

Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: May 2007



Lake L9817 Weather Station, Photo by Chad Cormack

by

Kristie Holland, Chad Cormack, Michael Lilly, Jeff Derry, Daniel
Reichardt, Greta Myerchin

September 2007

North Slope Lakes Hydrologic Modeling Project
Report No. INE/WERC 07.10

Water and Environmental
Research Center



Water and Environmental
Research Center



Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: May 2007

by

Kristie Holland¹, Chad Cormack², Michael Lilly¹, Jeff Derry¹, Dan Reichardt¹,
Greta Myerchin²

A report on research sponsored by the

**Alaska Department of Energy, National Energy Technology Laboratory, BP
Exploration (Alaska) Inc., ConocoPhillips Alaska, Inc., and the Bureau of
Land Management.**

September 2007

North Slope Lakes Hydrologic Modeling Project

Report Number INE/WERC 07.10

¹Geo-Watersheds Scientific, Fairbanks, Alaska

²University of Alaska Fairbanks, Water and Environmental Research Center

Recommended Citation:

Holland, K.M., Cormack, C.M., Lilly, M.R., Derry, J.E., Reichardt, D.A., and Myerchin, G.M., 2007. Lake chemistry and physical data for selected North Slope, Alaska, lakes: May 2007. University of Alaska Fairbanks, Water and Environmental Research Center, Report INE/WERC 07.10, Fairbanks, Alaska, 8 p.

Fairbanks, Alaska
September 2007

For additional information write to:

Publications,
Water and Environmental Research Center
University of Alaska Fairbanks
Fairbanks, Alaska 99775
www.uaf.edu/water/

For Project Information write to:

Daniel White – Project Manager
Box 5860, WERC. UAF
Fairbanks, AK 99775-5860
907-474-6222
ffdmw@uaf.edu

TABLE OF CONTENTS

LIST OF FIGURES	i
LIST OF TABLES	i
DISCLAIMER	ii
CONVERSION FACTORS, UNITS, WATER QUALITY UNITS, VERTICAL AND HORIZONTAL DATUM, ABBREVIATIONS AND SYMBOLS	iii
PROJECT COOPERATORS.....	vii
ACKNOWLEDGEMENTS.....	vii
INTRODUCTION	1
TRIP OBJECTIVES	2
PROCEDURES.....	4
SELECTED RESULTS	5
SUMMARY	7
REFERENCES	7
APPENDIX A. WATER QUALITY FIELD SAMPLING FORMS.....	A-1
APPENDIX B. WATER QUALITY METER CALIBRATION FORMS.....	B-1
APPENDIX C. ELEVATION SURVEY FORMS.....	C-1
APPENDIX D. SNOW DEPTH AND WATER CONTENT SURVEY FORMS.....	D-1

LIST OF FIGURES

Figure 1. Location of study lakes in the NPR-A, Alpine, Kuparuk, and Prudhoe Bay field operating areas, North Slope, Alaska.....	2
Figure 2. Field crew conducting snow survey at Lake L9312.....	5

LIST OF TABLES

Table 1. In-Situ Troll 9000 calibration quality control criteria.	4
Table 2. Ice thickness, Median DO Concentration, Median Actual Conductance and Monthly Water Change for North Slope lakes in mid-May.	6
Table 3. Average snow depth and snow water equivalent at L9312 [in; (cm)]	6

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
	<u>Length</u>	
inch (in)	25.4	millimeter (mm)
inch (in)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	<u>Area</u>	
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)
	<u>Volume</u>	
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)
	<u>Velocity and Discharge</u>	
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)
	<u>Hydraulic Conductivity</u>	
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)
	<u>Hydraulic Gradient</u>	
foot per foot (ft/ft)	5280	foot per mile (ft/mi)
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
	<u>Pressure</u>	
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 ($^{\circ}\text{C}$) and in degrees Fahrenheit ($^{\circ}\text{F}$).

Degrees Celsius can be converted to degrees Fahrenheit by use of the following equation:

$$^{\circ}\text{F} = 1.8(^{\circ}\text{C}) + 32$$

Electrical Conductance (Actual Conductivity and Specific Conductance):

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

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

where:

SC25 = Specific Conductance at 25°C , in $\mu\text{S}/\text{cm}$

AC = Actual Conductivity, in $\mu\text{S}/\text{cm}$

R = temperature correction coefficient for the sample, in $^{\circ}\text{C}$

T = temperature of the sample, in $^{\circ}\text{C}$

Milligrams per liter (mg/L) or micrograms per liter ($\mu\text{g}/\text{L}$):

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:

“Sea level” in the following report 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 (°F).
ft	feet
GWS	Geo-Watersheds Scientific
GWSI	USGS Ground-Water Site Inventory
km ²	square kilometers
kPa	kilopascal
lb/in ²	pounds per square inch
m	meters
mg/L	milligrams per liter, equivalent to ppm
µg/L	micrograms per liter
mi ²	square miles
mm	millimeters
µS/cm	microSiemens per centimeter
mV	Millivolt
NGVD	National Geodetic Vertical Datum
NTU	Nephelometric Turbidity Units
NWIS	National Water Information System
ORP	oxygen-reduction potential
ppm	parts per million, equivalent to mg/L
SC25	specific conductance at 25°C
SWE	Snow Water Equivalent
QA	quality assurance
QC	quality control
UAF	University of Alaska Fairbanks
USACE	U.S. Army Corps of Engineers, Alaska District
USGS	U.S. Geological Survey
WERC	Water and Environmental Research Center
WWW	World Wide Web
YSI	Yellow Springs Instruments

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, Inc.
- Bureau of Land Management
- Alaska Department of Natural Resources
- The Nature Conservancy
- Northern Alaska Environmental Center

ACKNOWLEDGEMENTS

This project was funded by cooperative agreement number DE-FC26_01NT41248, from the U.S. Department of Energy's (DOE) Arctic Energy Office to the University of Alaska Fairbanks Arctic Energy Technology Development Laboratory (AETDL). Field coordination and logistics support were provided by BP Exploration (Alaska) Inc. and ConocoPhillips (Alaska). Additional support was provided by other project cooperators, North Slope Borough, Bureau of Land Management (BLM), National Weather Service, and Geo-Watersheds Scientific (GWS), in the form of financial and in-kind match.

Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: May 2007

INTRODUCTION

The University of Alaska Fairbanks (UAF) Water and Environmental Research Center (WERC) and Geo-Watersheds Scientific (GWS), together with project cooperators, initiated a study in the Fall of 2002 (Phase One) to obtain baseline information about the physical and chemical characteristics of North Slope tundra lakes. The project was extended in 2005 (Phase Two). The location of the study lakes changed and was expanded to include other reservoirs so as to further develop the understanding and simulation tools necessary for water-source management. K113 is an un-pumped lake in the Kuparuk oilfield and is sampled on selected field trips during the year. L9312 is a natural lake studied in the Alpine operations area. L9817 is a natural lake in eastern NPRA, west of Nuiqsut. L9817 has been used in previous years for ice-road construction, but was not used during winters of 2005-06 or 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. The study location can be seen in Figure 1.

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 purposes of this publication are to 1) report data collected for the month of May 2007, 2) summarize accomplished field trip objectives.

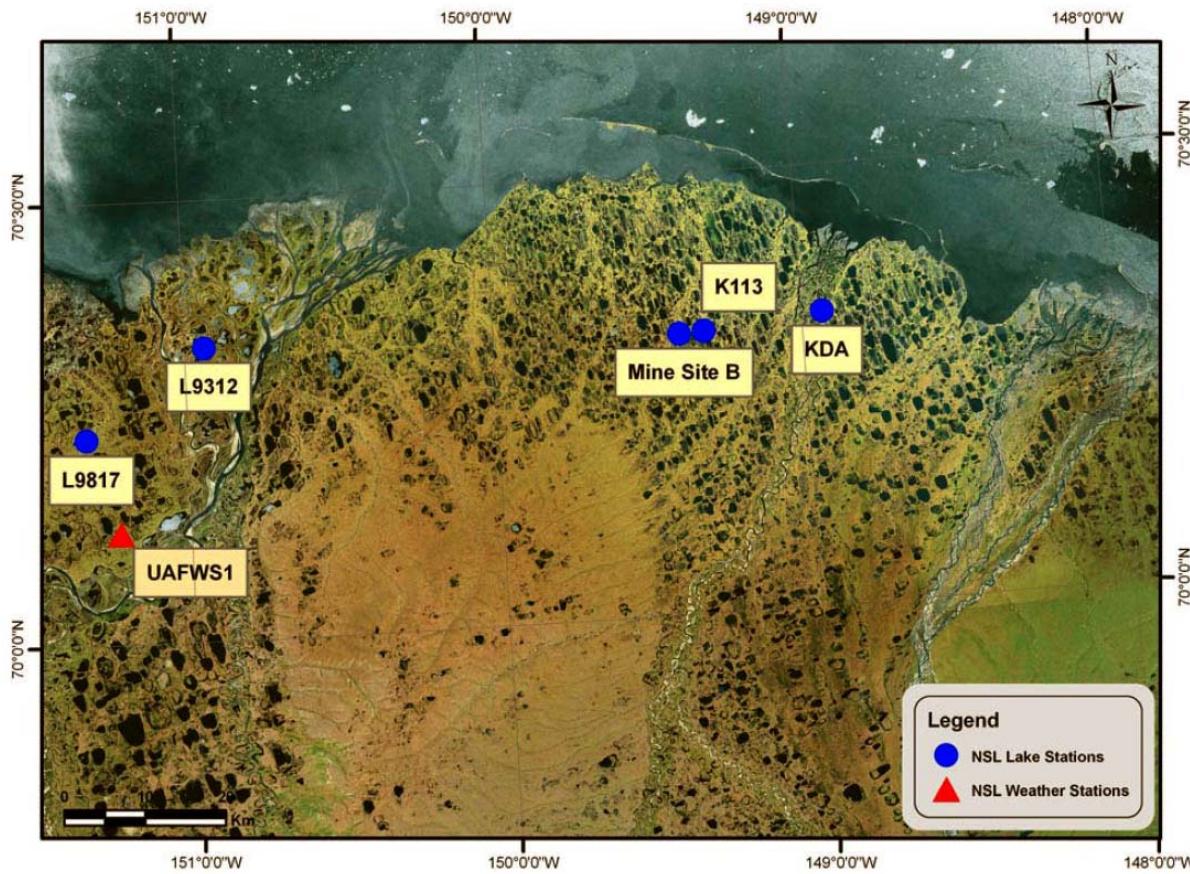


Figure 1. Location of study lakes in the NPR-A, Alpine, Kuparuk, and Prudhoe Bay field operating areas, North Slope, Alaska.

TRIP OBJECTIVES

The goal of each sampling trip is to collect physical and chemical data from each study lake. For each lake, a series of holes are drilled at designated sampling locations. Logistical, personnel, and weather constraints, can limit the amount of time available in the field for sampling. A project workplan was distributed before the trip outlining the sampling schedule (Lilly and others, 2007). In May, we focused on the following locations/tasks:

1. Kuparuk Dead Arm Reservoirs (1-3): Prudhoe Bay operating area.
 - Survey water levels to local elevation control on cells 1, 2, 3.
 - Measure water-quality profile parameters in cells 1, 2, and 3.
 - Conduct snow-course measurements on tundra and lake sites.

- Collect water-column samples from cells 1 and 2.
2. Mine Site B: Prudhoe Bay operating area.
 - Survey water levels to local elevation control on North and South cells.
 - Measure water-quality profile parameters on North and South cells.
 - Measure water depth at eastern and western channels.
 - Conduct water-column samples from North Cell/ South Cell sampling locations.
 3. K113: Kuparuk.
 - Survey water level to local benchmark elevation control.
 - Measure water-quality profile parameters at index sampling location.
 - Conduct snow-course measurements on tundra and lake sites.
 - Collect water-column samples from sampling location.
 4. Big Lake
 - Survey water level to local benchmark elevation control.
 - Measure water-quality profile parameters near pump inlet and in reservoir pit.
 5. Webster Reservoir
 - Survey water level to local benchmark elevation control.
 - Measure water-quality profile parameters near pump inlet and in reservoir pit.
 6. L9312: Alpine Facility
 - Survey water level to local elevation control.
 - Collect water-quality profile data at standard sites.
 - Collect water-column samples from Raft “B” sample location.
 - Conduct snow-course measurements both at tundra and lake locations
 7. L9817: NPRA
 - Survey water level to local BLM elevation control.
 - Collect water-quality profile data.
 - Collect water-column samples from L9817-1 sampling location.
 - Conduct snow course measurements.

PROCEDURES

Water Chemistry Sampling

All field work follows the specified health, safety, and environmental guidelines outlined by BPX and CPA (White and Lilly, 2007 *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 ($\mu\text{s}/\text{cm}$)	Within 10%
100% DO	100 % saturated	Within 10%
0% DO	0 % saturated solution	within 0.3 mg/L
ORP	InSitu 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 (Figure 2). 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.



Figure 2. Field crew conducting snow survey at Lake L9312.

SELECTED RESULTS

Sampling occurred at Kuparuk Deadarm Lakes, Mine Site B, L9312, L9817, Big Lake and Webster Reservoir during May field activities. Tundra travel was open, and allowed access to Lake L9817. As Table 2 demonstrates, water levels dropped at each study lake with the exception of L9817. L9312 does not show as rapid of a water level drop probably due to the large surface area relative to the monthly pumping rate. The increase in water level at L9817 is

most likely due to the absence of pumping combined with the additional snow load on the lake ice surface.

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

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

Sampling Site	Ice Thickness [ft; (m)]	Median DO Concentration [mg/L]	Median Actual Conductivity [µS/cm]	Water level change since mid April [ft; (m)]
KDA2-CT	5.55 (1.69)	14.97	153.1	-0.21 (-0.064)
MSBS-CT	5.56 (1.69)	10.67	288.1	-0.25 (-0.076)
MSBN-CT	5.55 (1.69)	7.69	266.7	-0.63 (-0.192)
L9312 Raft B	5.55 (1.69)	12.29	80.36	-0.02 (-.006)
L9817-1	5.15 (1.57)	0.18	763.3	+0.25 (+0.076)

Lake and tundra snow surveys were collected at L9312 to compare the accumulation at each location. The average snow depth on the tundra was larger than the depths observed on the lake. We measured the density of 5 different snow samples from each location and determined a higher snow water equivalent over the tundra as well (Table 3).

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

L9312	Average Depth (cm)	Snow Water Equivalents
Lake	18.8	2.31; (5.9)
Tundra	50.7	6.38; (16.2)

SUMMARY

Continuous monitoring of the water-quality parameters seen in North Slope lakes throughout the winter will help in the understanding and development of simulation tools necessary for water resource management. As water levels change 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 hope to answer some of the questions brought forth on the effects of mid-winter pumping of North Slope lakes.

REFERENCES

- Holland, K., Derry, J., Reichardt, D., Lilly, M.R., and Kemnitz, R., 2007. Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: April 2007. Water and Environmental Research Center, University of Alaska Fairbanks. 8 p.
- Lilly, M.R., Reichardt, D., and Derry, J., 2007. A Workplan for Lake Chemistry Sampling and Surveying, Snowmelt, and Lake Recharge Monitoring at Study Lakes in NPRA, Alpine, Kuparuk River, and Prudhoe Bay Areas: May 2007. Water and Environmental Research Center, University of Alaska Fairbanks. 21 p.
- White, D.M., and Lilly, M.R. 2007 *a.* BPX: Health, Safety, and Environmental Interface Document. Water and Environmental Research Center, University of Alaska Fairbanks. 4 p.
- White, D.M., and Lilly, M.R. 2007 *b.* BPX: Health, Safety, and Environmental Plan. Water and Environmental Research Center, University of Alaska Fairbanks. 6 p.

White, D.M., and Lilly, M.R. 2007 *c.* ConocoPhillips Alaska, Inc.: Health, Safety, and Environmental Plan. Water and Environmental Research Center, University of Alaska Fairbanks. 5 p.

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
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: Big Lake
 Date: 5/10/07 Time 16:30

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>nr</u>	Easting:	<u>nr</u>	Datum:	<u>nr</u>
Measurements By:	<u>DAR</u>	Time:	<u>nr</u>		
Water Depth (ft):	<u>na</u>	Ice Thickness (ft):	<u>na</u>		
Freeboard (ft):	<u>na</u>	Snow Depth (ft):	<u>na</u>		
Elev. (BPMSL):	<u>na</u>	Survey By:	<u>na</u>	Date:	<u>na</u>
Water Sampling By:	<u>DAR/GM</u>	Sample Depths BWS (ft):	<u>1 Grab</u>	Date:	<u>5/10/07</u>
			<u>2</u>		
			<u>3</u>		

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	PASS	PASS (Conductivity- Fail)
Parameters					
	Pipe	Lake			
Depth BWS (ft):	<u>na</u>	<u>nr</u>			
Temp (°C):	<u>6.78</u>	<u>4.13</u>			
pH:	<u>8.12</u>	<u>8.18</u>			
Barometric (mmHg):	<u>764.2</u>	<u>794.0</u>			
Pressure (kPa):	<u>-</u>	<u>-</u>			
Conductivity (µS/cm):					
RDO (ppm): (mg/L)	<u>-</u>	<u>-</u>			
Turbidity (NTU):	<u>-</u>	<u>-</u>			
ORP	<u>-</u>	<u>-</u>			

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	
Alkalinity (mg/L as CaCO ₃)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										

Remarks: _____

Field-Form Filled Out By: Cormack Date: 7/19/07
 QAQC Check By: Holland Date: 7/20/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: K113-CT
 Date: 5/10/07 Time: 13:15

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°19.178'</u>	Easting:	<u>W149°19.324'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>DAR/GMM</u>	Time:	<u>14:00</u>		
Water Depth (ft):	<u>6.95</u>	Ice Thickness (ft):	<u>5.90</u>		
Freeboard (ft):	<u>0.45</u>	Snow Depth (ft):	<u>0.6</u>		
Elev. (BPMSL +/- .02):	<u>53.21</u>	Survey By:	<u>DAR, GMM</u>	Date:	<u>5/10/07</u> Time: <u>15:15</u>
Water Sampling By:	<u>GMM</u>	Sample Depths BWS (ft):	<u>1 6.5</u>	Date:	<u>5/10/07</u> Time: <u>14:25</u>
			<u>2 na</u>		
			<u>3 na</u>		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ Troll 9000		33033	PASS, Fail pH	Pass, Fail pH, Fail Cond.
Parameters						
Time:	14:13	14:17				
Depth BWS (ft):	6	Bot				
Temp (°C):	-2.9	-1.2				
pH:						
Barometric (mmHg):	764.5	764.6				
Pressure (kPa):	16.399	20.267				
Conductivity (µS/cm):						
RDO (ppm): (mg/L)	0.94	0.95				
Turbidity (NTU):	4.5	267.5				
ORP	609	606				

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): <u>6.5</u>			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)	426	436	430							Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	0.62	0.69	0.59							Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.08	0.09	0.08							Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH ₃ -N
Ammonia/ Iron dilution										

Remarks: Log 2007-05-10 140423

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/3/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: KDA1-CT
Date: 5/8/07 Time: 15:25

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°19.9026'</u>	Easting:	<u>W148°56.6748'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>DAR</u>	Time:	<u>15:25</u>		
Water Depth (ft):	<u>20.8</u>	Ice Thickness (ft):	<u>5.80</u>		
Freeboard (ft):	<u>0.55</u>	Snow Depth (ft):	<u>0.85</u>		
Elev. (BPMSL +/- .02):	<u>8.49</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/8/07</u> Time: <u>17:30</u>
Water Sampling By:	<u>DAR</u>	Sample Depths BWS (ft):	<u>1 6</u> <u>2 12</u> <u>3 20</u>	Date:	<u>5/18/07</u> Time: <u>15:45</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	IN-SITU TROLL 9000	33033	PASS	Pass (ORP- Fail)

Parameters	Field Measurements									
	15:31	15:32	15:33	15:34	15:35	15:36	15:37	15:38	15:40	15:41
Time:	15:31	15:32	15:33	15:34	15:35	15:36	15:37	15:38	15:40	15:41
Depth BWS (ft):	<u>6</u>	<u>7</u>	<u>9</u>	<u>11</u>	<u>13</u>	<u>15</u>	<u>17</u>	<u>19</u>	<u>20</u>	<u>Bot</u>
Temp (°C):	<u>-0.13</u>	<u>0.59</u>	<u>1.31</u>	<u>1.54</u>	<u>1.62</u>	<u>1.65</u>	<u>1.67</u>	<u>1.67</u>	<u>1.69</u>	<u>1.70</u>
pH:	<u>7.78</u>	<u>7.77</u>	<u>7.75</u>	<u>7.74</u>	<u>7.72</u>	<u>7.70</u>	<u>7.68</u>	<u>7.65</u>	<u>7.60</u>	<u>7.58</u>
Barometric (mmHg):	<u>764.2</u>	<u>764.2</u>	<u>764.3</u>	<u>764.4</u>	<u>764.4</u>	<u>764.5</u>	<u>764.5</u>	<u>764.6</u>	<u>764.6</u>	<u>764.7</u>
Pressure (kPa):	<u>16.050</u>	<u>19.345</u>	<u>25.637</u>	<u>31.404</u>	<u>37.367</u>	<u>43.188</u>	<u>49.263</u>	<u>55.045</u>	<u>58.199</u>	<u>61.692</u>
Conductivity (µS/cm):	<u>149.9</u>	<u>152.4</u>	<u>156.0</u>	<u>156.9</u>	<u>156.6</u>	<u>156.7</u>	<u>156.7</u>	<u>156.7</u>	<u>156.7</u>	<u>156.7</u>
RDO (ppm): (mg/L)	<u>13.92</u>	<u>14.11</u>	<u>14.61</u>	<u>14.78</u>	<u>14.95</u>	<u>15.05</u>	<u>15.11</u>	<u>15.13</u>	<u>15.20</u>	<u>15.14</u>
Turbidity (NTU):	<u>0.9</u>	<u>0.9</u>	<u>0.7</u>	<u>0.7</u>	<u>0.8</u>	<u>0.9</u>	<u>0.5</u>	<u>1.1</u>	<u>0.4</u>	<u>35.4</u>
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): <u>6</u>			Depth BWS (ft): <u>12</u>			Depth BWS (ft): <u>20</u>			Method
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as CaCO ₃)	<u>133</u>	<u>133</u>	<u>127</u>	<u>135</u>	<u>130</u>	<u>133</u>	<u>132</u>	<u>125</u>	<u>129</u>	Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	<u>0</u>	<u>0</u>	<u>0</u>	<u>0.01</u>	<u>0.01</u>	<u>0.01</u>	<u>0.03</u>	<u>0.02</u>	<u>0.02</u>	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	<u>0.01</u>	<u>0.02</u>	<u>0.01</u>	<u>0</u>	<u>0.01</u>	<u>0.02</u>	<u>0.02</u>	<u>0.01</u>	<u>0.02</u>	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH ₃ -N
Ammonia/ Iron dilution										

Remarks: Log 2007-05-08 152715

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
QAQC Check By: K. Holland Date: 6/3/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: KDA1-SH
 Date: 5/8/07 Time: 14:33

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°19.9026'</u>	Easting:	<u>W148°56.6748'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>DAR</u>	Time:	<u>14:33</u>		
Water Depth (ft):	<u>10.45</u>	Ice Thickness (ft):	<u>4.95</u>		
Freeboard (ft):	<u>0.00</u>	Snow Depth (ft):	<u>0.90</u>		
Elev. (BPMSL +/- .02):	<u>8.49</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/8/07</u> Time: <u>17:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	IN-SITU TROLL 9000	33033	PASS	Pass (ORP- Fail)

Parameters	Field Measurements					
Time:	14:38	14:39	14:46	14:49	14:50	14:53
Depth BWS (ft):	6	7	8	9	10	Bot
Temp (°C):	-0.05	0.59	1.34	1.54	1.56	1.56
pH:	7.73	7.73	7.71	7.71	7.71	7.69
Barometric (mmHg):	764.3	764.4	764.4	764.4	764.4	764.5
Pressure (kPa):	16.591	19.435	22.740	25.200	28.235	30.215
Conductivity (µS/cm):	151.1	152.6	155.0	155.5	155.6	155.3
RDO (ppm): (mg/L)	13.69	13.89	14.08	14.20	14.38	14.47
Turbidity (NTU):	0.4	0.5	0.7	0.8	1.0	8.1
ORP						

FIELD TESTING OF WATER SAMPLES (if small probe is used)					
Probe:					
Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Log 2007-05-08 143305 Using UAF Rugged Reader.

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: KDA2 - RES2
 Date: 5/8/07 Time: 13:03

FIELD MEASUREMENTS

GPS Coord. Northing:	N70°19.966'	Easting:	W148°56.429'	Datum:	NAD83
Measurements By:	DAR	Time:	13:03		
Water Depth (ft):	17.0	Ice Thickness (ft):	5.55		
Freeboard (ft):	0.40	Snow Depth (ft):	0.85		
Elev. (BPMSL +/- .02):	4.92	Survey By:	DAR, MRL	Date:	5/8/07 17:30
Water Sampling By:	DAR	Sample Depths BWS (ft):	1 6 2 10 3 16.5	Date:	5/8/07 nr

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model			Serial No.	Pre-Sampling QAQC Check		Post-Sampling QAQC Check	
Multi	GWS	IN-SITU TROLL 9000			33033	PASS		Pass (ORP- Fail)	
Parameters									
Time:	13:20	13:22	13:24	13:25	13:27	13:28	13:31	13:36	13:39
Depth BWS (ft):	6	7	9	11	13	15	16	17	Bot
Temp (°C):	-0.09	0.67	1.44	1.55	1.59	1.60	1.59	1.59	1.58
pH:	7.58	7.58	7.58	7.56	7.53	7.51	7.44	7.37	7.36
Barometric (mmHg):	764.2	764.3	764.4	764.4	764.5	764.5	764.6	764.7	764.7
Pressure (kPa):	16.343	19.306	25.429	31.322	37.414	43.144	46.223	49.218	49.837
Conductivity (µS/cm):	149.1	150.2	152.3	152.6	153.1	153.2	154.1	154.9	154.9
RDO (ppm): (mg/L)	14.46	14.71	14.97	15.02	15.02	14.99	14.98	13.79	13.45
Turbidity (NTU):	1.4	1.5	1.4	1.5	1.7	1.6	1.8	1.7	6.1
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): <u>6</u>			Depth BWS (ft): <u>10</u>			Depth BWS (ft): <u>16.5</u>			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)	130	132	129	128	129	123	133	130	132	Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	0.03	0.02	0.02	0.02	0.02	0.03	0.07	0.06	0.07	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.02	0.01	0.01	0.01	0.01	0	0.02	0.01	0.01	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH ₃ -N
Ammonia/ Iron dilution										

Remarks: Used UAF Rugged Reader

Log 2007-05-08 130129

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: KDA3-CT
Date: 5/8/07 Time: 16:39

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.025</u>	Easting:	<u>W148°56.2044</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>DAR</u>	Time:	<u>16:39</u>		
Water Depth (ft):	<u>20.65</u>	Ice Thickness (ft):	<u>5.60</u>		
Freeboard (ft):	<u>0.30</u>	Snow Depth (ft):	<u>0.7</u>		
Elev. (BPMSL +/- .02):	<u>4.91</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/8/07</u> Time: <u>17:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check		Post-Sampling QAQC Check		
Mulit	GWS	IN-SITU TROLL 9000		33033	PASS		Pass (ORP- Fail)		
Parameters									
Time:	16:43	16:44	16:45	16:46	16:47	16:50	16:51	16:52	16:54
Depth BWS (ft):	6	7	9	11	13	15	17	19	20
Temp (°C):	-0.15	0.29	1.15	1.29	1.37	1.39	1.40	1.40	1.40
pH:	7.71	7.70	7.69	7.68	7.66	7.61	7.59	7.58	7.56
Barometric (mmHg):	764.2	764.2	764.3	764.3	764.4	764.5	764.5	764.6	764.6
Pressure (kPa):	16.405	19.118	25.213	31.314	37.483	43.244	49.392	55.293	58.463
Conductivity (µS/cm):	132.2	132.9	134.5	134.0	134.3	134.4	134.5	136.5	134.7
RDO (ppm): (mg/L)	14.16	14.28	14.43	14.42	14.45	14.51	14.52	14.51	14.47
Turbidity (NTU):	0.3	0.4	0.4	0.4	0.6	0.4	0.5	0.4	0.4
ORP									

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Note-wet snow where water was pulled up during drilling, might have some color.

Used UAF Rugged Reader Log 2007-05-08 163551

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9312 Raft A
 Date: 5/13/07 Time: 11:55

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.053'</u>	Easting:	<u>W150°56.600'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM/DAR</u>	Time:	<u>12:45</u>		
Water Depth (ft):	<u>10.08</u>	Ice Thickness (ft):	<u>4.98</u>		
Freeboard (ft):	<u>0.20</u>	Snow Depth (ft):	<u>0.70</u>		
Elev. (BPMSL):	<u>7.48</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/13/07</u> Time: <u>14:30</u>
Water Sampling By:	<u>GMM/DAR</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check		Post-Sampling QAQC Check	
Multi	UAF	InSitu Troll 9000		33205	PASS		PASS (Conductivity - Fail)	
Parameters								
Time:	12:55	13:03	13:16	13:20	13:25	13:34	13:37	
Depth BWS (ft):	5	6	7	8	9	10	Bot	
Temp (°C):	0.07	0.21	1.15	1.73	2.20	2.34	2.34	
pH:	6.70	6.68	6.61	6.61	6.61	6.60	6.65	
Barometric (mmHg):	769.2	769.4	769.5	769.5	769.6	769.7	769.7	
Pressure (kPa):	13.682	16.502	20.891	22.694	25.500	28.720	29.014	
Conductivity (µS/cm):								
RDO (ppm):	9.98	10.15	6.92	6.79	6.80	5.07	4.81	
Turbidity (NTU):	0.5	0.8	11.6	1.5	1.7	18.0	18.4	
ORP								

FIELD TESTING OF WATER SAMPLES (if small probe is used)				
Probe:				
Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: LOG 2007-05-13 115548

Switched in-situ ENTS because GWS filled with water and readings incorrectly.

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9312 AB Midpoint
 Date: 5/13/07 Time: 13:48

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.024'</u>	Easting:	<u>W150°56.753'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM</u>	Time:	<u>13:50</u>		
Water Depth (ft):	<u>11.02</u>	Ice Thickness (ft):	<u>5.45</u>		
Freeboard (ft):	<u>0.4</u>	Snow Depth (ft):	<u>nr</u>		
Elev. (BPMSL):	<u>7.48</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/13/07</u> Time: <u>14:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	UAF	InSitu Troll 9000		33205	PASS	PASS (Conductivity - Fail)
Parameters						
Time:		14:02	14:11	14:19	14:25	14:36
Depth BWS (ft):		6	7	8	9	10
Temp (°C):		0.32	1.47	1.91	2.27	2.32
pH:		6.80	6.76	6.73	6.71	6.65
Barometric (mmHg):		769.6	769.8	769.8	769.8	769.9
Pressure (kPa):		16.284	19.920	22.407	25.240	28.656
Conductivity (µS/cm):						
RDO (ppm):		12.04	11.66	10.12	8.65	4.98
Turbidity (NTU):		1.3	1.4	0.9	1.2	2.6
ORP						

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Log 2007-05-13 115548

Field-Form Filled Out By: A Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9312 Raft B
Date: 5/13/07 Time 10:18

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°19.995'</u>	Easting:	<u>W150°56.918'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM/DAR</u>	Time:	<u>10:20</u>		
Water Depth (ft):	<u>11.1</u>	Ice Thickness (ft):	<u>5.55</u>		
Freeboard (ft):	<u>0.32</u>	Snow Depth (ft):	<u>0.60</u>		
Elev. (BPMSL):	<u>7.48</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/13/07</u> Time: <u>14:30</u>
Water Sampling By:	<u>GMM/DAR</u>	Sample Depths BWS (ft):	<u>1 6</u> <u>2 9</u> <u>3 10.5</u>	Date:	<u>5/13/07</u> Time: <u>nr</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check		
Multi	GWS	InSitu Troll 9000		33033	PASS	PASS (Conductivity - Fail)		
Parameters								
Time:	10:35	10:41	10:50	10:54	11:01	11:06		
Depth BWS (ft):	6	7	8	9	10	Bot		
Temp (°C):	0.08	0.99	1.07	2.06	2.34	2.40		
pH:	7.00	6.95	6.92	6.74	6.64	6.72		
Barometric (mmHg):	767.7	767.8	767.2	767.9	768.0	768.1		
Pressure (kPa):	17.380	20.177	19.713	25.554	28.330	32.681		
Conductivity (µS/cm):	76.05	77.15	77.41	83.31	87.23	91.17		
RDO (ppm): (mg/L)	12.63	12.85	12.67	11.94	8.07	6.31		
Turbidity (NTU):	0.7	1.0	1.9	3.1	1.9	190.5		
ORP	641	630	628	624	626	629		

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): <u>6</u>			Depth BWS (ft): <u>9</u>			Depth BWS (ft): <u>10.5</u>			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)	53	60	51	63	66	57	63	64	62	Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	0.05	0.06	0.06	0.21	0.19	0.21	1.30	1.34	1.31	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.02	0.03	0.03	0.23	0.24	0.24	4.00*	4.00*	4.00*	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH ₃ -N

Remarks: Log 2007-05-13 102309

* Results obtained by running 1:10 dilution

Field-Form Filled Out By: A.Blackburn Date: 6/1/07
QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9312 Screen
 Date: 5/13/07 Time: 15:00

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.003'</u>	Easting:	<u>W150°57.005'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM</u>	Time:	<u>15:01</u>		
Water Depth (ft):	<u>11.18</u>	Ice Thickness (ft):	<u>5.6</u>		
Freeboard (ft):	<u>0.45</u>	Snow Depth (ft):	<u>0.7</u>		
Elev. (BPMSL):	<u>7.48</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/13/07</u> Time: <u>14:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	UAF	InSitu Troll 9000		33205	PASS	PASS (Conductivity - Fail)
Parameters						
Time:	15:07	15:13	15:28	15:41	15:50	15:54
Depth BWS (ft):	6	7	9	10	11	Bot
Temp (°C):	0.39	1.46	2.38	2.47	2.51	2.51
pH:	6.85	6.86	6.74	6.51	6.62	6.77
Barometric (mmHg):	770.0	770.0	770.1	770.2	770.3	770.4
Pressure (kPa):	16.365	19.424	25.481	28.287	31.407	32.848
Conductivity (µS/cm):						
RDO (ppm):	13.04	13.70	11.99	6.73	2.35	2.01
Turbidity (NTU):	0.7	0.8	1.0	3.0	5.3	196.7
ORP						

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Log 2007-05-13 150020

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9312 SH
Date: 5/13/07 Time: 16:04

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.017'</u>	Easting:	<u>W150°57.076'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM/DAR</u>	Time:	<u>16:06</u>		
Water Depth (ft):	<u>9.55</u>	Ice Thickness (ft):	<u>5.6</u>		
Freeboard (ft):	<u>0.35</u>	Snow Depth (ft):	<u>0.5</u>		
Elev. (BPMSL):	<u>7.48</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/13/07</u> Time: <u>14:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	UAF	InSitu Troll 9000		33205	PASS	PASS (Conductivity - Fail)
Parameters						
Time:	16:06	16:13	16:22	16:31	16:42	16:46
Depth BWS (ft):	5	6	7	8	9	Bot
Temp (°C):	0.13	0.23	0.93	1.50	1.91	1.95
pH:	6.79	6.77	6.60	6.61	6.64	6.68
Barometric (mmHg):	770.1	770.2	770.3	770.3	770.4	770.4
Pressure (kPa):	13.764	16.240	19.288	22.323	25.660	28.044
Conductivity (µS/cm):						
RDO (ppm):	11.18	10.97	5.70	4.70	3.18	1.41
Turbidity (NTU):	0.7	3.1	1.7	3.9	3.6	9.8
ORP						

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Log 2007-05-13 160219

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9312-BAKER
Date: 5/14/07 Time: 10:10

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.8683</u>	Easting:	<u>W150°56.3499</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM/DAR</u>	Time:	<u>10:20</u>		
Water Depth (ft):	<u>11.4</u>	Ice Thickness (ft):	<u>5.75</u>		
Freeboard (ft):	<u>4.2</u>	Snow Depth (ft):	<u>0.3</u>		
Elev. (BPMSL):	<u>7.48</u>	Survey By:	<u>DAR, MRL</u>	Date:	<u>5/13/07</u> Time: <u>14:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check		Post-Sampling QAQC Check	
Multi	UAF	InSitu Troll 9000		33205	PASS		PASS	
Parameters								
Time:	10:37	10:40	10:46	10:51	11:01	11:13	11:23	
Depth BWS (ft):	6	7	8	9	10	11	Bot	
Temp (°C):	0.37	0.93	1.83	2.41	2.81	3.13	3.16	
pH:	6.57	6.51	6.49	6.47	6.48	6.38	6.50	
Barometric (mmHg):	773.5	773.5	773.6	773.7	773.8	773.8	773.8	
Pressure (kPa):	16.774	19.467	22.199	25.714	28.235	31.840	33.751	
Conductivity (µS/cm):	94.61	95.69	97.46	99.85	103.5	109.1	111.2	
RDO (ppm):	16.19	16.16	15.66	15.40	14.97	5.39	4.44	
Turbidity (NTU):	1.0	0.6	0.4	0.6	0.9	2.3	282.0	
ORP								

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: _____

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9313-BAKER
Date: 5/14/07 Time: 9:24

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°20.3412</u>	Easting:	<u>W150°56.3422</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM/DAR</u>	Time:	<u>9:27</u>		
Water Depth (ft):	<u>8.85</u>	Ice Thickness (ft):	<u>5.65</u>		
Freeboard (ft):	<u>0.3</u>	Snow Depth (ft):	<u>0.5</u>		
Elev. (BPMSL):	<u>na</u>	Survey By:	<u>na</u>	Date:	<u>na</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u>	Date:	<u>na</u>
			<u>2 na</u>		
			<u>3 na</u>		

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	UAF	InSitu Troll 9000		33205	PASS	PASS
Parameters						
Time:	9:39	9:41	9:48	9:54		
Depth BWS (ft):	6	7	8	Bot		
Temp (°C):	0.25	1.08	2.12	2.30		
pH:	6.64	6.62	6.65	6.69		
Barometric (mmHg):	773.4	773.4	773.4	773.5		
Pressure (kPa):	16.577	19.494	22.647	25.998		
Conductivity (µS/cm):	349.2	354.1	370.0	375.3		
RDO (ppm):	5.15	5.16	4.44	3.93		
Turbidity (NTU):	2.0	1.6	2.1	19.9		
ORP						

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Michael Baker's hole; no log

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9817-20
 Date: 5/15/07 Time: 14:20

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°14.079'</u>	Easting:	<u>W151°19.969'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>DAR/GMM</u>	Time:	<u>14:25</u>		
Water Depth (ft):	<u>8.4</u>	Ice Thickness (ft):	<u>4.65</u>		
Freeboard (ft):	<u>0.1</u>	Snow Depth (ft):	<u>1.30</u>		
Elev. (BPMSL +/- .02):	<u>100</u>	Survey By:	<u>DAR/CC</u>	Date:	<u>5/25/07</u> Time: <u>13:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check	
MULTI	UAF	InSitu Troll 9000		33205	PASS	PASS	
Parameters							
Time:	14:32	14:36	14:38	14:40	14:42		
Depth BWS (ft):	5	6	7	8	BOT		
Temp (°C):	0.04	0.09	0.34	0.60	0.70		
pH:	6.72	6.73	6.73	6.79	7.09		
Barometric (mmHg):	769.7	769.7	769.7	769.8	769.7		
Pressure (kPa):	13.602	16.390	19.510	22.591	23.670		
Conductivity (µS/cm):	745.1	745.4	752.3	758.1	765.0		
RDO (ppm): (mg/L)	0.19	0.13	0.12	0.11	0.09		
Turbidity (NTU):	2.7	3.2	3.8	4.5	74.1		
ORP							

FIELD TESTING OF WATER SAMPLES (if small probe is used)				
Probe:				
Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Log # 2007-05-15 1413128

Field-Form Filled Out By: Rsamuel Date: 7/5/07
 QAQC Check By: K. Holland Date: 7/9/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9817-3
Date: 5/15/07 Time: 13:35

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70 14.043</u>	Easting:	<u>W151 19.840</u>	Datum:	<u>NAD 27</u>
Measurements By:	<u>GMM</u>	Time:	<u>13:42</u>		
Water Depth (ft):	<u>7.8</u>	Ice Thickness (ft):	<u>4.75</u>		
Freeboard (ft):	<u>0.15</u>		<u>0.4</u>		
Elev. (BPMSL +/- .02):	<u>100</u>	Survey By:	<u>DAR/CC</u>	Date:	<u>5/25/07</u> Time: <u>13:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
MULTI	UAF	InSitu Troll 9000		33205	PASS	PASS
Parameters						
Time:		13:45	13:48	13:50	13:52	
Depth BWS (ft):		<u>5</u>	<u>6</u>	<u>7</u>	BOT	
Temp (°C):		<u>0.06</u>	<u>0.09</u>	<u>0.29</u>	<u>0.57</u>	
pH:		<u>6.65</u>	<u>6.64</u>	<u>6.63</u>	<u>6.65</u>	
Barometric (mmHg):		<u>769.8</u>	<u>769.8</u>	<u>769.8</u>	<u>769.8</u>	
Pressure (kPa):		<u>13.372</u>	<u>16.333</u>	<u>19.556</u>	<u>22.231</u>	
Conductivity (µS/cm):		<u>755.2</u>	<u>753.5</u>	<u>756.8</u>	<u>766.0</u>	
RDO (ppm): (mg/L)		<u>0.18</u>	<u>0.16</u>	<u>0.13</u>	<u>0.11</u>	
Turbidity (NTU):		<u>9.9</u>	<u>7.1</u>	<u>5.4</u>	<u>31.0</u>	
ORP						

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: log # 2007/05/15 134328

Field-Form Filled Out By: RSamuel Date: 6/6/07
QAQC Check By: K. Holland Date: 7/9/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9817-4
 Date: 5/15/07 Time: 13:59

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°13.998'</u>	Easting:	<u>W151°19.997'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM</u>	Time:	<u>13:59</u>		
Water Depth (ft):	<u>5.95</u>	Ice Thickness (ft):	<u>5.2</u>		
Freeboard (ft):	<u>0.05</u>	Snow Depth (ft):	<u>1.8</u>		
Elev. (BPMSL +/- .02):	<u>100</u>	Survey By:	<u>DAR/CC</u>	Date:	<u>5/25/07</u> Time: <u>13:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
MULTI	UAF	InSitu Troll 9000	33205	PASS	PASS
Parameters					
Time:	14:08	14:10			
Depth BWS (ft):	5.5	BOT			
Temp (°C):	0.00	0.00			
pH:	6.68	6.88			
Barometric (mmHg):	769.7	769.7			
Pressure (kPa):	14.851	16.922			
Conductivity (µS/cm):	750.1	757.3			
RDO (ppm): (mg/L)	0.18	0.12			
Turbidity (NTU):	1.7	63.5			
ORP					

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: log #2007-05-15 1403xx

Field-Form Filled Out By: Rsamuel Date: 7/1/07
 QAQC Check By: K. Holland Date: 7/9/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9817-1
 Date: 5/15/07 Time 12:00

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°14.070'</u>	Easting:	<u>W151°20.121'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM</u>	Time:	<u>12:01</u>		
Water Depth (ft):	<u>8.53</u>	Ice Thickness (ft):	<u>5.15</u>		
Freeboard (ft):	<u>0.25</u>	Snow Depth (ft):	<u>0.2</u>		
Elev. (BPMSL):	<u>100</u>	Survey By:	<u>DAR/CC</u>	Date:	<u>5/25/07</u> Time: <u>13:30</u>
Water Sampling By:	<u>DAR</u>	Sample Depths BWS (ft):	<u>1 6</u> <u>2 7</u> <u>3 8</u>	Date:	<u>5/15/07</u> Time: <u>nr</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
MULTI	UAF	InSitu Troll 9000		33205	PASS	PASS
Parameters						
Time:		12:13	12:17	12:20	12:27	
Depth BWS (ft):		<u>6</u>	<u>7</u>	<u>8</u>	Bot	
Temp (°C):		<u>0.16</u>	<u>0.45</u>	<u>0.68</u>	<u>0.93</u>	
pH:		<u>6.69</u>	<u>6.69</u>	<u>6.70</u>	<u>6.88</u>	
Barometric (mmHg):		<u>769.9</u>	<u>770.0</u>	<u>770.0</u>	<u>770.1</u>	
Pressure (kPa):		<u>16.340</u>	<u>19.398</u>	<u>22.362</u>	<u>23.923</u>	
Conductivity (µS/cm):		<u>748.1</u>	<u>757.3</u>	<u>769.2</u>	<u>775.5</u>	
RDO (ppm): (mg/L)		<u>0.17</u>	<u>0.17</u>	<u>0.18</u>	<u>0.21</u>	
Turbidity (NTU):		<u>4.0</u>	<u>3.3</u>	<u>3.9</u>	<u>10.1</u>	
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): <u>6 ft</u>			Depth BWS (ft): <u>7 ft</u>			Depth BWS (ft): <u>8</u>			Method
Alkalinity (mg/L as CaCO ₃)	<u>235</u>	<u>229</u>	<u>229</u>	<u>236</u>	<u>240</u>	<u>250</u>	<u>252</u>	<u>249</u>	<u>255</u>	Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	<u>0.45</u>	<u>0.45</u>	<u>0.46</u>	<u>0.71</u>	<u>0.71</u>	<u>0.70</u>	<u>29.9</u>	<u>30.1</u>	<u>30.2</u>	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	<u>0.08</u>	<u>0.06</u>	<u>0.05</u>	<u>0.28</u>	<u>0.26</u>	<u>0.24</u>	<u>31.2</u>	<u>31.6</u>	<u>32.1</u>	Hach spec 0.02-3.00 mg/L

Remarks: 2007-05-15 121206

Field-Form Filled Out By: A.Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
Sample Purpose: Lake Water Quality

Site Location/Lake ID: L9817 - 2
Date: 5/15/07 Time 13:05

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°14.046'</u>	Easting:	<u>W151°20.079'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM</u>	Time:	<u>13:07</u>		
Water Depth (ft):	<u>7.20</u>	Ice Thickness (ft):	<u>5.25</u>		
Freeboard (ft):	<u>0.25</u>	Snow Depth (ft):	<u>0.95</u>		
Elev. (BPMSL):	<u>100</u>	Survey By:	<u>DAR/CC</u>	Date:	<u>5/25/07</u> Time: <u>13:30</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model		Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
MULTI	UAF	InSitu Troll 9000		33205	PASS	PASS
Parameters						
Time:		13:17	13:20	13:22	13:25	
Depth BWS (ft):		5.5	6	7	Bot	
Temp (°C):		0.06	0.06	0.25	0.37	
pH:		6.59	6.59	6.59	6.59	
Barometric (mmHg):		769.8	769.8	769.8	769.8	
Pressure (kPa):		14.836	16.573	19.326	20.688	
Conductivity (µS/cm):		755.1	754.1	758.3	761.1	
RDO (ppm): (mg/L)		0.36	0.26	0.22	0.17	
Turbidity (NTU):		3.4	4.2	4.9	37.4	
ORP						

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	Depth BWS (ft): _____			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	
Alkalinity (mg/L as CaCO ₃)										Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L

Remarks: LOG 2007-05-15 131329

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
QAQC Check By: K. Holland Date: 6/5/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: MSBN-CT (pg 1 of 2)
 Date: 5/9/07 Time: 12:33

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70 19.280</u>	Easting: <u>W149 24.009</u>	Datum: <u>NAD 83</u>
Measurements By:	<u>DAR</u>	Time: <u>12:35</u>	
Water Depth (ft):	<u>31.83</u>	Ice Thickness (ft): <u>5.55</u>	
Freeboard (ft):	<u>0.38</u>	Snow Depth (ft): <u>0.70</u>	
Elev. (BPMSL +/- .02):	<u>92.58</u>	Survey By: <u>DAR/MRL</u>	Date: <u>5/9/07</u> Time: <u>na</u>
Water Sampling By:	<u>DAR</u>	Sample Depths BWS (ft): <u>1 6</u>	Date: <u>5/9/07</u> Time: <u>nr</u>
		<u>2 21</u>	
		<u>3 31</u>	

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ Trolle 9000	33033	Pass	PASS (ORP- Fail)

Parameters	Field Measurements								
	12:46	12:47	12:48	12:49	12:49	12:50	12:51	12:54	12:56
Time:	12:46	12:47	12:48	12:49	12:49	12:50	12:51	12:54	12:56
Depth BWS (ft):	<u>6</u>	<u>7</u>	<u>9</u>	<u>11</u>	<u>13</u>	<u>15</u>	<u>17</u>	<u>19</u>	<u>21</u>
Temp (°C):	-0.27	-0.28	-0.29	-0.29	-0.29	-0.28	-0.28	-0.25	-0.19
pH:	7.20	7.20	7.19	7.16	7.11	7.07	7.00	6.87	6.83
Barometric (mmHg):	764.1	764.3	764.2	764.3	764.4	764.4	764.5	764.6	764.6
Pressure (kPa):	16.362	19.252	25.226	31.246	37.205	43.498	49.118	55.408	61.363
Conductivity (µS/cm):	266.3	269.2	268.7	265.8	265.4	265.4	265.2	264.9	264.4
RDO (ppm): (mg/L)	7.70	7.71	7.73	7.76	7.78	7.78	7.76	7.76	7.67
Turbidity (NTU):	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.3
ORP									

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	Depth BWS (ft): <u>6</u>			Depth BWS (ft): <u>21</u>			Depth BWS (ft): <u>31</u>			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)	198	189	200	179	210	193	263	255	255	Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	0.05	0.06	0.04	0.07	0.07	0.07	0.67	0.69	0.69	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.07	0.06	0.06	0.05	0.02	0.02	0.18	0.14	0.15	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH ₃ -N
Ammonia/ Iron dilution										

Remarks: UAF Rugged Reader LOG: 2007-05-09 123307

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: MSBN-CT (pg 2 of 2)
 Date: 5/9/07 Time: 12:33

FIELD MEASUREMENTS

GPS Coord. Northing:	N70 19.280	Easting: W149 24.009	Datum: NAD 83
Measurements By:	DAR	Time: 12:35	
Water Depth (ft):	31.83	Ice Thickness (ft): 5.55	
Freeboard (ft):	0.38	Snow Depth (ft): 0.70	
Elev. (BPMSL +/- .02):	92.58	Survey By: DAR/MRL	Date: na Time: na
Water Sampling By:	DAR	Sample Depths BWS (ft): 1 6 2 21 3 31	Date: 5/9/07 Time: nr

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ Trolle 9000	33033	Pass	PASS (ORP - Fail)

Parameters

Field Measurements								
Time:	12:58	13:01	13:07	13:12	13:16	13:19	13:21	
Depth BWS (ft):	23	25	27	29	30	31	Bot	
Temp (°C):	-0.09	-0.02	0.05	0.12	0.14	0.15	0.16	
pH:	6.80	6.73	6.70	6.67	6.69	6.77	6.79	
Barometric (mmHg):	764.7	764.8	764.9	765.1	765.0	765.0	765.1	
Pressure (kPa):	67.023	73.261	78.999	85.283	87.927	91.184	94.441	
Conductivity (µS/cm):	265.1	267.0	271.8	293.1	301.5	356.5	390.6	
RDO (ppm): (mg/L)	7.19	6.18	4.73	2.36	1.66	0.83	0.71	
Turbidity (NTU):	0.5	0.8	1.6	2.4	5.9	13.3	14.0	
ORP								

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

Probe:

Depth (ft) Temp (°C) pH Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: UAF Rugged Reader LOG: 2007-05-09 123307. See page 1 for chemistry.

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: MSBS-CT (pg 1 of 2)
 Date: 5/9/07 Time: 14:12

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70 19.214</u>	Easting:	<u>W149 24.020</u>	Datum:	<u>NAD 83</u>
Measurements By:	<u>DAR</u>	Time:	<u>14:15</u>		
Water Depth (ft):	<u>26.55</u>	Ice Thickness (ft):	<u>5.56</u>		
Freeboard (ft):	<u>0.38</u>	Snow Depth (ft):	<u>0.7</u>		
Elev. (BPMSL +/- .02):	<u>93.63</u>	Survey By:	<u>DAR/MRL</u>	Date:	<u>5/9/07</u> Time: <u>na</u>
Water Sampling By:	<u>DAR</u>	Sample Depths BWS (ft):	<u>1 6 2 16 3 26</u>	Date:	<u>5/9/07</u> Time: <u>nr</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ Trolle 9000	33033	Pass	PASS (ORP - Fail)

Parameters

	Field Measurements									
Time:	14:23	14:24	14:26	14:29	14:32	14:35	14:37	14:38	14:40	14:41
Depth BWS (ft):	6	7	9	11	13	15	17	19	21	23
Temp (°C):	-0.22	-0.22	-0.21	0.14	0.19	0.18	0.19	0.19	0.19	0.19
pH:	7.45	7.45	7.44	7.37	7.34	7.30	7.27	7.26	7.23	7.19
Barometric (mmHg):	764.4	764.4	764.4	764.5	764.5	764.5	764.6	764.7	764.7	764.8
Pressure (kPa):	16.485	19.407	25.432	31.397	37.094	43.237	49.338	55.189	61.096	67.322
Conductivity (µS/cm):	286.1	286.0	286.1	287.9	288.2	288.2	288.1	288.1	288.1	288.1
RDO (ppm): (mg/L)	10.99	11.05	11.06	10.67	10.49	10.45	10.45	10.50	10.57	10.69
Turbidity (NTU):	3.2	3.8	3.5	0.9	0.5	0.5	0.6	0.3	0.3	0.3
ORP										

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	Depth BWS (ft): <u>6</u>			Depth BWS (ft): <u>16</u>			Depth BWS (ft): <u>26</u>			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)	226	217	224	210	218	217	223	219	228	Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)	0.10	0.05	0.06	0.14	0.09	0.07	8.00*	8.20*	8.60*	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.06	0.05	0.05	0.05	0.02	0.06	4.90*	5.40*	5.10*	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH ₃ -N
Ammonia/ Iron dilution										

Remarks: Used UAF Rugged Reader * calculated from 1:10 dilution

LOG: 2007-05-09 141941

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: MSBS-CT (pg 2 of 2)
 Date: 5/9/07 Time: 14:12

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70 19.214</u>	Easting:	<u>W149 24.020</u>	Datum:	<u>NAD 83</u>
Measurements By:	<u>DAR</u>	Time:	<u>14:15</u>		
Water Depth (ft):	<u>26.55</u>	Ice Thickness (ft):	<u>5.56</u>		
Freeboard (ft):	<u>0.38</u>	Snow Depth (ft):	<u>0.7</u>		
Elev. (BPMSL +/- .02):	<u>93.63</u>	Survey By:	<u>DAR/MRL</u>	Date:	<u>na</u>
Water Sampling By:	<u>DAR</u>	Sample Depths BWS (ft):	<u>1 6</u>	Date:	<u>5/9/07</u>
			<u>2 16</u>		Time: <u>na</u>
			<u>3 26</u>		Time: <u>nr</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ Trolle 9000	33033	Pass	PASS (ORP - Fail)

Parameters	Field Measurements							
	14:44	14:46	15:04					
Time:	14:44	14:46	15:04					
Depth BWS (ft):	25	26	Bot					
Temp (°C):	0.20	0.20	0.38					
pH:	7.17	7.14	7.61					
Barometric (mmHg):	764.9	764.9	764.9					
Pressure (kPa):	73.075	76.064	78.859					
Conductivity (µS/cm):	288.2	288.3	399.9					
RDO (ppm): (mg/L)	10.75	10.68	3.13					
Turbidity (NTU):	0.5	0.5	6.8					
ORP								

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: Used UAF Rugged Reader * calculated from 1:10 dilution. See page 1 for chemistry info.

LOG: 2007-05-09 141941

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: MSBS-SW
 Date: 5/9/07 Time: 15:40

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70 19.186</u>	Easting:	<u>W149 24.234</u>	Datum:	<u>NAD 83</u>
Measurements By:	<u>DAR</u>	Time:	<u>15:45</u>		
Water Depth (ft):	<u>18.6</u>	Ice Thickness (ft):	<u>6.10</u>		
Freeboard (ft):	<u>0.50</u>	Snow Depth (ft):	<u>0.65</u>		
Elev. (BPMSL +/- .02):	<u>93.63</u>	Survey By:	<u>DAR/MRL</u>	Date:	<u>na</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u>
				Time:	<u>na</u>
				Time:	<u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	In-Situ Trolle 9000	33033	Pass	PASS (ORP - Fail)

Parameters

Field Measurements									
Time:	15:45	15:48	15:50	15:52	15:54	15:56	15:57	15:59	16:00
Depth BWS (ft):	6	7	9	11	13	15	16	17	18
Temp (°C):	-0.23	-0.23	-0.17	0.18	0.19	0.19	0.19	0.19	0.20
pH:	7.54	7.52	7.50	7.46	7.45	7.43	7.43	7.40	7.39
Barometric (mmHg):	764.4	764.4	764.4	764.5	764.5	764.6	764.6	764.7	764.7
Pressure (kPa):	12.900	19.252	25.433	31.357	37.368	43.272	46.183	49.099	52.183
Conductivity (µS/cm):	288.8	284.9	288.1	290.4	290.9	287.5	287.5	287.6	287.7
RDO (ppm): (mg/L)	12.22	11.92	11.74	10.88	10.70	10.62	10.58	10.54	10.53
Turbidity (NTU):	3.5	2.6	3.6	0.4	0.6	0.5	0.3	0.6	0.3
ORP									

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

Probe:

Depth (ft) Temp (°C) pH Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	Depth BWS (ft):			Depth BWS (ft):			Depth BWS (ft):			Method
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as CaCO ₃)										Digital titrator 10-4000 mg/L as CaCO ₃
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH ₃ -N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks: UAF Rugged Reader LOG: 2007-05-09 154209

Field-Form Filled Out By: A. Blackburn Date: 5/31/07
 QAQC Check By: K. Holland Date: 6/4/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes
 Sample Purpose: Lake Water Quality

Site Location/Lake ID: Webster-CT
 Date: 5/11/07 Time: 18:26

FIELD MEASUREMENTS

GPS Coord. Northing:	<u>N70°15.589'</u>	Easting:	<u>W148°18.373'</u>	Datum:	<u>NAD83</u>
Measurements By:	<u>GMM/DAR</u>	Time:	<u>18:30</u>		
Water Depth (ft):	<u>12.12</u>	Ice Thickness (ft):	<u>5.85</u>		
Freeboard (ft):	<u>0.43</u>	Snow Depth (ft):	<u>0.6</u>		
Elev. (BPMSL):	<u>88.89</u>	Survey By:	<u>DAR</u>	Date:	<u>5/11/07</u> Time: <u>19:00</u>
Water Sampling By:	<u>na</u>	Sample Depths BWS (ft):	<u>1 na</u> <u>2 na</u> <u>3 na</u>	Date:	<u>na</u> Time: <u>na</u>

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model			Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	GWS	InSitu Troll 9000			33033	PASS	PASS (Conductivity - Fail)
Parameters							
Time:	16:30	16:34	16:37	16:40	16:44	16:46	16:49
Depth BWS (ft):	6	7	9	10	11	12	Bot
Temp (°C):	0.13	0.53	1.30	1.54	1.85	2.04	2.07
pH:	7.89	7.88	7.84	7.82	7.78	7.72	7.69
Barometric (mmHg):	761.3	761.3	761.3	761.3	761.3	761.2	761.4
Pressure (kPa):	16.193	19.331	26.167	28.245	31.366	34.246	35.446
Conductivity (µS/cm):							
RDO (ppm):	13.88	14.17	14.49	14.51	14.15	13.52	13.05
Turbidity (NTU):	0.2	0.4	0.4	0.7	0.8	1.0	283.9
ORP	619	613	608	607	606	605	603

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

Probe:

Depth (ft)				
Temp (°C)				
pH				
Eh				

NORTH SLOPE LAB CHEMISTRY ANALYSIS

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

Remarks: _____

Field-Form Filled Out By: A. Blackburn Date: 6/1/07
 QAQC Check By: K. Holland Date: 6/5/07

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: K113, Big Lake
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu 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	5/9/07	2227	Oakton	2612530	Dec-08	4.08 @ 21.82	Pass
pH 7.00	5/9/07	2233	Oakton	2612531	Dec-08	7.03 @ 21.48	Pass
pH 10.00	5/9/07	2236	Oakton	2612532	Jun-08	10.04 @ 19.80	Pass
Conductivity	5/9/07	2222	Oakton 447us/cm	2701471	Jan-08	424.1 @ 22.10	Pass
DO 100	5/9/07	2212	Bubbled Nanopure	---	---	102.9 @ 22.77	Pass
DO 0	5/8/07	2100	Hanna H17040	G1012	Feb-11	0.01 @18.01	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/10/07	1901	Oakton	2612530	Dec-08	4.10 @ 19.72	Pass
pH 7.00	5/10/07	1906	Oakton	2612531	Dec-08	7.07 @ 19.62	Pass
pH 10.00	5/10/07	1910	Oakton	2612532	Jun-08	10.11 @ 19.90	Pass
Conductivity	5/10/07	1930	Oakton 447us/cm	2701471	Apr-08	328.7 @ 19.65	FAIL
DO 100	5/10/07	1925	Bubbled Nanopure	---	---	102.0 @ 19.10	Pass
DO 0	5/10/07	1934	Hanna H17040	G1012	Feb-11	0.01 @17.45	Pass

Remarks: _____

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A. Blackburn Date: 7/12/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: KDA1, 2 3
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu 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	5/7/07	1712	Oakton	2610086	Oct-08	4.03 @ 19.98	Pass
pH 7.00	5/7/07	1707	Oakton	2610087	Oct-08	7.04 @ 20.26	Pass
pH 10.00	5/7/07	1705	Oakton	2612532	Jun-08	10.01 @ 20.13	Pass
Conductivity	5/7/07	1734	Oakton 447us/cm	2701471	Apr-08	399.4 @ 19.61	Pass
DO 100	5/7/07	1730	Bubbled Nanopure	---		8.88 mg/l @ 759 mmHG	Pass
DO 0	5/7/07	1745	Hanna H17040	G1012	Feb-11	0.00 @ 16.80	Pass
ORP	5/7/07	1719	Zobells	7AZ-859-1	Jul-07	246 @ 15.59	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/8/07	2124	Oakton	2612530	Dec-08	4.09 @ 19.75	Pass
pH 7.00	5/8/07	2127	Oakton	2610087	Oct-08	7.07 @ 19.25	Pass
pH 10.00	5/8/07	2130	Oakton	2612532	Jun-08	10.20 @ 19.21	Pass
Conductivity	5/8/07	2133	Oakton 447us/cm	2701471	Apr-08	404.3 @ 19.45	Pass
DO 100	5/8/07	2158	Bubbled Nanopure	---	---	93.2 @ 15.73	Pass
DO 0	5/8/07	2204	Hanna H17040	G1012	Feb-11	0.01 @ 15.23	Pass
ORP	5/8/07	2204	Quickcal	33240	May-07	1115 @ 20.72	FAIL

Remarks: _____

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A. Blackburn Date: 7/12/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: L9312 & 9313 - Baker Sites
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu Make: Troll 9000
Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/13/07	1806	Oakton	2610411	Oct-08	4.08 @ 16.86	Pass
pH 7.00	5/13/07	1817	Oakton	2612531	Dec-08	7.04 @ 17.58	Pass
pH 10.00	5/13/07	1821	Oakton	2612532	Jun-08	10.06 @ 17.99	Pass
Conductivity	5/13/07	1802	Oakton 447us/cm	260977	Sep-07	371.1 @ 14.81	Pass
DO 100	5/13/07	1833	Bubbled Nanopure	---	---	109.1 @ 17.31	Pass
DO 0	5/13/07	1839	Hanna H17040	G1012	Feb-11	-0.01 @ 15.03	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/14/07	1354	Oakton	2610411	Oct-08	4.08 @ 18.23	Pass
pH 7.00	5/14/07	1358	Oakton	2612531	Dec-08	7.03 @ 18.34	Pass
pH 10.00	5/14/07	1403	Oakton	2612532	Jun-08	10.05 @ 18.20	Pass
Conductivity	5/14/07	1341	Oakton 447us/cm	260977	Sep-07	399.1 @ 18.36	Pass
DO 100	5/14/07	1346	Bubbled Nanopure	---	---	105.2 @ 17.51	Pass
DO 0	5/14/07	1413	Hanna H17040	G1012	Feb-11	-0.00 @ 15.92	Pass

Remarks: _____

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A. Blackburn Date: 7/21/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: L9312
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu 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	5/12/07	1631	Oakton	2610411	Oct-08	4.04 @ 9.32	Pass
pH 7.00	5/12/07	1634	Oakton	2612531	Dec-08	7.03 @ 9.81	Pass
pH 10.00	5/12/07	1638	Oakton	2612532	Jun-08	10.15 @ 10.78	Pass
Conductivity	5/12/07	1640	Oakton 447us/cm	2701471	Apr-08	447 @ 17.08	Pass
DO 100	5/12/07	1625	Bubbled Nanopure	---	---	92.1 @ 7.38	Pass
DO 0	5/10/07	1934	Hanna H17040	G1012	Feb-11	0.01 @17.45	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/16/07	2124	Oakton	2610411	Oct-08	4.09 @ 19.75	Pass
pH 7.00	5/16/07	2127	Oakton	2612531	Dec-08	7.07 @ 19.25	Pass
pH 10.00	5/16/07	2130	Oakton	2612532	Jun-08	10.20 @ 19.21	Pass
Conductivity	5/16/07	2133	Oakton 447us/cm	260977	Sep-07	404.3 @ 19.45	Pass
DO 100	5/16/07	2158	Bubbled Nanopure	---	---	93.2 @ 15.73	Pass
DO 0	5/16/07	2204	Hanna H17040	G1012	Feb-11	0.01 @15.23	Pass

Remarks: Insitu leaked into device and removed from service on 5/14/07. Fixed and placed in service 5/16/07.

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A.Blackburn Date: 7/13/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: L9312
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu Make: Troll 9000
Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/12/07	1631	Oakton	2610411	Oct-08	4.01 @ 9.32	Pass
pH 7.00	5/12/07	1634	Oakton	2612531	Dec-08	7.03 @ 9.81	Pass
pH 10.00	5/12/07	1638	Oakton	2612532	Jun-08	10.15 @ 10.78	Pass
Conductivity	5/12/07	nr	Oakton 447us/cm	2701471	Jan-08	Recalibrated	Pass
DO 100	5/12/07	1625	Bubbled Nanopure	---	---	11.09 @ 7.38	Pass
DO 0	5/12/07	nr	Hanna H17040	G1012	Jan-08	0.01 @17.45	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/13/07	1806	Oakton	2610411	Oct-08	4.08 @ 16.86	Pass
pH 7.00	5/13/07	1817	Oakton	2612531	Dec-08	7.04 @ 17.58	Pass
pH 10.00	5/13/07	1821	Oakton	2612532	Jun-08	10.06 @ 17.99	Pass
Conductivity	5/13/07	1802	Oakton 447us/cm	260977	Sep-07	371.1 @ 14.81	Pass
DO 100	5/13/07	1833	Bubbled Nanopure	---	---	109.1 @ 17.31	Pass
DO 0	5/13/07	1839	Hanna H17040	G1012	Feb-11	-0.01 @15.03	Pass

Remarks: Insitu assembled and placed into service on 5/14/07. Pre-Sampling QA?

Field-Form Filled Out By:
QAQC Check By:

Greta Myerchin
A. Blackburn

Date: 6/12/2007
Date: 7/12/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: L9817
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu Make: Troll 9000
Owner: UAF S/N: 33205

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/14/07	1354	Oakton	2610411	Oct-08	4.08 @ 18.23	Pass
pH 7.00	5/14/07	1358	Oakton	2612531	Dec-08	7.03 @ 18.34	Pass
pH 10.00	5/14/07	1403	Oakton	2612532	Jun-08	10.05 @ 18.20	Pass
Conductivity	5/14/07	1341	Oakton 447us/cm	260977	Sep-07	399.1 @ 18.36	Pass
DO 100	5/14/07	1346	Bubbled Nanopure	---	---	105.2 @ 17.51	Pass
DO 0	5/14/07	1413	Hanna H17040	G1012	Feb-11	-0.00 @ 15.92	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/15/07	1829	Oakton	2610411	Oct-08	4.10 @ 18.68	Pass
pH 7.00	5/15/07	1836	Oakton	2612531	Dec-08	7.05 @ 18.20	Pass
pH 10.00	5/15/07	1844	Oakton	2612532	Jun-08	10.04 @ 18.61	Pass
Conductivity	5/15/07	1825	Oakton 447us/cm	260977	Sep-07	350.1 @ 18.03	Pass
DO 100	5/15/07	1701	Bubbled Nanopure	---	---	109 @ 18.0	Pass

Remarks: _____

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A. Blackburn Date: 7/12/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: MSB
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu 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	5/8/07	2100	Oakton	2612530	Dec-08	4.08 @ 19.06	Pass
pH 7.00	5/8/07	2100	Oakton	2610087	Oct-08	7.06 @ 19.46	Pass
pH 10.00	5/8/07	2100	Oakton	2612532	Jun-08	10.04 @ 19.63	Pass
Conductivity	5/8/07	2100	Oakton 447us/cm	2701471	Apr-08	387.7 @ 20.55	Pass
DO 100	5/8/07	2100	Bubbled Nanopure	---	---	103.7 @ 19.20	Pass
ORP	5/8/07	2100	Quickcal	33240	May-07	209 @ 20.50	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/9/07	2227	Oakton	2612530	Dec-08	4.08 @ 21.82	Pass
pH 7.00	5/9/07	2233	Oakton	2612531	Dec-08	7.03 @ 21.48	Pass
pH 10.00	5/9/07	2236	Oakton	2612532	Jun-08	10.04 @ 19.80	Pass
Conductivity	5/9/07	2222	Oakton 447us/cm	2701471	Apr-08	424.1 @ 22.10	Pass
DO 100	5/9/07	2212	Bubbled Nanopure	---	---	102.9 @ 22.77	Pass
ORP	5/9/07	2241	Quickcal	2207B	Aug-07	196 @ 21.65	FAIL

Remarks: _____

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A. Blackburn Date: 7/13/2007

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

Project ID: North Slope Lakes Site Location/Lake ID: Webster Reservoir
Sample Purpose: Lake Water Quality

WATER QUALITY METER INFORMATION

Meter Make: Insitu 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	5/10/07	1901	Oakton	2612530	Dec-08	4.10 @ 19.72	Pass
pH 7.00	5/10/07	1906	Oakton	2612531	Dec-08	7.07 @ 19.62	Pass
pH 10.00	5/10/07	1910	Oakton	2612532	Jun-08	10.11 @ 19.90	Pass
Conductivity	5/10/07	1934	Oakton 447us/cm	2701471	Apr-08	401 @ 19.66	Pass
DO 100	5/10/07	1925	Bubbled Nanopure	---	---	102.0 @ 19.10	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.01	5/12/07	1631	Oakton	2610411	Oct-08	4.04 @ 9.32	Pass
pH 7.00	5/12/07	1634	Oakton	2612531	Dec-08	7.03 @ 9.81	Pass
pH 10.00	5/12/07	1638	Oakton	2612532	Jun-08	10.15 @ 10.78	Pass
Conductivity	5/12/07	1640	Oakton 447us/cm	2701471	Apr-08	519 @ 17.08	FAIL
DO 100	5/12/07	1625	Bubbled Nanopure	---	---	92.1 @ 7.38	Pass

Remarks: _____

Field-Form Filled Out By: Greta Myerchin Date: 6/12/2007
QAQC Check By: A. Blackburn Date: 7/21/2007

APPENDIX C. ELEVATION SURVEY FORMS

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: North Slope Lakes Site Location/Lake ID: K113 - SH1
 Survey Purpose: Water-Level Elevations Date: 5/10/2007 Time: 15:15

Location:	K113, Survey to BM elevations located on VSM 615 and VSM 617.							
Survey objective:	Lake water elevation survey.						Weather Observations:	20 F, Flat Light
Instrument Type:	Leica NA 720		Instrument ID:	5482372 (GWS owned)		Overcast, 5 MPH Wind		
Rod Type:	Craine fiberglass 20'		Rod ID:	GWS owned				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)	Dan Reichardt, Greta Myerchin			
VSM 615	na	59.3	N 70 18.111'	W 149 19.183'				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
615	-2.03	57.27		59.30				
617		57.27	-1.20	58.47				
Water Level		57.27	4.06	53.21				
Move instrument to ^2, turn on water surface								
Water Level	3.81	57.02		53.21				K113 Water Level
617		57.02	-1.45	58.47				
615		57.02	-2.28	59.30				Survey closes within 0.00'

Note:

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: North Slope Lakes Site Location/Lake ID: Kuparuk Dead Arm Reservoirs
 Survey Purpose: Water-Level Elevations Date: 5/8/2007 Time: 17:30

Location:	Kuparuk Deadarm Reservoirs Cells 1, 2, 3							
Survey objective:	Determine FWS Elevation of KDA 1,2,3				Weather Observations:			
Instrument Type:	Leica NA720	Instrument ID:	5482372 (GWS owned)		25 F, Sunny			
Rod Type:	Craine fiberglass 20'	Rod ID:	GWS owned					
Bench Mark Information:					Survey Team Names			
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)	Dan Reichardt, Michael Lilly			
BM #1 WO040768	BP	19.32	N70 20.048 NAD83	W148 56.367 NAD83				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
BM#1	1.21	20.53		19.32				Shot to flagged benchmark
KDA3-SH		20.53	15.62	4.91				WS Elevation for Reservoir #3
KDA2-SH1		20.53	15.61	4.92				WS Elevation for Reservoir #2
Turn point, Moved instrument.								
KDA2-SH1	15.73	20.65		4.92				
KDA3-SH		20.65	15.72	4.93				
BM#1		20.65	1.32	19.33				Close survey to 0.01
Move instrument to island between KDA2 and KDA1. Use KDA2 FWS as turn point.								
KDA2-SH2	10.58	15.50		4.92				
KDA1-SH		15.50	7.01	8.49				WS Elevation for Reservoir #1
Turn point, Moved instrument.								
KDA1-SH	7.06	15.55		8.49				
KDA2-SH2		15.55	10.64	4.91				Close survey to 0.01

Note:

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID:	<u>North Slope Lakes</u>	Site Location/Lake ID:	<u>L9312</u>
Survey Purpose:	<u>Water-Level Elevations</u>	Date:	<u>5/13/2007</u>
		Time:	<u>14:30</u>

Location:	L9312, Survey to LCMF BM elevations. Point "P" is 11.73'							
Survey objective:	Lake water elevation survey						Weather Observations:	
Instrument Type:	Leica NA720		Instrument ID:	5482372 (GWS owned)		10 F, Partly Cloudy, Sunny		
Rod Type:	Craine fiberglass 20'		Rod ID:	GWS owned				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)	Dan Reichardt, Michael Lilly			
P	LCMF	11.72	N70°20.017'	W150°57.076'				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
P	1.85	13.57		11.72				
O		13.57	2.12	11.45				
PH-VSM		13.57	-0.98	14.55				
Water Surface		13.57	6.09	7.48				
Turn point. Moved on Water Surface								
Water Surface	6.04	13.52		7.48				L9312 Water Level
PH-VSM		13.52	-1.03	14.55				close point to 0.00
O		13.52	2.07	11.45				close point to 0.00
P		13.52	1.80	11.72				close survey 0.00'

Note:

Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasl; 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:	<u>North Slope Lakes</u>	Site Location/Lake ID:	<u>L9817</u>
Survey Purpose:	<u>Water-Level Elevations</u>	Date:	<u>5/15/2007</u>
		Time:	<u>13:00</u>

Location:	Near rebar on west side of lake. Water surface elevation taken near sample point #4							
Survey objective:	Lake water elevation survey						Weather Observations:	30 F, Overcast, Calm
Instrument Type:	Leica NA 720		Instrument ID:	5482372 (GWS owned)				
Rod Type:	Craine fiberglass 20'		Rod ID:					
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)	Dan Reichardt, Horacio Toniolo			
B	nr	54.98	na	na				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
B	5.11	60.09		54.98				
A		60.09	4.96	55.13				
D		60.09	5.40	54.69				
C		60.09	4.16	55.93				
E		60.09	3.61	56.48				
Water surface		60.09	6.80	53.29				All measurements to water level
								Turn point, moved instrument.
Water surface	6.69	59.98		53.29				L9817 Water Level
E		59.98	3.51	56.47				
C		59.98	4.05	55.93				
D		59.98	5.30	54.68				
A		59.98	4.85	55.13				
B		59.98	5.00	54.98				Survey closes within 0.00'

Note:

Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasl; 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: 5/9/2007 Time: 16:30

Location:	Mine Site B, NE corner of North Cell, temporary datum										
Survey objective:	Lake water elevation survey					Weather Observations:					
Instrument Type:	Leica NA720		Instrument ID:	Leica Runner 24 Serial # 5482372							
Rod Type:	Craine Fiberglass 20'		Rod ID:	GWS							
Bench Mark Information:					Survey Team Names						
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)	Daniel Reichardt Michael Lilly						
"Post"	WERC	100 Temp.	na	na							
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks			
Post TBM1	6.39	106.39		100.00				Top of nail in post, temp elevation			
NC-WL		106.39	13.81	92.58				North Cell, closest to north bank			
TBM3		106.39	2.92	103.47				VSM 387A on Pipeline, north side			
TBM2		106.39	2.54	103.85				VSM 387B on Pipeline, south side			
Move instrument to ^2, turn on TBM2											
TBM2	2.14	105.99		103.85				VSM 387B on Pipeline			
TBM3		105.99	2.51	103.48				VSM 387A on Pipeline, +0.01			
NC-WL		105.99	13.41	92.58				North Cell, closest to north bank, +0.00			
TBM1		105.99	5.99	100.00				close survey to +0.00			
Move instrument to island, turn on MSBN Water Level.											
NC-WL	10.09	102.67		92.58				Frozen water level			
SC-WL		102.67	9.04	93.63				TBM, tripod			
Move to ^4, use MSBS as TP.											
SC-WL	8.89	102.52		93.63				South Cell, frozen water level			
NC-WL		102.52	9.94	92.58				close survey to +0.00			

Note:

Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasl; 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: **Webster Reservoir**
Survey Purpose: **Water-Level Elevations** Date: **5/11/2007** Time: **19:00**

Note:

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

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:
Survey Purpose:

North Slope Lakes Project
Snow Depth and Water Content

Site Location/Lake ID: **K113**
Date: **5/10/2007** Time: _____

Location Description:	Located on lake beginning at lathe "K113-CT", headed for drill tower in distance. Went 20' south to undisturbed area, did "L" shaped pattern, first going East 1 meter for 25 meters and then North 1 meter for 25 meters.			
Survey objective:	Snow depths and snow-water content for lake recharge estimates		Weather Observations:	Calm. Visibility unrestricted. -10 at 5mph
Latitude:	N70 32.003	Longitude:	W149 31.878	Datum: NAD27AK
Elevation:		Elevation Datum:		Reference Markers: Center of north cell
Drainage Basin:	K113	Slope Direction:	Flat	Vegetation Type: Ice Surface
Slope Angle:	Flat	Access Notes:	none	Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,		Snow-Survey Team Names	
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm ²		Dan Reichardt	

Snow Course Depths, in cm.

	1	2	3	4	5
1	10	19	13	15	16
2	13	20	14	15	15
3	15	19	15	16	16
4	16	20	14	15	18
5	18	17	14	15	19
6	18	15	13	14	18
7	19	13	14	14	17
8	21	13	14	14	18
9	20	13	13	15	17
10	20	11	14	15	16

(cm)
Average snow depth = **15.7**
Maximum snow depth = **21.0**
Minimum snow depth = **10.0**
Standard variation = **2.5**

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm ³)	Density (gr/cm ³)
SWE 1	10.50	108.8	374.9	0.29
SWE 2	22.00	205.7	785.4	0.26
SWE 3	14.00	100.8	499.8	0.20
SWE 4	18.00	167.9	642.6	0.26
SWE 5	18.00	126.2	642.6	0.20

Average Density = **0.24**
Average Snow Water Equivalent (SWE) = **3.8** cm H₂O
Average Snow Water Equivalent = **1.50** inches H₂O
Average Snow Water Equivalent = **0.12** feet H₂O

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center
Form F-012: Snow Depth and Water Content Survey Form

Project ID: North Slope Lakes Project Site Location/Lake ID: L9312
Survey Purpose: Snow Depth and Water Content Date: 5/13/2007 Time: _____

Location Description:	Did "L" shape, started at stake between belford gauge and snow sensor. 25 x 25 meters at 1 meter increments. Went North, then West.			
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations: 10 F, Sunny
Latitude:	N 70°19.9444'	Longitude:	W 150° 57.047'	Datum: NAD27 Alaska
Elevation:	100' approximately	Elevation Datum:	BPMGL	Reference Markers: Site marked with GPS
Drainage Basin:	L9312	Slope Direction:	flat	Vegetation Type: snow depth on tundra surface
Slope Angle:	Flat	Access Notes:		Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,			Snow-Survey Team Names
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2			Dan Reichardt

Snow Course Depths, in cm.

	1	2	3	4	5	
1	51.0	77.0	30.0	56.5	51.0	(cm)
2	53.0	67.0	31.5	56.0	43.5	Average snow depth = <u>50.7</u>
3	49.0	62.0	41.0	49.0	70.0	Maximum snow depth = <u>88.5</u>
4	64.0	49.0	48.0	46.5	71.0	Minimum snow depth = <u>20.0</u>
5	60.0	43.0	41.0	44.0	88.5	Standard variation = <u>16.9</u>
6	70.0	57.0	32.0	32.0	72.0	
7	73.5	62.5	33.5	21.0	55.5	
8	77.5	47.0	27.0	20.0	61.0	
9	78.0	41.0	33.5	27.5	39.0	
10	80.0	38.0	36.0	36.5	41.0	

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE1	63.5	800.2	2267.0	0.35
SWE2	49.53	604.4	1768.2	0.34
SWE3	52.07	560.6	1858.9	0.30
SWE4	39.37	406.6	1405.5	0.29
SWE5	54.61	607.7	1949.6	0.31

$$\begin{aligned} \text{Average Density} &= \underline{\underline{0.32}} \text{ gr/cm}^3 \\ \text{Average Snow Water Equivalent (SWE)} &= \underline{\underline{16.2}} \text{ cm H}_2\text{O} \\ \text{Average Snow Water Equivalent} &= \underline{\underline{6.38}} \text{ inches H}_2\text{O} \\ \text{Average Snow Water Equivalent} &= \underline{\underline{0.53}} \text{ feet H}_2\text{O} \end{aligned}$$

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes Project Site Location/Lake ID: L9312 - Midpoint
 Survey Purpose: Snow Depth and Water Content Date: 5/13/2007 Time: _____

Location Description:	On lake surface, towards south end. Did "L" shape, started at North and went West 25 x 25m for 1m increments			
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations: Clear, sunny, 10 F
Latitude:	N70°19.995'	Longitude:	W150°56.918'	Datum: WGS84
Elevation:	8' approximately	Elevation Datum:	BPM SL	Reference Markers: Site staked with lathe
Drainage Basin:	L9312	Slope Direction:	Flat	Vegetation Type: Tussock
Slope Angle:	Flat	Access Notes:	Hagglund	Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,		Snow-Survey Team Names	
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2		Dan Reichardt	

Snow Course Depths, in cm.

	1	2	3	4	5	(cm)
1	23.5	12.0	26.5	18.0	13.0	Average snow depth = <u>18.9</u>
2	22.0	13.5	30.5	21.0	12.0	Maximum snow depth = <u>43.0</u>
3	14.0	15.0	28.0	19.0	14.0	Minimum snow depth = <u>11.0</u>
4	17.0	17.0	29.5	18.0	15.0	Standard variation = <u>7.5</u>
5	15.5	19.0	27.5	16.0	14.0	
6	14.0	22.5	34.0	14.5	13.0	
7	12.0	22.0	43.0	13.5	15.5	
8	11.5	20.0	43.0	14.0	14.0	
9	11.0	21.0	25.5	14.0	15.0	
10	11.0	23.5	19.0	13.0	14.0	

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE1	12.7	107.1	453.4	0.24
SWE2	15.24	168.3	544.1	0.31
SWE3	9.906	96.2	353.6	0.27
SWE4	11.938	127.5	426.2	0.30
SWE5	17.78	280.1	634.7	0.44

Average Density = 0.31 gr/cm^3
 Average Snow Water Equivalent (SWE) = 5.9 cm H2O
 Average Snow Water Equivalent = 2.32 inches H2O
 Average Snow Water Equivalent = 0.19 feet H2O

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes Project Site Location/Lake ID: L9312 - Sno1
 Survey Purpose: Snow Depth and Water Content Date: 5/13/2007 Time: _____

Location Description:	Did "L" shape, started at orange pole at southerly end of lake on tundra, went 25 m to orange pole, turned, and 25m to other pole			
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations: Cloudy, 15 F, 7 MPH
Latitude:	N 70°19.9444'	Longitude:	W 150° 57.047'	Datum: WGS84
Elevation:	8' approximately	Elevation Datum:	BPM85	Reference Markers: Site staked with lathe
Drainage Basin:	L9312	Slope Direction:	Flat	Vegetation Type: Tussock
Slope Angle:	Flat	Access Notes:	Hagglund	Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,			Snow-Survey Team Names
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2			Dan Reichardt, Chad Cormack

Snow Course Depths, in cm.

	1	2	3	4	5
1	23.0	35.5	24.0	40.5	30.0
2	37.5	37.0	24.5	40.5	28.0
3	33.0	29.5	21.5	28.0	27.5
4	24.0	18.0	39.0	28.0	26.5
5	32.0	23.0	41.0	32.0	20.0
6	33.0	26.0	44.5	30.0	27.0
7	30.5	32.0	33.5	29.5	32.0
8	28.0	31.0	25.0	31.0	22.0
9	32.0	23.0	26.0	29.0	13.0
10	31.5	26.0	41.5	30.5	14.0

(cm)
 Average snow depth = 29.3
 Maximum snow depth = 44.5
 Minimum snow depth = 13.0
 Standard variation = 6.7

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE1	20.32	152.7	725.4	0.21
SWE2	35.56	187.5	1269.5	0.15
SWE3	45.72	497.3	1632.2	0.30
SWE4	46.99	385.2	1677.5	0.23
SWE5	16.51	95.2	589.4	0.16

Average Density = 0.21 gr/cm^3
 Average Snow Water Equivalent (SWE) = 6.2 cm H2O
 Average Snow Water Equivalent = 2.43 inches H2O
 Average Snow Water Equivalent = 0.20 feet H2O

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes Project Site Location/Lake ID: L9817 - Lake
 Survey Purpose: Snow Depth and Water Content Date: 5/15/2007 Time: 12:00

Location Description:	On lake surface. Did "L" shape, started at South then towards shore 25 x 25m for 1m increments			
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations: Foggy, 15 F, No Wind
Latitude:	N70°13.998'	Longitude:	W151°19.997'	Datum: NAD83
Elevation:	8' approximately	Elevation Datum:	BPMSL	Reference Markers: Site staked with lathe
Drainage Basin:	L9817	Slope Direction:	Flat	Vegetation Type:
Slope Angle:	Flat	Access Notes:	Hagglund	Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,		Snow-Survey Team Names	
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2		Chad Cormack	

Snow Course Depths, in cm.

	1	2	3	4	5
1	29	12	13	10	23
2	26	15	13	8	21
3	27	23	11	10	25
4	34	28	11	12	27
5	29	24	12	13	33
6	20	19	11	14	36
7	15	20	9	15	42
8	18	20	11	15	40
9	17	19	12	16	35
10	13	15	11	19	35

(cm)
 Average snow depth = 19.7
 Maximum snow depth = 42.0
 Minimum snow depth = 8.0
 Standard variation = 8.9

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE1	17.78	147.4	634.7	0.23
SWE2	43.18	625.2	1541.5	0.41
SWE3	22.86	234.9	816.1	0.29
SWE4	13.97	134.7	498.7	0.27
SWE5	10.16	93.2	362.7	0.26

Average Density = 0.29 gr/cm^3
 Average Snow Water Equivalent (SWE) = 5.7 cm H2O
 Average Snow Water Equivalent = 2.26 inches H2O
 Average Snow Water Equivalent = 0.19 feet H2O

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center
Form F-012: Snow Depth and Water Content Survey Form

Project ID: North Slope Lakes Project Site Location/Lake ID: L9817 - Metstation
Survey Purpose: Snow Depth and Water Content Date: 5/15/2007 Time: 11:00

Location Description:	Did "L" shape, started at stake between belford gauge and snow sensor. 25 x 25 meters at 1 meter increments. Went East, then North.			
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations: Low visibility 15 F
Latitude:	N70°20.017'	Longitude:	W150°57.076'	Datum: WGS84
Elevation:	100' approximately	Elevation Datum:	BPMSL	Reference Markers: Site marked with GPS
Drainage Basin:	L9817	Slope Direction:	flat	Vegetation Type: snow depth on tundra surface
Slope Angle:	Flat	Access Notes:		Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,		Snow-Survey Team Names	
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2			Chad Cormack, Amy Tidwell

Snow Course Depths, in cm.

	1	2	3	4	5	(cm)
1	25	33	40	44	53	Average snow depth = <u>40.7</u>
2	33	32	42	46	51	Maximum snow depth = <u>53.0</u>
3	36	34	39	43	49	Minimum snow depth = <u>25.0</u>
4	42	26	40	48	45	Standard variation = <u>6.5</u>
5	43	29	44	47	44	
6	39	42	44	50	44	
7	40	40	39	51	45	
8	37	39	40	51	37	
9	35	37	38	48	40	
10	31	32	42	45	42	

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE1	44.45	462.3	1586.9	0.29
SWE2	35.56	216.8	1269.5	0.17
SWE3	36.83	264.7	1314.8	0.20
SWE4	36.83	265.2	1314.8	0.20
SWE5	25.4	216.6	906.8	0.24

Average Density = 0.22 gr/cm^3
Average Snow Water Equivalent (SWE) = 9.0 cm H2O
Average Snow Water Equivalent = 3.54 inches H2O
Average Snow Water Equivalent = 0.29 feet H2O

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: North Slope Lakes Project Site Location/Lake ID: L9817 - SW
 Survey Purpose: Snow Depth and Water Content Date: 5/15/2007 Time: 15:30

Location Description:	L9817 SW survey. Done on top of ridge SW of lake. South 25 m x west 25 m.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	Foggy, 15 F, No Wind
Latitude:	N70°13' 49.6"	Longitude:	W151° 21' 13.3"	Datum:	NAD83
Elevation:	8' approximately	Elevation Datum:	BPM SL	Reference Markers:	Site staked with lathe
Drainage Basin:	L9817	Slope Direction:	Flat	Vegetation Type:	
Slope Angle:	Flat	Access Notes:	Hagglund	Other:	1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,		Snow-Survey Team Names		
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2		Dan Reichardt		

Snow Course Depths, in cm.

	1	2	3	4	5	(cm)
1	16.0	26.0	32.0	16.0	26.0	Average snow depth = <u>24.3</u>
2	21.0	25.0	23.0	20.0	25.5	Maximum snow depth = <u>36.0</u>
3	23.5	26.0	28.0	24.0	22.0	Minimum snow depth = <u>16.0</u>
4	22.0	18.0	21.0	35.0	23.0	Standard variation = <u>4.2</u>
5	18.0	29.0	23.5	27.0	27.0	
6	19.0	23.0	22.0	25.5	23.0	
7	25.0	17.5	31.0	23.0	26.0	
8	25.5	23.5	24.0	28.0	21.0	
9	25.0	28.0	24.0	25.0	21.5	
10	36.0	29.0	21.5	26.0	26.0	

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE1	20.57	102.5	734.3	0.14
SWE2	20.32	109.5	725.4	0.15
SWE3	26.67	152.4	952.1	0.16
SWE4	35.56	219	1269.5	0.17
SWE5	19.3	114.5	689.0	0.17

Average Density = 0.16 gr/cm^3
 Average Snow Water Equivalent (SWE) = 3.8 cm H2O
 Average Snow Water Equivalent = 1.51 inches H2O
 Average Snow Water Equivalent = 0.13 feet H2O

SWE = avg. snow depth*(density snow/density water)

University of Alaska Fairbanks, Water and Environmental Research Center
Form F-012: Snow Depth and Water Content Survey Form

Project ID: North Slope Lakes Project Site Location/Lake ID: Inigok
Survey Purpose: Snow Depth and Water Content Date: 5/4/2007 Time:

Location Description:	We took a depth (cm) every 5 feet and collected 30 depths per course for a total of 150feet West to East and 150feet North to South			
Survey objective:	Snow depths and snow-water content for lake recharge estimates		Weather Observations:	Calm. Visibility unrestricted. -10 at 5mph
Latitude:	N 69 59.377		Longitude:	W153 05.630
Elevation:		Elevation Datum:		Datum:
Drainage Basin:		Slope Direction:	Flat	Vegetation Type:
Slope Angle:	Flat	Access Notes:	none	Other: 1 meter increments
Snow Depth Probe Type:	T-handle snow depth probe,		Snow-Survey Team Names	
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2		Frank Urban	

Snow Course Depths, in cm.

	1	2	3	4	5
1	27	20.5	32.5	16	20
2	27.5	25.5	30.5	30	28.5
3	26	20	32	24	34
4	17	17	27	29.5	29.5
5	17	15.5	20	25	27.5
6	23	24	23	29	28
7	23.5	23	18	25	28
8	23.5	34.5	17.5	24.5	27.5
9	18.5	37	21	23	41.4
10	26	40	24	22.5	25
11	25.5	29	19.5	27	23
12	24.5	23	18	20.5	24

(cm)
Average snow depth = 25.4
Maximum snow depth = 41.4
Minimum snow depth = 15.5
Standard variation = 5.9

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
SWE 1	17.00	290.0	606.9	0.48
SWE 2	8.50	106.0	303.5	0.35
SWE 3	15.00	203.0	535.5	0.38
SWE 4	17.50	203.0	624.8	0.32
SWE 5	14.50	177.0	517.7	0.34

Average Density = 0.37
Average Snow Water Equivalent (SWE) = 9.5 cm H₂O
Average Snow Water Equivalent = 3.74 inches H₂O
Average Snow Water Equivalent = 0.31 feet H₂O

SWE = avg. snow depth*(density snow/density water)

Snow Depth and Water Content Survey Form

Bureau of Land Management

UAF WRC Form F-012

Project ID:

Umiat Snow Surveys

Site Location:

Umiat

Survey Purpose:

Snow Depth and Water Content

Date: 5/1/2007

Time: 1700hrs

Location Description:	App. 260 meters NW of BLM hut. Cross-shaped, 40m legs, SE,SW,NW,NE directions Measurements taken every 1.5 meter. From center pole: Went SE, SW, NW, and NE			
Latitude:	N 69° 22.075 (WPT 179)	Longitude:	N 152° 8.977	Datum: NAD83 Alaska
Elevation:	265 FT	Elevation Datum:		Reference Markers:
Drainage Basin:		Slope Direction:	Flat	Vegetation Type: Tussock with low shrubs
Slope Angle:	Flat	Access Notes:	snowmachines	Other: 1.5 meter increments
Snow Depth Probe Type:	collapsible Black Diamond avalanche probe	Snow-Survey Team Names:		
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2	Kemnitz		

Sequence of survey: Pole to SE (columns 1-2), Pole to SW (columns 2-3), Pole to NW (columns 3-4), Pole to NE (Columns 4-5) hoar frost resulted in low densities at some locations

Snow Course Depths, in cm.

	1	2	3	4	5
1	37.0	35.0	43.0	34.0	39.0
2	44.0	34.0	51.0	30.0	47.0
3	48.0	45.0	58.0	40.0	54.0
4	40.0	44.0	62.0	58.0	49.0
5	45.0	45.0	69.0	49.0	42.0
6	46.0	37.0	70.0	57.0	38.0
7	41.0	37.0	48.0	42.0	46.0
8	48.0	47.0	57.0	51.0	45.0
9	40.0	49.0	52.0	53.0	38.0
10	51.0	39.0	53.0	41.0	54.0
11	43.0	39.0	47.0	38.0	51.0
12	41.0	40.0	47.0	37.0	42.0
13	40.0	35.0	39.0	36.0	48.0
14	38.0	48.0	42.0	38.0	44.0
15	42.0	47.0	42.0	38.0	44.0
16	44.0	47.0	39.0	40.0	47.0
17	41.0	42.0	42.0	42.0	51.0
18	38.0	48.0	37.0	40.0	45.0
19	31.0	44.0	27.0	33.0	52.0
20	38.0	48.0	31.0	46.0	48.0

Average snow depth =	<u>44.1</u>	(cm) <u>17.4</u>
Maximum snow depth =	<u>70.0</u>	27.6
Minimum snow depth =	<u>27.0</u>	10.6
Standard variation =	<u>7.5</u>	

Snow Sample Depths and Weights

5/4/07 resample of density only at 2100 hr

Bag #	(cm)	(gr)	(cm^3)	(gr/cm^3)
A	27	194	963.9	0.20
B	38	194	1356.6	0.14
C	32	248	1142.4	0.22
D	26	162	928.2	0.17
E	32	281	1142.4	0.25

Average Density = 0.20

Average Snow Water Equivalent (SWE) = 8.7 cm H2O

Average Snow Water Equivalent = 3.41 inches H2O

Average Snow Water Equivalent = 0.28 feet H2O

*tare weight of 10 g subtracted

Snow Depth and Water Content Survey Form
Bureau of Land Management

UAF WRC Form F-012

Project ID:

Umiat USGS Met Site Snow Survey
Snow Depth and Water Content

Site Location: **Umiat USGS Met Site**
Date: 5/2/2007 Time: 1600

Location Description:	2.0 miles north of BLM Umiat quanset hut. L-shaped, 50 m by 50 m Measurements taken every 2 meters. From center pole (A): SW to B and SE to C				
Latitude:	N 69° 23.734 (Point A)	Longitude:	N 152° 8.575 (Point A)	Datum:	NAD83 Alaska
Elevation:	645 ft	Elevation Datum:	From GPS	Reference Markers:	3 lathe and USGS Met Station
Drainage Basin:	Seabee Creek	Slope Direction:	South	Vegetation Type:	Tussocks
Slope Angle:	Slight southern slope	Access Notes:	snowmachines	Other:	2 meter increments
Snow Depth Probe Type:	collapsible Black Diamond avalanche probe			Snow-Survey Team Names:	
Snow Tube Type:	Adirondak, 6.74 cm diameter cutter, area = 35.7 cm^2			Kemnitz, Yeager, Urban	

Sequence of Point A to B (columns 1,2 and 3), Point A to C (columns 3, 4, and 5)
survey:

Snow Course Depths, in cm.

	1	2	3	4	5
1	31.0	51.0	55.5	38.5	53.0
2	53.5	55.5	42.0	36.0	48.5
3	53.5	48.0	32.0	39.0	43.5
4	38.5	49.0	35.0	55.5	39.0
5	31.0	49.5	36.0	47.0	43.5
6	39.5	46.5	58.0	35.5	53.5
7	27.0	57.0	59.5	49.5	43.5
8	39.0	72.0	51.0	48.5	40.5
9	49.0	85.0	38.5	53.0	43.0
10	50.5	71.0	44.0	48.5	42.5

(cm)	(in)
Average snow depth = 47.0	18.5
Maximum snow depth = 85.0	33.5
Minimum snow depth = 27.0	10.6
Standard variation = 10.9	

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight* (gr)	Volume (cm^3)	Density (gr/cm^3)
A	40	310	1428.0	0.22
B	59	494	2106.3	0.23
C	56	340	1999.2	0.17
D	44	331	1570.8	0.21
E	34	267	1213.8	0.22

Average Density = **0.21**

Average Snow Water Equivalent (SWE) = **9.9** cm H₂O

Average Snow Water Equivalent = **3.89** inches H₂O

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

*tare weight of 10 g subtracted

SWE = avg. snow depth*(density snow/density water)