Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: May-June 2006

Lake L9312 Outlet Control Point, Photo by D. Reichardt

by

Kristie Holland, Dan Reichardt, Elizabeth Binning, and Michael Lilly

January 2008

North Slope Lakes Hydrologic Modeling Project

Report No. INE/WERC 06.08

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[1]Geo-Watersheds Scientific
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DISCLAIMER

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

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

Conversion Factors

Multiply	By	To obtain
	Length	
inch (in)	25.4	millimeter (mm)
inch (in)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
Acre	43560.0	square feet (ft^2)
Acre	0.405	hectare (ha)
square foot (ft^2)	3.587e-8	square mile (mi^2)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
gallon (gal)	3.785	liter (L)
gallon (gal)	3785.412	milliliter (mL)
cubic foot (ft^3)	28.317	liter (L)
Acre-ft	1233.482	cubic meter (m^3)
Acre-ft	325851.43	gallon(gal)
gallon(gal)	0.1337	cubic feet (ft^3)
	Velocity and Discharge	
foot per day (ft/d)	0.3048	meter per day (m/d)
Square foot per day (ft^2/d)	0.0929	square meter per day (m^2/d)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/sec)
	Hydraulic Conductivity	
foot per day (ft/d)	0.3048	meter per day (m/d)
foot per day (ft/d)	0.00035	centimeter per second (cm/sec)
meter per day (m/d)	0.00116	centimeter per second (cm/sec)
	Hydraulic Gradient	
foot per foot (ft/ft)	5280	foot per mile (ft/mi)
foot per mile (ft/mi)	0.1894	meter per kilometer (m/km)
	Pressure	
pound per square inch (lb/in^2)	6.895	kilopascal (kPa)

Units

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

Physical and Chemical Water-Quality Units:

Temperature:

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

$°F = 1.8(°C) + 32$

Electrical Conductance (Actual Conductivity and Specific Conductance):

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

where: $SC25 = AC/(1+r\ (T-25))$

SC25 = Specific Conductance at 25°C, in µS/cm
AC = Actual Conductivity, in µS/cm
R = temperature correction coefficient for the sample, in °C
T = temperature of the sample, in °C

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

Milligrams per liter is a unit of measurement indicating the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For concentrations less

than 7,000 mg/L, the numerical value is the same as for concentrations in parts per million (ppm).

Millivolt (mV):
A unit of electromotive force equal to one thousandth of a volt.

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

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

Abbreviations, Acronyms, and Symbols

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

<u>Lake Nomenclature</u>

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

PROJECT COOPERATORS

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

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

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Lake Chemistry and Physical Data For Selected North Slope, Alaska, Lakes: May-June 2006

INTRODUCTION

The University of Alaska Fairbanks (UAF) Water and Environmental Research Center (WERC) and Geo-Watersheds Scientific (GWS), together with project cooperators, initiated a study in the Fall of 2002 (Phase One) to obtain baseline information about the physical and chemical characteristics of North Slope tundra lakes. The project was extended in 2005 (Phase Two). The location of study lakes changed and was expanded to include other reservoirs so as to further develop the understanding and simulation tools necessary for water-source management (Figure 1). K113 is an un-pumped lake in the Kuparuk oilfield and is sampled on selected field trips during the year. L9312 is a natural lake studied in the Alpine operations area. L9817 is a natural lake in eastern NPRA, west of Nuiqsut. This lake has been used in previous years for ice-road construction, but was not used during winter 2005-06, nor will it be used during the winter of 2006-07. Two reservoir systems (mine sites) were added to the study in 2005. Mine Site B, also known as Six-mile Lake, is located near the Milne Point facility at the intersection of the Spine Road with the Milne Point Road and has two cells connected to East Milne Creek. The Kuparuk Reservoir System (Kuparuk Deadarm Lakes) has 9 reservoirs. The three southernmost reservoir cells (1-3) are included in the study to observe ground-water and surface-water interactions between each cell and the adjacent Kuparuk River.

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

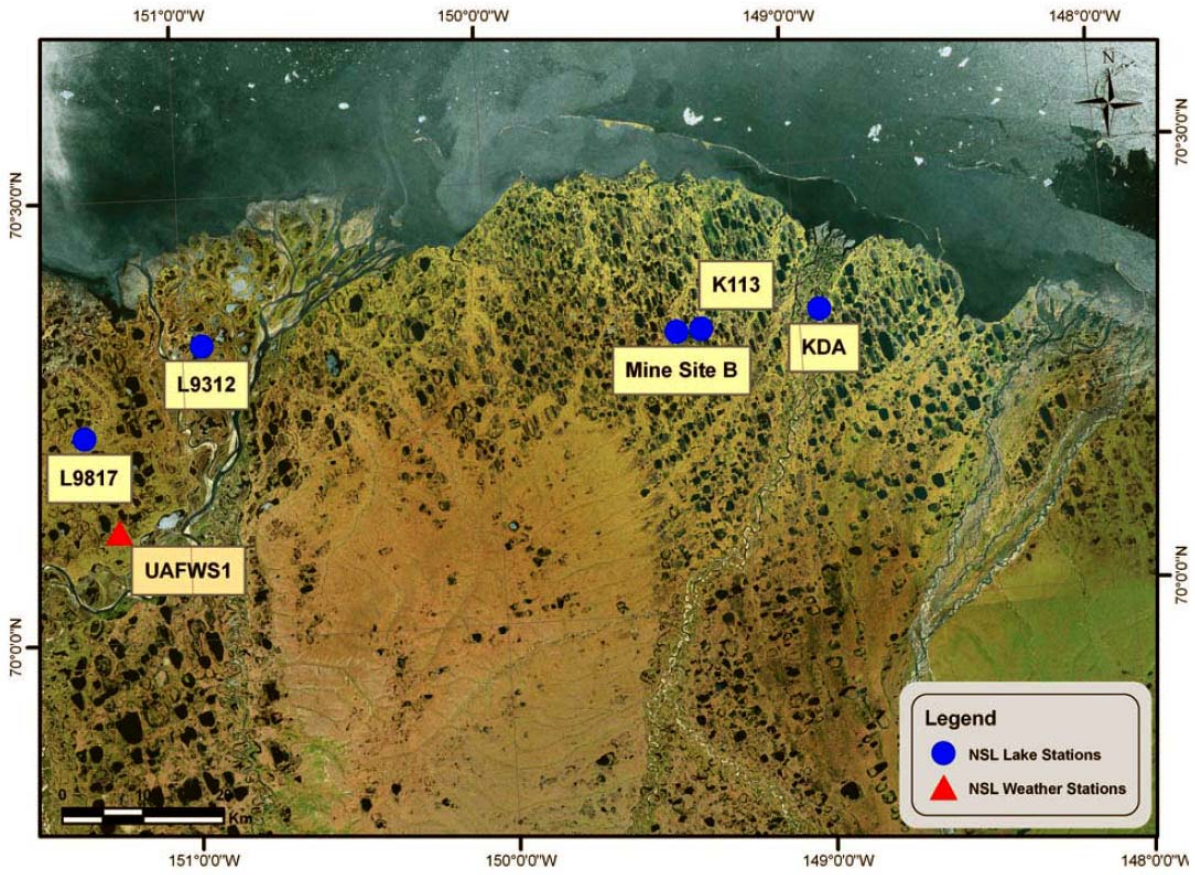

Figure 1. Location of study lakes in the NPR-A, Alpine, Kuparuk, and Prudhoe Bay field operating areas, North Slope, Alaska.

TRIP OBJECTIVES

The goal of each sampling trip is to collect physical and chemical data from each study lake. For each lake, a series of holes are drilled at designated sampling locations. Logistical, personnel, and weather constraints, can limit the amount of time available in the field for sampling. A project work plan was distributed before the trip outlining the sampling schedule (Lilly and others, 2006). In addition to the information collected on each monthly sampling trip, the May-June trip was extended in order to observe spring snowmelt. The trip duration was from 16 May, 2006 to 8 June, 2006. During the trip we focused on the following locations/tasks:

1. Lake L9312: Alpine operating area.
    - Survey water level to local elevation control.
    - Collect water-quality profile data.

- Collect water-column samples from Raft “B”.
- Automated data collection station maintenance (Figure 2).
- Conduct snow-course measurements.

2. Lake L9817: NPR-A.
    - Survey water level to local BLM elevation control.
    - Collect water-quality profile data.
    - Collect water-column samples from hole 1.
    - Automated data collection station maintenance.
    - Conduct snow course measurements.
3. Mine Site B: Kuparuk operating area.
    - Survey water levels to local elevation control on North and South cells.
    - Additional physical measurements will be taken in the reservoir channels connecting the north and south cells to determine whether North and South cells are hydraulically connected.
    - Measure water-quality profile parameters on North and South cells and adjacent stream as practical.
    - Collect water-column samples from North Cell and South Cell sampling locations.
4. Kuparuk Dead Arm (KDA) Reservoirs: Prudhoe Bay operating area.
    - Survey water levels to local elevation control on cells 1, 2, and 3.
    - Measure water-quality profile parameters in cells 1, 2, and 3.
    - Collect water-column samples from cells 1, 2, and 3
5. K113: Kuparuk operating area.
    - Collect water-quality profile data.
    - Collect water-column samples from sampling locations.
6. Webster Reservoir, Prudhoe Bay operating area.
    - Collect water-quality profile data.
7. 2M-Pad, Kuparuk operating area.
    - Automated data collection station maintenance
8. 2006 Spring Snowmelt Monitoring

- Daily snow surveys document show ablation processes at L9312, Kuparuk Deadarm Reservoirs and Mine Site B.
- Snow depth transects across selected sections of each lake/reservoir watershed to help identify available recharge volumes.
- Document observations of lake recharge processes, including photographs, field measurements of snowmelt inflow and lake outflows.
- Document timing of initial melt water on lake/reservoir ice, initial stream flow and lake outflow.

PROCEDURES

Water Chemistry Sampling

All field work follows the specified health, safety, and environmental guidelines outlined by BPX and CPA (White and Lilly, 2006*a,b,c*). 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-surface elevation surveys were conducted using closed level loops and optical levels (Figure 2). 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.

Water samples were also collected at 3 depths (1 ft. (0.3 m) below bottom of ice, varying depths within the central part of the water column, and 1 ft. (0.3 m) above lake bottom). Some of these samples were preserved for further analysis at UAF, while other samples were analyzed with a Hach spectrophotometer at Prudhoe Bay and Alpine facilities. UAF laboratory chemistry analysis will be reported separately.

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

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

Snow Surveys

Small-scale snow depth measurements were conducted in "L" shaped patterns on the lake surface and/or tundra surface at predetermined snow-course locations. Snow depth measurements were taken every 3.3 ft (1 m) for 82 ft (25 m), then turning 90 degrees, and continuing for another 82 ft (25 m). Snow-density samples were also collected at even intervals along transects with an Adirondack snow sampler. Five samples were collected from points along the snow courses and averaged to establish a representative density. Larger-scale snow-depth measurements were conducted at L9312 along general east/west and north/south transects. Depth measurements were typically recorded every 10 ft (3 m, 2 paces). Measurements at transition zones from tundra to lake were recorded 5 ft (1.5 m, 1 pace), and on homogeneous lake surfaces depths were recorded every 20 ft (6.1 m, 4 paces).

Figure 2. Inspecting deployed conductivity probe at L9312, photo by D. Reichardt.

SELECTED RESULTS

Sampling occurred at Kuparuk Deadarm Lakes, K113, Mine Site B, L9312, L9817, and Webster Reservoir during the May/June field activities. Due to weather constraints, the work plan was not followed exactly as planned. However, with some rescheduling, all trip objectives were completed. Table 2 summarizes these conditions at "priority sampling sites". Median results represent all values measured from the listed sampling site. 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 have been chosen as representative of the deeper portion of the respective lakes.

The thickest ice was recorded at KDA-1 (4.90 ft, 1.49 m), whereas the thinnest ice was recorded at K113 (4.02 ft, 122 m), with all of the ice thickness falling between 4 and 5 ft (1.22-1.52 m). The greatest median DO value was found at KDA-1 (12.78 mg/L) and the lowest were observed at L9817 (1.41 mg/L). The other locations were all above 9.5 mg/L. The large difference in dissolved oxygen concentrations between L9817 and the other sample sites is most likely a result of the shallow depth at L9817 and the continual consumption of oxygen throughout the winter by fish and/or sediments. Conductivity measurements were much more variable with the lowest conductivity at L9312 (97.00 uS/cm) and the highest values at K113 (434.0 uS/cm), with a similar median conductivity level at L9817 (413.1 uS/cm). All 3 Kuparuk Deadarm Reservoirs (KDA 1-3) and Mine Site B (North and South Cells) had conductivity values between 139.41 uS/cm and 167.4 uS/cm in May.

With the increasing rate of snowmelt and the accompanying contributions to the adjacent watersheds, all of the lakes which were sampled showed an increase in water levels in May when compared to the April sampling trip as demonstrated in Table 2.

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)]
K113-CT	4.02: (1.22)	-	434.0	-
KDA1-CT	4.90; (1.49)	12.78	167.4	+1.54; (0.469)
KDA2-CT	4.45; (1.36)	11.54	165.8	-
KDA3-CT	4.60; (1.40)	12.56	138.19	+1.57; (0.478)
L9312 Raft B	4.62; (1.41)	9.64	97.00	+4.37; (1.331)
L9817-1	4.35; (1.33)	1.41	413.1	-
MSBN-CT	4.19: (1.28)	10.4	139.41	+1.2; (0.365)
MSBS-CT	4.42: (1.35)	-	162.45	+1.22; (0.372)

Figure 3 displays the water level changes at Mine Site B in both the North and South Cells throughout the winter of 2005-2006. Figure 4 outlines the winter appropriation limits set for each of the cells and their relationship to the water usage at Mine Site B. Figures 5 and 6 present the water level changes at L9312 during the snowmelt period and winter of 2005-2006.

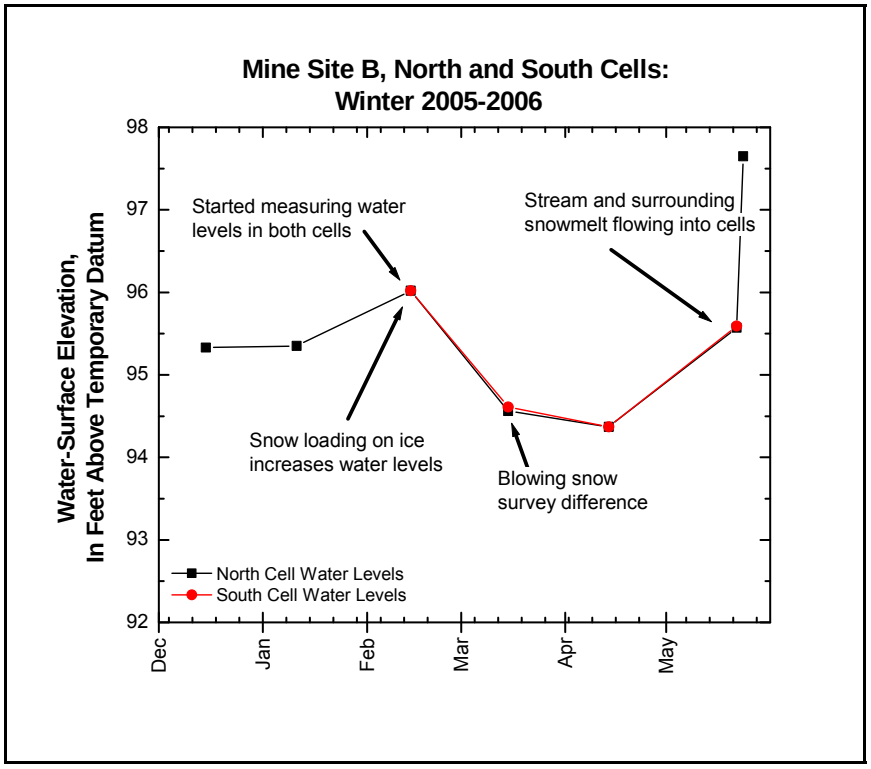

Figure 3. Water levels at Mine Site B (North and South Cells), winter 2005-2006.

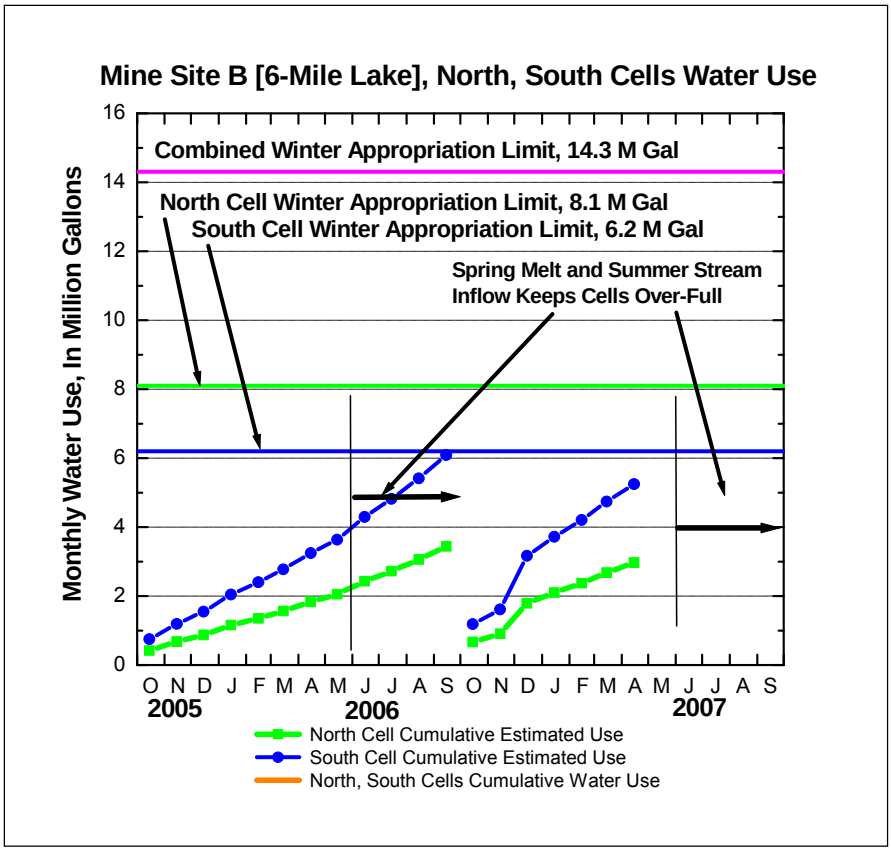

Figure 4. Mine Site B (North and South Cells) 2005-2006 water use.

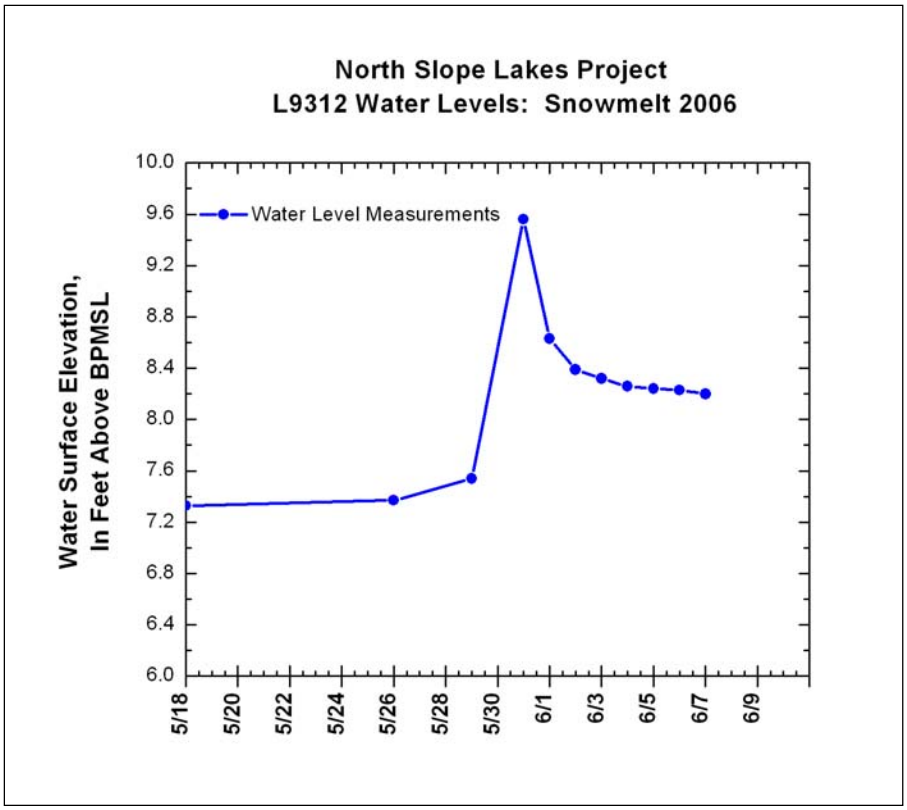

Figure 5. L9312 water levels during snowmelt 2006.

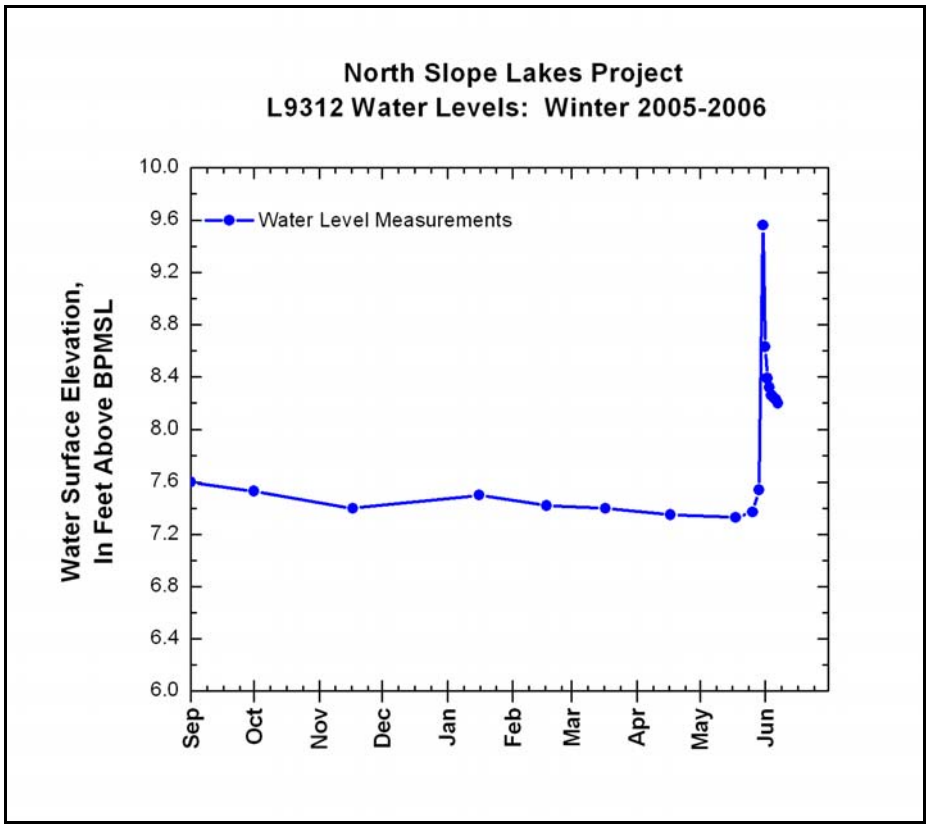

Figure 6. L9312 water levels for winter 2005-2006.

SELECTED SNOWMELT OBSERVATIONS

Kuparuk Deadarm Reservoirs:

On 5/23/06 KDA-1 was observed to have significant water flowing into it from the parking lot, and in the northeast corner of the lake 2 channels had been cut into the lake bed. Water was also flowing onto the surface of the ice at this time, however, the ice still seemed to maintain it's integrity. By 5/25/06 the water from KDA-4 was flowing to KDA-3 through a culvert. The overflowing water from the nearby parking lot also began to cut channels through KDA-3 and a moat of standing water was created around KDA-2. On 5/26/06, it appeared as if the water level of KDA-2 had risen to match the level of KDA-3, and by 6/2/06, KDA 1, 2, and 3 were completely connected and had receded to their designated areas.

Mine Site B:

On 5/22/06 MSB was observed to have standing water on the ice which formed ½"-1" of hard crust on the lake surface. On 5/24/06, East Milne Creek (located directly next to MSB) was studied. At this time, the southern fork of the stream was measured at 30'wide, with the eastern channel of the stream noted to be around 1' deep and the western channel at approximately 2' deep, with a flow estimate of .5 ft/sec. Water levels at MSB appeared to have increased at least 8" since the previous day. By 5/25/06, the amount of surface water had increased again, the North Cell had become almost completely separated, and the stream had melted to the bottom in most places along the east side. By 5/29/06, water was flowing out of 2 of the culverts and the ice sheet in the North Cell had shifted 4-6 ft towards the northeast corner. The water levels continued to rise significantly until 6/2/06 when it was noted that there was a high water mark above the existing water level which indicated that the water level was beginning to drop back down. At this time the island was also completely submerged.

L9312:

On 5/25/06 the tundra around L9312 was wet and partially thawed to approximately ½". When re-visited on 5/26/06, it was estimated that approximately 45-60% of the lake was still covered in snow and the remaining 40-55% of the lake had water on top of the ice. Point 554 was also identified as the lake outlet at this time because of the large amount of water on the ice. By 5/28/06, there was water flowing through a channel by the pump house to the conductivity sampling hole where significant ice melt was beginning to occur. On 5/31/06 it was noted that there was flooding from potentially 3 locations, and that the Niqglik channel had filled a flood plain immediately west of the CD4 pipeline which flooded a slough that passes under CD4-VSM 395 and connects to the Sakoonang channel. By 6/2/06 it was observed that the outlet was mostly dried up and the inlet side was still flooded. On 6/4/06 the ridge at L9312-OUT-HP was moist with puddles of water at low points but was not flowing. Documentation of near zero flow was confirmed by the presence of a thin layer of ice on top of the puddles that the outlet would flow through.

SUMMARY

Monthly monitoring of water-quality parameters and spatial distribution of snow cover at North Slope lakes throughout the winter will help in the understanding and development of simulation tools necessary for water-resources management. As lake 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-snowmelt recharge. This information is important for permitting agencies as well as industry professionals who depend on water assets for facility use and ice road/pad construction. Through monthly hydrologic assessments, water-chemistry testing, and water-sample analysis, we will continue to answer some of the questions on the hydrology of North Slope lakes and adaptive management strategies.

REFERENCES

Lilly, M.R., Reichardt, D., and Hilton, K. 2006. A Workplan for Snowmelt Monitoring and Lake Chemistry Sampling and Surveying at Study Lakes in NPRA, Alpine, and Kuparuk River Areas: May 2006. Water and Environmental Research Center, University of Alaska Fairbanks. 14 p.

White, D.M., and Lilly, M.R. 2006*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. 2006*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. 2006*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** Site Location/Lake ID: L9817-1

Sample Purpose: **Lake Water Quality** Date: 5/17/06 Time: 12:13

FIELD MEASUREMENTS

GPS Coord. Northing: N70.23485 Easting: W151.33221 Datum: NAD 27

Measurements By: DAR, LB Time: 12:15

Water Depth (ft): 8.59 Ice Thickness (ft): 4.35

Freeboard (ft): 0.13 Snow Depth (ft): 0.73

Elev. (BPMSL +/- .02): 53.49 Survey By: MRL Date: 5/17/06 Time: nr

Water Sampling By: DAR, EAB Sample Depths BWS (ft): 1 5 Date: 5/17/06 Time: 12:30

2 6.5

WATER QUALITY METER INFORMATION 3 8

Calibration Information

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

Parameters	**Field Measurements**									
nr	nr	nr	12:50	12:55	12:58	13:02				
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	8.6				
Temp (°C):	-0.13	-0.06	0.27	0.57	0.81	1.00				
pH:	7.17	7.15	7.16	7.18	7.43	8.27				
Barometeric (mmHg):	758.0	758.0	758.0	758.1	758.10	758.1				
Pressure (kPa):	10.73	13.50	16.58	19.52	22.5	23.81				
Conductivity (µS/cm):	421.6	421.9	427.9	434.9	448.20	324.3				
RDO (ppm): (mg/L)	2.06	2.02	1.73	1.39	0.86	0.41				
Turbidity (NTU):	1.6	1.3	2.1	2.0	17.9	22.6				
ORP	254	255	240	194	53	-115				
Hach LDO (UAF) mg/L										
Hach temp °C										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft): 5**			**Depth BWS (ft): 6.5**			**Depth BWS (ft): 8**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	121	123	120	130	132	135	175	180	181	Digital titrator 10-4000 mg/L as CaCO3
Nitrite (mg/L NO2-N)	0.000			0.001			UR= -0.087			Hach Spec 0.002-0.300 mg/L NO2-N
Total iron--UF (mg/L)	0.21			2.14			*OR			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.03			2.28			*OR			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0.28			0.54			*0.27			0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution							10%			
pH										Hanna pH probe

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

Field-Form Filled Out By: Hilton Date: 7/6/06

QAQC Check By: Blackburn Date: 7/17/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: L9817-2

Sample Purpose: **Lake Water Quality** Date: 5/17/06 Time: 14:21

FIELD MEASUREMENTS

GPS Coord. Northing: N70.23463 Easting: W151.33128 Datum: NAD 27

Measurements By: DAR Time: 14:30

Water Depth (ft): 8.35 Ice Thickness (ft): 4.30

Freeboard (ft): 0.05 Snow Depth (ft): 0.75

Elev. (BPMSL +/- .02): 53.49 Survey By: Lilly Date: 5/17/06 Time: nr

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

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WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Multi	Rental	In-Situ Troll 9000E	A	yes	yes
DO, Temp	UAF	Hach LDO	5197-03	yes	yes

Parameters	**Field Measurements**									
Time:	14:36	14:40	14:49	14:58	15:05	15:08				
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	8.3				
Temp (°C):	-0.08	-0.02	0.21	0.52	0.76	0.84				
pH:	7.20	7.21	7.21	7.23	7.80	8.50				
Barometeric (mmHg):	757.7	757.6	757.6	757.8	757.9	757.9				
Pressure (kPa):	10.60	13.74	16.42	19.55	22.62	23.70				
Conductivity (µS/cm):	420.6	422.7	435.6	441.6	463.8	477.0				
RDO (ppm): (mg/L)	0.96	0.86	1.92	1.87	1.69	0.93				
Turbidity (NTU):	6.4	5.9	3.2	3.1	23.2	56.0				
ORP	188	189	190	159	-79	-163				
Hach LDO (UAF) mg/L	0.78	0.65	1.92	1.38	0.2	0.12				
Hach temp °C	0.1	0.2	0.5	0.7	1.1	1				

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

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):**			**Depth BWS (ft):**			**Depth BWS (ft):**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/7/06

QAQC Check By: Blackburn Date: 7/17/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: L9817-3

Sample Purpose: **Lake Water Quality** Date: 5/17/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.23402 Easting: W151.33061 Datum: NAD 27

Measurements By: DAR Time: nr

Water Depth (ft): 8.25 Ice Thickness (ft): 3.96

Freeboard (ft): 0.03 Snow Depth (ft): 1.25

Elev. (BPMSL +/- .02): 53.49 Survey By: MRL Date: 5/17/06 Time: nr

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

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WATER QUALITY METER INFORMATION 3

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	yes	yes

Parameters	**Field Measurements**									
Time:	15:42	15:46	16:06	16:11	16:13	16:15				
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	8.2				
Temp (°C):	-0.11	-0.07	0.19	0.40	0.63	0.72				
pH:	7.19	7.17	7.20	7.21	7.40	7.84				
Barometeric (mmHg):	758.3	758.2	758.3	758.4	758.4	758.4				
Pressure (kPa):	10.69	13.53	16.33	19.52	22.41	23.107				
Conductivity (µS/cm):	426.9	431.5	440.1	443.7	462.4	484.5				
RDO (ppm): (mg/L)	2.29	1.25	1.15	0.79	0.54	0.43				
Turbidity (NTU):	5.7	6.2	7.1	6.6	13.1	32.7				
ORP	100	103	117	119	24	67				
Hach LDO (UAF) mg/L										
Hach temp °C										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):**			**Depth BWS (ft):**			**Depth BWS (ft):**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: A. Blackburn Date: 6/8/06

QAQC Check By: Hilton Date: 7/9/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: L9817-4

Sample Purpose: **Lake Water Quality** Date: 5/17/06 Time: 16:23

FIELD MEASUREMENTS

GPS Coord. Northing: N70.23365 Easting: W151.33006 Datum: NAD 27

Measurements By: DAR Time: 16:23

Water Depth (ft): 6.2 Ice Thickness (ft): 4.50

Freeboard (ft): 0.10 Snow Depth (ft): 0.75

Elev. (BPMSL +/- .02): 53.49 Survey By: MRL Date: 5/17/06 Time: nr

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

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WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	16:35	16:38	16:41	16:42						
Depth BWS (ft):	4.0	5.0	6.0	6.2						
Temp (°C):	-0.20	-0.19	0.07	0.08						
pH:	7.18	7.18	7.18	7.18						
Barometeric (mmHg):	757.9	758.0	758.0	758.0						
Pressure (kPa):	10.32	13.53	16.74	17.020						
Conductivity (µS/cm):	439.0	439.3	442.2	442.6						
RDO (ppm): (mg/L)	1.51	0.83	0.49	0.36						
Turbidity (NTU):	7.5	8.2	54.3	170.8						
ORP	97	99	98	89.00						
Hach LDO (UAF) mg/L										
Hach temp °C										

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

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):**			**Depth BWS (ft):**			**Depth BWS (ft):**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/706

QAQC Check By: Blackburn Date: 7/17/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: L9817-20

Sample Purpose: **Lake Water Quality** Date: 5/17/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.23492 Easting: W151.32963 Datum: NAD 27

Measurements By: DAR/EAB Time: 16:52

Water Depth (ft): 9.55 Ice Thickness (ft): 3.60

Freeboard (ft): -0.03 Snow Depth (ft): 1.42

Elev. (BPMSL +/- .02): 53.49 Survey By: MRL Date: 5/17/06 Time: nr

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

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WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	17:11	17:16	17:18	17:19	17:23	17:30	17:28			
Depth BWS (ft):	4.0	5.0	6.0	7.0	8.0	9.5	9.0			
Temp (°C):	-0.16	-0.03	0.24	0.48	0.57	0.53	0.56			
pH:	7.21	7.19	7.20	7.26	7.34	8.96	8.92			
Barometeric (mmHg):	758.0	758.0	758.1	758.1	758.2	758.3	758.2			
Pressure (kPa):	10.48	13.45	16.47	19.46	22.54	27.24	25.670			
Conductivity (µS/cm):	419.3	423.4	431.7	442.3	453.9	752.4	700.9			
RDO (ppm): (mg/L)	0.86	0.37	0.34	0.30	0.20	0.22	0.18			
Turbidity (NTU):	21.3	21.9	19.6	19.8	29.0	83.8	21.2			
ORP	125	120	115	78	18	-272	-261.00			
Hach LDO (UAF) mg/L										
Hach temp °C										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):**			**Depth BWS (ft):**			**Depth BWS (ft):**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks: Small methane bubbles were released when the bottom was disturbed. Bug surfaced during testing (1/2" long, 1/4" diameter)-looked like a beetle.

Field-Form Filled Out By: Hilton Date: 7/7/06

QAQC Check By: Blackburn Date: 7/31/03

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 15:48

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33392 Easting: W150.94803 Datum: NAD 27

Measurements By: DAR Time: 15:48

Water Depth (ft): 9.3 Ice Thickness (ft): 4.62

Freeboard (ft): 0 Snow Depth (ft): 1.15

Elev. (BPMSL +/- .02): 11.72 Survey By: MRL/EB Date: 5/18/06 Time: 9:55

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

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WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	15:49	15:58	16:05	16:10	16:12	16:16				
Depth BWS (ft):	5.0	6.0	7.0	8.0	9.0	9.2				
Temp (°C):	0.07	0.28	0.53	0.83	1.01	1.15				
pH:	6.91	6.67	6.62	6.61	6.58	6.58				
Barometeric (mmHg):	760.1	760.1	760.1	760.1	760.1	760.2				
Pressure (kPa):	13.26	16.38	19.82	23.18	25.38	26.61				
Conductivity (µS/cm):	85.6	99.3	103.3	107.9	108.3	108.4				
RDO (ppm): (mg/L)	13.50	10.41	7.98	6.99	6.11	4.47				
Turbidity (NTU):	0.8	0.1	0.8	1.2	2.3	2.8				
ORP	289	303	309	314	317	308				

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 $CaCO_3$)										titrator 10-4000
Total iron--UF (mg/L)										0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										0.02-3.00
Ammonia (mg/L NH_3-N)****										0.01-0.50
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/26/06

QAQC Check By: A. Blackburn Date: 8/23/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: L9312-MP (A-B)

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 13:45

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33405 Easting: W150.94272 Datum: NAD 27

Measurements By: DAR Time: 13:45

Water Depth (ft): 10.95 Ice Thickness (ft): 4.6

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

Elev. (BPMSL +/- .02): 11.72 Survey By: MRL/EB Date: 5/18/06 Time: 9:55

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

2 na

WATER QUALITY METER INFORMATION 3 na

Calibration Information

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

Parameters	**Field Measurements**									
Time:	13:49	13:51	13:57	14:01	14:21	14:27	14:35			
Depth BWS (ft):	5.0	6.0	7.0	8.0	9.0	10.0	10.8			
Temp (°C):	0.23	0.37	0.76	0.98	1.36	1.56	1.69			
pH:	6.78	6.71	6.68	6.63	6.63	6.57	6.64			
Barometeric (mmHg):	760.2	760.2	760.2	760.3	760.4	760.4	760.4			
Pressure (kPa)	13.85	16.38	19.43	22.31	25.77	28.73	30.59			
Conductivity (µS/cm):	90.3	90.6	94.2	97.2	103.4	111.2	115.5			
RDO (ppm): (mg/L)	12.85	12.86	10.56	9.48	8.47	6.56	5.40			
Turbidity (NTU):	0.2	0.2	-0.2	-0.1	4.3	6.6	21.9			
ORP	313	318	324	330	332	294	191			
Hach LDO (mg/L)										
Hach temp °C										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/25/06

QAQC Check By: A. Blackburn Date: 8/23/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 9:55

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33356 Easting: W150.94537 Datum: NAD 27

Measurements By: DAR Time: 9:55

Water Depth (ft): 11.05 Ice Thickness (ft): 4.62

Freeboard (ft): 0.04 Snow Depth (ft): 0.95

Elev. (BPMSL +/- .02): 11.72 Survey By: MRL/EB Date: 5/18/06 Time: 9:55

Water Sampling By: DAR Sample Depths BWS (ft): 1 5 Date: 5/18/06 Time: nr

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WATER QUALITY METER INFORMATION 3 10.5

Calibration Information

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

Parameters	**Field Measurements**									
Time:	9:59	0:10	10:08	10:12	10:19	10:22	10:25			
Depth	5	6	7	8	9	10	10.5			
Temp (°C):	0.16	0.51	0.97	1.24	1.51	1.77	1.81			
pH:	6.82	6.74	6.68	6.84	6.68	6.51	6.65			
Barometeric (mmHg):	760.5	760.5	760.5	760.5	760.4	760.5	760.5			
Pressure (kPa)	13.64	16.43	19.46	22.53	25.45	23.55	30.18			
Conductivity (µS/cm):	89.3	91.8	92.3	92.5	97.0	103.9	112.2			
RDO (ppm): (mg/L)	12.77	12.55	12.91	12.93	9.21	4.08	3.03			
Turbidity (NTU):	0.4	0	0.4	1.1	3.1	6.6	6.9			
ORP										
Hach LDO (mg/L)										
Hach temp °C										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):__5____**			**Depth BWS (ft):__9____**			**Depth BWS (ft):__10.5____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	60	56	61	68	71	66	94	99	94	Digital titrator 10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.007	-	-	0.004	-	-	*UR= 0.02	-	-	Hach spec 0.002-0.300 mg/L NO2-N
Total iron--UF (mg/L)	0.17	-	-	0.21	-	-	*26.8	-	-	Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.05	-	-	0.09	-	-	*OR	-	-	Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0	-	-	0.12	-	-	*1.3	-	-	Hach spec 0.01-0.50 mg/L NH3-N
pH (hanna)		-	-		-	-		-	-	

Remarks: *Over Range- used a 10% dillution. Bottom sample is colored. Lab pHs are at warmer temp.

Field-Form Filled Out By: Hilton Date: 7/25/06

QAQC Check By: Blackburn Date: 7/28/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: L9312-MP (B-SH)

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 15:05

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33378 Easting: W150.94832 Datum: NAD 27

Measurements By: DAR Time: 15:05

Water Depth (ft): 10.75 Ice Thickness (ft): 4.6

Freeboard (ft): 0.05 Snow Depth (ft): 0.8

Elev. (BPMSL +/- .02): 11.72 Survey By: MRL/EB Date: 5/18/06 Time: 9:55

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

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WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	15:07	15:12	15:18	15:20	15:27	15:30	15:32			
Depth BWS (ft):	5.0	6.0	7.0	8.0	9.0	10.0	10.7			
Temp (°C):	0.10	0.33	0.68	0.95	1.24	1.44	1.52			
pH:	6.76	6.70	6.67	6.63	6.60	6.56	6.61			
Barometeric (mmHg):	760.2	760.3	760.2	760.2	760.2	760.3	760.3			
Pressure (kPa)	13.68	16.56	19.87	22.64	25.37	28.67	29.91			
Conductivity (µS/cm):	91.29	94.47	98.98	94.78	103.40	108.90	111.40			
RDO (ppm): (mg/L)	11.43	11.28	10.02	9.27	8.61	6.44	5.40			
Turbidity (NTU):	0.0	0.3	0.9	0.9	3.2	5.5	7.4			
ORP	298	305	311	316	315	281	210			
Hach LDO (mg/L)										
Hach Temp (°C):										

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

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/26/06

QAQC Check By: A. Blackburn Date: 8/23/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 12:10

FIELD MEASUREMENTS

GPS Coord. Northing: N70.33450 Easting: W150.94005 Datum: NAD 27

Measurements By: DAR Time: 12:10

Water Depth (ft): 9.95 Ice Thickness (ft): 4.35

Freeboard (ft): 0.15 Snow Depth (ft): 0.93

Elev. (BPMSL +/- .02): 11.72 Survey By: MRL/EB Date: 5/18/06 Time: 9:55

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	12:11	12:19	12:30	12:32	13:14	13:31				
Depth BWS (ft):	5.0	6.0	7.0	8.0	9.0	9.9				
Temp (°C):	0.06	0.32	0.60	0.83	1.12	1.23				
pH:	6.73	6.71	6.67	6.60	6.59	6.54				
Barometeric (mmHg):	760.3	760.2	760.3	760.3	760.2	760.3				
Pressure (kPa)	13.58	16.43	19.41	22.38	25.38	27.24				
Conductivity (µS/cm):	89.64	98.40	103.80	104.90	109.60	114.80				
RDO (ppm): (mg/L)	11.26	11.13	10.47	9.93	8.76	3.98				
Turbidity (NTU):	-0.3	-0.1	0.2	0.3	2.4	6.9				
ORP	354	357	354	360	340	278				
Hach LDO (mg/L)										
Hach Temp (°C):										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks: Batteries replaced at 9' Ft.

Field-Form Filled Out By: Hilton Date: 7/25/06

QAQC Check By: A. Blackburn Date: 8/23/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 9:20

FIELD MEASUREMENTS

GPS Coord. Northing: nr Easting: nr Datum: nr

Measurements By: DAR Time: 9:20

Water Depth (ft): 6.32 Ice Thickness (ft): 4.64

Freeboard (ft): 0.26 Snow Depth (ft): 0.7

Elev. (BPMSL +/- .02): 11.72 Survey By: MRL/EB Date: 5/18/06 Time: 9:55

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	9:25	9:28	9:31							
Depth BWS (ft):	4.5	5.0	6.0							
Temp (°C):	0.31	0.22	0.24							
pH:	6.74	6.76	6.70							
Barometeric (mmHg):	760.8	760.8	760.7							
Pressure (kPa)	11.85	13.75	16.64							
Conductivity (µS/cm):	90.03	94.98	97.18							
RDO (ppm): (mg/L)	8.64	8.39	7.69							
Turbidity (NTU):	3.2	2.4	7.0							
ORP	349	351	348							
Hach LDO (mg/L)										
Hach Temp (°C):										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Oxygen (mg/L)										Hach spec 0.3-15 mg/L
Alkalinity (mg/L as $CaCO_3$)										Digital titrator 10-4000 mg/L as CaCO3
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)****										0.01-0.50 mg/L NH3-N
Ammonia/ Iron dilution										

Remarks: At first depth, the pH from the pH/ORP probe read 5.7.

Field-Form Filled Out By: Hilton Date: 7/25/06

QAQC Check By: A. Blackburn Date: 8/23/07

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/18/06 Time: 3:00

FIELD MEASUREMENTS

GPS Coord. Northing: na Easting: na Datum: na

Measurements By: Hilton Time: 3:20

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

Freeboard (ft): na Snow Depth (ft): na

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

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

2 na

WATER QUALITY METER INFORMATION 3 na

Calibration Information

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

Parameters	**Field Measurements**									
Time:	3:33	3:35	3:37	3:39						
Depth BWS (ft):	na	na	na	na						
Temp (°C):	14.62	14.63	14.64	14.65						
pH:	6.73	6.73	6.73	6.73						
Barometeric (mmHg):	760.2	760.1	760.1	760.1						
Pressure (kPa):	0.671	0.669	0.668	0.671						
Conductivity (µS/cm):	137.1	137.1	137.1	137.2						
RDO (ppm): (mg/L)	6.96	6.86	6.74	6.64						
Turbidity (NTU):	1.3	2.2	2.4	2.0						
ORP	353	354	354	355						
Hach LDO (BLM) mg/L										
Hach temp °C										

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Raw Water Supply**									**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3				
Alkalinity (mg/L as $CaCO_3$)	60	58	63							10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.01									0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.11									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									0.01-0.50 mg/L NH3-
*Ammonia dilution										
pH										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/7/06

QAQC Check By: Blackburn Date: 7/17/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: KDA1-CT

Sample Purpose: **Lake Water Quality** Date: 5/21/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: DAR Time: nr

Water Depth (ft): 21.16 Ice Thickness (ft): 4.90

Freeboard (ft): 0.10 Snow Depth (ft): 0.32

Elev. (BPMSL): nr Survey By: MRL/EB Date: 5/21/06 Time: 6:30

Water Sampling By: DAR Sample Depths BWS (ft): 1 5.5 Date: 5/21/06 Time: nr

2 11

WATER QUALITY METER INFORMATION 3 20.5

Calibration Information

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

Parameters	**Field Measurements**											
Time:	15:09	15:21	15:25	15:27	15:30	15:32	15:33	15:35	15:36	15:41	15:46	15:49
Depth BWS (ft):	5	6	7	8	10	12	14	16	18	19.5	20.5	21
Temp (°C):	0.23	0.58	0.59	0.59	0.59	0.61	0.64	0.67	0.73	0.87	0.98	0.99
pH:	7.80	7.77	7.74	7.73	7.73	7.72	7.72	7.69	7.67	7.51	7.44	7.41
Barometeric (mmHg):	761.9	761.9	762.0	762.1	762.1	762.2	762.3	762.3	762.4	762.4	762.5	762.5
Pressure (kPa):	13.79	16.35	19.44	22.55	28.47	34.48	40.43	46.42	52.28	56.88	59.53	61.17
Conductivity (µS/cm):	133.3	169.1	169.3	169.7	169.6	169.6	169.7	169.8	170.2	171.4	173.1	174.2
RDO (ppm): (mg/L)	14.63	14.99	15.17	15.23	15.29	15.31	15.22	14.99	14.45	8.99	4.86	4.23
Turbidity (NTU):	6.2	-0.1	-0.3	-0.3	-0.3	-0.2	-0.3	-0.2	0.1	2.8	3.8	3.7
ORP	218	220	219	219	218	218	218	219	219	222	223	222

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): 5.5**			**Depth BWS (ft): 11**			**Depth BWS (ft): 20.5**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	118	113	-	123	120	-	123	121	-	titrator 10-4000
Nitrite (mg/L NO2--N)	0.005			0.006			0.010			spec 0.002-
Total iron--UF (mg/L)	0.01			0.01			0.28			spec 0.02-
Filtered Iron--F tot Fe (mg/L)	0.01			0.00			0.16			spec 0.02-
Ammonia (mg/L NH_3-N)	0.00			UR=-0.01			0.06			spec 0.01-
*Ammonia/ Iron dilution										
pH	7.57			7.64			7.39			

Remarks: Snow is consolidated frozen slush

Field-Form Filled Out By: Blackburn Date: 7/31/06

QAQC Check By: Hilton Date: 8/15/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/21/06 Time: 12:50

FIELD MEASUREMENTS

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

Measurements By: DAR Time: 12:50

Water Depth (ft): 15.19 Ice Thickness (ft): 4.45

Freeboard (ft): -0.20 Snow Depth (ft): 1.00

Elev. (BPMSL): 3.15 Survey By: MRL/EB Date: 5/21/06 Time: 6:30

Water Sampling By: DAR Sample Depths BWS (ft): 1 5 Date: 5/21/06 Time: nr

2 11

WATER QUALITY METER INFORMATION 3 14.5

Calibration Information

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

Parameters	**Field Measurements**									
Time:	13:03	13:05	13:07	13:10	13:12	13:15	13:35	13:42	13:44	13:45
Depth BWS (ft):	5	6	7	8	9	11	13	14	14.5	15
Temp (°C):	0.30	0.53	0.68	0.71	0.74	0.83	0.97	1.08	1.09	1.12
pH:	7.75	7.70	7.68	7.70	7.69	7.66	7.43	7.37	7.39	7.41
Barometeric (mmHg):	761.2	761.2	761.2	761.2	761.2	761.3	761.5	761.5	761.6	761.6
Pressure (kPa):	13.40	16.59	19.50	22.68	22.56	31.38	37.45	40.50	41.86	43.39
Conductivity (µS/cm):	159.1	160.9	162.2	162.5	162.2	163.2	164.2	168.1	173.9	181.7
RDO (ppm): (mg/L)	15.97	16.55	16.99	17.03	17.05	16.41	7.74	3.76	2.38	1.47
Turbidity (NTU):	0.0	-0.3	-0.3	-0.2	-0.2	-0.2	0.2	2.5	4.7	5.0
ORP	217	218	216	215	215	215	217	217	214	210

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):___5__**			**Depth BWS (ft):__11__**			**Depth BWS (ft):___14.5_**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	105	107	-	109	111	-	123	125	-	titrator 10-4000
Nitrite (mg/L NO2--N)	0.005			0.006			0.009			spec 0.002-
Total iron--UF (mg/L)	0.00			0.03			0.03			spec 0.02-3.00
Filtered Iron--F tot Fe (mg/L)	0.01			0.01			0.02			spec 0.02-3.00
Ammonia (mg/L NH_3-N)	0.03			0.02			0.38			spec
*Ammonia/ Iron dilution										
pH	7.68			7.60			7.34			

Remarks: 0.80' of snow column is frozen slush, part of which should be considered ice.

Field-Form Filled Out By: Blackburn Date: 7/31/06

QAQC Check By: Hilton Date: 8/15/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/21/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: DAR Time: nr

Water Depth (ft): 10.4 Ice Thickness (ft): 0.25

Freeboard (ft): 0.0 Snow Depth (ft): 0.95

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

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	19:46	19:48	19:50	19:51	19:53	19:57				
Depth BWS (ft):	5	6	7	8	9	10				
Temp (°C):	0.15	0.11	0.61	0.67	0.72	0.73				
pH:	7.79	7.75	7.63	7.62	7.60	7.59				
Barometeric (mmHg):	763.9	763.9	764.0	764.0	764.0	764.1				
Pressure (kPa):	13.74	16.42	20.32	22.86	25.59	28.66				
Conductivity (µS/cm):	75.45	103.40	153.50	157.30	158.20	158.20				
RDO (ppm): (mg/L)	14.69	14.84	14.90	14.85	14.62	13.64				
Turbidity (NTU):	6.3	4.3	0.5	1.4	2.3	4.2				
ORP	215	216	222	221	221	220				

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 $CaCO_3$)										10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)										0.01-0.50 mg/L NH3-
*Ammonia/ Iron dilution										
pH										

Remarks:

Field-Form Filled Out By: Blackburn Date: 7/31/06

QAQC Check By: Hilton Date: 8/15/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/21/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: DAR Time: nr

Water Depth (ft): 22.56 Ice Thickness (ft): 4.6

Freeboard (ft): -0.20 Snow Depth (ft): 1.2

Elev. (BPMSL): 5.17 Survey By: MRL/EB Date: 5/21/06 Time: 6:30

Water Sampling By: DAR Sample Depths BWS (ft): 1 5 Date: 5/21/06 Time: nr

2 12

WATER QUALITY METER INFORMATION 3 22

Calibration Information

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

Parameters	**Field Measurements**									
Time:	17:08	17:11	17:12	17:16	17:17	17:19	17:21	17:24	17:31	(see next page)
Depth BWS (ft):	5	6	7	8	10	12	14	16	18	
Temp (°C):	0.09	0.53	0.66	0.67	0.69	0.68	0.70	0.76	0.82	
pH:	7.59	7.62	7.64	7.67	7.66	7.66	7.67	7.66	7.56	
Barometeric (mmHg):	762.7	762.7	762.8	762.8	762.8	762.9	763.0	763.1	763.1	
Pressure (kPa):	13.33	16.32	19.47	22.44	28.54	34.40	40.45	46.51	52.36	
Conductivity (µS/cm):	48.56	140.7	143.6	144.0	144.1	144.2	144.2	144.0	144.1	
RDO (ppm): (mg/L)	14.77	15.21	15.59	15.94	16.11	16.12	16.13	16.01	15.20	
Turbidity (NTU):	4.8	0.4	-0.5	-0.4	-0.3	-0.4	-0.4	-0.4	-0.3	
ORP	216	221	221	220	219	219	219	219	220	

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): 5**			**Depth BWS (ft): 12**			**Depth BWS (ft): 22**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	90	93	-	97	96	-	105	109	-	10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.006			0.006			0.007			0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.02			0.01			0.13			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L	0.01			0.01			0.03			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	UR= -0.01			UR= -0.02			0.11			0.01-0.50 mg/L NH3-N
*Ammonia/ Iron dilution										
pH	7.53			7.51			7.17			

Remarks: 0.55' of snow column is frozen slush. (Chemistry on Page 2)

Field-Form Filled Out By: Blackburn Date: 7/31/06

QAQC Check By: Hilton Date: 8/15/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/21/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: DAR Time: nr

Water Depth (ft): 22.56 Ice Thickness (ft): 4.6

Freeboard (ft): -0.20 Snow Depth (ft): 1.2

Elev. (BPMSL): 5.17 Survey By: MRL/EB Date: 5/21/06 Time: 6:30

Water Sampling By: DAR Sample Depths BWS (ft): 1 5 Date: 5/21/06 Time: nr

2 12

3 22

WATER QUALITY METER INFORMATION

Calibration Information

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

Parameters	**Field Measurements**									
Time:	17:38	17:45	17:50	17:55						
Depth BWS (ft):	20	21	22	23						
Temp (°C):	0.87	0.94	1.00	1.01						
pH:	7.39	7.24	7.24	7.24						
Barometeric (mmHg):	763.3	763.3	763.3	763.4						
Pressure (kPa):	58.45	61.36	64.25	65.83						
Conductivity (µS/cm):	146.8	147.9	151.6	152.7						
RDO (ppm): (mg/L)	10.56	6.12	3.18	2.35						
Turbidity (NTU):	0.4	0.7	2.6	6.6						
ORP	224	228	227	132						

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): 5**			**Depth BWS (ft): 12**			**Depth BWS (ft): 22**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	90	93	-	97	96	-	105	109	-	10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.006			0.006			0.007			0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.02			0.01			0.13			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L	0.01			0.01			0.03			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	UR= - 0.01			UR= - 0.02			0.11			0.01-0.50 mg/L NH3-N
*Ammonia/ Iron dilution										
pH	7.53			7.51			7.17			

Remarks: 0.55' of snow column is frozen slush.

Field-Form Filled Out By: Blackburn Date: 7/31/06

QAQC Check By: Hilton Date: 8/15/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/22/06 Time: 14:10

FIELD MEASUREMENTS

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

Measurements By: DAR Time: 14:15

Water Depth (ft): 34.6 Ice Thickness (ft): 3.97

Freeboard (ft): 0.0 Snow Depth (ft): 0.43 (frozen slush)

Elev. (BPMSL+/- .02): 95.57 Survey By: MRL Date: 5/24/06 Time: nr

Water Sampling By: DAR Sample Depths BWS (ft): 1 5 Date: 5/22/06 Time: nr

2 14

3 34

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	UAF	Hach	5197-03	yes	yes
all	UAF	In-Situ	33205	yes	yes
Conductivity, Temp	GWS	YSI	B0064	yes	yes

Parameters	**Field Measurements**									
Time:	14:11	14:16	14:18	14:27	14:30	14:31	14:36	14:37	14:42	14:44
Depth BWS (ft):	5	6	7	8	10	12	14	16	18	20
Temp (°C):	0.55	0.72	0.71	0.65	0.53	0.51	0.53	0.52	0.52	0.53
pH:	7.49	7.50	7.51	7.50	7.52	7.48	7.52	7.50	7.48	7.44
Barometeric (mmHg):	766.0	765.9	765.9	765.9	765.9	765.9	766.1	766.1	766.2	766.3
Pressure (kPa):	13.28	16.56	19.52	22.58	28.38	34.40	40.44	46.16	52.44	58.37
Conductivity (µS/cm):	137.6	161.6	168.7	185.7	196.1	196.1	196.3	196.2	196.1	195.7
RDO (ppm): (mg/L)	11.75	11.24	11.02	11.04	10.67	10.49	10.65	10.61	10.75	10.70
Turbidity (NTU):	21.6	9.8	8.0	4.3	2.1	2.1	2.0	2.0	2.0	2.3
ORP	186	188	188	191	192	193	194	195	198	200
YSI cond.				0.6						0.6
YSI temp				146.3						146.1

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):___5__**			**Depth BWS (ft):_14___**			**Depth BWS (ft):____34__**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	96	98	94	125	120	123	173	178	180	10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.003			0.004			UR= 0.062			0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.25			0.09			*22			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.09			0.03			*21.9			0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0.01			0.02			*2.3			0.01-0.50 mg/L NH3-
*Ammonia/ Iron dilution							10%			
pH										

Remarks: 0.43" of snow column is saturated, frozen slush

Field-Form Filled Out By: Hilton Date: 7/7/06

QAQC Check By: Blackburn Date: 7/17/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/22/06 Time: 14:10

FIELD MEASUREMENTS

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

Measurements By: DAR Time: 14:15

Water Depth (ft): 34.6 Ice Thickness (ft): 3.97

Freeboard (ft): 0.00 Snow Depth (ft): 0.44

Elev. (BPMSL+/- .02): 95.57 Survey By: MRL Date: 5/24/06 Time: nr

Water Sampling By: DAR Sample Depths BWS (ft): 1 5 Date: 5/22/06 Time: nr

2 14

WATER QUALITY METER INFORMATION 3 34

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	UAF	Hach	5197-03	yes	yes
all	UAF	In-Situ	33205	yes	yes
Conductivity, Temp	GWS	YSI	B0064	yes	yes

Parameters	**Field Measurements**									
Time:	14:45	14:49	14:51	14:59	15:02	15:10	15:12	15:13	15:13	
Depth BWS (ft):	22	24	26	28	30	32	33	34	34.5	
Temp (°C):	0.53	0.53	0.53	0.53	0.52					
pH:	7.43	7.52	7.46	7.47	7.36					
Barometeric (mmHg):	766.3	766.4	766.4	766.5	766.6					
Pressure (kPa):	64.25	70.19	76.16	82.16	88.02					
Conductivity (µS/cm):	195.7	195.7	196.2	198.6	205.8					
RDO (ppm): (mg/L)	10.61	10.62	10.56	9.48	7.00					
Turbidity (NTU):	2.1	2.1	2.0	1.20	0.70					
ORP	201	198	200	200	203					
YSI Cond.					154.5	177.3	277.5	343.0	348.4	
YSI Temp.					0.6	0.6	0.6	0.6	0.6	

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft): 5**			**Depth BWS (ft): 14**			**Depth BWS (ft): 34**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)	96	98	94	125	120	123	173	178	180	10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.003			0.004			UR= 0.062			0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.25			0.09			*22			Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	0.09			0.03			*21.9			Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	0.01			UR= 0.02			*2.3			0.01-0.50 mg/L NH3-N
*Ammonia/ Iron dilution							10%			
pH										

Remarks: Insitu failed at 32 ft. UAF short cord was being used, but was not long enough. So, cord was replaced by GWS 50' cord at 32 ft. Cord is marked one foot long, depth corrected in field.

Field-Form Filled Out By: Blackburn Date: 7/31/06

QAQC Check By: Hilton Date: 8/15/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32134 Easting: W149.40015 Datum: NAD 27

Measurements By: EB Time: nr

Water Depth (ft): 36.05 Ice Thickness (ft): 3.9

Freeboard (ft): nr Snow Depth (ft): nr

Elev. (BPMSL): 95.57 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters :										
Time:										
Depth BWS (ft):	4.5	5.0	6.0	7.0	8.0	10.0	12.0	14.0	16.0	18.0
Temp (°C):	0.5	0.6	0.7	0.8	0.7	0.6	0.6	0.6	0.6	0.6
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	108.00	108.50	122.00	145.50	156.40	167.20	167.80	167.80	167.90	167.90
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32134 Easting: W149.40015 Datum: NAD 27

Measurements By: EB Time: nr

Water Depth (ft): 36.05 Ice Thickness (ft): 3.9

Freeboard (ft): nr Snow Depth (ft): nr

Elev. (BPMSL): 95.57 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters										
Time:										
Depth BWS (ft):	20.0	22.0	24.0	26.0	28.0	30.0	31.0	32.0	33.0	34.0
Temp (°C):	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	167.90	168.00	168.00	168.20	170.40	173.40	179.60	183.60	194.10	231.10
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32134 Easting: W149.40015 Datum: NAD 27

Measurements By: EB Time: nr

Water Depth (ft): 36.05 Ice Thickness (ft): 3.9

Freeboard (ft): nr Snow Depth (ft): nr

Elev. (BPMSL): 95.57 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters										
Time:										
Depth BWS (ft):	35.0	35.5								
Temp (°C):	0.6	0.6								
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	277.70	339.90								
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 12:45

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32134 Easting: W149.40015 Datum: NAD 27

Measurements By: EB Time: 12:45

Water Depth (ft): 36.68 Ice Thickness (ft): 4.19

Freeboard (ft): 0.25 Snow Depth (ft): 0.16 (deformed)

Elev. (BPMSL): 95.57 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	Failed, recalibrated	PASS
LDO, Barom., Temp	UAF	Hach LDO (long cord)	5197-03	PASS	PASS

Parameters										
Time:	12:48	12:49	12:49	12:50	12:51	12:51	12:52	12:52	12:54	12:55
Depth BWS (ft):	4.5	5.0	6.0	8.0	10.0	15.0	20.0	25.0	28.0	30.0
Temp (°C):	1.0	0.9	0.7	0.7	0.7	0.6	0.5	0.5	0.5	0.5
LDO (mg/L):	11.3	11.2	11.3	11.1	10.9	10.7	10.7	10.6	9.1	7.3
Barometeric (mmHg):										
Pressure (kPa):										
Temp (°C):	0.9	0.7	0.6	0.8	0.7	0.6	0.6	0.6	0.6	0.5
Conductivity (µS/cm):	68.60	81.50	106.50	131.10	160.50	168.60	168.40	168.30	169.10	171.50
RDO (ppm):										
Turbidity (NTU):										
ORP										

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

NORTH SLOPE LAB CHEMISTRY ANALYSI

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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 12:45

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32134 Easting: W149.40015 Datum: NAD 27

Measurements By: EB Time: 12:45

Water Depth (ft): 36.68 Ice Thickness (ft): 4.19

Freeboard (ft): 0.25 Snow Depth (ft): 0.16 (deformed)

Elev. (BPMSL): 95.57 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	Failed, recalibrated	PASS
LDO, Barom., Temp	UAF	Hach LDO (long cord)	5197-03	PASS	PASS

Parameters										
Time:	12:58	13:00	13:00	13:01	13:06					
Depth BWS (ft):	32.0	34.0	35.0	36.0	37.0					
Temp (°C):	0.5	0.5	0.5	0.5	0.5					
LDO (mg/L):	3.2	0.2	0.0	-0.1	0.0					
Barometeric (mmHg):										
Pressure (kPa):										
Temp (°C):	0.6	0.6	0.6	0.6	0.6					
Conductivity (µS/cm):	174.30	190.50	227.30	271.50	388.70					
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 12:20

FIELD MEASUREMENTS

GPS Coord. Northing: N70°19.232' Easting: W149°24.089' Datum: WGS84

Measurements By: DAR, Binning Time: 12:20

Water Depth (ft): 25.01 Ice Thickness (ft): 3.29

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

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	yes	yes
DO, Temp., Baro.	UAF	Hach LDO	5197-03	yes	yes

Parameters										
Time:	12:21	12:23	12:23	12:24	12:25	12:26	12:34	12:35	12:36	12:36
Depth BWS (ft):	3.5	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0
Temp (°C):	0.7	0.8	0.8	0.7	0.6	0.6	0.4	0.4	0.4	0.4
LDO (mg/L):	11.5	11.6	11.5	11.3	11.0	10.8	10.7	10.7	10.7	10.7
Barometeric (mmHg):										
Pressure (kPa):										
Temp (°C):	0.5	1.1	0.9	0.7	0.7	0.6	0.6	0.6	0.6	0.6
Conductivity (µS/cm):	53.80	58.30	70.50	109.40	136.40	161.80	168.50	168.50	168.50	168.50
RDO (ppm):										
Turbidity (NTU):										
ORP										

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

NORTH SLOPE LAB CHEMISTRY ANALYSI

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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 12:20

FIELD MEASUREMENTS

GPS Coord. Northing: N70°19.232' Easting: W149°24.089' Datum: WGS84

Measurements By: DAR, Binning Time: 12:20

Water Depth (ft): 25.01 Ice Thickness (ft): 3.29

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

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	yes	yes
DO, Temp., Baro.	UAF	Hach LDO	5197-03	yes	yes

Parameters										
Time:	12:37	12:37	12:37	12:38	12:38					
Depth BWS (ft):	20.0	22.0	23.0	24.0	24.5					
Temp (°C):	0.4	0.4	0.4	0.4	0.4					
LDO (mg/L):	10.7	10.7	10.7	10.7	10.6					
Barometeric (mmHg):										
Pressure (kPa):										
Temp (°C):	0.6	0.6	0.6	0.6	0.6					
Conductivity (µS/cm):	168.50	168.50	168.60	168.60	168.50					
RDO (ppm):										
Turbidity (NTU):										
ORP										

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

NORTH SLOPE LAB CHEMISTRY ANALYSI

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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/22/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: DAR Time: nr

Water Depth (ft): 35.5 Ice Thickness (ft): 4.32

Freeboard (ft): 0.28 Snow Depth (ft): 0.12

Elev. (BPMSL +/- .02): 95.57 Survey By: MRL Date: 5/22/06 Time: nr

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

2

WATER QUALITY METER INFORMATION 3

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
DO, Temp	UAF	Hach LDO	5197-03	yes	yes

Parameters	**Field Measurements**									
Time:	17:20	17:21	17:22	17:23	17:23	17:24	17:25	17:25	17:27	17:30
Depth BWS (ft):	4	5	6	8	10	15	20	25	27	29
Temp (°C):	1.1	0.9	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.5
Conductivity (µS/cm):										
LDO (mg/L)	11.2	11.2	11.1	10.9	10.7	10.6	10.6	10.5	8.5	6.0
Time:	17:31	17:33	17:34	17:34	17:34					
Depth BWS (ft):	31.0	33.0	34.0	35.0	35.5					
Temp (°C):	0.5	0.5	0.5	0.5	0.5					
Conductivity (µS/cm):										
LDO (mg/L)	1.8	0.3	0.1	0.0	0.0					

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 $CaCO_3$)										10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)										0.01-0.50 mg/L NH3-
*Ammonia/ Iron dilution										
pH										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/25/06

QAQC Check By: Blackburn Date: 7/27/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 11:45

FIELD MEASUREMENTS

GPS Coord. Northing: N70°19.186' Easting: W149°24.234' Datum: WGS84

Measurements By: EB Time: 11:45

Water Depth (ft): 30.91 Ice Thickness (ft): 3.81

Freeboard (ft): 0.05 Snow Depth (ft): 0.98

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	yes	yes
DO, Temp., Baro.	UAF	Hach LDO	5197-03	yes	yes

Parameters										
Time:	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
Depth BWS (ft):	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0
Temp (°C):	0.8	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5
LDO (mg/L):	11.5	11.5	11.5	11.2	11.0	10.9	10.9	10.9	10.9	10.9
Barometeric (mmHg):										
Pressure (kPa):										
Temp (°C):	0.3	0.5	0.7	0.7	0.6	0.5	0.5	0.5	0.5	0.5
Conductivity (µS/cm):	85.60	92.40	108.60	138.10	164.10	168.20	168.40	168.40	168.30	168.30
RDO (ppm):										
Turbidity (NTU):										
ORP										

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

NORTH SLOPE LAB CHEMISTRY ANALYSI

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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 11:45

FIELD MEASUREMENTS

GPS Coord. Northing: N70°19.186' Easting: W149°24.234' Datum: WGS84

Measurements By: DAR, Binning Time: 11:45

Water Depth (ft): 30.91 Ice Thickness (ft): 3.81

Freeboard (ft): 0.05 Snow Depth (ft): 0.98

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	yes	yes
DO, Temp., Baro.	UAF	Hach LDO	5197-03	yes	yes

Parameters										
Time:	nr	nr	nr	12:03	12:04	12:05	12:07			
Depth BWS (ft):	22.0	24.0	26.0	28.0	29.0	30.0	30.5			
Temp (°C):	0.5	0.5	0.5	0.5	0.5	0.5	0.4			
LDO (mg/L):	10.8	10.9	10.7	9.6	8.8	7.9	5.1			
Barometeric (mmHg):										
Pressure (kPa):										
Temp (°C):	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
Conductivity (µS/cm):	168.30	168.30	168.30	169.10	170.00	170.70	173.70			
RDO (ppm):										
Turbidity (NTU):										
ORP										

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

NORTH SLOPE LAB CHEMISTRY ANALYSI

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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/22/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: DAR Time: nr

Water Depth (ft): 27.95 Ice Thickness (ft): 4.40

Freeboard (ft): 0.35 Snow Depth (ft): 0.1 (frozen slush)

Elev. (BPMSL +/- .02): 95.59 Survey By: MRL Date: 5/22/06 Time: nr

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
DO, Temp	UAF	Hach LDO	5197-03	yes	yes

Parameters	**Field Measurements**									
Time:	17:40	17:41	17:42	17:43	17:44	17:45	17:45	17:47	17:49	17:51
Depth BWS (ft):	5	6	7	9	11	15	19	21	23	24
Temp (°C):	0.7	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.7	0.7
Conductivity (µS/cm):										
LDO (mg/L)	11.70	11.30	11.20	10.90	10.60	10.60	10.60	10.30	9.20	5.30
Time:	17:53	17:55	17:56	17:57						
Depth BWS (ft):	25	26	27	28						
Temp (°C):	0.7	0.7	0.7	0.7						
Conductivity (µS/cm):										
LDO (mg/L)	2.20	0.20	0.10	0.00						

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

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):_____**			**Depth BWS (ft):____**			**Depth BWS (ft):_____**			**Method**
	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	rep 1	rep 2	rep 3	
Alkalinity (mg/L as $CaCO_3$)										10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)										0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)										Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)										Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)										0.01-0.50 mg/L NH3-
*Ammonia/ Iron dilution										
pH										

Remarks:

Field-Form Filled Out By: Hilton Date: 7/25/06

QAQC Check By: Blackburn Date: 7/27/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: EB Time: nr

Water Depth (ft): 28.28 Ice Thickness (ft): 4.42

Freeboard (ft): 0.42 Snow Depth (ft): 0

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

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WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters										
Time:	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
Depth BWS (ft):	5.0	6.0	7.0	9.0	11.0	13.0	15.0	17.0	19.0	21.0
Temp (°C):	0.8	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	92.90	119.40	158.40	176.50	179.60	179.60	179.60	179.60	179.60	179.30
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

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

Measurements By: EB Time: nr

Water Depth (ft): 28.28 Ice Thickness (ft): 4.42

Freeboard (ft): 0.42 Snow Depth (ft): 0

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

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WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters										
Time:	nr	nr	nr	nr	nr					
Depth BWS (ft):	23.0	25.0	26.0	27.0	28.0					
Temp (°C):	0.8	0.8	0.8	0.8	0.8					
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	179.10	183.50	189.80	200.50	226.20					
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70°19.186' Easting: W149°24.234' Datum: WGS84

Measurements By: EB Time: nr

Water Depth (ft): 28.28 Ice Thickness (ft): 4.42

Freeboard (ft): 0.42 Snow Depth (ft): 0

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters										
Time:	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
Depth BWS (ft):	5.0	6.0	7.0	9.0	11.0	13.0	15.0	17.0	19.0	21.0
Temp (°C):	0.8	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	92.90	119.40	158.40	176.50	179.60	179.60	179.60	179.60	179.60	179.30
RDO (ppm):										
Turbidity (NTU):										
ORP										

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

Probe:

Depth (ft)					
Temp (°C)					
pH					
Eh					

NORTH SLOPE LAB CHEMISTRY ANALYSI

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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/23/06 Time: nr

FIELD MEASUREMENTS

GPS Coord. Northing: N70°19.186' Easting: W149°24.234' Datum: WGS84

Measurements By: EB Time: nr

Water Depth (ft): 28.28 Ice Thickness (ft): 4.42

Freeboard (ft): 0.42 Snow Depth (ft): 0

Elev. (BPMSL): 95.59 Survey By: MRL/EB Date: 5/22/06 Time: 19:00

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI Conductivity (30 m cord)	B0064	PASS	PASS

Parameters										
Time:	nr	nr	nr	nr	nr					
Depth BWS (ft):	23.0	25.0	26.0	27.0	28.0					
Temp (°C):	0.8	0.8	0.8	0.8	0.8					
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	179.10	183.50	189.80	200.50	226.20					
RDO (ppm):										
Turbidity (NTU):										
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 $CaCO_3$)										
Nitrite (mg/L NO_2^--N)										
Ammonia (mg/L NH_3-N)										
Total iron--UF (mg/L)										
Filtered Iron--F tot Fe (mg/L)										
pH (with Hanna probe)										

Remarks:

Field-Form Filled Out By: Binning Date: 6/29/06

QAQC Check By: Kevin Date: 8/2/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

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

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 15:44

FIELD MEASUREMENTS

GPS Coord. Northing: N70.32003 Easting: W149.31878 Datum: NAD27

Measurements By: EAB Time: 15:44

Water Depth (ft): 7.61 Ice Thickness (ft): 4:02

Freeboard (ft): 0.27 Snow Depth (ft): 0.07 (frozen slush)

Elev. (BPMSL): 59.33 Survey By: DAR/MRL Date: 1/18/06 Time: 13:10

Water Sampling By: DAR Sample Depths BWS (ft): 1 4.5 Date: 5/24/06 Time: nr

2 7.5

WATER QUALITY METER INFORMATION 3 na

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	UAF	Hach	5197-03	yes	yes
DO, temp	BLM	Hach LDO	3625	yes	yes

Parameters	**Field Measurements**									
Time:	15:53	15:55	15:56	15:57						
Depth BWS (ft):	4.5	5.5	6.5	7.5						
Temp (°C):	1.0	1.4	1.5	1.6						
pH:	7.43									
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	405	426	448	457						
RDO (ppm): (mg/L)										
Turbidity (NTU):										
ORP										
Hach LDO (BLM) mg/L	3.4	3.4	3.4	0.0						
Hach temp °C	1.4	1.2	1.2	1.2						

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Depth BWS (ft):___4.5__**			**Depth BWS (ft):_7.5___**			**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 $CaCO_3$)	195	197	196	265	270	271				10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0			UR=-0.125						0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	2.58			*OR						Hach spec 0.02-3.00 mg/L
Filtered Iron--F tot Fe (mg/L)	*0.16			*2.88						Hach spec 0.02-3.00 mg/L
Ammonia (mg/L NH_3-N)	*0.08			*0.27						0.01-0.50 mg/L NH3-
*Ammonia/ Iron dilution	10%			10%						
pH	7.31			7.14						

Remarks: LDO HQ10, BLM 15 meter cord, pH- GWS Hanna HI991300 #522797.
Lake is covered with wet snow (approximately 1") and has an 8" mote on north shore.

Field-Form Filled Out By: Hilton Date: 7/7/06

QAQC Check By: Blackburn Date: 7/17/06

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID: **North Slope Lakes** Site Location/Lake ID: Webster Reservoir- Pump House

Sample Purpose: **Lake Water Quality** Date: 5/24/06 Time: 23:06

FIELD MEASUREMENTS

GPS Coord. Northing: N70.25985 Easting: W148.30217 Datum: NAD27

Measurements By: DAR Time: 23:06

Water Depth (ft): 13.71 Ice Thickness (ft): 4.48

Freeboard (ft): 0.30 Snow Depth (ft): 0.00

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

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

2

3

WATER QUALITY METER INFORMATION

Calibration Information

Parameter (s)	Owner	Meter Make/Model	Serial No.	Pre-Sampling QAQC Check	Post-Sampling QAQC Check
Conductivity, Temp	GWS	YSI	B0064	yes	yes
DO, temp	BLM	Hach LDO	3625	yes	yes

Parameters	**Field Measurements**									
Time:	23:13	23:14	23:16	23:17	23:19	23:21	23:23	23:25	23:26	
Depth BWS (ft):	5.0	6.0	7.0	9.0	10.0	11.0	12.0	13.0	13.5	
Temp (°C):	0.9	1.1	1.2	1.7	1.9	2.1	2.3	2.5	2.8	
pH:										
Barometeric (mmHg):										
Pressure (kPa):										
Conductivity (µS/cm):	194.2	212.4	223.4	230.2	234.4	241.5	248.7	256.8	274.7	
RDO (ppm): (mg/L)										
Turbidity (NTU):										
ORP										
Hach LDO (BLM) mg/L	13.4	13.8	13.0	11.6	13.4	10.3	9.3	0.4	0.5	
Hach temp °C	1.1	1.1	1.3	1.6	1.8	2.0	2.1	2.5	2.6	

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

NORTH SLOPE LAB CHEMISTRY ANALYSIS

Parameter	**Raw Water Supply**									**Method**
	rep 1	rep 2	rep 3							
Alkalinity (mg/L as $CaCO_3$)	177	174								10-4000 mg/L as CaCO3
Nitrite (mg/L NO2--N)	0.005									0.002-0.300 mg/L NO2--N
Total iron--UF (mg/L)	0.02									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)	0.03									0.01-0.50 mg/L NH3-
*Ammonia dilution										
pH	7.76									

Remarks: Not the deepest part of the reservoir; approximately 60 ft. from pump house.
Re-sampled 10' and 9' (23:28- 10', 2.0C, 238.1 uS/cm, 12.8 mg/L O2, 2.0C)(23:31- 9', 1.8C, 233.9 uS/cm, 11.5 mg/L O2, 1.8C)
(23:34- 10', 1.9C, 236.0 uS/cm, 13.3 mg/L O2, 1.8C). Chemistry Analysis was performed on water collected at PBOC water plant.

Field-Form Filled Out By: KMH Date: 5/25/06

QAQC Check By: MRL Date: 5/25/06

APPENDIX B. WATER QUALITY METER CALIBRATION FORMS

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

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

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: Hanna, Hach, YSI Model: Hanna Combo, Hach LDO, YSI 30

Owner: GWS/UAF S/N: HI991500

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/22/06	8:00	In-Situ pH 4.01	2404386	Apr-07	4.00 @ 16.5	Pass
pH 7.00	5/22/06	8:00	In-Situ pH 7.00	27701	nr	7.08 @ 19.2	Pass
pH 10.00	5/22/06	8:00	In-Situ pH 10.01	2512278	Jun-07	10.17 @ 16.2	Pass
100% DO	5/22/06	8:00	TetraBubbler	--	--	9.49 @ 16.7	Pass
Zero DO	5/22/06	8:00	Oakton Zero DO	690	Dec-07	-0.02 @ 17.8	Pass
Conductivity	5/22/06	8:00	Oakton 447uS	2603492	Mar-07	330.0 @ 15.8	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 7.00	5/25/06	8:24	Singlet pH 7.00	nr	nr	7.07 @ 18.0	Pass
100% DO	5/25/06	8:24	TetraBubbler	--	--	9.30 @ 18.9	Pass
Conductivity	5/25/06	8:24	Oakton 447uS	2603492	Mar-07	392.1 @ 18.5	Pass

Remarks: pH calibration checks are for the Hanna Combo, Oxygen calibration checks are for the Hach LDO, and the Conductivity checks are for the YSI 30.

Field-Form Filled Out By: A. Blackburn Date: 9/11/2007

QAQC Check By: K. Holland Date: 1/18/2008

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

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

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: Hanna, Hach, YSI Model: Hanna Combo, Hach LDO, YSI 30

Owner: GWS/UAF S/N: HI991500

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/26/06	9:30	Singlet pH 4.01	2403214	Mar-07	4.00 @ 15.3	Pass
pH 7.00	5/26/06	9:30	Singlet pH 7.00	27701	nr	7.05 @ 15.1	Pass
pH 10.00	5/26/06	9:30	Singlet pH 10.01	2402122	Aug-07	9.96 @ 17.8	Pass
100% DO	5/26/06	9:30	TetraBubbler	--	--	9.71 @ 16.5	Pass
Zero DO	5/26/06	9:30	Oakton Zero DO	690	Dec-07	nr	Pass
Conductivity	5/26/06	9:30	Oakton 447uS	2603492	Mar-07	373.6 @ 15.2	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/28/06	9:30	Singlet pH 4.01	2403214	Mar-07	4.01 @ 14.3	Pass
pH 7.00	5/28/06	9:30	Singlet pH 7.00	27701	nr	7.08 @ 14.6	Pass
pH 10.00	5/28/06	9:30	Singlet pH 10.01	2402122	Aug-07	9.99 @ 14.6	Pass
100% DO	5/28/06	9:30	TetraBubbler	--	--	9.96 @ 15.5	Pass
Zero DO	5/28/06	9:30	Oakton Zero DO	690	Dec-07	0.18 @ 15.5	Pass
Conductivity	5/28/06	9:30	Oakton 447uS	2603492	Mar-07	379.6 @ 15.1	Pass

Remarks: pH calibration checks are for the Hanna Combo, Oxygen calibration checks are for the Hach LDO, and the Conductivity checks are for the YSI 30.

Field-Form Filled Out By: A. Blackburn Date: 9/11/2007

QAQC Check By: K. Holland Date: 1/18/2008

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

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

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: Hanna, Hach, YSI Model: Hanna Combo, Hach LDO, YSI 30

Owner: GWS/UAF S/N: HI991500

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/28/06	9:30	Singlet pH 4.01	2403214	Mar-07	4.01 @ 14.3	Pass
pH 7.00	5/28/06	9:30	Singlet pH 7.00	27701	nr	7.08 @ 14.6	Pass
pH 10.00	5/28/06	9:30	Singlet pH 10.01	2402122	Aug-07	9.99 @ 14.6	Pass
100% DO	5/28/06	9:30	TetraBubbler	--	--	9.96 @ 15.5	Pass
Zero DO	5/28/06	9:30	Oakton Zero DO	690	Dec-07	0.18 @ 15.5	Pass
Conductivity	5/28/06	9:30	Oakton 447uS	2603492	Mar-07	379.6 @ 15.1	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/29/06	10:00	Singlet pH 4.01	2403214	Mar-07	4.02 @ 13.1	Pass
pH 7.00	5/29/06	10:00	Singlet pH 7.00	27701	nr	7.09 @ 13.0	Pass
pH 10.00	5/29/06	10:00	Singlet pH 10.01	2402122	Aug-07	10.00 @ 11.6	Pass
100% DO	5/29/06	10:00	TetraBubbler	--	--	9.65 @ 17.0	Pass
Zero DO	5/29/06	10:00	Oakton Zero DO	690	Dec-07	0.01 @ 17.3	Pass
Conductivity	5/29/06	10:00	Oakton 447uS	2603492	Mar-07	384.9 @ 15.	Pass

Remarks: pH calibration checks are for the Hanna Combo, Oxygen calibration checks are for the Hach LDO, and the Conductivity checks are for the YSI 30.

Field-Form Filled Out By: A. Blackburn Date: 9/11/2007

QAQC Check By: K. Holland Date: 1/18/2008

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

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

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: Hanna, Hach, YSI Model: Hanna Combo, Hach LDO, YSI 30

Owner: GWS/UAF S/N: HI991500

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/29/06	10:00	Singlet pH 4.01	2403214	Mar-07	4.02 @ 13.1	Pass
pH 7.00	5/29/06	10:00	Singlet pH 7.00	27701	nr	7.09 @ 13.0	Pass
pH 10.00	5/29/06	10:00	Singlet pH 10.01	2402122	Aug-07	10.00 @ 11.6	Pass
100% DO	5/29/06	10:00	TetraBubbler	--	--	9.65 @ 17.0	Pass
Zero DO	5/29/06	10:00	Oakton Zero DO	690	Dec-07	0.01 @ 17.3	Pass
Conductivity	5/29/06	10:00	Oakton 447uS	2603492	Mar-07	384.9 @ 15.	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/30/06	13:20	Singlet pH 4.01	2403214	Mar-07	4.04 @ 13.4	Pass
pH 7.00	5/30/06	13:20	Singlet pH 7.00	27701	nr	7.09 @ 13.8	Pass
pH 10.00	5/30/06	13:20	Singlet pH 10.01	2402122	Aug-07	9.98 @ 13.8	Pass
100% DO	5/30/06	13:20	TetraBubbler	--	--	10.1 @ 15.1	Pass
Zero DO	5/30/06	13:20	Oakton Zero DO	690	Dec-07	-0.03 @ 15.4	Pass
Conductivity	5/30/06	13:20	Oakton 447uS	2603492	Mar-07	379.6 @ 13.9	Pass

Remarks: pH calibration checks are for the Hanna Combo, Oxygen calibration checks are for the Hach LDO, and the Conductivity checks are for the YSI 30.

Field-Form Filled Out By: A. Blackburn Date: 9/11/2007

QAQC Check By: K. Holland Date: 1/18/2008

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

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

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: Hanna, Hach, YSI Model: Hanna Combo, Hach LDO, YSI 30

Owner: GWS/UAF S/N: HI991500

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	5/30/06	13:20	Singlet pH 4.01	2403214	Mar-07	4.04 @ 13.4	Pass
pH 7.00	5/30/06	13:20	Singlet pH 7.00	27701	nr	7.09 @ 13.8	Pass
pH 10.00	5/30/06	13:20	Singlet pH 10.01	2402122	Aug-07	9.98 @ 13.8	Pass
100% DO	5/30/06	13:20	TetraBubbler	--	--	10.1 @ 15.1	Pass
Zero DO	5/30/06	13:20	Oakton Zero DO	690	Dec-07	-0.03 @ 15.4	Pass
Conductivity	5/30/06	13:20	Oakton 447uS	2603492	Mar-07	379.6 @ 13.9	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	6/2/06	10:00	Singlet pH 4.01	2403214	Mar-07	4.05 @ 17.8	Pass
pH 7.00	6/2/06	10:00	Singlet pH 7.00	27701	nr	7.10 @ 18.0	Pass
pH 10.00	6/2/06	10:00	Singlet pH 10.01	2402122	Aug-07	9.92 @ 18.2	Pass
100% DO	6/2/06	10:00	TetraBubbler	--	--	9.30 @ 18.5	Pass
Zero DO	6/2/06	10:00	Oakton Zero DO	690	Dec-07	0.03 @ 19.4	Pass
Conductivity	6/2/06	10:00	Oakton 447uS	2603492	Mar-07	387.1 @ 18.3	Pass

Remarks: pH calibration checks are for the Hanna Combo, Oxygen calibration checks are for the Hach LDO, and the Conductivity checks are for the YSI 30.

Field-Form Filled Out By: A. Blackburn Date: 9/11/2007

QAQC Check By: K. Holland Date: 1/18/2008

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-004e: Water Quality Meter Calibration Form

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

Sample Purpose: **Lake Water Quality**

WATER QUALITY METER INFORMATION

Meter Make: Hanna, Hach, YSI Model: Hanna Combo, Hach LDO, YSI 30

Owner: GWS/UAF S/N: HI991500

CALIBRATION AND QUALITY ASSURANCE INFORMATION

Pre-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	6/4/06	13:50	Singlet pH 4.01	2403214	Mar-07	4.06 @ 14.8	Pass
pH 7.00	6/4/06	13:50	Singlet pH 7.00	27701	nr	7.14 @ 14.8	Pass
pH 10.00	6/4/06	13:50	Singlet pH 10.01	2402122	Aug-07	9.95 @ 14.4	Pass
100% DO	6/4/06	13:50	TetraBubbler	--	--	9.76 @ 16.8	Pass
Zero DO	6/4/06	13:50	Oakton Zero DO	690	Dec-07	0.04 @ 17.5	Pass
Conductivity	6/4/06	13:50	Oakton 447uS	2603492	Mar-07	383.5 @ 15.7	Pass

Post-Sampling QA

Parameter	Date	Time	Standard	Lot No.	Exp.	Meter Reading	Pass/Fail
pH 4.00	6/4/06	21:40	Singlet pH 4.01	2403214	Mar-07	4.14 @ 15.9	Pass
pH 7.00	6/4/06	21:40	Singlet pH 7.00	27701	nr	7.14 @ 15.3	Pass
pH 10.00	6/4/06	21:40	Singlet pH 10.01	2402122	Aug-07	9.97 @ 14.	Pass
100% DO	6/4/06	21:40	TetraBubbler	--	--	9.31 @ 18.2	Pass
Zero DO	6/4/06	21:40	Oakton Zero DO	690	Dec-07	-0.02 @ 18.9	Pass
Conductivity	6/4/06	21:40	Oakton 447uS	2603492	Mar-07	400.1 @ 17.0	Pass

Remarks: pH calibration checks are for the Hanna Combo, Oxygen calibration checks are for the Hach LDO, and the Conductivity checks are for the YSI 30.

Field-Form Filled Out By: A. Blackburn Date: 9/11/2007

QAQC Check By: K. Holland Date: 1/18/2008

APPENDIX C. ELEVATION SURVEY FORMS

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 5/17/2006 Time: 13:15

Location:	Lake L9817, located west of Nuiqsut, survey control at southeast corner of lake							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	147298 (Alpine)		low wind, cold, overcast		
Rod Type:	Craine fiberglass 20'		Rod ID:	Zeiss NI2 Level				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		M. Lilly, L. Benning		
L9817 "B"	BLM	54.98 BPMSL	N70 14.010	W150 19.449				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
B	5.82	60.80		54.98				
A	6.39	60.80		54.41				
D	5.77	60.80		55.03				
C	4.84	60.80		55.96				
WL	7.31	60.80		53.49				survey hole **WL=53.49'**
E	4.36	60.80		56.44				
move instrument								
E	4.13	60.57		56.44				
WL	7.08	60.57		53.99				+/- 0.00
C	4.61	60.57		55.96				+/- 0.00
D	5.53	60.57		55.04				+/- 0.01
A	6.16	60.57		55.41				+/- 0.00
B	5.59	60.57		54.98				closed survey

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 5/18/2006 Time: 9:55

Location:	Lake L9312, located southeast of Alpine pad, survey by pump house benchmarks							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	5482372 (GWS owned)		n/r		
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)		M. Lilly, E. Benning		
L9312 "P"	CP	11.72 BPMSL	70-20.032 NAD83	150-57.138 NAD83				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
P	2.27	17.00		11.73				
O	2.53	14.00		11.47				
PH-WS	0.57	14.00		14.57				
WS	6.66	14.00		**7.34**				WS= **7.34'**
TBM	6.38	14.00		7.62				
move instrument								
TBM	6.23	13.85		7.62				
WS	6.52	13.85		7.33				0.01
PHV3M	0.72	13.85		14.57				0
O	2.37	13.85		11.48				0.01
P	2.12	13.85		11.73				Close survey to 0.00

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 5/26/2006 Time: 9:30

Location:	Lake L9312,survey by pump house benchmarks							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	5482372 (GWS owned)		n/r		
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)		D. Reichardt, E. Benning		
L9312 "P"	CP	11.72 BPMSL	70-20.032 NAD83	150-57.138 NAD83				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
39-O	3.03	14.50		14.47				TBM-LCMF-02-01-39-O-P
move instrument ^1								
39-P		14.50	2.77	11.73				TBM-LCMF-02 39-P
L9312-Cond		14.50	7.13	**7.37**				Water surface = **7.37'**
Staff TOI		14.50	6.77	7.73				TOI
Staff GA		14.50	14.46	0.04				
move instrument ^2								
Staff TOI	6.73	14.46		7.73				
Staff GA		14.46	14.43	0.03				
L9312-Cond		14.46	7.08	7.38				
39-O		14.46	2.72	11.74				
39-P		14.46	2.99	11.47				Close survey

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Kuparuk Deadarm 1,2,3

Survey Purpose: **Water-Level Elevations** Date: 5/21/2006 Time: nr

Location:	Kuparuk Deadarm Mine Sites, reservoir 1, 2, 3. Adjacent to Kuparuk River							
Survey objective:	Determine elevations in reservoirs 2,1					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	5482372 (GWS owned)		NR		
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)		M. LillyE. Benning		
BM #1 WO040768	BP	19.32	N70 20.065 NAD27	W148 56.183 NAD27				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
C2-WL3	9.85	29.17		19.32				Cell 2 WL3- primary WL below ice
C3-WL1		29.17	6.70	22.47				Cell 3 WL1- primary WL at ice
C3-WL1		29.17	6.60	22.57				
move instrument								
C3-WL1	6.60	29.17		22.57				
C2-WL3		29.17	9.76	19.41				Close survey
Note: Field notes use temperary datum for BM #1 = 100.00 ft.								

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

Project ID: **North Slope Lakes** Site Location/Lake ID: Kuparuk Deadarm 1,2,3

Survey Purpose: **Water-Level Elevations** Date: 5/21/2006 Time: 6:30

Location:	Kuparuk Deadarm Mine Sites, reservoir 1, 2, 3. Adjacent to Kuparuk River							
Survey objective:	Determine elevations in reservoirs 3,2					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	5482372 (GWS owned)		NR		
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)		M. LillyE. Benning		
BM #1 WO040768	BP	19.32	N70 20.065 NAD27	W148 56.183 NAD27				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
BM	0.78	20.10		19.32				
C3-WL1		20.10	12.78	7.32				Cell 3 WL1- primary WL below ice
C2-WL1		20.10	14.04	6.06				Cell 2
C2-WL 2		20.10	16.95	3.15				WL2- on top of ice
move instrument								
C2-WL2	14.74	17.89		3.15				
C2-WL1		17.89	14.74	**3.15**				**Cell 2= 3.15'**
C3-WL2		17.89	12.96	4.93				
C3-WL1		17.89	12.72	**5.17**				**Cell 3= 5.17'**
BM		17.89	0.70	17.19				Close survey
Note: Field notes use temperary datum for BM #1 = 100.00 ft.								

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 6/2/2006 Time: 14:30

Location:	Kuparuk Deadarm Mine Sites, reservoir 1, 2, 3. Adjacent to Kuparuk River							
Survey objective:	Determine elevations in reservoirs 1, 2, 3					Weather Observations:		
Instrument Type:	Leica NA720		Instrument ID:	5482372 (GWS owned)		NR		
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)		E. Benning		
BM #1 WO040768	BP	19.32	N70 20.065 NAD27	W148 56.183 NAD27				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
BM#1	0.53	19.85		19.32				Bell Assoc. Benchmark
TP1		19.85	9.66	10.19				
Move instrument								
TP1	9.87	20.06		10.19				
BM #2		20.06	0.75	19.31				
TBM1		20.06	6.84	13.22				6/2 W.L.=0.00
TBM2		20.06	5.06	15.00				5/31 W.L= .20
TBM3		20.06	3.47	16.59				5/30 W.L.=.38 5/29 W.L.=.50
TBM4		20.06	2.95	17.11				5/28 W.L= .52
Move instument east of peak 2.48								
TBM4	2.82	19.93		17.11				
TBM3		19.93	3.33	16.6				
TBM2		19.93	4.92	15.01				
TBM1		19.93	6.7	13.23				
TBM1		19.93	14.66	5.27				
TBM2		19.93	16.66	3.27				
TBM3		19.93	21.92					Estimate of peak 12.55 move instr.
TBM3			21.73					
TBM1			14.46					
Note: Field notes use temperary datum for BM #1 = 100.00 ft.								

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 5/22/2006 Time: 19:00

Location:	Mine Site B, NE corner of North Cell, temporary datum							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Optical Survey Level		Instrument ID:	Leica Runner 24 Serial # 404374		Overcast, some light snow, ~30F		
Rod Type:	Fiberglass		Rod ID:	Sokkia Fiber Glass				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		Michael Lilly Liz Binning		
"Post"	WERC	100 Temp.	na	na				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
Post TBM1	5.33	105.33		100.00				Top of nail in post, temp elevation
TBM2		105.33	1.49	103.84				VSM on Pipeline, south side
TBM3		105.33	1.86	103.47				VSM on Pipeline, north side
TBM4		105.33	3.95	101.38				Top of old cutoff VSM
WL1-TBM		105.33	7.62	97.71				North Cell, closest to north bank
NC-WL offset			2.14	**95.57**				Depth to WL from TBM = 2.14
								moved Instr., used WL1-TBM as turn
WL1-TBM	7.49	105.20		97.71				TBM, Auger extension in snow
TBM4		105.20	3.84	101.36				Top of old cutoff VSM
TBM3		105.20	1.75	103.45				VSM on Pipeline, north side
TBM2		105.20	1.38	103.82				VSM on Pipeline, south side
Post TBM1		105.20	5.21	99.99				close survey to -0.01
NC-WLTBM	6.88	106.88		100.00				TBM, ice scoop extension in snow
NC-WL			0.35	99.65				Depth to WL from TMP = 0.35
NSC-West Channel		106.88	7.23	99.65				Water level in channel on west side of island
NSC-East Channel		106.88	7.22	99.66				Water level in channel on east side of island
SC-WLTBM		106.88	5.24	101.64				TBM, tripod
SC-WL			1.97	99.67				Depth to WL from TMP = 1.97
								moved Instr., used WL as turn point

SC-WLTBM	5.08	106.72		101.64				TBM, Auger extension in snow
NSC-East Channel		106.72	7.06	99.66				North Cell, closest to island
NSC-West Channel		106.72	7.05	99.67				South Cell, closest to island
NC-WLTBM		106.72	6.72	100.00				close survey to +0.02
Elevation adjustment for south cell water levels								
North Cell, WL1				**95.57**				**North Cell, closest to island = 95.57'**
South Cell, WL2				**95.59**				**South Cell, closest to island = 95.59'**
NSC-East Channel				**95.58**				
NSC-West Channel				**95.59**				

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

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

University of Alaska Fairbanks, Water and Environmental Research Center

Form F-011: Elevation Survey Form

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

Survey Purpose: **Water-Level Elevations** Date: 5/24/2006 Time: 14:30

Location:	Mine Site B, NE corner of North Cell, temporary datum							
Survey objective:	Lake water elevation survey					Weather Observations:		
Instrument Type:	Optical Survey Level		Instrument ID:	Leica Runner 24 Serial # 404374		36 deg F, 7 mph S wind.		
Rod Type:	Fiberglass		Rod ID:	Sokkia Fiber Glass				
Bench Mark Information:						Survey Team Names		
Name	Agency Responsible	Elevation (ft)	Latitude (dd-mm.mmm)	Longitude (ddd-mm.mmm)		Dan Reichardt Liz Binning		
"Post"	WERC	100 Temp.	na	na				
Station	BS (ft)	HI (ft)	FS (ft)	Elevation (fasl)	Distance (ft)	Horizontal Angle	Vertical Angle	Remarks
Post TBM1	5.46	105.46		100.00				Top of nail in post, temp elevation
MSBN--WL		105.46	7.81	**97.65**				**North Cell, closest to north bank = 97.65'**
Move Instrument, use water surface as TP								
MSBN-WL	7.94	105.59		97.65				Depth to WL from TBM = 0.27
Post TBM1		105.59	5.59	100.00				Loop closes to 0.00 ft.

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

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

APPENDIX D. SNOW SURVEY FORMS

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

University of Alaska Fairbanks, Water and Environmental Research Center

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

Project ID:	**North Slope Lakes Project**	Site Location/Lake ID:	L9817
Survey Purpose:	**Snow Depth and Water Content**	Date: 5/17/2006	Time: 14:00

Location Description:	On lake, starting at hole #2 towards hole #3 then left towards shore.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	nr
Latitude:	N 70º20.123'	Longitude:	W 150º 56.499'	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	Reference Markers:	Starts at water chemistry test hole
Drainage Basin:	L9817	Slope Direction:	Flat	Vegetation Type:	N/A
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			Liz Binning, Jack (LCMF)	

Snow Course Depths, in cm.

	1	2	3	4	5
1	32.0	26.0	25.5	20.5	17.5
2	30.0	25.5	23.0	22.5	20.0
3	31.0	26.5	32.0	20.0	20.0
4	35.0	22.0	30.5	21.5	20.5
5	31.0	23.5	28.0	22.0	21.0
6	26.0	31.0	27.0	19.5	19.0
7	29.0	31.0	23.5	17.0	16.5
8	32.0	34.5	21.5	18.5	17.5
9	37.5	31.5	20.0	18.0	20.0
10	39.5	32.0	19.5	18.0	23.5

	(cm)
Average snow depth =	**25.0**
Maximum snow depth =	39.5
Minimum snow depth =	16.5
Standard variation =	6.0

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
DW1-1	26	537.0	928.2	0.58
DW1-2	10	314.0	357.0	0.88
DW1-3	28	344.0	999.6	0.34
DW1-4	18	250.0	642.6	0.39
DW1-5	25	278.0	892.5	0.31
			Average Density =	**0.50**
			Average Snow Water Equivalent (SWE) =	**12.5** cm H2O
			Average Snow Water Equivalent =	**4.93** inches H2O
			Average Snow Water Equivalent =	**0.41** 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
Survey Purpose:	**Snow Depth and Water Content**	Date: 5/17/2006	Time: 15:00

Location Description:	Snow survey on shore. Site marked by lathe				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	nr
Latitude:	N 70º20.123'	Longitude:	W 150º 56.499'	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	Reference Markers:	Site marked by lathe
Drainage Basin:	L9817	Slope Direction:	Flat	Vegetation Type:	N/A
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			Liz Binning, Jack (LCMF)	

Snow Course Depths, in cm.

	1	2	3	4	5
1	40.0	33.0	27.0	43.5	38.5
2	38.0	28.0	32.5	43.0	35.0
3	38.0	34.0	34.5	46.0	34.5
4	45.5	31.0	33.0	47.5	30.0
5	49.0	30.0	35.0	46.0	32.0
6	47.0	27.0	35.5	41.5	30.0
7	41.5	27.5	34.5	39.5	33.5
8	37.5	26.0	37.0	39.0	29.0
9	38.5	28.5	34.0	38.5	33.5
10	43.0	28.0	36.0	44.0	32.5
11	36.5	29.0	40	34.0	

	(cm)
Average snow depth =	**36.0**
Maximum snow depth =	49.0
Minimum snow depth =	26.0
Standard variation =	6.0

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
9817-2-1	38	346.0	1356.6	0.26
9817-2-2	26	221.0	928.2	0.24
9817-2-3	29	214.0	1035.3	0.21
9817-2-4	41	524.0	1463.7	0.36
9817-2-5	46	452.0	1642.2	0.28
			Average Density =	**0.27**
			Average Snow Water Equivalent (SWE) =	**9.6** cm H2O
			Average Snow Water Equivalent =	**3.78** inches H2O
			Average Snow Water Equivalent =	**0.32** 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: 5/16/2006	Time: 16:00

Location Description:	West side of water pump house, first length parallel to water pipeline, second length perpendicular to water pipline moving away from the pipeline.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	Sunny, windy
Latitude:	N 70º20.123'	Longitude:	W 150º 56.499'	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	Reference Markers:	Site staked with lathe
Drainage Basin:	L9312	Slope Direction:	Southwest	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			Liz Binning, Dan Reichardt	

Snow Course Depths, in cm.

	1	2	3	4	5
1	43.0	40.0	45.0	0.0	55.5
2	42.0	42.5	44.5	24.0	53.5
3	34.5	38.0	47.0	54.0	44.0
4	43.0	42.0	51.0	65.5	36.0
5	45.5	39.5	50.0	27.0	25.0
6	49.0	37.5	49.5	19.0	18.5
7	45.0	36.5	50.0	0.0	27.5
8	47.0	39.0	47.0	17.5	62.0
9	39.0	44.0	34.0	43.0	67.0
10	38.5	44.5	15.5	49.0	55.5

	(cm)
Average snow depth =	**40.1**
Maximum snow depth =	67.0
Minimum snow depth =	0.0
Standard variation =	14.1

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
DW2-1	38	412.0	1356.6	0.30
DW2-2	38	439.0	1356.6	0.32
DW2-3	42	434.0	1499.4	0.29
DW2-4	49.5	455.0	1767.2	0.26
DW2-5	58	589.0	2070.6	0.28
		Average Density =		**0.29**
		Average Snow Water Equivalent (SWE) =		**11.7** cm H2O
		Average Snow Water Equivalent =		**4.61** inches H2O
		Average Snow Water Equivalent =		**0.38** 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: 5/18/2006	Time: 11:00

Location Description:	On lake starting at the midpoint between holes A and B. First leg is towards hole B and second leg is right towards shore.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	Overcast, low winds
Latitude:	N 70º20.123'	Longitude:	W 150º 56.499'	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	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			Liz Binning, Jack (LCMF)	

Snow Course Depths, in cm.

	1	2	3	4	5
1	23.5	13.0	17.5	15.0	14.5
2	24.0	14.5	16.0	19.0	12.5
3	22.5	18.0	18.0	20.0	16.0
4	21.5	20.5	16.0	18.5	17.0
5	20.5	20.0	17.5	18.0	16.5
6	15.0	18.0	16.5	16.5	15.5
7	16.5	17.5	16.5	16.0	13.5
8	17.0	17.0	17.0	14.5	14.5
9	12.5	18.5	13.5	11.5	15.0
10	13.5	16.5	14.5	15.0	14.5

	(cm)
Average snow depth =	**16.7**
Maximum snow depth =	24.0
Minimum snow depth =	11.5
Standard variation =	2.8

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
DW3-1	24	374.0	856.8	0.44
DW3-2	18	218.0	642.6	0.34
DW3-3	17	215.0	606.9	0.35
DW3-4	14	173.0	499.8	0.35
DW3-5	14	160.0	499.8	0.32
		Average Density =		**0.36**
		Average Snow Water Equivalent (SWE) =		**6.0** cm H2O
		Average Snow Water Equivalent =		**2.37** 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:	L9312
Survey Purpose:	**Snow Depth and Water Content**	Date: 5/18/2006	Time: 12:15

Location Description:	West side of water pump house, first length parallel to water pipeline, second length perpendicular to water pipline moving away from the pipeline.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	Overcast, low winds
Latitude:	N 70º20.123'	Longitude:	W 150º 56.499'	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	Reference Markers:	Site staked with lathe
Drainage Basin:	L9312	Slope Direction:	Southwest	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			Liz Binning, Jack (LCMF)	

Snow Course Depths, in cm.

	1	2	3	4	5
1	43.5	32.0	45.5	16.0	49.5
2	44.0	37.0	47.0	0.0	54.0
3	34.5	37.0	50.5	24.0	51.5
4	42.0	37.0	48.5	53.0	40.5
5	45.0	34.0	30.5	56.5	33.0
6	48.5	37.0	51.0	27.5	24.0
7	43.0	34.5	48.0	15.5	29.5
8	41.5	40.5	49.5	0.0	29.0
9	33.5	41.5	47.0	11.5	60.5
10	34.5	42.5	29.5	43.5	64.5

	(cm)
Average snow depth =	**38.3**
Maximum snow depth =	64.5
Minimum snow depth =	0.0
Standard variation =	13.6

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
DW4-1	42	486.0	1499.4	0.32
DW4-2	32	339.0	1142.4	0.30
DW4-3	50	482.0	1785.0	0.27
DW4-4	28	210.0	999.6	0.21
DW4-5	62	633.0	2213.4	0.29
			Average Density =	**0.28**
			Average Snow Water Equivalent (SWE) =	**10.6** cm H2O
			Average Snow Water Equivalent =	**4.18** inches H2O
			Average Snow Water Equivalent =	**0.35** 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:	West Dock
Survey Purpose:	**Snow Depth and Water Content**	Date: 5/24/2006	Time: 20:00

Location Description:	Snow course at west dock. Beginning of course marked with lathe.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	nr
Latitude:	nr	Longitude:	nr	Datum:	nr
Elevation:		Elevation Datum:	BPMSL	Reference Markers:	Marked with lathe
Drainage Basin:		Slope Direction:	Flat	Vegetation Type:	Tussock
Slope Angle:	Flat	Access Notes:	Truck	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			DAR, EB	

Snow Course Depths, in cm.

	1	2	3	4	5
1	30.0	0.0	15.5	35.5	34.5
2	25.0	7.5	18.0	27.0	32.0
3	28.5	4.0	22.5	0.0	30.5
4	13.5	9.5	22.5	0.0	30.0
5	26.0	15.0	23.5	0.0	28.5
6	23.0	17.0	22.5	30.0	26.0
7	27.0	26.5	27.0	33.5	22.0
8	28.5	22.5	27.5	33.0	19.5
9	28.5	12.5	21.0	36.5	21.5
10	17.0	26.0	37.5	38.0	17.5

	(cm)
Average snow depth =	**22.4**
Maximum snow depth =	38.0
Minimum snow depth =	0.0
Standard variation =	10.1

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
WD24-1	16	240.0	571.2	0.42
WD24-2	23	236.0	821.1	0.29
WD24-3	25	216.0	892.5	0.24
WD24-4	24	227.0	856.8	0.26
WD24-5	26	281.0	928.2	0.30
			Average Density =	**0.30**

Average Snow Water Equivalent (SWE) =	**6.8**	cm H2O
Average Snow Water Equivalent =	**2.68**	inches H2O
Average Snow Water Equivalent =	**0.22**	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: 5/18/2006	Time: 11:00

Location Description:	On lake starting at the midpoint between holes A and B. First leg is towards hole B and second leg is right towards shore.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	Overcast, low winds
Latitude:	N 70º19.9444'	Longitude:	W 150º 57.047'	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	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			Liz Binning, Jack (LCMF)	

Snow Course Depths, in cm.

	1	2	3	4	5
1	23.5	13.0	17.5	15.0	14.5
2	24.0	14.5	16.0	19.0	12.5
3	22.5	18.0	18.0	20.0	16.0
4	21.5	20.5	16.0	18.5	17.0
5	20.5	20.0	17.5	18.0	16.5
6	15.0	18.0	16.5	16.5	15.5
7	16.5	17.5	16.5	16.0	13.5
8	17.0	17.0	17.0	14.5	14.5
9	12.5	18.5	13.5	11.5	15.0
10	13.5	16.5	14.5	15.0	14.5

	(cm)
Average snow depth =	**16.7**
Maximum snow depth =	24.0
Minimum snow depth =	11.5
Standard variation =	2.8

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
DW3-1	24	142.0	856.8	0.17
DW3-2	18	181.0	642.6	0.28
DW3-3	17	180.0	606.9	0.30
DW3-4	14	518.0	499.8	1.04
DW3-5	14	196.0	499.8	0.39
		Average Density =		**0.43**
		Average Snow Water Equivalent (SWE) =		**7.3** cm H2O
		Average Snow Water Equivalent =		**2.86** inches H2O
		Average Snow Water Equivalent =		**0.24** 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:	Betty Pingo
Survey Purpose:	**Snow Depth and Water Content**	Date: 5/24/2006	Time: 18:40

Location Description:	Snow course near weather stations at Betty Pingo.				
Survey objective:	Snow depths and snow-water content for lake recharge estimates			Weather Observations:	nr
Latitude:	N 70.28085	Longitude:	W 148.89304	Datum:	NAD27 Alaska
Elevation:		Elevation Datum:	BPMSL	Reference Markers:	Near weather station
Drainage Basin:		Slope Direction:		Vegetation Type:	Tussock
Slope Angle:	Flat	Access Notes:	Truck	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			DAR, Binning	

Snow Course Depths, in cm.

	1	2	3	4	5
1	12.0	25.5	21.0	23.0	0.0
2	13.0	28.0	31.5	23.0	18.5
3	0.0	35.0	32.5	22.5	19.0
4	21.5	37.5	23.5	20.5	12.0
5	19.5	35.5	24.5	0.0	16.0
6	22.0	32.0	21.5	20.0	13.5
7	24.5	28.5	39.0	25.5	16.5
8	31.5	27.0	32.0	13.5	17.0
9	28.0	22.5	27.0	24.0	14.0
10	30.5	16.5	28.5	24.5	16.5

	(cm)
Average snow depth =	**22.2**
Maximum snow depth =	39.0
Minimum snow depth =	0.0
Standard variation =	8.8

Snow Sample Depths and Weights

Bag #	Depth (cm)	Weight (gr)	Volume (cm^3)	Density (gr/cm^3)
BP24-1	13	142.0	464.1	0.31
BP24-2	18	181.0	642.6	0.28
BP24-3	14	180.0	499.8	0.36
BP24-4	38	518.0	1356.6	0.38
BP24-5	22	196.0	785.4	0.25
			Average Density =	**0.32**

Average Snow Water Equivalent (SWE) =	**7.0**	cm H2O
Average Snow Water Equivalent =	**2.76**	inches H2O
Average Snow Water Equivalent =	**0.23**	feet H2O

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