REPORT TO THE WEST KITIKMEOT/SLAVE STUDY SOCIETY

Investigation of Aquatic Impacts of On-Ice Exploratory Diamond Drilling

Preliminary Data Report

Anne Wilson - Aug. 24, 1997

SUMMARY

This study involves the identification and evaluation of the impacts to lake ecosystems which may occur when the effluent from diamond drilling (i.e. the drill return water containing rock flour and possibly additives) is released to the lake bottom in limited quantities and at specified depths. To measure the impacts, samples were collected from the areas of drilling operations at Baton Lake and Great Slave Lake, including sediment, benthic invertebrates, and water. Water quality readings were also taken.

Work done under this funding was the first year of a multi-year study. Until followup work is done next year, conclusions can't be drawn on the effects on benthic organisms, but good visual data was collected on the deposition of materials, and from the water quality data the length of time that the effluent affected water clarity could be assessed. Sediment chemistry was tested, and benthic populations were collected for counting and identification, providing good baseline information.

Baton Lake:
Return water from a drill rig was discharged to an area of the lake that was up to 15 metres deep. Thirteen sample locations were marked off, going out from the point of discharge at set distances. Water quality readings and sediment samples were taken before the discharge, and again after. A second set of samples was collected from an area of the lake which was not impacted by the drilling, to use for comparison. Water quality measurements included pH, turbidity, and temperature using a Hydrolab meter; and Total Suspended Solids and metals, done by Taiga Environmental Laboratory. Background turbidity was less than 5NTUs, while turbidity in the area of drilling ranged from 10 to 40NTUs, with most values in the 10-20NTU range. This suggested that materials settled out very quickly. Lake pH was consistently around 7.5, and water

temperatures ranged from .005 to 3.3^{o} C for both reference and study sites. Total Suspended Solids were extremely low, even in samples which showed visible turbidity. Of 41 samples tested, 34 were at or below detection limits (3mg/L) and seven samples ranged from 4 to 11 mg/L. This is consistent with the calculated value of 5.5mg/L as an average TSS within a 100m radius of release before settling. Metals were measured for one reference and four study site water samples; surface water (2m below the top of the ice) samples were no different from reference samples, but samples taken from just above the bottom showed higher levels of aluminum and manganese. Both of these elements are present in high levels in the sediments, and not in the drilling effluent, so likely originated from disturbed lake bottom sediments (The rock fines in the drilling effluent originated in a soapstone deposit, which doesn't contain aluminum or manganese).

Sediment samples were collected using a modified KB corer, and from these, benthic invertebrates were extracted, and samples collected for chemical analyses and for visual measurement of deposition of drill fines. Sediment chemistry showed few differences in levels of metals or nutrients between reference and study stations, even with the addition of the drill fines. Based on drilling of 312.42m, (NQ size core) the quantity of rock solids released was 937 L. The amounts of fines deposited on the sediment surface were the greatest at the end of pipe (7mm) but by 15 metres away, were less than 1mm. At sites further that 15 m, patchy traces were only occasionally visible. The benthic community was dominated by copepods (*Diacylops* spp.) with chironomid (midge) larvae and hydracarinids (water mites) found in the less abundant groups. Samples were all baseline, or pre-impact. This site will be sampled again next winter to look for differences in benthic populations to assess impacts.

Great Slave Lake

Eleven short holes were drilled along a line that was about 5.5 km long. Of these, eight were suitable for release of effluent based on depth and proximity to shoals. For each of these holes, water quality data and core samples were taken before (2 sets) and after (3 sets) effluent release. Using the Hydrolab, measurements were taken for turbidity, pH, dissolved oxygen (DO), and temperature. Turbidity readings were in the 5NTU to 24 NTU range for both, and pH was from 7.6 to 8.2. The lake was well oxygenated, with DO

values averaging about 12 mg/L. Core samples were taken before and after discharge, and benthic animals collected for identification and enumeration. Samples have been sent out for chemical analyses and particle size analysis. Core samples showed little of the rock fines accumulated on the sediment surface; a thin coating (less than 1mm) was seen in the area of the discharge, and nothing at 15m away.

ACKNOWLEDGMENTS

The researcher would like to acknowledge the contribution of the West Kitikmeot/Slave Study Society for funding in the amount of $6400; the Dogrib Treaty 11 Council for their support and practical assistance in locating field technicians; Dr. Buster Welch, for scientific advice, practical help, and providing lab equipment; Fisheries and Oceans for providing field equipment and laboratory facilities; Royal Oak Mines, especially Malcolm Robb and Hendryk Falck, and their drilling contractors Connor's Drilling and Canamera Geological Drilling for site access and logistical support including accomodation, meals, and site clearing; Environment Canada for equipment, support, lab analyses, and supplementary funding in the amount of $5000; DIAND Mineral Development Division for funding benthic analyses in the amount of $9000; Laurie Didiodato for lab assistance, and the hardy souls who put in long hours under sometimes arduous field conditions - Ron Bujold, Dean Halifax, Frank Nitsiza, and Patrick Adzin.

OBJECTIVES

The overall study objective is to examine the impacts of releasing drilling effluent to the lake bottom. To this end, the program objectives for this work were to:

- collect water quality data (turbidity, pH, temperature, and dissolved oxygen) before and after drilling to compare for significant differences;
- collect samples of benthic animals to compare numbers and species before and after drilling.
- collect sediment core samples to assess differences in chemistry before and after drilling, and to visually assess the amount of deposition of fines on the lake

bottom surface.

- obtain samples of drilling wastes for chemical and total suspended solids analyses.

For the purposes of this report, the objectives which were achieved were the baseline collections of benthic and sediment data, for comparison to future work. Water quality data were collected to assess duration of impacts on water clarity in the short term.

DESCRIPTION/METHODS AND MATERIALS

Site access for both locations was via vehicle over winter roads, and the drilling sites had vehicle access. Camp support was provided at Baton Lake by Royal Oak Mines Ltd. Water quality data was collected using a Hydrolab Multiprobe with a 50m cable and underwater stirrer, connected to a Surveyor 3 Display logger. Instrument calibrations were done prior to going out and approximately biweekly thereafter. Water samples for Total Suspended Solids were collected with a van dorn type water sampler. A modified KB corer was used to collect sediment cores; the corer was lowered and raised by a 12V battery-powered winch mounted on a tetrapod frame. Four inch diameter plexiglass tubes were used to bring up core samples, which were then extruded so the top oxidized layer could be retained in 500 ml plastic bottles. For Baton Lake, which had highly unconsolidated sediments, this involved collection of up to 1L of sample for processing to ensure all animals were included. For samples from Great Slave Lake, all core portions above the solid clay layer were collected for processing.

Release of effluent for all sites was done through a diffuser hose, at 5 m above lake bottom. Figure 1 depicts the sample locations for Baton Lake. Because of the short notice given, limited water quality and core samples were taken for baseline work. The centre hole, C, was located at the greatest depth of 16.5 m, and points N1, E1, S1, and W1 were 15 m from C. Points were placed another 15m out in each direction and designated N2, E2, S2, and W1, and intermediate points were placed 21.2 m from C at NE1, SE1, NW1 and NW2. Reference points (R1, R2, and R3) were located to the south, well away from the area of disturbance, at depths of about 14m. Effluent samples were

taken from the drill return water stream.

Figure 2 shows the sample grid for Great Slave Lake. At each hole sampled (all but numbers 1, 8, and 11) where the bottom type permitted, four core samples were taken at the hole collar (point of discharge), and four at 15 m away in the direction of increasing depth prior to effluent discharge. After drilling, four cores were taken from the hole collar, again at 15m, and also at 50m from the collar. Of these, the first three were used for benthic population sampling, and the fourth for chemical analyses. Benthic samples were taken back to Yellowknife for separation in the lab. For samples from Baton Lake which consisted almost entirely of organic detritus, materials were rinsed through a 112 micron screen, then separated by flotation using sugar water at a specific gravity of 1.16. Animals were alive at the time of flotation, with samples held at 4^{o}C for a maximum of 5 days before processing. Bottom sediments to be discarded were checked visually for larger invertebrates, and under the dissecting microscope for smaller animals. Samples from Great Slave Lake varied considerably in rock/sand content, overlying a fine clay. These were washed using a 72 micron screen, then picked through under the dissecting scope. Animals were stained using rose bengal, fixed in 10% formalin, and stored in 70% ethanol for shipment to the lab.

ACTIVITIES FOR THE YEAR

Drilling started at Baton Lake Feb. 10th with almost no notice to researchers; a field crew arrived in time to collect limited baseline samples prior to release of effluent starting. Discharge into the lake occurred from Feb. 13th at 1800 hours, starting at 406 feet in the drill hole, to Feb. 18th afternoon, at 1431 feet. It had been hoped to continue discharge until 3000' was reached, but unsafe ice conditions shut down that hole. The field crew returned to do control site and post-impact sample collections Feb. 25-28, 1997. Sample processing for extraction of benthic invertebrates occurred in the lab in Yellowknife.

On March 3, data collection started for the Great Slave Lake program; drilling started shortly thereafter. Samples and water quality data were collected over the drilling program, which ran to March 27th, then sample processing was completed by Mar. 31,

and samples shipped to the labs.

RESULTS

Water quality results are shown on Table 1 for Baton Lake, and Table 2 for Great Slave Lake locations. Table 3 shows data on Total Suspended Solids. Invertebrate enumeration and species compositions for Baton Lake are shown in Table 4. Those for Great Slave Lake have not been completed yet. Sediment and effluent chemistry are shown on Table 5. Table 6 summarizes the visual observations of sediment deposition at Baton Lake. This was not done for Great Slave Lake; given the short holes, such limited quantities were discharged that very few drill fines were seen on the lake bottom, and never in measurable thicknesses.

DISCUSSION/CONCLUSIONS

For this report, it would be premature to draw conclusions as the data are incomplete, and statistical analyses have not been completed for the water quality data. In general, preliminary data and visual observations indicate that impacts to water quality are localized, and of short duration.

Chemical analysis of the drilling effluent shows it provides little enrichment of any chemical elements, and acts as a 'sterile' layer covering the lake sediments. At Baton Lake, the greatest deposition seen was at the discharge point, and was seven mm overlying the natural sediments. The small quantities of effluent released at the Great Slave Lake holes were representative of typical exploration drilling, involving short holes, widely spaced. Very thin layers were seen at Great Slave Lake drilling sites, and were largely discontinuous, or patchy.

Drilling fines have been collected and stockpiled, and lab experiments will be done this fall on smothering effects on aquatic invertebrates (using chironomids). Actual effects will be evaluated after re-sampling Baton Lake next drilling season.

TRAINING ACTIVITIES AND RESULTS

Field training was provided to Frank Nitsiza and Patrick Adzin in operation of the gas auger and sampling equipment (KB corer and van dorn water sampler). They observed record keeping and were party to discussions on what we were doing and why. The study benefited a lot from the assistance of Frank and Patrick, as they learned quickly and worked hard and willingly. As an unexpected training result, I found I learned much from them - about their lifestyles and values, about the caribou that we saw on the winter road, and how the herd was managed. It was a good experience, and I hope to have their help again for future work at Baton Lake.

EXPENDITURES AND SOURCE OF FUNDS

The WKSS has been provided an expenditures table which shows a breakdown of expenditures and funding. There is variance from the original budget categories projected (although not total amount) as the opportunity arose to do more field work than originally planned. Funding from the WKSS went to fund technician time, and some lab analyses were arranged to be done at no cost by Environment Canada's lab. Purchased items not consumed in the course of the work will be required to be retained for the completion of this study to 1998, but will then revert back to the WKSS if desired. These include 12 gas cans and a marine battery.

SCHEDULE

Further work will be done on this study this summer, with water quality looked at for both sites. Winter followup work will be done next drilling season for the Baton Lake site only. As lab results come in for Great Slave Lake benthic and sediment data, these will be forwarded to the WKSS.

PHOTO CREDITS

Photographs were taken by Ron Bujold and Anne Wilson, with film funded by WKSS and developing by Environment Canada.

Water Quality - Baton Lake 64 23.909N 115 05.421 W

"BEFORE"

2/12/97					
Hole "C"	Depth(m)	Turb	pH	Temp	Comments
Ice depth	1	13.5	7.57	1.08	Flagging lowered; no
25"	2	12.5			current.
	3	11.3			
	4	10.9			
	5	10.4			
	6	9.9			
	7	9.0			
	8	8.7			
	9	7.7	7.8	2.95	
	10	6.8			
	11	6.5	7.72	3.09	
	12	6.4			
	13	6.4			
	14	6.3			

2/12/97					
E1	Depth(m)	Turb	pH	Temp	Comments
	1	11.4	7.9	0.7	
	2	10.1			
	3	8.7			
	4	8.4			
	5	7.8			
	6	7.3			
	7	7.0			
	8	6.7			
	9	6.5			
	10	6.1			
	11	5.6			
	12	5.7			
	13	5.6			
	14	5.2			

2/12/97					
E2	Depth(m)	Turb	pH	Temp	Comments
	1	2.9			
	2	2.8			
	3	2.8			
	4	2.7			
	5	2.7			
	6	2.7			
	7	2.6			
	8	2.5			
	9	2.5			
	10	2.5			
	11	2.4			
	12	4.1			

2/12/97					
NE1	Depth(m)	Turb	pH	Temp	Comments
1515hrs	1	11.6			
	2	4			
	3	4.1			
	4	3.9	8.0	2.47	
	5	3.9			
	6	3.8			
	7	3.7			
	8	3.6			
	9	3.4			
	10	3.4			
	11	3.2			Site shut down for blast from
	12	3.1			1530-1645 hours.
	13	4.1			
	14	4.3			

"AFTER"

2/26/97					
C	Depth(m)	Turb	pH	Temp	Comments
Ice depth	1	10.4	7.43		
32"	2	10.4	7.42		
	3	10.4	7.41		
	4	13.1	7.41		
	5	12.9	7.4		
	6	13.0	7.39		
	7	13.3	7.38		
	8	14.1	7.34		
	9	14.2	7.31		
	10	16.4	7.28		
	11	24.6	7.23		
	12	24.8	7.21		
	13	25.5	7.17		
	14	14.4	7.13		
	15	12.9	7.08		

2/26/97					
E1	Depth(m)	Turb	pH	Temp	Comments
1355 hrs	1	15.5	7.34		
	2	14.4	7.34		
	3	12.9	7.36		
	4	11.9	7.35		
	5	12	7.35		
	6	12.1	7.35		
	7	11.2	7.32		
	8	12.2	7.28		
	9	12.6	7.25	2.82	
	10	14.4	7.22		
	11	14.8	7.19	2.85	
	12	16	7.16		
	13	16.7	7.14		
	14	14.3	7.08	3.11	bottom at 14.7

2/26/97					
E2	Depth(m)	Turb	pH	Temp	Comments
1415 hrs	1	12.6	7.3		
	2	11.8	7.32		
	3	11.7	7.33	2.38	
	4	11.4	7.33		
	5	11.3	7.34		
	6	11.1	7.33		
	7	11.1	7.33	2.72	
	8	11.2	7.3		
	9	13.3	7.24		
	10	14.7	7.2		
	11	14.6	7.18		
	12	17.1	7.14		Bottom at 12.5m

2/26/97					
NE1	Depth(m)	Turb	pH	Temp	Comments
1649 hrs	1	15.7	7.44	0.69	Hole was drilled 6m too
	2	14.2	7.38	2.03	close to N1
	3	13.4	7.37	2.34	
	4	12.7	7.37	2.58	
	5	12.4	7.35	2.57	
	6	12.1	7.35		
	7	11.9	7.33		
	8	12.2	7.31	2.79	
	9	13.5	7.26	2.81	
	10	14.4	7.22	2.83	
	11	15.6	7.2	2.85	
	12	17.1	7.17	2.86	
	13	17.9	7.14	2.91	
	14	17.4	7.08	3.07	
	15	16	7.05	3.19	

Bottom at 15.8m

2/26/97 "AFTER"

N1	Depth(m)	Turb	pH	Temp	Comments
	1	7.7	7.39		turbidity re-read as didn't stabilize
	2	7.8	7.38		quickly on first readings.
	3	8	7.36		
	4	7.2	7.32		
	5	7.9	7.39		
	6	8.6	7.39		*bubble on turbidity electrode likely
	7	8.9	7.39		remeasured those with no askerisk
	8	9.3	7.35		
	9	10.3	7.3		
	10	11.7	7.3		
	11	14.1	7.25		
	12	15.8	7.23		
	13	15.4	7.23		
	14	15.6			
	15	22.7			
	16	60	7.1		bottom touched?

2/26/97 "AFTER"

N2	Depth(m)	Turb	pH	Temp	Comments
	1	21.5	7.35	0.81	
	2	19.3	7.36		
	3	17.7	7.35	2.2	
	4	15.6	7.36	2.51	
	5	15.2	7.35		
	6	14.4	7.35	2.65	
	7	14.3	7.34	2.67	
	8	15.4	7.31	2.72	
	9	16.1	7.28	2.79	
	10	17.8	7.24	2.83	
	11	19.1	7.2	2.86	
	12	19	7.17		
	13	20.4	7.15	2.91	
	14	19.9	7.09	3.01	
	15	20.3	7.04	3.29	
	15.4 bottom				

2/26/97 "AFTER"

S1	Depth(m)	Turb	pH	Temp	Comments
	1	11.4	7.38		
	2	11.2	7.38		
	3	10.9	7.38		
	4	10.7	7.38		
	5	10.7	7.38		
	6	11.2	7.36		
	7	11.2	7.34		
	8	12.2	7.33		
	9	13.8	7.26		
	10	14.3	7.24		
	11	15.3	7.22		
	12	17.4	7.2		
	13	17.6	7.16		
	14	16.9	7.12		
	14.8 bottom				

2/26/97 "AFTER"

S2	Depth(m)	Turb	pH	Temp	Comments
	1	20.8	7.36		
	2	19.2	7.37		
	3	19	7.37		
	4	18	7.37		
	5	17.6	7.37		
	6	14.7	7.36		
	7	13.2	7.34		
	8	12.9	7.37		
	9	13.4	7.28		
	10	13.5	7.26		
	11	15.7	7.22		
	12	15.9	7.19		
	13	17.1	7.16		
	14	17.3	7.11		

2/26/97 "AFTER" 1355 hours

E1	Depth(m)	Turb	pH	Temp	Comments
	1	15.5	7.34		
	2	14.4	7.34		
	3	12.9	7.36		
	4	11.9	7.35		
	5	12	7.35		
	6	12.1	7.35		
	7	11.2	7.32		
	8	12.2	7.28		
	9	12.6	7.25	2.82	
	10	14.4	7.22		
	11	14.8	7.19	2.85	
	12	16	7.16		
	13	16.7	7.14		
	14	14.3	7.08	3.11	
	14.7 bottom				

2/26/97 "AFTER" 1415 hours

E2	Depth(m)	Turb	pH	Temp	Comments
	1	12.6	7.3		
	2	11.8	7.32		
	3	11.7	7.33		
	4	11.4	7.33		
	5	11.3	7.34		
	6	11.1	7.33		
	7	11.1	7.33		
	8	11.2	7.3		
	9	13.3	7.24		
	10	14.7	7.2		
	11	14.6	7.18		
	12	17.1	7.14		
	12.5 bottom				

2/26/97 "AFTER" 1536 hours

W1	Depth(m)	Turb	pH	Temp	Comments
	1	23.2	7.35	1.06	
	2	21.4	7.34	1.65	
	3	18.7	7.34	2.32	
	4	17.2	7.36	2.45	
	5	17.3	7.35	2.54	
	6	18	7.34	2.61	
	7	18.6	7.33	2.69	
	8	20.9	7.3	2.77	
	9	26	7.26	2.8	
	10	29.5	7.22	2.82	
	11	39	7.17	2.84	
	12	46.8	7.14	2.87	
	13	48.9	7.11	2.91	
	14	46.9	7.07	3.03	
	14.3 bottom				

2/26/97 "AFTER" 1600 hours

W2	Depth(m)	Turb	pH	Temp	Comments
	1	10.3	7.3	1.16	
	2	9.7	7.31	1.75	
	3	9	7.32	2.3	
	4	8.7	7.33	2.44	
	5	8.8	7.33	2.61	
	6	8.9	7.32	2.62	
	7	9.5	7.31	2.66	
	8	9.9	7.29	2.78	
	9	12.2	7.24	2.82	
	10	13.2	7.2	2.84	
	11	14.4	7.18	2.85	
	12	14.7	7.15	2.86	
	12.6 bottom				

2/26/97 "AFTER" 1614 hours

SW1	Depth(m)	Turb	pH	Temp	Comments
	1	17.1	7.34	0.88	
	2	15.6	7.34	1.92	
	3	15.1	7.35	2.24	
	4	14.5	7.35	2.48	
	5	14.3	7.34	2.59	
	6	14.2	7.34	2.63	
	7	14.3	7.32	2.7	
	8	14.3	7.3	2.75	
	9	15.6	7.27	2.8	
	10	17.4	7.22	2.82	
	11	18.2	7.19	2.84	
	12	19.3	7.16	2.86	
	13	20.6	7.1	2.92	
	14	18.8	7.06	3.05	

2/26/97 "AFTER" 1330 hours

SE-1	Depth(m)	Turb	pH	Temp	Comments
	1	10.3	7.23		
	2	10.1	7.27		
	3	10	7.29		
	4	10	7.3		
	5	10	7.31		
	6	10.1	7.31		
	7	10.6	7.28		
	8	10.7	7.26		
	9	13.3	7.22		
	10	14.7	7.19		
	11	15.3	7.16		
	12	16	7.14		
	13	16.9	7.12		
	14	16.3	7.09		
	14.2 bottom				

2/28/97 "AFTER"

NW1	Depth(m)	Turb	pH	Temp	Comments
	1	40	7.62	0.89	Redone - turbidity readings
	2	42.6	7.4	1.81	fluctuated on 26/02/97.
	3	45.6	7.39	2.21	
	4	45.1	7.39	2.46	
	5	47.6	7.37	2.6	
	6	45.5	7.36	2.66	
	7	46.6	7.35	2.7	
	8	42.6	7.32	2.72	
	9	41.1	7.28	2.83	
	10	35.9	7.25	2.84	
	11	37	7.19	2.85	
	12	35.7	7.17	2.88	
	13	35.7	7.14	2.94	
	14	33.2	7.1	3.01	
	15 bottom				

2/27/97 Reference Site

R1	Depth(m)	Turb	pH	Temp	Comments
0800hrs	1	5.4	7.49	0.22	
	2	4	7.52	1.85	
	3	3	7.44	2.41	
	4	2.8	7.4	2.74	
	5	2.9	7.38	2.88	
	6	2.9	7.37	3	
	7	2.8	7.34	3.03	
	8	2.5	7.32	3.05	
	9	2.5	7.3	3.08	
	10	2.3	7.28	3.03	
	11	2	7.24	3.06	
	12	1.9	7.23	3.06	
	13	1.9	7.22	3.06	
	14	1.8	7.2	3.07	
	14.8 bottom				

2/27/97 Reference Site

R2	Depth(m)	Turb	pH	Temp	Comments
0817hrs	1	2.8	7.4	0.47	
	2	3.1	7.37	7.78	
	3	4.2	7.36	2.34	
	4	5.1	7.35	2.74	
	5	4.9	7.34	2.88	
	6	4.7	7.33	2.97	
	7	4.6	7.31	3.02	
	8	4.4	7.29	3.03	
	9	4.2	7.28	3.05	
	10	4.1	7.27	3.06	
	11	4	7.25	3.06	
	12	3.8	7.24	3.05	
	13	3.6	7.22	3.04	
	14	3.5	7.2	3.04	

2/27/97 Reference Site

R3	Depth(m)	Turb	pH	Temp	Comments
0830hrs	1	2.8	7.37	0.05	
	2	2.8	7.36	1.34	
	3	2.8	7.35	1.84	
	4	2.8	7.34	2.25	
	5	2.7	7.34	2.81	
	6	2.7	7.32	2.87	
	7	2.7	7.31	2.95	
	8	2.7	7.3	3.02	
	9	2.7	7.28	3.05	
	10	2.7	7.27	3.07	
	11	2.7	7.25	3.05	
	12	2.7	7.23	3.05	
	13	2.8	7.2	3.05	
	14	2.8	7.19	3.05	
	14.1 bottom				

Great Slave Lake Hydrolab

"BEFORE"

3/3/97

G1-1	Depth(m)	Turb	pH	DO	Temp	Comments
	1	6.8	7.7	9.12	-0.16	
	2	9.5	7.7	9.12	-0.11	
	3	9.9	7.73	9.02	-0.11	
	4	10	7.73	8.95	-0.08	
	5	12.4	7.7	9.01	-0.09	
	6	12.7	7.62	8.94	-0.11	
	7	12.7	7.53	9.02	-0.04	
	8	12.7	7.35	9.14	-0.01	Touched bottom

G1-2	Depth(m)	Turb	pH	DO	Temp	Comments
	1	7.7	8.37	9.8	-0.19	300 m south east
	2	7.5	8.23	9.65	-0.14	
	3	7.5	8.14	9.51	-0.11	
	4	8.1	8.1	9.43	-0.1	
	5	8.9	8.11	9.27	-0.02	
	6	10.2	8.14	8.93	-0.12	
	7	10.8	8.15	8.85	-0.03	
	8	10.9	8.15	8.83	-0.01	
	9	11	8.13	8.96	0.13	
	10	11.4	8.09	8.13	0.36	
	11	11.6	8.04	9.22	0.51	
	12					depth11.5 m

6/3/97

G2-1	Depth(m)	Turb	pH	DO	Temp	Comments
	1	11.9	7.6	12.01	-0.18	
	2	11.8	7.58	11.13	-0.12	
	3	12.6	7.67	10.76	-0.14	
	4	13.5	7.79	10.18	-0.16	
	5	13.6	7.85	9.63	-0.18	
	6	13.4	7.87	9.52	-0.18	
	7	13.3	7.89	9.36	-0.15	
	8	13.3	7.9	9.36	-0.1	
	9	13.3	7.79	9.35	-0.06	
	10	13.4	7.88	9.39	0.07	
	11					depth10.1 m

6/3/97

G2-2	Depth(m)	Turb	pH	DO	Temp	Comments
	1	18.9	7.75	9.8	-0.19	
	2	18.6	7.8	10.12	-0.19	
	3	18.6	7.82	10.17	-0.14	
	4	19.4	7.86	9.97	-0.14	
	5	20	7.89	9.72	-0.18	
	6	20	7.91	9.46	-0.18	
	7	19.8	7.95	9.34	-0.15	
	8	19.6	7.97	9.26	-0.14	
	9	19.3	7.98	9.28	-0.14	
	10	19.3	7.99	9.32	0.05	
	11					depth9.9 m

6/3/97

G2-3	Depth(m)	Turb	pH	DO	Temp	Comments

"AFTER"

8/3/97

G1	Depth(m)	Turb	pH	DO	Temp	Comments
After	1	ice		7.32	9.91	-0.02 Hydrolab at drill casing/visible oil
Drilling	2	3.2	7.32	9.91	-0.02	sheen. Good site clean-up. Filtered
Filtration	3	3.7	7.38	9.55	-0.06	out 3 five gallon pails of solids. Did
system	4	3.9	7.45	9.47	-0.07	~ 490' hole. Finished discharge
used.	5	4.6	7.55	9.29	-0.07	7/3/97.
	6	5.1	7.61	9.15	-0.04	
	7	5.5	7.65	9.14	0.01	
	8	5.9	7.69	9.16	0.07	
	9					depth8.1 m

10/3/97

G2-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	2.9	7.63	10.36	-0.04	G2-1A No amphipods, deposition
	3	3.1	7.66	10.32	-0.09	visible 7.5cm thick(picture #1).
	4	3.5	7.7	10.25	-0.12	Pushed down side, actual layer
	5	4.5	7.78	9.8	-0.15	just a dusting
	6	4.9	7.81	9.62	-0.15	G2-2C Chem. 65% of top layer there
	7	5.3	7.84	9.46	-0.13	dusting of fines on A & B
	8	5.4	7.86	9.39	-0.09	Amphipods above all
	9	5.6	7.84	9.3	-0.04	
	10	7.3	8.01	9.33	0.12	
	11					depth10.1m

1	22.9	7.92	10.16	-0.13	
2	17.5	7.89	10.32	-0.13	Bottom sed. seemed frozen, had
3	17.3	7.91	10.27	. Fine -.13	to punch through crust. Fine ice
4	17.5	7.93	10.02	-0.16	slush rose whenever corer hit
5	18.1	7.97	9.66	-0.18	bottom. over 4' of ice, very hard
6	18.2	7.99	9.45	-0.17	just a few inches of snow.
7	18.2	8	9.37	-0.13	
8	18.1	8.01	9.3	-0.11	
9	18	8.01	9.25	-0.04	
10	17.9	8	9.24	0.05	
11					depth10.1 m

N62' 19.517" 700 ft
W114' 29.768"

8/3/97

G3-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	9.1	7.93	9.27	-0.16	Cores started @ 11:00 hrs. Moved
	3	8.7	7.92	9.4	-0.17	~ 13m N bbottom @ 8m was
	4	9.3	7.93	9.36	-0.18	rocky or frozen - couldn't get cores
	5	9.8	7.95	9.21	-0.18	up. (4 tries)
	6	9.9	7.96	9.14	-0.19	
	7	9.9	7.96	9.12	-0.18	
	8	9.9	7.97	9.09	-0.17	
	9					depth8.7 m

8/3/97

G3-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	10.2	7.91	10.05	-0.15	
	3	10.2	7.93	10.13	-0.16	
	4	10.6	7.94	10.91	-0.18	
	5	11.2	7.96	9.71	-0.18	
	6	11.5	7.97	9.55	-0.18	
	7	11.6	7.98	9.42	-0.18	
	8	11.6	7.99	9.36	-0.17	
	9	11.6	7.99	9.33	-0.14	
	10					depth9.3 m/temp -.11

8/3/97

G3-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	11.9	7.88	10.97	-0.15	
	3	11.9	7.89	10.82	-0.15	
	4	12.1	7.91	10.61	-0.17	
	5	12.7	7.95	10.19	-0.19	
	6	12.9	7.97	9.93	-0.18	
	7	12.8	7.98	9.73	-0.18	
	8	12.7	7.99	9.63	-0.15	
	9	12.7	7.99	9.53	-0.11	
	10					depth9.9 m/temp -.03

10/3/97

G4-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	12.3	7.96	10.6	-0.17	15:00 hrs wind ENE~ 25 kms
	3	11.7	7.96	10.87	-0.15	and sunny.
	4	12.3	8.01	10.77	-0.17	G4 shut down mid-morning 13/3/97
	5	13.6	8.03	10.32	-0.17	at ~ 500' (487+/-), moving to G5.
	6	13.6	8.06	9.9	-0.17	

13/3/97

G3-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	23.5	7.85	9.06	-0.14	Collar 13:10 hrs oily film on surface.
	3	23.2	7.86	9.09	-0.16	
	4	24.3	7.86	8.83	-0.17	
	5	24.3	7.86	8.56	-0.18	
	6	24.1	7.88	8.46	-0.17	
	7	22.7	7.92	8.17	-0.16	
	8	22.5	7.93	8.16	-0.16	
	9	22.3	7.94	8.18	-0.12	
	10					depth9.4 m/temp -.11

13/3/97

G3-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	22.9	8.16	8.22	-0.16	15m from collar
	3	22.8	8.16	8.18	-0.16	1st set of G3 cores taken 29.5m
	4	22.9	8.15	8.13	-0.17	NNE of collar. finished 15:25 hrs
	5	22.9	8.16	8.06	-0.17	G3-2 A-D no traces of fines on 4
	6	22.7	8.16	8.02	-0.17	core surfaces,amphipods~6 per?
	7	22.5	8.16	7.99	-0.16	snails, calms visible.
	8	22.3	8.16	7.96	-0.16	
	9	22.3	8.16	7.95	-0.14	
	10					depth9.8 m/temp-.14

13/3/97

G3-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	23.7	7.98	7.89	-0.16	50 m from collar
	3	23.2	7.98	7.94	-0.16	
	4	23.3	7.99	7.88	-0.17	
	5	23.3	8	7.81	-0.17	
	6	23.2	8.01	7.78	-0.17	
	7	23.3	8.01	7.76	-0.17	
	8	23.3	8.02	7.77	-0.15	
	9	23.4	8.02	7.76	-0.1	
	10	23.5	8.03	7.76	-0.05	
	11					depth10.3 m

16/3/97

G4-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	20.1	8.13	8.25	-0.16	13:50 hrs
	3	19.6	8.12	8.08	-0.16	G4-1A core had light coating only.
	4	19.5	8.12	7.98	-0.16	Pictures # 7-9.

7	13.7	8.08	9.65	-0.16	
8	13.8	8.09	9.49	-0.13	
9	13.8	8.09	9.46	-0.08	
10	13.9	8.09	9.32	-0.03	
11	13.9	8.08	9.27	0.02	
12	14	8.07	9.21	0.09	
13	13.9	8.06	9.19	0.18	
14					depth13.8 m/temp .24

10/3/97

G4-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	14.9	8.04	9.73	-0.14	
	3	14.6	8.04	10	-0.14	
	4	14.8	8.04	9.77	-0.16	
	5	14.9	8.05	9.56	-0.17	
	6	15.4	8.06	9.34	-0.17	
	7	15.5	8.07	9.21	-0.15	
	8	15.6	8.07	9.19	-0.13	
	9	15.6	8.06	9.17	-0.09	
	10	15.7	8.06	9.17	-0.01	
	11	15.8	8.06	9.17	0.02	
	12	15.7	8.06	9.08	0.08	
	13	15.7	8.05	9.07	0.14	
	14					depth13.2m/temp .14

10/3/97

G4-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	24.1	8.32	7.37	-0.14	
	3	23.7	8.34	7.54	-0.13	
	4	23.9	8.35	8.14	-0.14	
	5	24.1	8.34	8.75	-0.16	
	6	24.1	8.34	8.86	-0.16	
	7	23.7	8.32	8.87	-0.15	
	8	23.1	8.32	8.87	-0.14	
	9	22.2	8.31	8.78	-0.09	
	10	21.8	8.29	8.72	-0.03	
	11	21.2	8.28	8.75	0.01	
	12	20.5	8.24	8.72	0.11	
	13	19.8	8.22	8.69	0.2	
	14	19.4	8.21	8.73	0.33	
	15	19.2	8.19	8.87	0.63	
	16					depth15.3 m

13/03/97

G5-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	11.2	7.97	10.1	-0.17	09:30 hrs -30c sunny and calm
	3	11.3	7.96	9.95	-0.15	G5 very short hole (1 shift).
	4	11.7	7.97	9.64	-0.17	
	5	12.1	8	9.46	-0.17	
	6	12.1	8.01	9.28	-0.17	
	7	12.1	8.01	9.18	-0.17	
	8	12.1	8.02	9.14	-0.14	
	9	12.1	8.02	9.11	-0.09	
	10	12.2	8.02	9.05	-0.06	
	11	12.2	8.01	9.07	0.02	
	12	12.3	8	9.04	0.11	
	13	12.2	7.98	9.1	0.27	

5	19.7	8.12	7.81	-0.16	
6	19.9	8.12	7.66	-0.17	
7	20	8.12	7.57	-0.16	
8	20	8.12	7.49	-0.16	
9	20	8.13	7.43	-0.13	
10	20.1	8.12	7.47	-0.02	
11	20.3	8.12	7.39	0	
12	20.4	8.11	7.33	0.07	
13	20.5	8.09	7.33	0.14	
14					depth13.7 m

16/3/97

G4-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	20.6	8.26	8.18	-0.16	14:00 hrs
	3	20.3	8.24	7.93	-0.16	
	4	20.1	8.23	7.81	-0.16	
	5	20.2	8.24	7.65	-0.17	
	6	20.5	8.24	7.47	-0.17	
	7	20.5	8.23	7.26	-0.16	
	8	20.5	8.23	7.19	-0.13	
	9	20.5	8.23	7.15	-0.13	
	10	20.5	8.22	7.12	-0.08	
	11	20.6	8.21	7.15	0	
	12	20.7	8.2	7.17	0.11	
	13	20.8				depth12.9 m

16/3/97

G4-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	21.1	8.12	8.02	-0.16	14:10 hrs
	3	20.6	8.13	7.57	-0.16	
	4	20.5	8.12	7.31	-0.16	
	5	20.5	8.13	7.21	-0.16	
	6	20.4	8.14	7.12	-0.17	
	7	20.4	8.14	7.05	-0.16	
	8	20.3	8.14	7.01	-0.16	
	9	20.3	8.14	6.98	-0.12	
	10	20.3	8.14	7.01	-0.06	
	11	20.4	8.13	7.01	0.01	
	12	20.5	8.12	6.93	0.08	
	13	20.5	8.11	6.95	0.14	
	14	20.6	8.09	7.07	0.26	
	15					depth ?

16/3/97

G5-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	18.1	7.92	9.16	-0.12	13:35 hrs
	3	16.9	7.89	9.39	-0.12	Sunny and windy
	4	17.2	7.9	9.3	-0.15	
	5	17.8	7.93	9.01	-0.16	
	6	18.4	7.96	8.78	-0.16	
	7	18.6	7.97	8.65	-0.14	
	8	18.7	7.98	8.6	-0.12	
	9	18.7	7.98	8.53	-0.11	
	10	18.7	7.99	8.51	-0.06	
	11	18.8	7.99	8.53	0.03	
	12	19	7.97	8.59	0.18	
	13	19.1	7.93	8.61	0.36	

	14					depth13.6 m/temp .31

13/3/97

G5-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	7.4	7.89	10.3	-0.12	4feet east of collar
	3	7.4	7.89	10.9	-0.13	
	4	7.9	7.9	9.84	-0.16	
	5	8.7	7.94	9.59	-0.17	
	6	8.9	7.95	9.45	-0.16	
	7	9.1	7.97	9.3	-0.17	
	8	9.2	7.98	9.25	-0.14	
	9	9.3	7.98	9.19	-0.12	
	10	9.4	7.99	9.17	-0.05	
	11	9.6	7.98	9.18	0.03	
	12	9.6	7.97	9.11	0.06	
	13	9.7	7.95	9.24	0.27	
	14					depth13.3 m

13/3/97

G5-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	12.2	7.82	9.91	-0.13	G5-1 thru 3 cores done by 12:15 hrs
	3	12	7.81	9.79	-0.15	
	4	11.7	7.83	9.64	-0.16	
	5	11.7	7.86	9.48	-0.17	
	6	11.5	7.87	9.41	-0.17	
	7	11.4	7.88	9.35	-0.16	
	8	11.4	7.89	9.29	-0.14	
	9	11.7	7.9	9.26	-0.09	
	10	11.9	7.9	9.24	-0.04	
	11	12	7.9	9.21	-0.01	
	12	12	7.89	9.31	0.14	
	13	12	7.87	9.3	0.26	
	14					depth13.2 m/temp .32

14/3/97

G6-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	17.2	7.59	9.34	-0.08	No sediment samples taken at
	3	17.7	7.56	9.19	-0.04	collar, drilled 3 holes and hit
	4	18.3	7.6	8.98	-0.05	bedrock.
	5	19	7.67	8.73	-0.09	Overcast light winds ~ -25c
	6	19.7	7.77	8.53	-0.15	
	7	20	7.81	8.58	-0.1	
	8					depth7.1 m/temp -.09

14/3/97

G6-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	16.7	7.65	9.1	-0.04	G6-2 sediments A-D taken, none
	3	17	7.64	9.01	-0.05	from collar.
	4	17.4	7.67	8.86	-0.05	
	5	18	7.71	8.61	-0.07	
	6	18.3	7.75	8.53	-0.08	
	7	18.5	7.77	8.5	-0.08	
	8	18.8	7.8	8.53	-0.06	
	9	19.5	7.82	8.72	0.08	
	10	19.6	7.84	8.83	0.27	
	11	20	7.81	9.01	0.52	
	12	20.2	7.72	8.91	1.05	

	14					depth13.7 m

16/3/97

G5-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	16.4	7.71	9.64	-0.1	Sunny and windy
	3	16.2	7.72	9.79	-0.13	
	4	16.8	7.74	9.57	-0.14	
	5	17.3	7.76	9.35	-0.15	
	6	17.6	7.8	9.2	-0.15	
	7	17.7	7.81	9.15	-0.13	
	8	17.9	7.83	9.09	-0.1	
	9	18	7.84	9.01	-0.06	
	10	18.1	7.85	9.01	0.01	
	11	18.2	7.85	9.01	0.01	
	12	18.3	7.84	9.05	0.23	
	13	18.9	7.81	9.01	0.37	
	14					depth13.1 m

16/3/97

G5-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	13.3	7.72	9.35	-0.13	13:00 hrs sunny and windy.
	3	13.3	7.74	9.42	-0.14	50 m south of collar
	4	14.1	7.78	9.19	-0.15	
	5	14.4	7.81	9.05	-0.16	
	6	14.6	7.82	9	-0.16	
	7	14.8	7.84	8.98	-0.13	
	8	14.9	7.85	8.95	-0.12	
	9	15.1	7.86	8.97	-0.09	
	10	15.3	7.86	9.02	-0.03	
	11	15.4	7.86	9.11	0.14	
	12	15.5	7.85	9.06	0.2	
	13					depth12.8 m

17/3/97

G6-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	3.8	7.89	8.87	-0.03	
	3	4.1	7.84	8.87	-0.06	
	4	4.3	7.86	8.8	-0.09	
	5	5.5	7.89	8.77	-0.14	
	6	5.6	7.93	8.77	-0.14	
	7	5.7	7.95	8.77	-0.13	
	8					depth7.1 m

17/3/97

G6-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	4.2	7.9	9.66	-0.05	
	3	4.8	7.8	9.49	-0.03	
	4	5.9	7.81	9.28	-0.07	
	5	7.1	7.87	9.15	-0.12	
	6	7.6	7.95	9.01	-0.14	
	7	7.7	7.98	8.97	-0.14	
	8	7.9	7.99	8.94	-0.12	
	9	8	8.02	9	-0.08	
	10	8.4	8.03	9.29	0.29	
	11	9.6	7.97	9.46	0.8	
	12	9.8	7.84	8.91	1.33	
	13					depth12.3 m

	13					depth12.3 m/temp 1.32

14/3/97

G6-3	Depth(m)	Turb	pH	DO	Temp	Comments
	1	12.6	7.4	8.53	-0.04	
	2	12.4	7.38	8.7	-0.02	
	3	12.6	7.42	8.59	-0.05	
	4	12.9	7.45	8.49	-0.09	
	5	13.5	7.52	8.56	-0.08	
	6	13.5	7.52	8.5	-0.13	
	7	14.1	7.58	8.62	-0.1	
	8	14.4	7.61	8.72	-0.03	
	9	14.5	7.62	8.92	0.14	
	10	14.7	7.62	8.98	0.34	
	11	15	7.58	9.37	0.75	
	12	15.4	7.49	8.79	1.56	
	13	15.7	7.41	7.6	1.74	
	14					depth13.2 m/temp1.86

G7-1 no hydrolab before data due to early move of the rig
Cores taken 2m SSW of collar hole, 4 samples 2 bottles each.
~ 6 inches of moss over mixed 3 inches over clay.

G7-2 no hydrolab before data due to early move of the rig
Camera #2 shots 5-6 G7-2A

G7-3 no hydrolab before data due to early move of the rig.

17/3/97

G8-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	13.8	7.56	6.79	-0.06	No core samples taken at G8.
	3					depth2.7 m

18/3/97

G9-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	5.4	7.76	8.56	-0.06	16:10 hrs

17/3/97

G6-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	9.1	7.92	9.02	-0.04	
	3	9.1	7.89	8.97	-0.05	
	4	9.5	7.92	8.8	-0.06	
	5	9.8	7.94	8.64	-0.1	
	6	10.8	7.96	8.62	-0.13	
	7	10.8	8.01	8.61	-0.13	
	8	11.2	8.05	8.61	-0.09	
	9	11.4	8.05	8.7	0.05	
	10	11.9	8.04	8.83	0.19	
	11	12.3	8	9.01	0.51	
	12	13.1	7.93	9.11	1.01	
	13	14.7	7.76	7.88	1.65	
	14					depth13.1 m

19/3/97

G7-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	5.6	7.73	9.1	-0.02	
	3	5.6	7.71	9.1	0.01	
	4	5.8	7.71	9.07	0.1	
	5	6.2	7.74	9.09	0.15	
	6					Depth4.8 m ?

19/3/97

G7-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	2.6	7.77	9.25	-0.02	
	3	2.8	7.71	9.03	0.03	
	4	3.3	7.71	8.99	0.08	
	5	4	7.75	8.84	-0.01	
	6	6.1	7.96	8.75	-0.02	
	7					depth6.0 m ?

19/3/97

G7-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	2.6	7.74	8.56	-0.02	
	3	2.8	7.71	8.53	-0.03	
	4	3.2	7.7	8.5	-0.03	
	5	3.7	7.73	8.47	-0.07	
	6	4.2	7.77	8.51	-0.08	
	7	4.6	7.81	8.55	-0.07	
	8	5.1	7.84	8.61	-0.04	
	9	5.3	7.86	8.67	0.01	
	10	5.5	7.88	8.71	0.06	
	11	5.7	7.89	8.93	0.28	
	12	5.9	7.85	9.11	0.52	
	13					depth12.1 m

19/3/97

G8-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	18.6	7.79	9.14	-0.09	Poor site clean-up-cement, dull
	3					fines, grease smears @ 10:30 hrs.
						May have went back to clean-up
						later.Should check.

3/23/97

3	5.2	7.75	8.47	-0.07	
4	5.9	7.76	8.38	-0.07	
5	6.5	7.8	8.21	-0.12	
6	7	7.83	8.19	-0.14	
7	7.4	7.86	8.19	-0.1	
8	7.6	7.88	8.16	-0.09	
9	7.8	7.88	8.38	0.11	
10	8.5	7.86	8.41	0.34	
11	8.6	7.84	8.81	0.75	
12	8.9	7.75	8.4	1.29	
13					depth12.5 m/temp 1.38

18/3/97

G9-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	11.3	7.84	8.59	-0.11	
	3	11.7	7.79	8.49	-0.04	
	4	12.4	7.82	8.32	-0.05	
	5	13	7.88	8	-0.12	
	6	13.5	7.96	7.94	-0.14	
	7	13.5	8	7.93	-0.1	
	8	13.4	8.01	7.9	-0.09	
	9	13.4	8.02	7.89	-0.05	
	10	13.4	8.02	8.03	0.14	
	11	13.7	8.01	8.33	0.51	
	12	13.9	7.95	8.46	0.96	
	13					depth12.7 m

18/3/97

G9-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	9.9	7.92	8.16	-0.07	Judging bottom when hydrolab
	3	9.8	7.9	8.17	-0.07	touched there appears to be
	4	10	7.89	8.05	-0.08	sediment.
	5	10.2	7.91	7.99	-0.12	
	6	10.8	7.96	8.05	-0.14	
	7	11.1	8.01	8.06	-0.11	
	8	11.2	8.02	8.07	-0.08	
	9	11.3	8.02	8.14	-0.01	
	10	11.7	7.99	8.4	0.33	
	11	12.1	7.95	8.71	0.72	
	12	12.3	7.81	8.14	1.23	
	13					depth12.7 m/temp 1.55

19/3/97

G10-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	12.7	8.09	7.81	-0.07	Overcast, -16c east wind @ 20kms.
	3	12.6	8.04	8.05	-0.04	Cable shortened by ~ 13m on winch
	4	12.7	8.03	7.77	-0.09	Cores started at 13:15 hrs, done
	5	13.5	8.05	7.49	-0.14	by 14:30. This site has fine clays
	6	13.8	8.09	7.42	-0.15	covered by med-fine gravel(1-1.5cm)
	7	13.8	8.11	7.37	-0.14	and a thin organic layer. Amphipods
	8	13.8	8.12	7.36	-0.1	as usual. Land use inspectors
	9	13.8	8.13	7.36	-0.04	came by drill at G9 and our site at
	10	13.9	8.11	7.48	0.11	G10. Short demo done along with a
	11	14.1	8.07	7.92	0.65	explanation.
	12					depth11.2 m/temp 0.78

19/3/97

G9-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	10.8	7.77	13.09	-0.02	
	3	10.7	7.73	13.21	-0.03	
	4	11.4	7.72	12.97	-0.06	
	5	12	8.77	12.87	-0.1	
	6	12.6	7.82	13	-0.12	
	7	13.2	7.85	13.01	-0.14	
	8	13.6	7.88	13.02	-0.11	
	9	14.6	7.89	13.31	0.12	
	10	16.4	7.86	13.28	0.45	
	11	17.7	7.79	13.12	0.89	
	12	18	7.58	9.87	1.1	depth 12.4m

3/23/97

G9-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	14.7	7.77	13.02	-0.04	
	3	15	7.73	13.02	-0.03	
	4	15.2	7.72	12.68	-0.04	
	5	16.1	7.75	12.58	-0.09	
	6	16.5	7.84	12.89	-0.13	
	7	16.6	7.88	12.85	-0.14	
	8	16.8	7.9	12.81	-0.12	
	9	19.6	7.9	12.74	0.03	
	10	18.7	7.88	13.04	0.37	
	11	20.8	7.85	12.93	0.64	
	12	19.7	7.78	11.77	1.17	depth 12.6m

3/23/97

G9-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	14.7	7.7	12.66	-0.03	
	3	14.6	7.69	13.09	-0.03	
	4	15.7	7.66	12.9	0.05	
	5	16.5	7.73	12.56	-0.1	
	6	16.6	7.83	12.87	-0.11	
	7	17.2	7.86	12.84	-0.12	
	8	19.8	7.9	12.85	-0.08	
	9	20.7	7.91	12.77	-0.04	
	10	24.6	7.91	12.99	0.33	
	11	19.4	7.84	12.62	0.61	
	12	19.5	7.74	11.22	1.04	depth 12.7m

3/25/97

G10-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	15.2	7.8	13.45	-0.05	Data maybe unreliable due to mix-up of sample heading
	3	15	7.8	13.35	-0.06	
	4	15.2	7.8	13.07	-0.09	
	5	15.9	7.83	13.04	-0.12	
	6	16.5	7.87	13.01	-0.13	
	7	16.9	7.89	12.89	-0.11	
	8	17.1	7.9	12.89	-0.04	
	9	17.3	7.9	12.89	0.06	
	10	19.4	7.83	13.05	0.25	
	11	22.3	7.83	13.05	0.64	

3/25/97

G10-2	Depth(m)	Turb	pH	DO	Temp	Comments

G10-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	10.7	7.96	9.27	-0.06	
	3	10.3	7.96	9.03	-0.06	
	4	10.4	7.97	8.73	-0.09	
	5	11.1	8	8.58	-0.13	
	6	11.5	8.04	8.45	-0.14	
	7	11.6	8.06	8.39	-0.11	
	8	11.7	8.07	8.34	-0.09	
	9	11.7	8.08	8.33	-0.02	
	10	11.8	8.06	8.59	0.33	
	11	12.1	8.02	8.95	0.76	
	12					depth11.5 m/temp 1.23

19/3/97

G10-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	11.3	7.87	8.69	-0.06	
	3	11.4	7.87	8.77	-0.05	
	4	11.8	7.88	8.7	-0.07	
	5	12.1	7.9	8.63	-0.09	
	6					depth5.6 m/temp -.09

3/27/97

G11-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	2.5	7.64	13.24	-0.04	No after done-lost hole and moved drill
	3	2.6	7.6	13.27	0	
	4	3	7.6	13.18	-0.03	
	5	3.8	7.64	12.96	-0.06	
	6	4	7.67	12.83	-0.06	
	7	4.7	7.69	12.86	-0.08	
	8	4.7	7.75	12.93	-0.06	
	9	5	7.77	12.99	-0.06	
	10	5.6	7.85	12.94	0.05	
	11	12.4	7.97	13	0.14	depth11.2m/temp 0.22

3/27/97

G11-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	3.9	7.74	13.19	-0.03	
	3	3.6	7.7	13.27	0	
	4	4	7.71	13.19	-0.02	
	5	4.3	7.72	13.07	-0.06	
	6	5.5	7.73	12.92	-0.1	
	7	5.8	7.8	12.93	-0.08	
	8	6.1	7.82	12.97	-0.03	
	9	6.4	7.84	12.96	0.01	
	10	6.7	7.85	12.88	0.04	
	11	7.3	7.88	12.89	0.08	depth11.8/temp 0.16

3/27/97

G11-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	7.9	7.25	13.04	-0.03	
	3	7.7	7.23	13.03	-0.02	
	4	7.8	7.71	13.04	-0.02	
	5	8.3	7.72	12.91	-0.05	
	6	8.6	7.76	12.71	-0.06	
	7	9.1	7.78	12.65	-0.08	
	8	9.7	7.83	12.74	-0.05	
	9	10	7.85	12.78	0.01	
	2	14.3	7.76	13.42	-0.05	***Data unreliable***
	3	14.3	7.73	13.41	-0.07	
	4	14.9	7.75	13.05	-0.11	
	5	14.9	7.8	13.11	-0.12	
	6	14.6	7.86	12.26	-0.09	
	7	14.6	7.86	12.78	-0.07	
	8	14.6	7.87	12.89	0	
	9	14.6	7.85	13	0.15	
	10	14.8	7.8	13.08	0.43	depth 10.7m

3/25/97

G10-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	13.7	7.75	13.23	-0.06	Data marked correctly
	3	13.5	7.74	13.08	-0.05	
	4	13.7	7.76	12.79	-0.06	
	5	14.1	7.78	13.03	-0.11	
	6	14.7	7.83	13.13	-0.12	
	7	15.3	7.85	12.97	-0.08	
	8	15.6	7.86	12.91	-0.01	
	9	15.8	7.87	12.88	0.06	
	10	16.3	7.84	13.3	0.41	depth 10.9m

3/22/97

G11-1	Depth(m)	Turb	pH	DO	Temp	Comments
	2	12.4	7.73	12.72	-0.04	
	3	12	7.69	13.54	-0.03	
	4	12.2	7.69	13.52	-0.03	
	5	12.3	7.69	13.48	-0.05	
	6	12.6	7.73	13.16	-0.06	
	7	13.3	7.76	13.16	-0.04	
	8	13.6	7.77	13.18	-0.02	
	9	13.6	7.79	13.18	-0.01	
	10	13.8	7.79	13.25	0.06	
	11	14.1	7.79	13.27	0.13	
	12	14.4	7.77	13.44	0.32	depth 12.9m/ temp0.6

3/22/97

G11-2	Depth(m)	Turb	pH	DO	Temp	Comments
	2	12.8	7.71	13.46	-0.04	
	3	12.5	7.69	13.53	-0.04	
	4	12.7	7.69	13.45	-0.04	
	5	12.7	7.74	13.35	-0.05	
	6	13.1	7.73	13.1	-0.05	
	7	13.8	7.77	13.04	-0.03	
	8	14.3	7.81	13.09	-0.01	
	9	14.3	7.82	13.1	0.01	
	10	14.4	7.82	13.21	0.11	
	11	14.8	7.82	13.34	0.26	
	12	15.3	7.78	13.32	0.47	
	13	14.5	7.73	12.32	0.72	depth 13.3m/temp 0.8.

3/22/97

G11-3	Depth(m)	Turb	pH	DO	Temp	Comments
	2	13.1	7.74	13.36	-0.06	
	3	13.2	7.68	13.41	-0.05	
	4	13.6	7.69	13.48	-0.03	

10	10.1	7.87	12.8	0.06	
11	10.4	7.87	12.82	0.14	
12	10.7	7.86	13.04	0.33	
13	11.2	7.84	13	0.63	depth 13.4m

5	13.6	7.7	13.44	-0.05	
6	13.9	7.75	13.29	-0.05	
7	14.4	7.78	12.93	-0.05	
8	14.8	7.82	12.97	-0.03	
9	15.1	7.84	13.05	0	
10	15.2	7.85	13.05	0.05	
11	15.3	7.86	13.15	0.15	
12	15.5	7.83	13.03	0.45	
13	15.4	7.77	13.03	0.67	
14	15	7.71	12.12	0.96	depth14.4m/temp 1.07

Sample #	TSS (mg/L)	Sampling Date: 27/02/97
R1-2	<3	Using a van dorn sampler, water samples
R1-8	<3	were collected at depths of 2m, 8m. and just above bottom.
R1-14	<3	Lab detection limit: 3mg/L
R2-2	<3	
R2-8	<3	
R2-14	<3	
R3-2	<3	
R3-8	<3	
R3-14	3	
C-2	<3	
C-8	<3	
C-14	5	
N1-2	<3	
N1-8	<3	
N1-16	11	
N2-2	<3	
N2-8	<3	
N2-14	(not done)	
NW-2	3	
NW-8	<3	
NW-14	4	
W1-2	<3	
W1-8	<3	
W1-14	4	
W2-2	<3	
W2-8	3	
W2-12	11	Bottom touched.
E1-2	<3	
E1-8	<3	
E1-14	4	
E2-2	<3	
E2-8	3	
E2-12	8	
NE-2	<3	
NE-8	<3	
NE-14	<3	
S1-2	<3	
S1-8	<3	
S1-14	<3	
S2-2	<3	
S2-8	<3	
S2-14	4	
SE-2	<3	
SE-8	<3	
SE-14	3	
SW-2	<3	
SW-8	<3	
SW-14	3	

Table 5

BATON LAKE SEDIMENT CHEMISTRY

Baton Lake Sediment Samples

Parameter	S1(before)	S1(after)	E1(before)	E1(after)	W1(before)	W1(after)	C(before)	C (after)	N1(after)	N2(after)	NE(after)	NW(after)	S2(after)	SE(after)	SW(after)	E2(after)	W2(after)	R1	R2	R3
Aluminum(%)	1.59	1.6	1.61	1.66	1.47	1.53	1.55	1.66	1.57	1.5	1.57	1.46	1.51	1.74	1.56	1.79	1.51	1.66	1.73	1.62
Arsenic	6.3	8	2.5	6.4	3.6	5.2	8.4	2.9	9.5	3.8	5.8	9.1	4.9	8.2	4.1	3	6.5	5.1	7	2.6
Barium	114	122	111	109	102	107	124	135	159	116	119	107	105	103	104	114	90.1	124	127	115
Cadmium	0.7	0.6	0.5	0.6	0.6	1	0.8	0.7	1.1	0.6	0.9	1.1	0.8	0.9	0.9	0.6	0.9	0.4	1	0.5
Calcium(%)	1.24	1.28	1.29	1.27	1.26	1.21	1.25	1.42	1.32	1.29	1.3	1.19	1.27	1.18	1.19	1.39	1.26	1.18	1.13	1.09
Chromium	62.1	65.2	63.4	66.1	56.3	65.1	56.8	79.1	64.1	58.6	61.2	54.2	59.4	70.9	60.6	84.1	59.3	96.6	101	106
Cobalt	18	19.8	14	18.7	13.3	17.8	19.4	21.1	21.3	15.8	17.6	15.7	17.8	19.6	16.7	18.2	15.4	18.4	17.8	17.7
Copper	101	91.6	115	100	104	92.4	103	115	110	107	108	93.3	102	91.4	96.4	95	71.7	65.7	67.3	70.9
Iron(%)	2.51	2.94	1.9	2.57	1.85	2.41	2.68	2.35	3.27	2.02	2.35	2.34	2.24	3.08	2.24	3	2.45	3.26	3.59	2.66
Lead	13	15	10	10	11	10	12	10	13	9	11	15	12	14	10	9	14	8	8	7
Magnesium	8540	9620	7540	9200	7350	9080	8330	10900	9520	7420	8050	8210	8300	10600	8470	10500	8750	11300	11300	10900
Manganese	989	1220	730	927	648	945	1240	940	1590	1000	1060	1010	814	869	768	641	536	726	921	538
Molybdenum	6.2	5.7	5.2	5.7	5.3	5.4	6.7	5.1	8.2	5.4	5.3	6	4.7	5.6	3.9	6	4.6	4.9	6.7	3.9
Nickel	48	50	49	52	45	50	46	69	57	47	50	42	48	55	48	62	46	58	64	63
Potassium	1400	1500	1500	1500	1400	1500	1400	1800	1500	1500	1400	1400	1400	1500	1500	1500	1500	1600	1500	1500
Selenium	<20	<20	<20	<20	<20	<20	<20	<20	20	<20	<20	<20	<20	<20	<20	<20	30	<20	20	<20
Sodium	220	250	210	300	210	270	240	410	280	240	260	220	270	280	240	250	240	230	260	230
Vanadium	43.3	48.2	37	44.8	35.7	41.2	44.4	38.6	45.6	37.8	42.3	41.8	40.2	49.2	42.1	53.8	44.6	53.4	53.6	49.8
Zinc	128	130	133	134	123	124	142	132	157	134	138	122	126	132	119	170	121	161	165	157
NH_3 - N	150	105	78	90.8	85	69	160	139	274	132	141	92.8	78.5	72	66.7	48	58.7	32.8	38.5	46.2
NO_3 - N	<1	<1	1.4	<1	2.7	<1	1.4	<1	1.2	1.4	1.2	1.2	<1	<1	<1	<1	<1	<1	<1	<1
TKN(%)	1.63	1.66	1.66	1.63	1.67	1.5	1.73	1.56	1.63	1.64	1.76	1.63	1.52	1.43	1.47	1.64	1.58	1.28	1.24	1.14
TC(%)	17	20	19	17	19	16	21	18	22	21	19	17	20	16	19	19	16	15	15	15
TOC (%)	17	16	17	16	16	14	17	17	20	19	18	17	18	15	16	16	15	14	13	15
Beryllium	0.5	0.6	0.4	0.6	0.4	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.6	0.7	0.5	0.6	0.5	0.7	0.6	0.6
Titanium	602	650	493	645	486	601	588	611	587	534	565	566	593	695	626	580	655	734	798	709

*All units are parts per million except where indicated to be % by dry weight

NH_3-N - Ammonia Nitrogen NO_3N - Nitrate Nitrogen TKN - Total Kjeldhal Nitrogen

TC - Total Carbon TOC - Total Organic Carbon

Table 6. Deposition of fines on the lake bottom - Baton Lake Feb. 27, 1997

Station	Observations
C	Variable thickness, 3-7mm
N1	About 2mm
N2	Less than 1mm dusting
NE1	Trace deposits, some mixing
NW1	Dusting only/patches
W1	Traces only
W2	No traces
SW1	Few traces
S1	Less than 1mm
S2	Traces only
SE1	About 1mm cover
E1	Dusting only
E2	Traces

WEST KITIKMEOT / SLAVE STUDY SOCIETY

Re: Investigation of Aquatic Impacts of On-Ice Exploratory Diamond Drilling

STUDY DIRECTOR RELEASE FORM

This Annual Report is the result of a project conducted under the West Kitikmeot / Slave Study. I have reviewed the report and advise that it has fulfilled the requirements to this stage of the approved proposal and can be subjected to independent expert review and be considered for release to the public.

Study Director — Date: May 20/97

INDEPENDENT EXPERT REVIEW FORM

I have reviewed this annual report for scientific content and scientific practices and find the report is acceptable given the preliminary stage of the project, its specific purposes, and subject to the field conditions encountered.

Reviewer — Date: Sept 15, 97

INDEPENDENT EXPERT REVIEW FORM

I have reviewed this annual report for scientific content and scientific practices and find the report is acceptable given the preliminary stage of the project, its specific purposes, and subject to the field conditions encountered.

Reviewer — Date: Oct 9/97

BOARD RELEASE FORM

The Study Board is satisfied that this Annual Report has been reviewed for scientific content and approves this Annual Report to be released to the public.

Chair
West Kitikmeot/Slave Study Society — Date: Oct 28/97

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