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

Snow cover on Mine Site B, photo by K. Hilton.

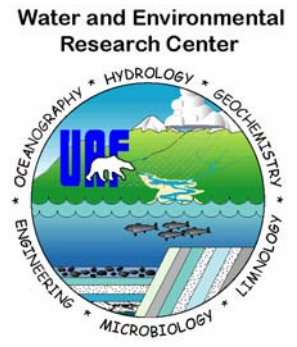
by

Kristie Hilton, Jeff Derry, Dan Reichardt, Michael Lilly, and Amanda Blackburn

June 2007

North Slope Lakes Hydrologic Project

Report No. INE/WERC 06.05



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Kristie Hilton[1], Jeff Derry[1], Dan Reichardt[1], Michael Lilly[1], Amanda Blackburn[1]

A report on research sponsored by:

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- National Energy Technology Laboratory
- BP Exploration (Alaska), Inc.
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- Bureau of Land Management
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[1]Geo-Watersheds Scientific, Fairbanks, Alaska

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DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the accuracy of the data presented herein. This research was funded by the U.S. Department of Energy (DOE) and the National Energy Technology Laboratory (NETL). Funding and support was also provided by the Bureau of Land Management (BLM), BP Exploration (Alaska) Inc.(BPX), ConocoPhillips Alaska, Inc. (CPA), and Geo-Watersheds Scientific (GWS). The contents of the report do not necessarily reflect the views of policies of the DOE, NETL, BLM, BPX, CPA, GWS, or any local sponsor. This work does not constitute a standard, specification, or regulation.

The use of trade and firm names in this document is for the purpose of identification only and does not imply endorsement by the University of Alaska Fairbanks, DOE, NETL, BLM, BPX, CPA, GWS, or other project sponsors.

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	43560.0	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	1233.482	cubic meter (m^3)
Acre-ft	325851.43	gallon(gal)
gallon(gal)	0.1337	cubic feet (ft^3)
	Velocity and Discharge	
foot per day (ft/d)	0.3048	meter per day (m/d)
Square foot per day (ft^2/d)	0.0929	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)	0.00116	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 value in cubic meters per second (m^3/s) in parentheses.

Physical and Chemical Water-Quality Units:

Temperature:

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

$$°F = 1.8(°C) + 32$$

Electrical Conductance (Actual Conductivity and Specific Conductance):

In this report conductivity of water is expressed as Actual Conductivity [AC] in microSiemens per centimeter (µS/cm). This unit is equivalent to micromhos per centimeter. Elsewhere, conductivity is commonly expressed as Specific Conductance at 25°C [SC25] in µS/cm which is temperature corrected. To convert AC to SC25 the following equation can be used:

$$SC25 = \frac{AC}{1 + r(T - 25)}$$

where:

SC25 = Specific Conductance at 25°C, in µS/cm

AC = Actual Conductivity, in µS/cm

R = temperature correction coefficient for the sample, in °C

T = temperature of the sample, in °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 (ppm).

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^{o}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

Lake Nomenclature

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 (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: February 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 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. This lake has been used in previous years for ice-road construction, but was not used during winter 2005-06, nor will it 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 9 reservoirs. The three southernmost reservoir cells (1-3) are included in the study to observe ground-water and surface-water interactions between each cell 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 February 2006, 2) summarize accomplished field-trip objectives.

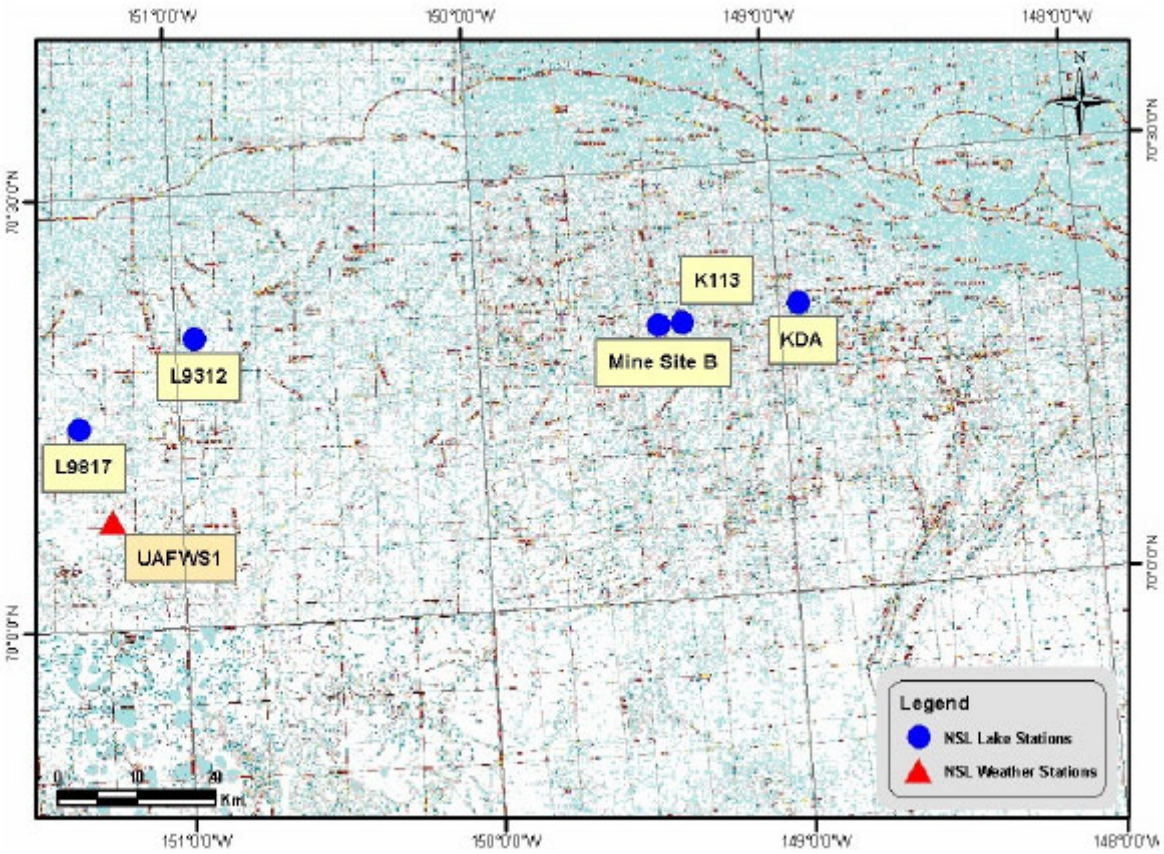

Figure 1. Location of study lakes in the NPR-A, Alpine, Kuparuk, and Prudhoe Bay field operating areas, North Slope, Alaska.

TRIP OBJECTIVES

The goal of each sampling trip is to collect physical and chemical data from each study lake. We drilled a series of holes at designated sampling locations for each lake. 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 February 2006, we focused on the following locations and tasks:

1. Kuparuk Dead Arm Reservoirs: Prudhoe Bay operating area.
    - Water chemistry at KDA-1.
    - Survey water levels to local elevation control.
    - Measure ice thickness and field water quality parameters.

- Conduct snow surveys.

2. Mine Site B: Kuparuk operating area.
   - Water chemistry at North Cell, South Cell, and southern stream junction area.
   - Survey water levels to local elevation control.
   - Measure snow depth, ice thickness, and field water quality parameters.
   - Conduct snow surveys.
3. L9312: Alpine operating area.
   - Water chemistry at various locations.
   - Survey water levels to local elevation control.
   - Measure snow depth, ice thickness, and field water quality parameters.
   - Conduct snow surveys
4. L9817: NPR-A.
   - Water chemistry at various locations.
   - Survey water levels to local elevation control.
   - Measure snow depth, ice thickness, and field water quality parameters.
   - Conduct snow surveys

Figure 2. Water sampling near the pump house on L9312, photo by K. Hilton.

PROCEDURES

Water Chemistry Sampling

All field work followed the specified health, safety, and environmental guidelines outlined by BPX and CPA (White and Lilly, 2006*a*, *b*, *c*). Using a gas powered auger, holes were drilled through the ice at specified locations at each study lake. Physical measurements of water depth (top of water to bottom of lake), ice thickness (top of ice to bottom of ice), freeboard (top of water to top of ice), and snow depth (top of ice to top of snow), 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 QuickCal 224 mV	within 10%

Water samples were also collected at 3 depths (1 ft. below bottom of ice, within the central part of the water column, 1 ft. above lake bottom). Some of these 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 analysis will be reported separately.

Snow Surveys

Small-scale snow depth measurements were conducted in "L" shaped patterns on lake surface and/or tundra surface at predetermined locations. Snow depth measurements were taken every meter for twenty-five meters, then turning 90 degrees, and continuing for another twenty-five meters. Snow samples were also collected for density measurements with an Adirondack snow sampler. Five densities were collected from points on tundra and lake and averaged to establish a representative density.

SELECTED RESULTS

Sampling occurred at Kuparuk Deadarm Lakes, Mine Site B, L9817 and L9312 during February field activities. As Table 2 demonstrates, water levels in KDA Reservoir 2 and L9312 appear to be dropping each month. Mine Site B and L9817 show a rise in water level between January and February, a possible result of heavy snow loading. L9312 shows only a small drop in level probably due to the large surface area relative to the experienced pumping rate.

Table 2 summarizes conditions at "Priority Sampling Sites". Each lake visited has one or more locations where water samples were drawn from multiple depths for laboratory analysis. These locations have more historical data than other locations on the lakes, and have been chosen as representative of the deeper portion of the respective lakes.

Table 2. Ice thickness, Median DO Concentration, Median Actual Conductance and Monthly Water Drop for North Slope lakes in mid-February.

Sampling Site	Ice Thickness [ft; (m)]	Median DO Concentration [mg/L]	Median Actual Conductivity [μS/cm]	Water level drop since mid January [ft; (m)]
KDA2-CT	3.05; (0.929)	17.10	131.30	0.35; (0.106)
MSBS-CT	3.2; (0.975)	12.70	181.50	-0.67; (-0.204)
MSBN-CT	4.0; (1.219)	12.34	176.90	-0.67; (-0.204)
L9312 Raft B	3.41; (1.039)	13.65	76.19	0.08; (0.024)
L9817	2.74; (0.835)	8.65	303.1	-.06; (-0.018)

Tundra snow surveys were collected at L9312 and L9817 to compare the accumulation at each location. The average snow depth at L9312 was greater than depths observed at L9817. However, field staff measured the density of 5 different snow samples from each location and determined a higher snow water equivalent at L9817 (Table 3).

Table 3. Average snow depth and snow water equivalent at L9312 and L9817 [in; (cm)]

Study Site	Average Depth (cm)	Snow Water Equivalent
L9817- Tundra	32.6	3.18; (8.1)
L9312- Tundra	36.9	2.10; (5.3)

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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Lilly, M.R., Hilton, K., Reichardt, D., and Chambers, M. 2006. A Workplan for Lake Chemistry Sampling and Surveying at Study Lakes in NPRA, Alpine, and Kuparuk River Areas: February 2006. Water and Environmental Research Center, University of Alaska Fairbanks. 9 pages.

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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: KDA1-CT

Sample Purpose: **Lake Water Quality** Date: 2/15/06 Time: 12:15

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33181 Easting: W148.94644 Datum: WGS84

Measurements By: MKC Time: 9:40

Water Depth (ft): 21.05 Ice Thickness (ft): 3.6

Freeboard (ft): 0.2 Snow Depth (ft): 0.28

Elev. (BPMSL): 8.83 +/- .02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

Water Sampling By: DAR, BM Sample Depths BWS (ft): 1 4 Date: 2/15/06 Time: nr

2 11

WATER QUALITY METER INFORMATION 3 20

Calibration Information

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

Parameters	**Field Measurements**									
Time:	12:23	12:26	12:42	12:54	12:58	13:03	13:07	13:09		
Depth BWS (ft):	20.5	20.0	19.0	18.0	17.0	15.0	13.0	11.0		
Temp (°C):	1.04	1.01	0.92	0.81	0.73	0.59	0.47	0.37		
pH:	7.21	7.22	7.22	7.23	7.33	7.54	7.53	7.49		
Barometeric (mmHg):	772.1	772.0	771.9	772.0	771.9	771.8	771.7	771.6		
Pressure (kPa):	59.420	58.100	55.130	52.170	49.290	43.240	37.470	31.190		
Conductivity (µS/cm):	165.80	162.10	151.50	147.00	144.90	144.70	144.40	144.30		
RDO (ppm):	2.61	2.92	6.53	8.94	12.77	15.22	15.96	16.08		
Turbidity (NTU):	0.70	0.10	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30		
ORP	324.00	324.00	327.00	328.00	327.00	325.00	326.00	326.00		

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): 11'**			**Depth BWS (ft): 20'**			**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 $CaCO_3$)	102	103	104	103	103	104	116	114	117	Digital titrator 10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.01	X	X	0.01	X	X	0.16	X	X	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.01	X	X	0.04	X	X	0.08	X	X	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0.02	X	X	0.02	X	X	0.26	X	X	Hach spec 0.01-0.50 mg/L NH3-N

Remarks: Note that in-situ battery tran out, hence no measurement at 4' was taken

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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: KDA1-CT

Sample Purpose: **Lake Water Quality** Date: 2/15/06 Time: 12:15

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33181 Easting: W148.94644 Datum: WGS84

Measurements By: MKC Time: 9:40

Water Depth (ft): 21.05 Ice Thickness (ft): 3.6

Freeboard (ft): 0.2 Snow Depth (ft): 0.28

Elev. (BPMSL): 8.83 +/- .02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

Water Sampling By: DAR, BM Sample Depths BWS (ft): 1 4 Date: 2/15/06 Time: nr

2 11

WATER QUALITY METER INFORMATION 3 20

Calibration Information

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

Parameters	**Field Measurements**									
Time:	13:13	13:15	13:18	13:21						
Depth BWS (ft):	9.0	7.0	6.0	5.0						
Temp (°C):	0.25	0.17	0.08	0.03						
pH:	7.53	7.53	7.53	7.54						
Barometeric (mmHg):	771.6	771.5	771.4	771.3						
Pressure (kPa):	25.240	19.230	16.260	13.520						
Conductivity (µS/cm):	144.10	144.30	144.50	144.40						
RDO (ppm):	16.18	16.28	16.37	16.45						
Turbidity (NTU):	-0.30	-0.40	-0.40	-0.40						
ORP	326.00	326.00	326.00	328.00						

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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: KDA1-SH1

Sample Purpose: **Lake Water Quality** Date: 2/15/06 Time: 16:11

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33171 Easting: W148.94458 Datum: WGS84

Measurements By: MKC Time: 11:00

Water Depth (ft): 5.4 Ice Thickness (ft): 2.92

Freeboard (ft): 0 or -0.01* Snow Depth (ft): 1.1

Elev. (BPMSL): 8.83 +/- .02 Survey By: DAR/Lilly Date: Time:

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

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	TROLL 9000		33033		yes		yes	
Parameters	**Field Measurements**								
Time:	16:16	16:17	16:19						
Depth BWS (ft):	3.0	4.0	5.0						
Temp (°C):	0.03	0.04	0.04						
pH:	7.49	7.46	7.49						
Barometeric (mmHg):	769.1	769.0	768.9						
Pressure (kPa):	7.434	10.160	13.430						
Conductivity (µS/cm):	149.30	148.30	148.20						
RDO (ppm):	16.51	16.79	16.82						
Turbidity (NTU):	-0.30	-0.30	-0.30						
ORP	330.00	328.00	328.00						

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: * - I cant really tell if it overflowed onto the surface and froze when drilled

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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: 2/15/06 Time: 10:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33296 Easting: W148.94077 Datum: WGS84

Measurements By: BM, DAR Time: 10:00

Water Depth (ft): 18.44 Ice Thickness (ft): 3.05

Freeboard (ft): -0.4 Snow Depth (ft): 0.95

Elev. (BPMSL): 6.46 +/-.02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

Water Sampling By: DAR, BM Sample Depths BWS (ft): 1 4 Date: 2/15/06 Time: 11:30

2 8

WATER QUALITY METER INFORMATION 3 18

Calibration Information

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

Parameters	**Field Measurements**									
Time:	10:08	10:10	10:15	10:17	10:19	10:22	10:24	10:26		
Depth BWS (ft):	4.0	5.0	6.0	8.0	10.0	12.0	14.0	15.0		
Temp (°C):	0.05	0.00	-0.05	0.14	0.23	0.46	0.64	0.75		
pH:	7.67	7.66	7.65	7.64	7.54	7.63	7.57	7.50		
Barometeric (mmHg):	771.9	771.8	771.8	771.8	771.8	771.9	772.0	772.1		
Pressure (kPa):	10.420	13.090	16.230	22.440	28.170	34.190	40.280	43.260		
Conductivity (µS/cm):	131.90	131.10	130.90	130.80	130.80	130.70	131.20	131.30		
RDO (ppm):	15.74	16.23	16.33	16.67	16.88	17.21	17.10	---		
Turbidity (NTU):	0.50	1.00	1.10	0.70	0.90	0.40	0.10	-0.10		
ORP	329.00	331.00	331.00	333.00	334.00	335.00	336.00	338.00		

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): 8'**			**Depth BWS (ft): 18'**			**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 $CaCO_3$)	90	92	90	91	95	91	128	127	133	Digital titrator 10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.01	X	X	0.01	X	X	1.03	X	X	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0	X	X	0	X	X	0.36	X	X	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0	X	X	0	X	X	0	X	X	Hach spec 0.01-0.50 mg/L NH3-N

Remarks: Note two profiles for the 15' mark. First profile was partially recorded when DO started dropping. Sample taken from 18' depth had some color

Field-Form Filled Out By: DAR0 Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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: 2/15/06 Time: 10:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33296 Easting: W148.94077 Datum: WGS84

Measurements By: BM, DAR Time: 10:00

Water Depth (ft): 18.44 Ice Thickness (ft): 3.05

Freeboard (ft): -0.4 Snow Depth (ft): 0.95

Elev. (BPMSL): 6.46 +/-.02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

Water Sampling By: DAR, BM Sample Depths BWS (ft): 1 4 Date: 2/15/06 Time: 11:30

2 8

WATER QUALITY METER INFORMATION 3 18

Calibration Information

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

Parameters	**Field Measurements**									
Time:	10:43	10:47	10:53	10:33	10:59	11:11				
Depth BWS (ft):	16.0	17.0	18.0	15.0	18.0	10.0				
Temp (°C):	0.93	1.02	1.16	0.82	1.16	0.34				
pH:	7.25	7.22	7.17	7.39	7.20	7.54				
Barometeric (mmHg):	772.1	772.1	772.3	772.0	772.3	772.3				
Pressure (kPa):	46.060	49.090	51.900	43.200	51.980	28.580				
Conductivity (µS/cm):	139.40	144.60	166.30	132.60	164.70	130.80				
RDO (ppm):	7.79	6.25	3.17	13.65	2.52	16.48				
Turbidity (NTU):	-0.10	0.10	0.70	-0.20	0.50	-0.30				
ORP	340.00	341.00	235.00	338.00	247.00	310.00				

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): 8'**			**Depth BWS (ft): 18'**			**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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: Note that two readings were taken @ 18' and 10' depths.

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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-SH1

Sample Purpose: **Lake Water Quality** Date: 2/15/06 Time: 16:58

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33372 Easting: W148.93948 Datum: WGS84

Measurements By: MKC Time: 13:00

Water Depth (ft): 5.9 Ice Thickness (ft): 2.2

Freeboard (ft): 0.3 Snow Depth (ft): 2.5

Elev. (BPMSL): 6.46 +/-.02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

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

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	
All	GWS	TROLL 9000			33033		yes		yes	
Parameters	**Field Measurements**									
Time:	16:58	17:01	17:03	17:05						
Depth BWS (ft):	3.0	4.0	5.0	5.5						
Temp (°C):	-0.05	-0.01	-0.05	-0.05						
pH:	7.39	7.39	7.39	7.38						
Barometeric (mmHg):	768.5	768.5	768.5	768.5						
Pressure (kPa):	7.430	10.260	13.480	14.950						
Conductivity (µS/cm):	135.70	134.70	134.40	134.40						
RDO (ppm):	16.35	16.69	16.94	17.05						
Turbidity (NTU):	-0.20	-0.20	-0.10	-0.10						
ORP	320.00	322.00	323.00	324.00						

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: * - I cant really tell if it overflowed onto the surface and froze when drilled

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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-SS

Sample Purpose: **Lake Water Quality** Date: 2/15/06 Time: 15:30

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33271 Easting: W148.93828 Datum: WGS84

Measurements By: MKC Time: 13:10

Water Depth (ft): 13.5 Ice Thickness (ft): 4.05

Freeboard (ft): 0.1 Snow Depth (ft): 0.5

Elev. (BPMSL): 6.46 +/-.02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

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

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
All	GWS	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	15:31	15:32	15:34	15:35	15:37	15:39	15:41	15:45	15:49	
Depth BWS (ft):	4.0	5.0	6.0	7.0	9.0	11.0	12.0	13.0	13.5	
Temp (°C):	-0.03	0.00	0.03	0.07	0.22	0.30	0.44	0.54	0.57	
pH:	7.43	7.44	7.46	7.47	7.44	7.46	7.46	7.40	7.39	
Barometeric (mmHg):	769.8	769.8	769.8	769.8	769.8	769.9	770.0	769.9	770.0	
Pressure (kPa):	10.470	13.460	16.470	19.440	25.240	31.400	34.610	37.330	38.640	
Conductivity (µS/cm):	134.20	131.80	131.20	131.30	131.20	131.40	131.70	132.80	331.00	
RDO (ppm):	17.70	17.65	17.57	17.55	17.32	17.28	17.08	16.23	15.43	
Turbidity (NTU):	-0.20	-0.30	-0.20	-0.20	-0.30	-0.20	-0.20	-0.20	0.90	
ORP	320.00	321.00	322.00	323.00	325.00	325.00	327.00	330.00	332.00	

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: Note that DAR corrected MKC measurement of H2o depth according to labling of the in-situ cord. Note that conductivity and pressure are transposed in 13.5 column.

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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: 2/15/06 Time: 14:27

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33375 Easting: W148.93674 Datum: WGS84

Measurements By: MKC Time: 12:37

Water Depth (ft): 22.35 Ice Thickness (ft): 3.55

Freeboard (ft): 0.08 Snow Depth (ft): 0.5

Elev. (BPMSL): 6.70 +/- .02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

Water Sampling By: DAR 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	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	14:28	14:30	14:31	14:32	14:34	14:36	14:38	14:40		
Depth BWS (ft):	4.0	5.0	6.0	7.0	9.0	11.0	13.0	15.0		
Temp (°C):	0.07	0.06	0.11	0.18	0.28	0.37	0.45	0.54		
pH:	7.44	7.44	7.45	7.44	7.45	7.45	7.44	7.41		
Barometeric (mmHg):	770.4	770.4	770.4	770.4	770.5	770.6	770.7	770.7		
Pressure (kPa):	10.530	13.580	16.350	19.640	25.370	31.290	37.170	43.500		
Conductivity (µS/cm):	127.00	124.60	124.50	124.30	124.30	124.10	124.10	124.10		
RDO (ppm):	16.33	16.44	16.46	16.46	16.39	16.33	16.24	16.13		
Turbidity (NTU):	-0.20	-0.30	-0.30	-0.30	-0.30	-0.30	-0.40	-0.30		
ORP	317.00	320.00	322.00	323.00	325.00	327.00	329.00	330.00		

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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: 2/15/06 Time: 14:27

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33375 Easting: W148.93674 Datum: WGS84

Measurements By: MKC Time: 12:37

Water Depth (ft): 22.35 Ice Thickness (ft): 3.55

Freeboard (ft): 0.08 Snow Depth (ft): 0.5

Elev. (BPMSL): 6.70 +/- .02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

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

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	
All	GWS	TROLL 9000			33033		yes		yes	
Parameters	**Field Measurements**									
Time:	14:42	14:46	14:55	14:58	15:07					
Depth BWS (ft):	17.0	19.0	20.0	21.0	22.0					
Temp (°C):	0.66	0.83	0.93	0.96	1.06					
pH:	7.44	7.28	7.02	6.99	6.98					
Barometeric (mmHg):	770.7	770.8	770.8	770.7	770.7					
Pressure (kPa):	49.300	55.240	58.380	61.020	63.950					
Conductivity (µS/cm):	124.20	125.10	130.60	132.10	141.90					
RDO (ppm):	15.91	14.53	7.49	6.25	3.87					
Turbidity (NTU):	-0.30	-0.20	0.30	0.60	0.90					
ORP	329.00	333.00	337.00	338.00	325.00					

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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-KDA3-EC

Sample Purpose: **Lake Water Quality** Date: 2/15/06 Time: 17:30

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33302 Easting: W148.93768 Datum: WGS84

Measurements By: MKC Time: 17:30

Water Depth (ft): 2.2 Ice Thickness (ft): 3.7

Freeboard (ft): 2.2 Snow Depth (ft): 0.7

Elev. (BPMSL): 6.70 +/- .02 Survey By: DAR/Lilly Date: 2/15/06 Time: nr

Water Sampling By: DAR 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	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	17:18									
Depth BWS (ft):	2.0									
Temp (°C):	-0.06									
pH:	7.43									
Barometeric (mmHg):	768.0									
Pressure (kPa):	5.080									
Conductivity (µS/cm):	141.70									
RDO (ppm):	16.65									
Turbidity (NTU):	18.70									
ORP	321.00									

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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/15/06

QAQC Check By: St. Amand Date: 3/20/06

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-SH

Sample Purpose: **Lake Water Quality** Date: 2/17/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70 20.036 Easting: W150 56.884 Datum: NAD 27

Measurements By: Hilton Time: 10:55

Water Depth (ft): 9' 9.5" Ice Thickness (ft): 3.64

Freeboard (ft): -0.02 Snow Depth (ft): 0.85

Elev. (BPMSL +/- .02): 7.42 Survey By: Lilly Date: 2/17/06 Time: nr

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

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
all	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	15:58	16:00	16:12	16:16	16:20	16:25	16:32			
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	9.0	10.0			
Temp (°C):	0.07	0.19	0.46	0.72	0.96	1.22	1.35			
pH:	6.53	6.49	6.46	6.46	6.46	6.41	6.47			
Barometeric (mmHg):	771.6	771.6	771.5	771.6	771.6	771.5	771.5			
Pressure (kPa):	10.380	13.380	16.330	19.400	22.430	25.630	28.360			
Conductivity (µS/cm):	80.06	79.27	78.71	78.44	78.28	78.25	79.12			
RDO (ppm): (mg/L)	11.04	10.25	9.77	9.72	9.14	6.45	4.32			
Turbidity (NTU):	0.7	1.8	1.1	1.2	1.5	2.2	200.0			
ORP	921	-	-	913	917	917	916			
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: Note- probe is just touching bottom at 10 ft.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St.Amand Date: 3/7/06

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-SH

Sample Purpose: **Lake Water Quality** Date: 2/17/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70 20.036 Easting: W150 56.884 Datum: NAD 27

Measurements By: Hilton Time: 10:55

Water Depth (ft): 9' 9.5" Ice Thickness (ft): 3.64

Freeboard (ft): -0.02 Snow Depth (ft): 0.85

Elev. (BPMSL +/- .02): 7.42 Survey By: Lilly Date: 2/17/06 Time: nr

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

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
all	UAF	In-Situ Troll 9000	-	yes	yes

Parameters	**Field Measurements**									
Time:	15:58	16:00	16:16	16:20	16:24	16:29	16:35			
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	9.0	10.0			
Temp (°C):	-0.09	-0.01	0.32	0.54	0.78	1.05	1.21			
pH:	6.93	6.86	6.89	6.89	6.86	6.83	6.83			
Barometeric (mmHg):	769.7	769.7	769.6	769.6	769.5	769.5	769.5			
Pressure (kPa):	10.338	13.280	16.370	19.310	22.310	25.330	28.110			
Conductivity (µS/cm):	80.38	79.42	79.11	78.80	79.50	79.01	80.18			
RDO (ppm): (mg/L)	12.34	12.02	10.02	9.70	8.01	5.05	3.62			
Turbidity (NTU):	1.0	1.5	1.7	1.7	2.1	2.9	4.5			
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: Field measurements (physical) taken from data for L9312-SH. 10 ft reading is just above bottom of lake.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St.Amand Date: 3/7/06

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-MP (B-SH)

Sample Purpose: **Lake Water Quality** Date: 2/17/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70 20.027 Easting: W150 56.820 Datum: NAD 27

Measurements By: Hilton Time: 10:40

Water Depth (ft): 10' 10.5" Ice Thickness (ft): 3.55

Freeboard (ft): 0.04 Snow Depth (ft): 0.8

Elev. (BPMSL +/- .02): 7.42 Survey By: Lilly Date: 2/17/06 Time: nr

Water Sampling By: DAR 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:	14:49	14:58	15:01	15:08	15:15	15:20	15:26			
Depth BWS (ft):	4.0	5.0	6.0	8.0	9.0	10.0	10.5			
Temp (°C):	0.19	0.25	0.66	1.09	1.43	1.65	1.72			
pH:	6.76	6.76	6.71	6.67	6.49	6.39	6.58			
Barometeric (mmHg):	772.1	772.1	772.1	772.2	772.2	722.2	722.1			
Pressure (kPa):	10.100	13.460	16.780	22.400	25.380	28.070	29.860			
Conductivity (µS/cm):	76.00	74.76	73.76	72.88	71.14	74.84	94.80			
RDO (ppm): (mg/L)	16.18	16.15	15.82	13.91	7.85	3.60	2.45			
Turbidity (NTU):	1.0	1.8	5.6	4.0	2.3	2.0	1.9			
ORP	922	920	914	915	913	916	911			
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: Midpoint between B and Survey Hole.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St.Amand Date: 3/7/06

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- B

Sample Purpose: **Lake Water Quality** Date: 2/17/06 Time: 10:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70 15.366 Easting: W148 19.942 Datum: NAD 27

Measurements By: Hilton Time: 10:00

Water Depth (ft): 11 Ice Thickness (ft): 3.55

Freeboard (ft): 0.73 Snow Depth (ft): 0.65

Elev. (BPMSL +/- .02): 7.42 Survey By: Lilly Date: 2/17/06 Time: nr

Water Sampling By: Reichardt Sample Depths BWS (ft): 1 4 Date: na Time: na

2 9

3 10.5

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:	10:26	10:41	10:47	10:55	11:05	11:10	11:15	11:26	11:33	
Depth BWS (ft):	4	5	6	7	8	9	10.0	10.5	4.0	
Temp (°C):	0.06	0.21	0.49	0.8	1.06	1.28	1.56	1.75	0.06	
pH:	7.07	7.02	7	6.98	6.94	6.86	6.55	6.57	6.85	
Barometeric (mmHg):	773.1	773.2	773.2	773.2	773.5	773.5	773.5	773.6	773.3	
Pressure (kPa):	10.210	13.350	16.550	19.260	22.290	25.390	28.170	29.950	10.350	
Conductivity (µS/cm):	74.70	75.18	75.01	75.05	74.88	74.19	74.24	83.31	75.83	
RDO (ppm): (mg/L)	14.89	15.59	16.05	16.1	15.91	15.74	13.70	9.52	14.97	
Turbidity (NTU):	2.1	3.4	3.5	2	3.4	4	8.2	8.10	14.40	
ORP	727	742	755	784	818	842	892	924	924	
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): 4**			**Depth BWS (ft): 9**			**Depth BWS (ft): 10.5**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	46	45	46	38	41	41	81	78	78	Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)	0.04	0.03	0.04	0.18	0.2	0.18	21.3	21.4	21.3	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.06	0.02	0.02	0.06	0.05	0.05	16.9	16.8	17.1	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****	0.02	0	0.01	0.03	0.01	0	1.2	1.2	1.1	0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution							10%	10%	10%	

Remarks:

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St.Amand Date: 3/7/06

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-MP (A-B)

Sample Purpose: **Lake Water Quality** Date: 2/17/06 Time: 10:30

FIELD MEASUREMENTS

GPS Coord. Northing: N70 20.042 Easting: W150 56.566 Datum: NAD 27

Measurements By: Hilton Time: 10:30

Water Depth (ft): 11' .5" Ice Thickness (ft): 3.66

Freeboard (ft): 0.03 Snow Depth (ft): 0.39

Elev. (BPMSL +/- .02): 7.42 Survey By: Lilly Date: 2/17/06 Time: nr

Water Sampling By: DAR 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:	14:01	14:09	14:12	14:16	14:22	14:27				
Depth BWS (ft):	4.0	5.0	7.0	9.0	10.0	10.5				
Temp (°C):	0.02	0.27	0.68	1.18	1.50	1.62				
pH:	6.76	6.75	6.71	6.64	6.46	6.43				
Barometeric (mmHg):	772.5	772.6	772.6	772.6	772.6	772.5				
Pressure (kPa):	10.320	13.500	19.330	25.230	28.380	30.170				
Conductivity (µS/cm):	78.56	77.72	77.38	76.90	80.08	92.34				
RDO (ppm): (mg/L)	15.56	15.65	15.83	14.86	8.38	5.48				
Turbidity (NTU):	0.0	0.3	1.1	0.2	1.3	2.9				
ORP	918	917	912	910	909	905				
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: Midpoint between A and B. Less sample density due to low priority of this sample site.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St.Amand Date: 3/7/06

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-A

Sample Purpose: **Lake Water Quality** Date: 2/17/06 Time: 10:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70 20.071 Easting: W150 56.405 Datum: NAD 27

Measurements By: Hilton Time: 10:15

Water Depth (ft): 10' .5" Ice Thickness (ft): 3.41

Freeboard (ft): 0.15 Snow Depth (ft): 0.58

Elev. (BPMSL +/- .02): 7.42 Survey By: Lilly Date: 2/17/06 Time: nr

Water Sampling By: DAR 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:	12:56	13:03	13:06	13:09	13:14	13:22	13:31	13:35	13:40	
Depth BWS (ft):	5.0	4.0	6.0	7.0	8.0	9.0	10.0	10.5a	10.5b	
Temp (°C):	0.33	0.02	0.38	0.77	1.03	1.21	1.35	1.39	1.39	
pH:	6.75	6.76	6.74	6.72	6.67	6.54	6.45	6.40	6.63	
Barometeric (mmHg):	772.9	772.9	772.9	772.9	733.0	773.0	773.0	773.1	773.0	
Pressure (kPa):	13.520	10.210	10.120	19.440	22.460	25.100	28.310	29.520	29.890	
Conductivity (µS/cm):	76.83	77.26	76.21	75.95	76.19	78.81	88.26	89.78	98.03	
RDO (ppm): (mg/L)	14.06	14.04	14.54	14.53	13.65	10.52	9.14	8.39	7.46	
Turbidity (NTU):	2.1	4.7	6.2	6.5	6.3	6.8	8.0	11.50	113.80	
ORP	924	924	924	924	924	924	924	924	905	
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: Note- 10.5a is gently on bottom, 10.5b is agitated briefly prior to letting equilbrate.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St.Amand Date: 3/7/06

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: L9817-1

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 10:20

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.090 Easting: W151 19.931 Datum: NAD 27

Measurements By: DAR, MW Time: 10:20

Water Depth (ft): 8.59 Ice Thickness (ft): 2.74

Freeboard (ft): -0.05 Snow Depth (ft): 1

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

Water Sampling By: DAR Sample Depths BWS (ft): 1 3 Date: 2/18/06 Time: nr

2 6.5

WATER QUALITY METER INFORMATION 3 8

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:	10:20	10:24	10:27	10:29	10:33	10:46	10:52			
Depth BWS (ft):	3.0	4.0	5.0	6.5	7.0	8.0	8.5			
Temp (°C):	0.01	0.08	0.35	0.90	1.16	1.49	1.70			
pH:	6.94	6.93	6.93	6.92	6.86	7.37	7.76			
Barometeric (mmHg):	756.3	756.3	756.3	756.3	756.3	756.3	756.2			
Pressure (kPa):	7.725	10.470	13.560	17.760	19.590	22.620	24.070			
Conductivity (µS/cm):	298.4	298.0	298.7	303.1	305.0	351.4	418.0			
RDO (ppm): (mg/L)	8.12	8.33	8.55	8.65	7.53	2.75	1.03			
Turbidity (NTU):	0.7	0.8	1.6	2.7	4.8	10.0	7.4			
ORP										
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): 3**			**Depth BWS (ft): 6.5**			**Depth BWS (ft): 8**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)	90	93	93	94	91	92	133	133	134	Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)	0.06	0.07	0.07	0.6	0.58	0.58	31.6	25.1	OR	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0	0.01	0.01	0.3	0.29	0.3	19.1	19.4	20.4	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****	0.1	0.1	0	0.28	0.27	0.28	2.6	2.4	2.5	0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution							10%	10%	10%	

Remarks: OR= Over Range. 8 ft sample had color, Iron and Ammonia diluted to 10% (5 ml sample, 45 ml nanopure).

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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: L9817-2

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 10:15

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.071 Easting: W151 19.868 Datum: NAD 27

Measurements By: Whitman Time: 10:15

Water Depth (ft): 8.25 Ice Thickness (ft): 3.08

Freeboard (ft): 0.16 Snow Depth (ft): 0.52

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

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

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
all	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	12:01	12:03	12:04	12:08	12:16	12:24				
Depth BWS (ft):	3.5	4.0	5.0	6.0	7.0	8.0				
Temp (°C):	0.02	0.09	0.47	0.79	1.16	1.51				
pH:	6.87	6.83	6.83	6.84	6.77	7.49				
Barometeric (mmHg):	755.5	755.4	755.4	755.4	755.4	755.4				
Pressure (kPa):	8.750	10.300	13.330	16.140	19.440	22.620				
Conductivity (µS/cm):	302.9	301.9	302.3	304.6	311.7	354.7				
RDO (ppm): (mg/L)	9.26	9.35	9.35	9.07	6.21	2.15				
Turbidity (NTU):	1.5	0.9	2.2	4.6	2.1	7.3				
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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: L9817-3

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 10:22

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.043 Easting: W151 19.840 Datum: NAD 27

Measurements By: Whitman Time: 10:22

Water Depth (ft): 7.94 Ice Thickness (ft): 2.76

Freeboard (ft): 0 Snow Depth (ft): 0.8

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

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

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
all	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	12:43	12:46	12:48	12:50	12:57	13:07	13:14			
Depth BWS (ft):	3.0	4.0	5.0	5.0	7.0	7.5	8.0			
Temp (°C):	0.00	0.08	0.29	0.36	1.01	1.23	1.42			
pH:	6.86	6.81	6.81	6.81	6.80	6.95	7.08			
Barometeric (mmHg):	755.1	755.1	755.1	755.2	755.2	755.1	755.1			
Pressure (kPa):	7.930	10.450	13.700	13.650	19.570	21.310	22.210			
Conductivity (µS/cm):	297.4	305.4	309.7	310.2	315.6	332.7	355.9			
RDO (ppm): (mg/L)	9.26	9.12	9.05	9.00	8.63	5.52	2.61			
Turbidity (NTU):	0.2	0.4	0.6	0.5	0.8	6.1	9.2			
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: 5 ft reading was taken twice. Both are good numbers, a reading at 6 ft was taken.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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: L9817-4

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 10:45

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.018 Easting: W151 19.807 Datum: NAD 27

Measurements By: Whitman Time: 10:45

Water Depth (ft): 5.89 Ice Thickness (ft): 3.26

Freeboard (ft): 0.17 Snow Depth (ft): 0.65

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

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

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
all	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	13:30	13:34	13:40	13:43	13:45					
Depth BWS (ft):	3.5	4.5	5.5	6a	6b					
Temp (°C):	-0.02	-0.02	0.29	0.42	0.38					
pH:	6.77	6.77	6.74	6.70	6.71					
Barometeric (mmHg):	754.7	754.7	754.6	754.7	754.7					
Pressure (kPa):	8.530	11.690	14.820	16.750	16.880					
Conductivity (µS/cm):	317.8	317.5	320.5	321.1	321.2					
RDO (ppm): (mg/L)	8.97	8.82	8.10	7.95	7.89					
Turbidity (NTU):	0.1	0.1	0.3	465.0	60.5					
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: 6 ft (a) mark is sitting on bottom. 6 ft (b) mark was being agitated. Bottom seems relatively hard, couldn't sink probe into much.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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: L9817-20a

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 12:15

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.098 Easting: W151 19.777 Datum: NAD 27

Measurements By: Whitman Time: 12:15

Water Depth (ft): 9.13 Ice Thickness (ft): 3.68

Freeboard (ft): 0.01 Snow Depth (ft): 1.07

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

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

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
all	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	14:45	14:51	14:55	15:00	15:06	15:10	15:13			
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	9.0	9.2			
Temp (°C):	0.09	0.26	0.59	0.86	0.99	0.98	0.98			
pH:	6.67	6.64	6.63	6.62	7.13	7.69	7.72			
Barometeric (mmHg):	753.7	753.7	753.7	753.6	753.6	753.5	753.5			
Pressure (kPa):	10.370	13.602	16.513	19.614	22.449	25.452	26.053			
Conductivity (µS/cm):	309.5	309.9	311.2	314.2	371.4	518.0	515.4			
RDO (ppm): (mg/L)	3.66	2.65	1.96	1.51	0.57	0.25	0.17			
Turbidity (NTU):	2.8	4.1	4.9	9.3	8.7	4.6	49.9			
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: 20a is 3 ft from 20b. See notes on F004a-20b. Drilled at 12:00.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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: L9817-20b

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 12:15

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.098 Easting: W151 19.777 Datum: NAD 27

Measurements By: Whitman Time: 10:45

Water Depth (ft): 9.13 Ice Thickness (ft): 3.68

Freeboard (ft): 0.01 Snow Depth (ft): 1.07

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

Water Sampling By: DAR 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		yes	yes

Parameters	**Field Measurements**									
Time:	14:44	14:51	14:55	15:00	15:06	15:10	15:13			
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	9.0	9.2			
Temp (°C):	-0.14	0.05	0.49	0.72	0.91	0.87	0.90			
pH:	6.89	6.85	6.84	6.87	7.26	7.87	7.88			
Barometeric (mmHg):	751.8	751.7	751.7	751.7	751.7	751.6	751.5			
Pressure (kPa):	10.280	13.570	16.680	19.320	22.490	25.610	26.590			
Conductivity (µS/cm):	299.0	300.0	301.4	303.1	334.6	495.6	526.8			
RDO (ppm): (mg/L)	4.10	2.46	2.02	1.77	0.45	0.14	0.16			
Turbidity (NTU):	3.1	5.4	5.9	6.1	8.9	5.2	57.2			
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks: Field Measurements were presumed to be the same as L9817-20b. 20b and 20a were sampled at the same time with both the UAF and GWS instruments. Lilly reported significant off-gassing and air voids in the ice. See his field book for details.

9 ft reading was at the bottom.

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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: L9817-21

Sample Purpose: **Lake Water Quality** Date: 2/18/06 Time: 11:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70 14.083 Easting: W151 20.084 Datum: NAD 27

Measurements By: Whitman Time: 11:00

Water Depth (ft): 7.31 Ice Thickness (ft): 2.92

Freeboard (ft): -0.08 Snow Depth (ft): 0.98

Elev. (BPMSL): 53.41 +/-.02 Survey By: Whitman Date: 2/18/06 Time: nr

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

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
all	GWS	In-Situ Troll 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	14:03	14:07	14:11	14:13	14:20					
Depth BWS (ft):	3.0	4.0	5.0	6.0	7.0					
Temp (°C):	0.04	0.18	0.57	0.86	1.06					
pH:	6.74	6.75	6.73	6.74	6.68					
Barometeric (mmHg):	754.3	754.3	754.2	754.2	754.2					
Pressure (kPa):	7.660	10.330	13.440	16.390	19.510					
Conductivity (µS/cm):	295.0	295.3	296.8	299.9	312.4					
RDO (ppm): (mg/L)	7.93	7.82	7.84	7.93	5.99					
Turbidity (NTU):	0.1	0.1	0.4	0.8	0.8					
ORP										
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 CaCO3
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 NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 2/26/06

QAQC Check By: St. Amand Date: 3/8/06

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-NC-CT

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: 10:00

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32134 Easting: W149.40015 Datum: WGS84

Measurements By: DAR, BM Time: 10:42

Water Depth (ft): 30.9' Ice Thickness (ft): 3.3'

Freeboard (ft): 0.15 Snow Depth (ft): 0.9

Elev. (BPMSL): 96.02 Survey By: DAR, BM Date: 2/14/06 Time: nr

Water Sampling By: DAR Sample Depths BWS (ft): 1 4' Date: 2/14/06 Time: 11:00

2 20'

3 30'

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model			Serial No.		Pre-Sampling QAQC Check		Post-Sampling QAQC Check	
All	GWS	Troll 9000			33033		yes		yes	
Parameters	**Field Measurements**									
Time:	10:09	10:12	10:13	10:15	10:16	10:17	10:22	10:25	10:28	10:32
Depth BWS (ft):	4.0	5.0	6.0	7.0	9.0	9.0	13.0	15.0	17.0	19.0
Temp (°C):	-0.03	0.00	-0.03	-0.05	-0.06	-0.02	0.06	0.15	0.22	0.28
pH:	7.60	7.65	7.66	7.67	7.69	7.70	7.72	7.71	7.70	7.71
Barometeric (mmHg):	768.7	768.5	768.4	768.5	768.6	768.6	768.6	768.9	768.9	768.9
Pressure (kPa):	10.200	13.380	16.240	19.430	25.350	25.500	36.940	43.240	49.070	55.110
Conductivity (µS/cm):	181.00	180.30	180.10	179.80	179.50	179.20	178.40	177.60	177.10	176.90
RDO (ppm):	12.17	12.29	12.38	12.45	12.51	12.65	12.61	12.60	12.44	12.34
Turbidity (NTU):	0.00	0.01	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20
ORP										
LDO DO	13.5	13.6	13.6	13.6	13.5	13.4	13.1	13.0	11.5	11.2
LDO TEMP	0.0	0.2	0.1	0.1	0.1	0.1	0.3	0.4	0.7	0.6

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): 20'**			**Depth BWS (ft): 30'**			**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	144	126	125	132	145	138	140	10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.02	X	X	0.03	X	X	0.12	X	X	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.02	X	X	0.02	X	X	0.07	X	X	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0.01	X	X	0.00	X	X	0.11	X	X	Hach spec 0.01-0.50 mg/L NH3-N

Remarks: HACH LDO HQ20 - UAF - 15 meter probe

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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-NC-CT

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: 10:00

FIELD MEASUREMENTS

GPS Coord. Northing: 70.32134 Easting: Westing 149.40015 Datum: WGS84

Measurements By: DAR, BM Time: 10:42

Water Depth (ft): 30.9' Ice Thickness (ft): 3.3'

Freeboard (ft): 0.15 Snow Depth (ft): 0.9

Elev. (BPMSL): 96.02 Survey By: DAR, BM Date: 2/14/06 Time: nr

Water Sampling By: DAR Sample Depths BWS (ft): 1 4' Date: 2/14/06 Time: 11:00

2 20'

3 30'

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model			Serial No.		Pre-Sampling QAQC Check		Post-Sampling QAQC Check	
All	GWS	Troll 9000			33033		yes		yes	
Parameters	**Field Measurements**									
Time:	10:34	10:38	10:46	10:52	10:57	11:06	11:13	11:17	11:23	11:30
Depth BWS (ft):	20.0	22.0	24.0	25.0	26.0	27.0	28.0	29.0	30.0	6.0
Temp (°C):	0.32	0.37	0.43	0.52	0.55	0.60	0.63	0.69	0.76	-0.04
pH:	7.69	7.70	7.69	7.63	7.54	7.42	7.39	7.31	7.27	7.67
Barometeric (mmHg):	769.0	769.0	769.1	769.2	769.2	769.4	769.4	769.3	769.4	768.9
Pressure (kPa):	58.170	63.960	70.060	72.940	75.700	78.870	81.950	84.970	88.080	16.320
Conductivity (µS/cm):	176.90	176.90	176.90	177.20	177.90	180.00	180.90	184.50	191.60	179.00
RDO (ppm):	12.24	12.08	11.99	11.37	10.35	7.51	6.63	5.17	3.17	12.38
Turbidity (NTU):	-0.20	-0.20	-0.20	-0.20	-0.20	-0.20	-0.10	0.10	0.40	-0.30
ORP										
LDO DO	11.3									
LDO TEMP	0.7									

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 CaCO3
Nitrite (mg/L NO2--N)										0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: Date:

QAQC Check By: St. Amand Date: 3/20/06

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-NC-NE

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.19312 Easting: W149.23715 Datum: NAD27AK

Measurements By: DAR Time: 16:30

Water Depth (ft): 25'4" Ice Thickness (ft): 4.0'

Freeboard (ft): -0.1' Snow Depth (ft): 1.35'

Elev. (BPMSL): 96.02 Survey By: DAR/Lilly Date: 2/14/06 Time: nr

Water Sampling By: DAR 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	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	17:03	17:07	17:08	17:10	17:13	16:25	16:28	16:31		
Depth BWS (ft):	25.0	24.0	23.0	22.0	21.0	19.0	18.0	17.0		
Temp (°C):	0.49	0.49	0.48	0.46	0.40	0.31	0.31	0.30		
pH:	7.35	7.35	7.40	7.42	7.45	7.55	7.55	7.54		
Barometeric (mmHg):	770.9	770.9	770.8	770.8	770.8	770.5	770.5	770.5		
Pressure (kPa):	73.190	69.990	66.800	63.890	61.190	54.820	51.910	49.150		
Conductivity (µS/cm):	177.30	177.20	175.90	175.90	175.70	176.00	176.10	176.10		
RDO (ppm):	9.99	9.69	10.21	10.99	11.57	12.64	12.64	12.64		
Turbidity (NTU):	0.40	0.30	0.20	0.00	0.10	0.00	0.00	-0.20		
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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: Times are correct. Started at 19', worked up, returned to bottom. Water depth in ft, inches.

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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-NC-NE

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.19312 Easting: W149.23715 Datum: NAD27AK

Measurements By: DAR Time: 16:30

Water Depth (ft): 25'4" Ice Thickness (ft): 4.0'

Freeboard (ft): -0.1' Snow Depth (ft): 1.35'

Elev. (BPMSL): 96.02 Survey By: DAR/Lilly Date: 2/14/06 Time: nr

Water Sampling By: DAR 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	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	16:32	16:35	16:48	16:49	16:51	16:54	16:55	16:56	16:57	
Depth BWS (ft):	16.0	14.0	12.0	10.0	8.0	7.0	6.0	5.0	4.0	
Temp (°C):	0.28	0.20	0.11	-0.05	0.00	-0.02	-0.04	-0.03	-0.05	
pH:	7.52	7.47	7.52	7.49	7.50	7.48	7.49	7.50	7.50	
Barometeric (mmHg):	770.5	770.4	770.4	770.4	770.3	770.6	770.3	770.3	770.3	
Pressure (kPa):	45.990	40.130	34.160	28.600	22.620	19.500	16.020	13.670	10.160	
Conductivity (µS/cm):	176.30	177.40	177.60	178.00	178.50	178.50	178.40	178.60	178.50	
RDO (ppm):	12.64	12.78	12.95	12.99	13.12	13.16	13.19	13.20	13.21	
Turbidity (NTU):	-0.20	-0.10	-0.20	-0.20	-0.30	-0.20	-0.30	-0.30	-0.30	
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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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-SC-SW

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.31977 Easting: W149.40390 Datum: WGS84

Measurements By: DAR, BM Time: nr

Water Depth (ft): 19' 8" Ice Thickness (ft): 3.15'

Freeboard (ft): 0.02 Snow Depth (ft): 0.75'

Elev. (BPMSL): 96.02 Survey By: ML Date: nr Time: nr

Water Sampling By: DAR 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	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	14:09	14:07	14:05	14:02	13:59	13:54	13:53	13:49		
Depth BWS (ft):	4.0	5.0	6.0	7.0	9.0	11.0	13.0	15.0		
Temp (°C):	-0.03	0.00	0.01	0.04	0.11	0.18	0.25	0.34		
pH:	7.59	7.57	7.57	7.56	7.56	7.57	7.53	7.56		
Barometeric (mmHg):	769.6	769.7	769.7	769.7	769.8	769.8	769.9	770.0		
Pressure (kPa):	10.490	13.270	16.420	19.540	25.450	31.330	37.270	43.160		
Conductivity (µS/cm):	185.00	184.40	184.30	184.20	184.60	184.20	184.00	183.80		
RDO (ppm):	13.62	13.53	13.48	13.40	13.24	13.05	12.90	12.64		
Turbidity (NTU):	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30		
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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: 19' depth was sampled first. Moved up from there

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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-SC-SW

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.31977 Easting: W149.40390 Datum: WGS84

Measurements By: DAR, BM Time: nr

Water Depth (ft): 19' 8" Ice Thickness (ft): 3.15'

Freeboard (ft): 0.02 Snow Depth (ft): 0.75'

Elev. (BPMSL): 96.02 Survey By: ML Date: 2/14/06 Time: nr

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

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	
All	GWS	TROLL 9000		33033		yes		yes	
Parameters	**Field Measurements**								
Time:	13:45	13:41	13:36	13:31					
Depth BWS (ft):	16.0	17.0	18.0	19.0					
Temp (°C):	0.38	0.42	0.47	0.53					
pH:	7.56	7.56	7.55	7.48					
Barometeric (mmHg):	770.0	769.9	769.9	769.9					
Pressure (kPa):	46.170	49.000	52.060	55.240					
Conductivity (µS/cm):	183.60	183.70	183.60	184.20					
RDO (ppm):	12.49	12.39	12.11	11.08					
Turbidity (NTU):	-0.30	-0.30	-0.30	-0.30					
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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Aamand Date: 3/20/06

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-SC-SJ

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.31969 Easting: W149.40526 Datum: WGS84

Measurements By: DAR Time: nr

Water Depth (ft): 3.9 Ice Thickness (ft): 3.18

Freeboard (ft): 0.28 Snow Depth (ft): 0.87

Elev. (BPMSL): 96.02 Survey By: DAR/ML Date: 2/14/06 Time: nr

Water Sampling By: Lilly 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	QWS	TROLL 9000	33033	yes	yes

Parameters	**Field Measurements**									
Time:	15:51									
Depth BWS (ft):	3.5									
Temp (°C):	0.02									
pH:	7.18									
Barometeric (mmHg):	770.0									
Pressure (kPa):	8.640									
Conductivity (µS/cm):	543.70									
RDO (ppm):	1.28									
Turbidity (NTU):	1.40									
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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks:

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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-SC-CT

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: 12:32

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32024 Easting: W149.40034 Datum: WGS84

Measurements By: KH Time: 12:20

Water Depth (ft): 27' 9" Ice Thickness (ft): 3.2'

Freeboard (ft): 0.18' Snow Depth (ft): 0.6'

Elev. (BPMSL): 96.02 Survey By: DAR/Lilly Date: 2/14/06 Time: nr

Water Sampling By: DAR Sample Depths BWS (ft): 1 4' Date: 2/14/06 Time: 12:45

2 17'

WATER QUALITY METER INFORMATION 3 27'

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:	14:30	14:32	14:35	14:39	14:43	14:50	14:56	15:01		
Depth BWS (ft):	27.0	26.0	25.0	24.0	22.0	20.0	18.0	16.0		
Temp (°C):	1.12	1.07	1.03	0.96	0.82	0.68	0.54	0.43		
pH:	7.41	7.22	7.13	7.12	7.20	7.31	7.52	7.53		
Barometeric (mmHg):	770.7	770.7	770.8	770.8	770.7	770.6	770.5	770.4		
Pressure (kPa):	78.830	76.070	73.040	70.050	64.130	57.910	51.960	46.150		
Conductivity (µS/cm):	235.20	209.20	198.70	192.20	185.80	182.20	181.50	181.50		
RDO (ppm):	0.36	0.27	0.32	1.62	3.69	9.36	12.20	12.70		
Turbidity (NTU):	0.30	2.10	2.60	0.60	0.00	-0.20	-0.30	-0.30		
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): 4'**			**Depth BWS (ft): 17'**			**Depth BWS (ft): 27'**			**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 $CaCO_3$)	118	117	124	120	116	121	175	159	165	Digital titrator 10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.02	X	X	0.02	X	X	OR (1.37*10=13.7)			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.02	X	X	0.02	X	X	OR (1.21*10=12.1)			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	-0.01	X	X	0	X	X	OR (0.13*10=1.3)			Hach spec 0.01-0.50 mg/L NH3-N

Remarks: Water samples @ 12:30, profiles @ 14:24

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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-SC-CT

Sample Purpose: **Lake Water Quality** Date: 2/14/06 Time: 12:32

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32024 Easting: W149.40034 Datum: WGS84

Measurements By: KH Time: 12:30

Water Depth (ft): 27' 9" Ice Thickness (ft): 3.2'

Freeboard (ft): 0.18' Snow Depth (ft): 0.6'

Elev. (BPMSL): 96.02 Survey By: DAR/Lilly Date: 2/14/06 Time: na

Water Sampling By: DAR Sample Depths BWS (ft): 1 4' Date: 2/14/06 Time: 12:45

2 17'

3 27'

WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	15:05	15:07	15:10	15:18	15:18	15:18	15:18			
Depth BWS (ft):	14.0	12.0	10.0	6.0	5.0	4.0	8.0			
Temp (°C):	0.33	0.27	0.18	0.02	-0.01	-0.04	0.08			
pH:	7.51	7.52	7.51	7.52	7.52	7.51	7.50			
Barometeric (mmHg):	770.4	770.3	770.3	770.1	770.1	770.1	770.2			
Pressure (kPa):	40.870	34.245	28.140	16.260	13.370	10.480	22.280			
Conductivity (µS/cm):	182.10	182.30	183.00	183.90	184.20	184.90	184.00			
RDO (ppm):	12.98	13.09	13.26	13.51	13.56	13.60	13.41			
Turbidity (NTU):	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30	-0.30			
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 CaCO3
Nitrite (mg/L NO2--N)										Hach spec 0.002-0.300 mg/L NO2--N
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 NH3-N

Remarks: See page 1 of 2. 8 ft depth taken sequentially but placed in the last column

Field-Form Filled Out By: DAR Date: 2/14/06

QAQC Check By: St. Amand Date: 3/20/06

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: KDA 1,2,3

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Make: 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	2/14/06	nr	Oakton	2404386	Apr-06	3.98	Pass
pH 10.00	2/14/06	nr	Oakton	2512278	Jun-07	10.04	Pass
Conductivity	2/14/06	nr	Oakton	2511074	Oct-06	279.1 @ 3.41C	Pass
0% RDO	2/14/06	nr	Hanna	690	Dec-06	0.00	Pass
100% RDO	2/14/06	nr	tetra bubbler	na	na	13.61 @ 3.0C/ 770mmHg	Pass
ORP	2/14/06	nr	Quick Cal Solution	36105	Jul-06	655 @ 3C	Fail

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	2/15/06	nr	Oakton	2404386	Apr-06	3.81	Pass
pH 10.00	2/15/06	nr	Oakton	2512278	Jun-07	9.89	Pass
Conductivity	2/15/06	nr	Oakton	2511074	Oct-06	273 @ 3.56C	Pass
0% RDO	2/15/06	nr	Hanna	690	Dec-06	0.01	Pass
100% RDO	2/15/06	nr	tetra bubbler	na	na	14.37 @ 1.0C/ 756mmHg	Pass
Turbidity	2/15/06	nr	1 NTU standard	nr	nr	2.0	Pass
ORP	2/14/06	nr	Quick Cal Solution	36105	Jul-06	619 @ 5.26C	Fail

Remarks:

Field-Form Filled Out By: Nicole Date: 3/10/2006

QAQC Check By: Hilton Date: 3/20/2006

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: L9312

Sample Purpose: **Lake Water Quality** 2/17/2006

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Make: 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	2/15/06	nr	Oakton pH 4.01	2402119	Apr-06	3.81	Pass
pH 10.00	2/15/06	nr	Oakton pH 10.01	2512278	Jun-07	9.89	Pass
Conductivity	2/15/06	nr	Oakton 447mS	2511074	Oct-06	273 @ 3.56C	Pass
0% RDO	2/15/06	nr	Hanna HI7040	690	Dec-05	0.0	
100% RDO	2/15/06	nr	tetra bubbler	na	na	14.37 @ 1C, 765 mmHg	
Turbidity	2/15/06	nr	1 NTU standard	nr	nr	2.000	
ORP	2/15/06	nr	Quick Cal Solution	nr	nr	619 @ 5.26C	Fail

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 10.01	2/17/06	18:45	In-Situ pH 10.01	530608-1	Aug-06	10.00	Pass
Conductivity	2/17/06	18:45	Oakton 447uS	2511074	Oct-06	475.6 @ 5.14C	Pass
0% RDO	2/17/06	18:45	Hanna HI7040	690	Dec-06	0.03	Pass
100% RDO	2/17/06	18:45	tetra bubbler	na	na	13.57@3.21C/ 769mmHg	Pass

Remarks:

Field-Form Filled Out By: Hilton Date: 3/20/2006

QAQC Check By: St. Amand Date: 3/21/2006

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: L9817

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Make: Troll 9000

Owner: UAF S/N: 34023

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01			Oakton pH 4.01	2402119	Apr-06		Pass
pH 7.00			Oakton pH 7.01	2404386	Jan-06		Pass
pH 10.00			In-Situ pH 10.01	530608-1	Aug-06		Pass
Conductivity			Oakton 447mS	2511074	Oct-06		Pass
0% RDO			Hanna HI7040	690	Dec-05		Pass
100% RDO			tetra bubbler	na	na		Pass
Turbidity			1 NTU standard	nr	nr		Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	2/18/06	22:15	Oakton pH 4.01	2402119	Apr-06	4.07	Pass
pH 7.00	2/18/06	22:15	Oakton pH 7.01	2404386	Jan-06	7.06	Pass
pH 10.00	2/18/06	22:15	In-Situ pH 10.01	530608-1	Aug-06	9.92	Pass
Conductivity	2/18/06	22:15	Oakton 447mS	2511074	Oct-06	303.9 @ 6.78C	Pass
0% RDO	2/18/06	22:15	Hanna HI7040	690	Dec-05	0.01	Pass
100% RDO	2/18/06	22:15	tetra bubbler	na	na	11.93 @ 6.64C/ 740mmHg	Pass
Turbidity	2/18/06	22:15	1 NTU standard	nr	nr	2.6	Pass

Remarks:

Field-Form Filled Out By: St. Amand Date: 3/9/2006

QAQC Check By: Hilton Date: 3/20/2006

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: L9817

Sample Purpose: **Lake Water Quality** 2/17/2006

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Make: 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 10.01	2/17/06	18:45	In-Situ pH 10.01	530608-1	Aug-06	10.00	Pass
Conductivity	2/17/06	18:45	Oakton 447uS	2511074	Oct-06	475.6 @ 5.14C	Pass
0% RDO	2/17/06	18:45	Hanna HI7040	690	Dec-06	0.03	Pass
100% RDO	2/17/06	18:45	tetra bubbler	na	na	13.57@3.21C/ 769mmHg	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	2/18/06	22:15	Oakton pH 4.01	2404386	Jan-06	4.03	Pass
pH 7.00	2/18/06	22:15	Oakton pH 7.01	2402119	Apr-06	7.03	Pass
pH 10.00	2/18/06	22:15	In-Situ pH 10.01	530608-1	Aug-06	9.92	Pass
Conductivity	2/18/06	22:15	Oakton 447mS	2511074	Oct-06	331.6 @10.52C	Pass
0% RDO	2/18/06	22:15	Hanna HI7040	690	Dec-05	0.02	Pass
100% RDO	2/18/06	22:15	tetra bubbler	na	na	11.66 @ 8.77C, 743.1 mmHg	Pass
Turbidity	2/18/06	22:15	1 NTU standard	nr	nr	2.0	Pass

Remarks:

Field-Form Filled Out By: St. Amand Date: 3/9/2006

QAQC Check By: Hilton Date: 3/20/2006

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: MSB

Sample Purpose: **Lake Water Quality** 2/14/2006

WATER QUALITY METER INFORMATION

Meter Make: In-Situ Make: 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	2/13/06	21:00	Oakton	2404386	Apr-06	3.93	Pass
pH 7.00	2/13/06	21:00	Oakton	2402119	Jan-06	6.94	Pass
pH 10.00	2/13/06	21:00	Oakton	2512278	Jun-07	10.06	Pass
Conductivity	2/13/06	21:00	Oakton	2511074	Oct-06	258.6 @ 1.89C	Pass
0% RDO	2/13/06	21:00	Hanna	690	Dec-06	0.01	Pass
100% RDO	2/13/06	21:00	tetra bubbler	na	na	13.08 @ 3.0C/ 770mm Hg	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	2/14/06	nr	Oakton	2404386	Apr-06	3.98	Pass
pH 10.00	2/14/06	nr	Oakton	2512278	Jun-07	10.04	Pass
Conductivity	2/14/06	nr	Oakton	2511074	Oct-06	279.1 @ 3.41C	Pass
0% RDO	2/14/06	nr	Hanna	690	Dec-06	0.00	Pass
100% RDO	2/14/06	nr	tetra bubbler	na	na	13.61 @ 3.0C/ 770mmHg	Pass
ORP	2/14/06	nr	QuickCal Solution	nr	nr	655 @ 3C	Fail

Remarks:

Field-Form Filled Out By: Nicole Date: 3/10/2006

QAQC Check By: Hilton Date: 3/20/2006

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: Kuparuk Deadarm Mine Sites

Survey Purpose: **Water-Level Elevations** Date: 2/15/2006 Time: 16:00

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		Mild, partly cloudy, slight breeze		
Rod Type:	Fiberglass		Rod ID:	na				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		Bill Morris Michael Lilly		
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	0.38	19.70		19.32				Bell Assoc. Benchmark
KDA2-S1		19.70	13.24	6.46				S1 was measured at WL, NW corner
KDA3-S1		19.70	13.00	6.70				S1 was measured at water surface frozen, SW corner
								moved Instr. Used KDA3-S2 as turn pt.
KDA3-S1	13.11	19.81		**6.70**				**WS Elevation for Reservoir #3**
KDA2-S1		19.81	13.35	**6.46**				**WS Elevation for Reservoir #2**
BM #1		19.81	0.48	19.33				Close survey to 0.01
KDA2-S2	9.57	16.03		6.46				S2 was measured at frozen WL
KDA1-S1		16.03	7.20	8.83				S1 was measured on ice surface
								moved Instr. Used KDA1-S1 as turn pt.
KDA1-S1	7.27	16.10		**8.83**				**WS Elevation for Reservoir #1**
KDA2-S2		16.10	9.63	6.47				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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 2/17/2006 Time: 13:30

Location:	Lake L9312, located southeast of Alpine pad, survey by pump house benchmarks						
Survey objective:	Lake water elevation survey				Weather Observations:		
Instrument Type:	Optical Survey Level	Instrument ID:	na		Cold, windy, blowing snow		
Rod Type:	Fiberglass	Rod ID:	na				
Bench Mark Information:					Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)	Michael Lilly Chris		
L9312 "P"	CP	11.61 BPMSL	na	na			

Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
P	2.47	14.19		11.72				Top of inlet pipe support
O		14.19	2.73	11.46				Top of inlet pipe support
PH-VSM		14.19	-0.37	14.56				Top of VSM plate, SE corner of pump house
WL		14.19	6.77	**7.42**				Top of ice in refrozen hole
								moved Instr., used WL ice as turn point
WL	6.63	14.05		7.42				
PH-VSM		14.05	-0.51	14.56				+0.02
O		14.05	2.59	11.46				+0.02
P		14.05	2.33	11.72				close survey to +0.00

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: 2/14/2006 Time: 16:30

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 Serial # 404374		Mild, partly cloudy, sligh breeze		
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 Bill Morris		
"Post"	WERC	100 Temp.	na	na			

Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
Post TBM1	6.35	106.35		100.00				Top of nail in post, temp elevation
WL1		106.35	10.43	95.92				Top of ice in refrozen hole, closest to bank
WL2		106.35	10.33	**96.02**				Top of ice in refrozen hole
								moved Instr., used WL ice as turn point
WL2	10.43	106.45		**96.02**				Top of ice in refrozen hole
WL1		106.45	10.48	95.97				Top of ice in refrozen hole, closest to bank
Post TBM1		106.45	6.44	100.01				close survey to +0.01

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

APPENDIX D. SNOW SURVEY FORMS

The following forms report the snow survey information obtained during field sampling.

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: **Betty Pingo Met. Sta.**

Survey Purpose: **Snow Depth and Water Content** Date: 2/15/2006 Time: 16:00

Location:	Betty Pingo Meteorological Station, Measured west and south of Wyoming Snow Gage		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	Cold, slight wind
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Molly Chambers	

Snow Course Depths, in cm.

	1	2	3	4	5
1	74.0	55.0	38.5	39.0	14.5
2	72.0	46.5	45.0	29.0	18.5
3	85.0	46.0	49.5	25.0	18.5
4	72.0	35.5	52.0	17.0	31.5
5	57.0	36.0	50.0	20.0	22.0
6	47.0	37.0	51.0	16.0	21.5
7	64.0	34.0	46.0	15.0	24.5
8	22.0	25.0	27.5	22.0	22.5
9	25.0	18.0	41.0	21.0	24.0
10	28.0	23.0	21.0	27.5	19.5

Average snow depth = **35.4**

Maximum snow depth = 85

Minimum snow depth = 14.5

Standard variation = 17.5

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	50	702	19.3	0.39
2	42	396	10.9	0.26
3	20	160	4.4	0.22
4	28	295	8.1	0.29
5	38	312	8.6	0.23
			Average =	**0.28**

Average Snow Water Equivalent = **9.8** cm H2O

Average Snow Water Equivalent = **3.86** inches H2O

Average Snow Water Equivalent = **0.32** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: **Kuparuk Deadarm Res.**

Survey Purpose: **Snow Depth and Water Content** Date: 2/15/2006 Time: 11:00

Location:	Kuparuk Deadarm Reservoir, #1, measured on lake ice		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	Cold, slight wind
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Molly Chambers Kristie Hilton	

Snow Course Depths, in cm.

	1	2	3	4	5
1	10.0	9.0	10.0	15.5	10.0
2	23.0	7.5	8.0	17.0	18.0
3	12.0	7.0	8.0	14.5	20.0
4	15.0	7.0	6.0	10.5	17.0
5	10.0	5.0	12.0	12.0	15.5
6	9.0	11.0	15.5	12.0	14.5
7	8.0	11.0	18.0	12.0	14.5
8	16.0	8.5	19.0	9.0	11.5
9	12.5	9.5	34.5	9.0	15.0
10	10.5	13.0	41.5	8.5	12.5

Average snow depth = **13.1**

Maximum snow depth = 41.5

Minimum snow depth = 5

Standard variation = 6.5

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	16	146	4.0	0.25
2	11	90	2.5	0.23
3	11	70	1.9	0.18
4	19	212	5.8	0.31
5	13	110	3.0	0.23
			Average =	**0.24**

Average Snow Water Equivalent = **3.1** cm H2O

Average Snow Water Equivalent = **1.23** inches H2O

Average Snow Water Equivalent = **0.10** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: **Kuparuk Deadarm Res.**

Survey Purpose: **Snow Depth and Water Content** Date: 2/15/2006 Time: 11:50

Location:	Kuparuk Deadarm Reservoir, #2, measured on lake ice, center location		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	Cold, slight wind
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Molly Chambers Kristie Hilton	

Snow Course Depths, in cm.

	1	2	3	4	5
1	14.0	16.5	10.0	10.0	14.0
2	17.0	25.0	9.5	12.0	11.0
3	21.0	24.5	12.0	10.5	14.0
4	21.5	16.0	14.0	13.5	24.0
5	18.5	10.5	13.5	19.5	19.5
6	13.0	11.0	9.0	17.5	16.0
7	17.0	11.0	13.0	19.5	16.0
8	16.0	38.0	17.5	15.0	13.0
9	29.0	28.5	16.0	11.0	17.5
10	37.0	17.0	11.5	11.0	15.0

Average snow depth = **16.6**

Maximum snow depth = 38

Minimum snow depth = 9

Standard variation = 6.4

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	20	203	5.6	0.28
2	14	142	3.9	0.28
3	14	130	3.6	0.26
4	15	142	3.9	0.26
5	16	170	4.7	0.29
			Average =	**0.27**

Average Snow Water Equivalent = **4.5** cm H2O

Average Snow Water Equivalent = **1.78** inches H2O

Average Snow Water Equivalent = **0.15** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: **Kuparuk Deadarm Res.**

Survey Purpose: **Snow Depth and Water Content** Date: 2/15/2006 Time: 12:30

Location:	Kuparuk Deadarm Reservoir, #3, measured on lake ice, center location		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	Cold, slight wind
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Molly Chambers Kristie Hilton	

Snow Course Depths, in cm.

	1	2	3	4	5
1	25.5	23.0	21.5	11.0	11.5
2	27.5	21.0	21.5	11.5	12.5
3	28.0	19.0	18.0	10.0	9.0
4	26.0	16.5	11.0	13.0	9.5
5	27.5	18.0	9.0	9.0	12.0
6	27.5	18.5	9.0	10.0	11.5
7	25.5	23.5	10.5	11.0	16.0
8	20.5	30.5	11.0	13.0	22.5
9	33.0	17.0	18.0	18.0	21.0
10	38.0	9.0	22.0	18.0	21.0

Average snow depth = **18.0**

Maximum snow depth = 38

Minimum snow depth = 9

Standard variation = 7.3

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	22	279	7.7	0.35
2	19	234	6.4	0.34
3	13	123	3.4	0.26
4	14	132	3.6	0.26
5	22	253	7.0	0.32
			Average =	**0.30**

Average Snow Water Equivalent = **5.5** cm H2O

Average Snow Water Equivalent = **2.15** inches H2O

Average Snow Water Equivalent = **0.18** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

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

Survey Purpose: **Snow Depth and Water Content** Date: 2/17/2006 Time: 11:50

Location:	L9312 snow survey located west of pump house and south of water pipeline		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	mild
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Michael Lilly	

Snow Course Depths, in cm.

	1	2	3	4	5
1	23.5	35.5	55.0	15.0	50.5
2	29.0	35.0	54.0	28.0	44.0
3	29.5	42.0	53.5	57.0	39.0
4	23.5	33.0	55.0	68.0	34.0
5	18.0	29.0	43.0	38.0	25.0
6	20.0	37.0	41.5	16.5	19.0
7	28.0	35.0	35.0	18.0	24.0
8	40.0	43.0	28.0	34.0	33.0
9	39.0	47.0	18.0	47.0	61.5
10	39.5	50.0	12.0	52.0	70.0

Average snow depth = **36.9**

Maximum snow depth = 70

Minimum snow depth = 12

Standard variation = 14.0

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	27	139	3.8	0.14
2	29	89	2.4	0.08
3	36	202	5.6	0.15
4	68	159	4.4	0.06
5	16	161	4.4	0.28
			Average =	**0.14**

Average Snow Water Equivalent = **5.3** cm H2O

Average Snow Water Equivalent = **2.10** inches H2O

Average Snow Water Equivalent = **0.17** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

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

Survey Purpose: **Snow Depth and Water Content** Date: 2/18/2006 Time: 14:20

Location:	L9817, survey located near sampling points #2, #3, on lake ice		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	mild
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Michael Lilly	

Snow Course Depths, in cm.

	1	2	3	4	5
1	20.0	22.0	26.0	15.5	20.0
2	21.0	21.0	25.0	18.0	23.0
3	20.0	18.0	24.0	17.5	31.5
4	18.0	22.0	23.5	19.0	31.0
5	17.0	27.0	20.0	19.0	29.5
6	20.5	30.0	17.5	18.5	28.5
7	21.0	28.0	18.0	18.5	29.0
8	22.0	29.5	16.0	18.5	33.0
9	24.5	25.5	16.0	18.5	40.0
10	23.0	25.0	15.5	19.5	42.0

Average snow depth = **22.9**

Maximum snow depth = 42

Minimum snow depth = 15.5

Standard variation = 6.0

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	20	186	5.1	0.26
2	22	201	5.5	0.25
3	25	253	7.0	0.28
4	18	153	4.2	0.23
5	42	422	11.6	0.28
			Average =	**0.26**

Average Snow Water Equivalent = **5.9** cm H2O

Average Snow Water Equivalent = **2.34** inches H2O

Average Snow Water Equivalent = **0.20** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

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

Survey Purpose: **Snow Depth and Water Content** Date: 2/18/2006 Time: 12:30

Location:	L9817, survey located south of monitoring station on eastern lake shore		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	mild
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Michael Lilly	

Snow Course Depths, in cm.

	1	2	3	4	5
1	46.0	29.0	30.0	46.5	31.0
2	33.0	33.0	33.0	41.0	29.0
3	34.0	30.0	34.0	36.0	32.5
4	28.0	31.0	27.0	31.5	34.0
5	24.0	29.0	29.0	29.0	37.0
6	24.5	21.0	38.0	29.0	32.5
7	32.0	25.5	38.0	29.0	37.5
8	29.0	22.0	41.0	28.0	41.0
9	26.0	20.0	37.0	28.0	48.0
10	29.0	29.0	46.0	30.0	52.0

Average snow depth = **32.6**

Maximum snow depth = 52

Minimum snow depth = 20

Standard variation = 7.0

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	32	272	7.5	0.23
2	26	132	3.6	0.14
3	27	296	8.1	0.30
4	30	290	8.0	0.27
5	47	508	14.0	0.30
			Average =	**0.25**

Average Snow Water Equivalent = **8.1** cm H2O

Average Snow Water Equivalent = **3.18** inches H2O

Average Snow Water Equivalent = **0.27** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

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

Survey Purpose: **Snow Depth and Water Content** Date: 2/14/2006 Time: 11:00

Location:	Mine Site B, located north of stream junction samplnig point, on tundra between Milne Creek and south cell		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	mild, slight breeze
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Molly Chambers Kristie Hilton	

Snow Course Depths

	1	2	3	4	5
1	15.0	16.0	12.5	15.0	24.0
2	14.5	20.0	13.5	16.0	23.0
3	12.0	16.0	13.0	19.0	20.0
4	16.0	18.0	15.0	24.0	15.0
5	18.0	19.0	14.0	20.0	12.0
6	11.0	18.5	17.5	15.0	16.0
7	21.5	18.0	16.5	22.0	16.5
8	14.0	13.0	9.0	17.0	13.5
9	9.0	12.0	10.0	14.0	12.0
10	11.5	11.0	13.5	15.0	

Average snow depth = **15.7**

Maximum snow depth = 24

Minimum snow depth = 9

Standard variation = 3.7

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	13	151	4.2	0.32
2	14	101	2.8	0.20
3	26	214	5.9	0.23
4	20	171	4.7	0.24
5	20	173	4.8	0.24
			Average =	**0.24**

Average Snow Water Equivalent = **3.8** cm H2O

Average Snow Water Equivalent = **1.50** inches H2O

Average Snow Water Equivalent = **0.13** feet H2O

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-012: Snow Depth and Water Content Survey Form

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

Survey Purpose: **Snow Depth and Water Content** Date: 2/14/2006 Time: 11:30

Location:	Mine Site B, located in North Cell, center		
Survey objective:	Snow depths and snow-water content for lake recharge estimates	Weather Observations:	mild, slight breeze
Snow Depth Probe Type:	T-handle snow depth probe,	Snow-Survey Team Names	
Snow Tube Type:	Adiraondak, 6.8 cm diameter cutter, area = 36.33 cm^2	Molly Chambers Kristie Hilton	

Snow Course Depths, in cm.

	1	2	3	4	5
1	22.0	15.0	11.0	23.0	12.5
2	17.0	12.0	13.0	20.0	14.5
3	17.5	18.0	16.0	18.0	13.0
4	21.5	12.0	23.0	13.0	16.0
5	23.0	17.0	18.0	17.0	13.5
6	21.0	13.0	24.0	14.0	15.0
7	19.5	14.5	24.0	15.0	16.0
8	18.0	20.0	21.0	15.0	16.5
9	21.0	19.0	20.0	13.0	12.5
10	19.5	22.0	16.0	14.5	11.0

Average snow depth = **17.0**

Maximum snow depth = 24

Minimum snow depth = 11

Standard variation = 3.7

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	(gr/cm^2)	(unitless)
1	11.5	88	2.4	0.21
2	12	153	4.2	0.35
3	16	151	4.2	0.26
4	14	104	2.9	0.20
5	14	142	3.9	0.28
			Average =	**0.26**

Average Snow Water Equivalent = **4.4** cm H2O

Average Snow Water Equivalent = **1.75** inches H2O

Average Snow Water Equivalent = **0.15** feet H2O