark.

Field-Form Filled Out By: Hilton Date: 3/19/07

QAQC Check By: A. Blackburn Date: 7/25/207

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: KDA2-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 17:10

FIELD MEASUREMENTS

GPS Coord. Northing: N70° 19.979' Easting: W148° 56.398 Datum: NAD 83

Measurements By: DAR/JD Time: 17:10

Water Depth (ft): 20.1 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): NA Survey By: NA Date: NA Time: NA

Water Sampling By: NA Sample Depths BWS (ft): 1 NA Date: NA Time: NA

2 NA

3 NA

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	17:13	17:14	17:15	17:16	17:17	17:18	17:19	17:20	17:21	
Depth BWS (ft):	1.5	3.0	5.0	7.0	9.0	11.0	13.0	15.0	17.0	
Temp (°C):	5.27	5.26	5.27	5.26	5.27	5.30	5.30	5.30	5.30	
pH:	8.16	8.12	8.12	8.12	8.12	8.12	8.13	8.12	8.11	
Barometeric (mmHg):	757.1	754.1	754.2	754.3	754.3	754.4	754.4	754.5	754.5	
Pressure (kPa):	3.72	7.25	13.03	19.09	25.03	31.10	37.01	42.94	49.02	
Conductivity (µS/cm):	115.8	115.9	115.9	115.9	115.9	116.0	116.0	116.0	116.0	
RDO (ppm): (mg/L)	12.25	12.25	12.27	12.27	12.31	12.32	12.35	12.33	12.30	
Turbidity (NTU):	0.4	0.5	0.3	0.2	0.4	0.3	0.5	0.4	0.4	
ORP	204	203	203	203	203	203	202	203	203	
Hach LDO (UAF) mg/L										
Hach temp °C										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3				
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 9/20/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: KDA2-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 17:10

FIELD MEASUREMENTS

GPS Coord. Northing: N70° 19.979' Easting: W148° 56.398' Datum: NAD 83

Measurements By: DAR/JD Time: 17:10

Water Depth (ft): 20.1 Thickness (ft): NA

Freeboard (ft): NA Low Depth (ft): NA

Elev. (BPMSL): 9.01 Survey By: JED/MRL Date: 9/20/06 Time: 16:20

Water Sampling By: NA Sample Depths BWS (ft): 1 NA Date: NA Time: NA

2 NA

3 NA

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	17:22	17:23	17:23							
Depth BWS (ft):	19.0	20.0	20.1							
Temp (°C):	5.29	5.30	5.30							
pH:	8.14	8.13	8.03							
Barometeric (mmHg):	754.6	754.6	754.7							
Pressure (kPa):	55.000	57.960	59.320							
Conductivity (µS/cm):	115.9	115.9	115.9							
RDO (ppm): (mg/L)	12.35	12.34	12.33							
Turbidity (NTU):	0.3	0.2	137.0							
ORP	202	203	169							
Hach LDO (UAF) mg/L										
Hach temp °C										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 9/20/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: KDA2-Shore

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 16:40

FIELD MEASUREMENTS

GPS Coord. Northing: N70° 19.914' Easting: W148° 56.535' Datum: NAD 83

Measurements By: DAR/KH Time: 16:40

Water Depth (ft): 1 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): NA Survey By: NA Date: NA Time: NA

Water Sampling By: DAR/KH Sample Depths BWS (ft): 1 0.5 Date: 9/20/06 Time: nr

2 NA

3 NA

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	GWS	In-Situ Troll 9000E	33033	yes	yes

Parameters										
Time:	16:38									
Depth BWS (ft):	0.5									
Temp (°C):	5.28									
pH:	8.35									
Barometeric (mmHg):	753.7									
Pressure (kPa):	1.25									
Conductivity (µS/cm):	115.7									
RDO (ppm): (mg/L)	11.91									
Turbidity (NTU):	0.5									
ORP	199									
Hach LDO (mg/L)										
Hach Temp (°C):										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):____0.5____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	73/78	70/75	71/76							Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.02									Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.01									Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Sampled while stanging in lake. Water is flowing away from us by wind, carries away disturbance.

Field-Form Filled Out By: DAR/KH Date: 9/20/06

QAQC Check By: Chambers Date: 12/7/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: KDA3-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 17:40

FIELD MEASUREMENTS

GPS Coord. Northing: NR Easting: NR Datum: NA

Measurements By: NR Time: 17:40

Water Depth (ft): 24.5 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): NR Survey By: NR Date: NA Time: NA

Water Sampling By: NA Sample Depths BWS (ft): 1 NA Date: NA Time: NA

2 NA

3 NA

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	17:40	17:41	17:41	17:42	17:43	17:44	17:47	17:49	17:50	
Depth BWS (ft):	3.0	5.0	8.0	11.0	14.0	17.0	19.0	21.0	23.0	
Temp (°C):	5.39	5.38	5.38	5.38	5.39	5.38	5.40	5.39	5.39	
pH:	8.12	8.13	8.12	8.10	8.10	8.10	8.11	8.10	8.10	
Barometeric (mmHg):	754.3	754.5	754.5	754.6	754.7	754.8	754.8	754.8	754.9	
Pressure (kPa):	7.37	13.05	22.18	30.92	40.09	49.01	55.06	61.10	66.97	
Conductivity (µS/cm):	115.5	115.5	115.5	115.5	115.5	115.5	115.5	115.5	115.5	
RDO (ppm): (mg/L)	12.68	12.84	13.26	13.46	13.78	14.25	14.50	14.27	14.31	
Turbidity (NTU):	0.6	2.7	0.6	0.6	0.7	0.7	0.7	0.5	0.4	
ORP	179	180	180	181	182	182	182	183	184	
Hach LDO (UAF) mg/L										
Hach temp °C										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3				
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 9/20/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: KDA3-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 17:40

2 of 2

FIELD MEASUREMENTS

GPS Coord. Northing: NR Easting: NR Datum: NA

Measurements By: NR Time: 17:40

Water Depth (ft): 24.5 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL): NA Survey By: NA Date: NA Time: NA

Water Sampling By: NA Sample Depths BWS (ft): 1 NA Date: NA Time: NA

2 NA

3 NA

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	17:50	17:51								
Depth BWS (ft):	24.0	24.5								
Temp (°C):	5.39	5.39								
pH:	8.10	8.11								
Barometeric (mmHg):	754.9	755.0								
Pressure (kPa):	69.96	72.63								
Conductivity (µS/cm):	115.5	115.5								
RDO (ppm): (mg/L)	14.39	14.60								
Turbidity (NTU):	0.7	33.9								
ORP	184	177								
Hach LDO (UAF) mg/L										
Hach temp °C										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 9/20/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	MSBN-CT
Sample Purpose:	**Lake Water Quality**	Date: 9/20/06	Time: 9:30

FIELD MEASUREMENTS

GPS Coord. Northing:	NR	Easting:	NR	Datum:	NR		
Measurements By:	DAR/KH	Time:	9:30				
Water Depth (ft):	35.25	Ice Thickness (ft):	NA				
Freeboard (ft):	NA	Snow Depth (ft):	NA				
Elev. (BPMSL +/- .02):	96.39	Survey By:	ML/JD	Date:	9/19/06	Time:	12:25
Water Sampling By:	DAR/KH	Sample Depths BWS (ft): 1	0.5	Date:	9/20/06	Time:	nr
		2	10				
		3	NA				

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	9:32	9:33	9:34	9:35	9:36	9:36	9:37	9:38	9:38	
Depth BWS (ft):	0.5	1.5	2.5	3.5	5.0	7.0	9.0	11.0	13.0	
Temp (°C):	5.45	5.46	5.46	5.47	5.47	5.47	5.47	5.47	5.47	
pH:										
Barometeric (mmHg):	750.7	750.8	750.8	750.8	750.9	751.0	751.1	751.1	751.2	
Pressure (kPa):	1.404	3.882	6.058	8.492	12.816	18.982	25.431	30.819	37.098	
Conductivity (µS/cm):	213.7	214.1	214.1	214.2	214.2	214.2	214.2	214.2	214.2	
RDO (ppm): (mg/L)	11.94	11.92	11.90	11.90	11.91	11.90	11.90	11.90	11.90	
Turbidity (NTU):	0.5	0.4	0.5	0.4	0.4	0.4	0.3	0.4	0.3	
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___0.5___**			**Depth BWS (ft):___10___**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	127/133	130/137	127/133	127/133	136/143	130/135				Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.1			0.13						Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.04			0.04						Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By:	Reichardt	Date:	10/5/06
QAQC Check By:	Chambers	Date:	12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: MSBN-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 9:30

2 of 3

FIELD MEASUREMENTS

GPS Coord. Northing: NR Easting: NR Datum: NR

Measurements By: DAR/KH Time: 9:30

Water Depth (ft): 35.25 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL +/- .02): 96.39 Survey By: ML/JD Date: 9/19/06 Time: 12:25

Water Sampling By: DAR/KH Sample Depths BWS (ft): 1 0.5 Date: 9/20/06 Time: nr

2 10

WATER QUALITY METER INFORMATION 3 NA

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	9:39	9:40	9:40	9:41	9:42	9:43	9:44	9:44	9:45	
Depth BWS (ft):	15.0	17.0	19.0	21.0	23.0	25.0	27.0	29.0	31.0	
Temp (°C):	5.47	5.47	5.47	5.47	5.47	5.48	5.48	5.47	5.48	
pH:										
Barometeric (mmHg):	751.3	751.4	751.3	751.4	751.5	751.5	751.6	751.6	751.7	
Pressure (kPa):	43.466	48.896	54.839	61.034	67.118	73.684	78.963	84.945	91.016	
Conductivity (µS/cm):	214.2	214.2	214.2	214.2	214.2	214.2	214.2	214.2	214.2	
RDO (ppm): (mg/L)	11.91	11.92	11.91	11.91	11.92	11.93	11.93	11.94	11.94	
Turbidity (NTU):	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 9/20/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	MSBN-CT
Sample Purpose:	**Lake Water Quality**	Date: 9/20/06	Time: 9:30

FIELD MEASUREMENTS

GPS Coord. Northing:	NR	Easting:	NR	Datum:	NR		
Measurements By:	DAR/KH	Time:	9:30				
Water Depth (ft):	35.25	Ice Thickness (ft):	NA				
Freeboard (ft):	NA	Snow Depth (ft):	NA				
Elev. (BPMSL +/- .02):	96.39	Survey By:	ML/JD	Date:	9/19/06	Time:	12:25
Water Sampling By:	DAR/KH	Sample Depths BWS (ft): 1	0.5	Date:	9/20/06	Time:	nr
		2	10				
		3	NA				

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	9:46	9:46	9:47	9:48						
Depth BWS (ft):	33.0	34.0	34.5	35.25						
Temp (°C):	5.47	5.47	5.48	5.47						
pH:										
Barometeric (mmHg):	751.8	751.8	751.8	751.9						
Pressure (kPa):	96.713	99.866	101.440	104.064						
Conductivity (µS/cm):	214.2	214.2	214.2	214.2						
RDO (ppm): (mg/L)	11.95	11.95	11.94	11.97						
Turbidity (NTU):	0.4	0.4	0.3	26.7						
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By:	Reichardt	Date:	9/20/06
QAQC Check By:	Chambers	Date:	12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: MSBS-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 10:26

FIELD MEASUREMENTS

GPS Coord. Northing: NR Easting: NR Datum: NR

Measurements By: DAR/KH Time: 10:26

Water Depth (ft): 29.28 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL +/- .02): 96.39 Survey By: ML/JD Date: 9/19/06 Time: 12:25

Water Sampling By: DAR/KH Sample Depths BWS (ft): 1 0.5 Date: 9/20/06 Time: nr

2 19

3 28.5

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	10:26	10:27	10:28	10:28	10:29	10:29	10:30	10:31	10:32	
Depth BWS (ft):	0.5	1.5	3.0	5.0	7.0	9.0	11.0	13.0	15.0	
Temp (°C):	5.30	5.31	5.30	5.31	5.32	5.32	5.31	5.31	5.32	
pH:										
Barometeric (mmHg):	751.2	751.3	751.3	751.3	751.4	751.4	751.5	751.5	751.6	
Pressure (kPa):	1.102	3.718	7.244	12.833	18.860	24.868	31.030	36.886	42.913	
Conductivity (µS/cm):	212.9	212.9	213.0	213.0	213.1	213.1	213.1	213.1	213.1	
RDO (ppm): (mg/L)	11.97	11.92	11.90	11.90	11.89	11.88	11.88	11.88	11.89	
Turbidity (NTU):	0.4	0.5	0.4	0.4	0.4	0.4	0.5	0.3	0.4	
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___0.5 __**			**Depth BWS (ft):___19__**			**Depth BWS (ft):___28.5_**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	134/140	132/139	133/138	127/134	127/135	127/134	126/133	127/134	131/136	Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.15			0.17			0.19			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.03			0.03			0.08			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 10/5/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID: **North Slope Lakes** Site Location/Lake ID: MSBS-CT

Sample Purpose: **Lake Water Quality** Date: 9/20/06 Time: 10:26

2 of 2

FIELD MEASUREMENTS

GPS Coord. Northing: NR Easting: NR Datum: NR

Measurements By: DAR/KH Time: 10:26

Water Depth (ft): 29.28 Ice Thickness (ft): NA

Freeboard (ft): NA Snow Depth (ft): NA

Elev. (BPMSL +/- .02): 96.39 Survey By: ML/JD Date: 9/19/06 Time: 12:25

Water Sampling By: DAR/KH Sample Depths BWS (ft): 1 0.5 Date: 9/20/06 Time: nr

2 19

WATER QUALITY METER INFORMATION 3 28.5

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ mp Troll 9000	33033	pass	pass

Parameters	**Field Measurements**									
Time:	10:33	10:34	10:35	10:36	10:36	10:37	10:38	10:39	10:39	
Depth BWS (ft):	17.0	19.0	21.0	23.0	25.0	27.0	28.0	28.5	29.28	
Temp (°C):	5.32	5.31	5.33	5.31	5.27	5.20	5.17	5.07	5.08	
pH:										
Barometeric (mmHg):	751.7	751.7	751.8	751.8	751.9	751.9	752.0	752.0	752.0	
Pressure (kPa):	48.926	54.906	60.938	66.860	72.777	78.728	81.822	83.007	86.262	
Conductivity (µS/cm):	213.1	213.1	213.1	212.9	212.5	212.1	211.8	211.6	211.6	
RDO (ppm): (mg/L)	11.89	11.90	11.90	11.89	11.89	11.89	11.88	11.87	11.88	
Turbidity (NTU):	0.4	0.5	0.4	0.4	0.6	0.4	0.4	0.3	134.5	
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By: Reichardt Date: 9/20/06

QAQC Check By: Chambers Date: 12/4/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	MSBN-MC1 Stream
Sample Purpose:	**Lake Water Quality**	Date: 9/20/06	Time: 13:25

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 19.156'	Easting:	W149° 24.354	Datum:	NAD 83
Measurements By:	DAR/KH	Time:	NR		
Water Depth (ft):	4.25	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL +/- .02):	96.39	Survey By:	ML/JD	Date: 9/19/06	Time: 12:25
Water Sampling By:	NA	Sample Depths BWS (ft): 1	NA	Date: NA	Time: NA
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All- GWS RDO	GWS	In-Situ mp Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	13:30									
Depth BWS (ft):	1.5									
Temp (°C):	3.61									
pH:										
Barometeric (mmHg):	751.9									
Pressure (kPa):	4.11									
Conductivity (µS/cm):	202.5									
RDO (ppm): (mg/L)	12.17									
Turbidity (NTU):	0.3									
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: MC1 is located at the midpoint between stakes A and B. Total distance equals 34', MC1 is located at 17'.

Turbidity cal checked 9-12-06, passed; no post cal check

Field-Form Filled Out By:	Hilton	Date:	12/7/06
QAQC Check By:	Chambers	Date:	12/7/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	MSB-MC2
Sample Purpose:	**Lake Water Quality**	Date: 9/20/06	Time: 13:40

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 19.178'	Easting:	W149° 24.332'	Datum:	NAD83
Measurements By:	DAR/KH	Time:	13:40		
Water Depth (ft):	5.78	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL +/- .02):	96.39	Survey By:	ML/JD	Date: 9/19/06	Time: 12:25
Water Sampling By:	NA	Sample Depths BWS (ft): 1	NA	Date: NA	Time: NA
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	13:46									
Depth BWS (ft):	3									
Temp (°C):	3.62									
pH:										
Barometeric (mmHg):	751.9									
Pressure (kPa):	8.240									
Conductivity (µS/cm):	202.5									
RDO (ppm): (mg/L)	12.88									
Turbidity (NTU):	0.3									
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks:

Turbidity cal checked 9-12-06, passed; no post cal check

Field-Form Filled Out By:	Blackburn	Date:	10/13/06
QAQC Check By:	Chambers	Date:	12/7/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	MSB-MC3
Sample Purpose:	**Lake Water Quality**	Date: 9/20/06	Time: 13:50

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 19.198'	Easting:	W149° 24.312'	Datum:	NAD 83
Measurements By:	KH/DAR	Time:	13:55		
Water Depth (ft):	3.86	Ice Thickness (ft):	NA		
Freeboard (ft):	NA	Snow Depth (ft):	NA		
Elev. (BPMSL +/- .02):	96.39	Survey By:	ML/JD	Date: 9/19/06	Time: 12:25
Water Sampling By:	NA	Sample Depths BWS (ft): 1	NA	Date: NA	Time: NA
		2	NA		
		3	NA		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	13:55									
Depth BWS (ft):	1.5									
Temp (°C):	3.08									
pH:										
Barometeric (mmHg):	752.0									
Pressure (kPa):	3.711									
Conductivity (µS/cm):	202.6									
RDO (ppm): (mg/L)	12.59									
Turbidity (NTU):	0.5									
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: Midpoint between stakes 34 ft. apart.

Turbidity cal checked 9-12-06, passed; no post cal check

Field-Form Filled Out By:	Hilton	Date:	12/7/06
QAQC Check By:	Chambers	Date:	12/7/06

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004a: Water Quality Field-Sampling General

Project ID:	**North Slope Lakes**	Site Location/Lake ID:	MSBN-Shore		
Sample Purpose:	**Lake Water Quality**	Date:	9/20/06	Time:	14:45

FIELD MEASUREMENTS

GPS Coord. Northing:	N70° 19.184	Easting:	W149° 19.316	Datum:	NAD 27		
Measurements By:	KH/DAR	Time:	14:45				
Water Depth (ft):	1.5	Ice Thickness (ft):	NA				
Freeboard (ft):	NA	Snow Depth (ft):	NA				
Elev. (BPMSL +/- .02):	96.39	Survey By:	ML/JD	Date:	9/19/06	Time:	12:25
Water Sampling By:	KH/DAR	Sample Depths BWS (ft): 1	0.5	Date:	9/20/06	Time:	NR
		2	NA				
		3	NA				

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
All- GWS RDO	GWS	In-Situ mp Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	15:25									
Depth BWS (ft):	0.5									
Temp (°C):	5.33									
pH:										
Barometeric (mmHg):	752.5									
Pressure (kPa):	2.03									
Conductivity (µS/cm):	213.2									
RDO (ppm): (mg/L)	12.41									
Turbidity (NTU):	0.5									
ORP										

FIELD TESTING OF WATER SAMPLES (if small probe is used)

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___0.5__**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)	127/134	132/135	125/131							Digital titrator 10-4000 mg/L as $CaCO_3$
Total iron--UF (mg/L)	0.14									Hach spec 0.02-3.00 mg/L
Ferrous (II) Iron--F tot Fe (mg/L)	0.06									Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										Hach spec 0.01-0.50 mg/L NH_3-N
Ammonia/ Iron dilution										

Remarks: From same location as last summer's shoreside sample.

Turbidity cal checked 9-12-06, passed; not post cal checked

Field-Form Filled Out By:	Hilton	Date:	12/7/06
QAQC Check By:	Chambers	Date:	12/7/06

APPENDIX B. WATER QUALITY METER CALIBRATION FORMS

The following forms report the pre- and post-calibration checks for the water quality meters used during field sampling.

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: UAF WERC Lab

Sample Purpose: **Lake Water Quality** 1 of 2

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH "B"	9/11/06	12:30	In-Situ pH 4.01	530478-2	Jul-06	4.05 @ 22.9°C	Pass
pH "B"	9/11/06	12:30	In-Situ pH 7.00	531034-3	Sep-06	7.09 @ 22.4°C	Pass
pH "B"	9/11/06	12:30	In-Situ pH 10.01	531001-1	Sep-06	10.02@ 22.6°C	Pass
ORP "B"	9/11/06	12:30	In-Situ Quick-Cal	9406B	Nov-06	227 @22.8°C	Pass
pH "A"	9/11/06	12:54	In-Situ pH 4.01	530478-2	Jul-06	4.02 @ 22.9°C	Pass
pH "A"	9/11/06	12:54	In-Situ pH 7.00	531034-3	Sep-06	7.02 @ 2^{2}.7	Pass
pH "A"	9/11/06	12:54	In-Situ pH 10.01	531001-1	Sep-06	10.03@ 22.9°C	Pass
ORP "A"	9/11/06	12:54	In-Situ Quick-Cal	9406B	Nov-06	228 @22.8°C	Pass
RDO	9/12/06	15:27	TetraBubbler	---	---	12.14 @6.2°C	Pass
RDO	9/12/06	15:40	Oakton Zero DO	2201500	nr	0.00 mg/L	Pass
Conductivity	9/12/06	15:52	Oakton 447uS	2603492	Mar-07	426.6 @22.4°C	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/20/06	2049	In-Situ pH 4.01	530478-2	Jul-08	4.15 @ 15.35	Pass
pH 7.00	9/20/06	2118	In-Situ pH 7.00	5310343	Sep-06	7.18 @ 15.05	Pass
pH 10.01	9/20/06	2117	In-Situ pH 10.01	531001-1	Sep-06	8.48 @ 15.79	Fail
100% DO	9/20/06	2046	Nanopure	---	---	10.21 @ 14.44	Pass
Zero DO	9/20/06	2100	Hanna H17040	690	Dec-06	-0.4 @ 14.78	Pass
Conductivity	9/20/06	2108	Oakton 447uS	2603492	Mar-07	362.1 @ 15.27	Pass
ORP	9/20/06	2113	In-Situ Quick-Cal	9406B	Oct-06	134 @ 15.81	Fail

Remarks: ph "A" and ORP "A" refer to the UAF owned pH/ORP probe "A". pH "B" and ORP "B" refer to the UAF owned pH/ORP probe "B"

Field-Form Filled Out By: Reichardt Date: 9/12/2006

QAQC Check By: Chambers Date: 12/4/2006

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: UAF WERC Lab

Sample Purpose: **Lake Water Quality** 2 of 2

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: UAF S/N: 33025

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
Turbidity	9/12//06	16:13	NanoPure 0.83 NTU	nr	nr	0.8 NTU	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/20/06	2017	In-Situ pH 4.01	530478-2	Jul-08	4.15 @ 15.35	Pass
pH 7.00	9/20/06	2118	In-Situ pH 7.00	5310343	Sep-06	7.18 @ 15.05	Pass
pH 10.01	9/20/06	2107	In-Situ pH 10.01	531001-1	Sep-06	8.48 @ 15.79	Fail
100% DO	9/20/06	nr	Nanopure	---	---	10.21 @ 14.44	Pass
Zero DO	9/20/06	2100	Hanna H17040	690	Dec-06	-0.4 @ 14.78	Pass
Conductivity	9/20/06	2108	Oakton 447uS	2603492	Mar-07	362.1 @ 15.27	Pass
ORP	9/20/06	nr	In-Situ Quick-Cal	9406B	Oct-06	134 @ 15.81	Fail

Remarks: Turbidity of Nanopure Water was determined using UAF "microTpi Trubidimeter" SN:108079

Field-Form Filled Out By: Reichardt Date: 9/12/2006

QAQC Check By: Chambers Date: 12/4/2006

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Alpine WTP

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/8/06	1830	In-Situ pH 4.01	530478-2	Jul-06	4.07 @ 17.8	Pass
pH 7.00	9/8/06	1832	In-Situ pH 7.00	531034-3	Sep-06	7.09 @ 17.44	Pass
pH 10.01	9/8/06	1834	In-Situ pH 10.01	531001-1	Sep-06	10.10 @ 17.79	Pass
100% DO	9/14/06	1802	Nanopure Bubbled	---	---	9.55 @ 16.5	Pass
Zero DO	9/14/06	1809	2N Sodium Sulfate	531864-1	Jun-05	-0.01 @ 17.24	Pass
Conductivity	9/14/06	1824	Oakton 447uS	2603492	Mar-07	378.2 @ 17.35	Pass
ORP	9/8/06	1826	In-Situ Quick-Cal	9406B	Nov-06	227 @ 18.40	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/15/06	nr	In-Situ pH 4.01	530478-2	Jun-06	4.03 @ 18.56	Pass
pH 7.00	9/15/06	nr	In-Situ pH 7.00	531034-3	Sep-06	7.05 @ 18.56	Pass
pH 10.01	9/15/06	nr	In-Situ pH 10.01	531001-1	Nov-06	10.09 @ 18.56	Pass
100% DO	9/15/06	nr	Nanopure Bubbled	---	---	92.3 @ 18.56	Pass
Zero DO	9/15/06	nr	2N Sodium Sulfate	531864-1	Jun-05	0.01 @ 18.56	Pass
Conductivity	9/15/06	nr	Oakton 447uS	2603492	Mar-07	386.6 @ 18.93	Pass
ORP	9/15/06	nr	In-Situ Quick-Cal	9406B	Nov-06	213 @ 19.34	Pass

Remarks:

Field-Form Filled Out By: A. Blackburn Date: 7/25/2007

QAQC Check By: R. Samuel Date: 8/9/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Alpine WTP

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/15/06	nr	In-Situ pH 4.01	530478-2	Jun-06	4.03 @ 18.56	Pass
pH 7.00	9/15/06	nr	In-Situ pH 7.00	531034-3	Sep-06	7.05 @ 18.56	Pass
pH 10.01	9/15/06	nr	In-Situ pH 10.01	531001-1	Nov-06	10.09 @ 18.56	Pass
100% DO	9/15/06	nr	Nanopure Bubbled	---	---	92.3 @ 18.56	Pass
Zero DO	9/15/06	nr	2N Sodium Sulfate	531864-1	Jun-05	0.01 @ 18.56	Pass
Conductivity	9/15/06	nr	Oakton 447uS	2603492	Mar-07	386.6 @ 18.93	Pass
ORP	9/15/06	nr	In-Situ Quick-Cal	9406B	Nov-06	213 @ 19.34	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/17/06	nr	In-Situ pH 4.01	530478-2	Jun-06	4.08 @ 18.48	Pass
pH 7.00	9/17/06	nr	In-Situ pH 7.00	531034-3	Sep-06	7.07 @ 18.48	Pass
pH 10.01	9/17/06	nr	In-Situ pH 10.01	531001-1	Nov-06	10.05 @ 18.48	Pass
100% DO	9/17/06	nr	Nanopure Bubbled	---	---	10.00 @ 18.14	Pass
Zero DO	9/17/06	nr	2N Sodium Sulfate	531864-1	Jun-05	0.30 @ 15.63	Pass
Conductivity	9/17/06	nr	Oakton 447uS	2603492	Mar-07	388.6 @ 18.48	Pass
ORP	9/17/06	nr	In-Situ Quick-Cal	9406B	Nov-06	219 @ 18.26	Pass

Remarks:

Field-Form Filled Out By: A. Blackburn Date: 7/25/2007

QAQC Check By: R. Samuel Date: 8/9/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Prudhoe Bay SRT Lab

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/18/06	1300	In-Situ pH 4.01	530478-2	Jun-06	nr	Pass
pH 7.00	9/18/06	1300	In-Situ pH 7.00	531034-3	Sep-06	7.14 @ 16.3	Pass
pH 10.01	9/18/06	1300	In-Situ pH 10.01	531001-1	Nov-06	nr	Pass
100% DO	9/18/06	1310	Nanopure Bubbled	---	---	10.33 @ 14.51	Pass
Zero DO	9/18/06	1320	Hanna HI7040	690	Dec-06	0.01 @ 14.51	Pass
Conductivity	9/18/06	1300	Oakton 447uS	2603492	Mar-07	630.6 @ 16.3	Pass
ORP	9/18/06	1300	In-Situ Quick-Cal	9406B	Nov-06	239 @ 16.3	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/20/06	2049	In-Situ pH 4.01	530478-2	Jul-08	4.15 @ 15.35	Pass
pH 7.00	9/20/06	2118	In-Situ pH 7.00	5310343	Sep-06	7.18 @ 15.05	Pass
pH 10.01	9/20/06	2117	In-Situ pH 10.01	531001-1	Sep-06	8.48 @ 15.79	Fail
100% DO	9/20/06	2046	Nanopure Bubbled	---	---	10.21 @ 14.44	Pass
Zero DO	9/20/06	2100	Hanna H17040	690	Dec-06	-0.4 @ 14.78	Pass
Conductivity	9/20/06	2108	Oakton 447uS	2603492	Mar-07	362.1 @ 15.27	Pass
ORP	9/20/06	2113	In-Situ Quick-Cal	9406B	Oct-06	134 @ 15.81	Fail

Remarks: Default coefficients were checked. Recalibrated ph

Field-Form Filled Out By: A. Blackburn Date: 7/25/2007

QAQC Check By: R. Samuel Date: 8/9/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: UAF WERC Lab

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: GWS S/N: 33033

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/11/06	13:40	In-Situ pH 4.01	530478-2	Jul-06	3.94 @22.8°C	Pass
pH 7.00	9/11/06	13:40	In-Situ pH 7.00	531034-3	Sep-06	6.95 @ 22.6°C	Pass
pH 10.01	9/11/06	13:40	In-Situ pH 10.01	531001-1	Sep-06	9.98@ 22.8°C	Pass
ORP	9/11/06	13:40	In-Situ Quick-Cal	9406B	Nov-06	225 @23.1°C	Pass
100% DO	9/12/06	14:37	Bubbled Nanopure	---	---	11.74 @8.3°C	Pass
Zero DO	9/12/06	14:44	Oakton Zero DO	2201500	Jan-03	0.00 mg/L	Pass
Conductivity	9/12/06	16:32	Oakton 447uS	2603492	Mar-07	427.4 @22.5°C	Pass
Turbidity	9/12/06	16:43	NanoPure 0.83 NTU	nr	nr	0.8 NTU	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/20/06	2140	In-Situ pH 4.01	530478-2	Jul-08	3.95 @ 17.59	Pass
pH 7.00	9/20/06	2141	In-Situ pH 7.00	5310343	Sep-06	6.91 @ 17.41	Pass
pH 10.01	9/20/06	2143	In-Situ pH 10.01	531001-1	Sep-06	9.87 @ 17.46	Pass
100% DO	9/20/06	2120	Bubbled Nanopure	---	---	10.23 @ 16.58	Pass
Zero DO	9/20/06	2120	Hanna H17040	690	Dec-06	0.210	Pass
ORP	9/20/06	2145	In-Situ Quick-Cal	9406B	Oct-06	211 @ 17.63	Pass

Remarks: ph/ORP probe is labled "GWS 4311". Turbidity of Nanopure Water was determined using UAF "microTpi Trubidimeter" SN:108079

Field-Form Filled Out By: Reichardt Date: 9/12/2006

QAQC Check By: Chambers Date: 12/4/2006

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: **North Slope Lakes** Site Location/Lake ID: SRT

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Model: Troll 9000

Owner: GWS S/N: 33033

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/19/06	1050	In-Situ pH 4.01	530478-2	Jul-06	recalibrated (nr)	Pass
pH 7.00	9/19/06	1045	In-Situ pH 7.00	531034-3	Sep-06	recalibrated (nr)	Pass
pH 10.01	9/19/06	1040	In-Situ pH 10.01	531001-1	Sep-06	recalibrated (nr)	Pass
ORP	9/19/06	1053	In-Situ Quick-Cal	9406B	Nov-06	242 @ 14.24	Pass
Conductivity	9/19/06	1030	Oakton 447uS	2603492	Mar-07	351.8 @13.62	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	9/19/06	2113	In-Situ pH 4.01	530478-2	Jul-08	3.97 @ 14.81	Pass
pH 7.00	9/19/06	2110	In-Situ pH 7.00	5310343	Sep-06	7.01 @ 14.36	Pass
pH 10.01	9/19/06	2100	In-Situ pH 10.01	531001-1	Sep-06	10.02 @ 14.51	Pass
100% DO	9/19/06	2130	Bubbled Nanopure	---	---	9.89 @ 15.25	Pass
Zero DO	9/19/06	2130	Hanna H17040	690	Dec-06	0.00 @ 15.25	Pass

Remarks:

Field-Form Filled Out By: A. Blackburn Date: 7/25/2007

QAQC Check By: R. Samuel Date: 8/14/2007

APPENDIX C. ELEVATION SURVEY FORMS

The following form reports the elevation survey information obtained during field sampling.

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: L9817

Survey Purpose: **Water-Level Elevations** Date: 9/16/2006 Time: 17:00

Location:	Lake L9817, located west of Nuiqsut, survey control at southeast corner of lake							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	147298 (Alpine)		50F, 15mph wind from East, Partly Cloudy		
Rod Type:	Craine fiberglass 20'		Rod ID:	Zeiss NI2 Level				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		Daniel Reichardt, Kristie Holland		
L9817 "B"	BLM	54.98 BPMSL	N70 14.010	W150 19.449				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
TBM-B	5.18	60.16		54.98				Shooting from inst. 1
TBM-B		60.16	5.52	54.64				rebar survey control point
TBM-C		60.16	4.21	55.95				rebar survey control point
Shoreside WS		60.16	7.04	53.12				Shoreside WS, near TBM-E
TBM-E		60.16	3.85	56.31				rebar survey control point
move instrument to inst. 2								
TBM-E	3.36	59.67		56.31				rebar survey control point
Shoreside WS		59.67	6.56	**53.11**				Shoreside WS, near TBM-E
TBM-C		59.67	3.72	55.95				rebar survey control point
TBM-D		59.67	5.05	54.62				rebar survey control point
TBM-B		59.67	4.67	55.00				Close to within +/- 0.02

Note:

Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasml; foresight, FS; height of instrument, HI; minutes, mm; seconds, ss; BP Mean Sea Level, BPMSL

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Mine Site B

Survey Purpose: **Water-Level Elevations** Date: 9/19/2006 Time: 12:25

Location:	Mine Site B, NE corner of North Cell, temporary datum							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Optical Survey Level		Instrument ID:	Leica Runner 24		Cool temperatures, overcast		
Rod Type:	Fiberglass		Rod ID:	Sokkia Fiber Glass				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		Michael Lilly Jeff Derry		
"Post" TBM1	WERC	100 Temp.	na	na				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
Post TBM1	5.31	105.31		100.00				Top of nail in post, temp elevation
NC-WL		105.31	8.93	96.38				North Cell WL
TBM2		105.31	1.30	104.01				VSM on Pipeline, south side
TBM4		105.31	3.76	101.55				Top of old cutoff VSM
TBM3		105.31	1.66	103.65				VSM on Pipeline, north side
								moved Instr., used TBM3 as turn point
TBM3	1.59	105.24		103.65				VSM on Pipeline, north side
TBM4		105.24	3.68	101.56				Top of old cutoff VSM
TBM2		105.24	1.22	104.02				VSM on Pipeline, south side
NC-WL		105.24	8.85	**96.39**				**North Cell WL**
Post TBM1		105.24	5.24	100.00				close survey to -0.00

Note: WL within 0.02 feet on all side of island, establishe 3 new TBMs

Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasml; foresight, FS; height of instrument, HI; minutes, mm; seconds, ss; BP Mean Sea Level, BPMSL

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Kuparuk Deadarm Mine Sites

Survey Purpose: **Water-Level Elevations** Date: 9/20/2006 Time: 16:20

Location:	Kuparuk Deadarm Mine Sites, reservoir 1, 2, 3. Adjacent to Kuparuk River							
Survey objective:	Determine elevations in reservoirs 1, 2, 3					Weather Observations:		
Instrument Type:	Optical Survey Level		Instrument ID:	na				
Rod Type:	Fiberglass		Rod ID:	na		Cool, partly cloudy		
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		Michael Lilly Jeff Derry		
BM #1 WO040768	BP	19.32	N70 20.065 NAD27	W148 56.183 NAD27				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
BM#1	0.06	19.38		19.32				Bell Assoc. Benchmark, rebar
KDA2-WL		19.38	10.37	9.01				Edge of shore, WL
								moved Instr. Used KDA2-TBM as turn pt.
KDA2-WL	10.90	19.91		**9.01**				**WS Elevation for Reservoir #1,23**
BM#1		19.91	0.59	19.32				Close survey to 0.01
Note: Field notes use temperary datum for BM #1 = 100.00 ft.								
KDA2-S1 is in NW Corner of Resevoir 2, KDA3-S1 is in SW Corner of Resevoir 3, BM #1 is set in dirt west of dike with pink flagging. KDA2-S2 is in SE Corner of Resevoir 2. KDA1-S1 is in NE corner of Resevoir 1.								

Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasml; foresight, FS; height of instrument, HI; minutes, mm; seconds, ss; BP Mean Sea Level, BPMSL