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: Aug 27/98

WEST KITIKMEOT / SLAVE STUDY SOCIETY

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

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 11/98

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

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. – as per comments sent via email

Reviewer — Date: 22 Sept 98

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

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. 2/98

ANNUAL REPORT TO THE WEST KITIKMEOT/SLAVE STUDY SOCIETY
Investigation of Aquatic Impacts of On-Ice Exploratory Diamond Drilling:
Data Report for the Water Quality Component

May 19, 1998
Submitted by Anne Wilson

SUMMARY

Work done under this funding is part of the second year of research of a three-year study which examines the impacts of exploratory drilling from ice. Diamond drills are used to extract rock core samples, and generate return water which contains rock fines or solids, plus any additives which may have been used. Disposal of this effluent is difficult at cold temperatures, so this research is being done to see what effects occur when the drilling waste is deposited on the lake bottom. Impacts of short holes involving limited discharges were measured in 1996/97 on Great Slave Lake, with "before" and "after" samples collected for analysis and evaluation. A longer hole with higher quantities of effluent released was studied at Baton Lake; baseline measurements were done in 1997, and follow up work has been done for water quality and benthic samples. In winter of 1998, drilling in kimberlite geology was examined for two short holes at Lac de Gras.

Summer water quality work was done at Great Slave Lake using the Hydrolab Multiprobe to measure temperature, pH, conductivity, dissolved oxygen, and turbidity. Although measurements were done while the wind velocity was low, the lake water appeared to have high suspended clay levels, as commonly occurs in summer due to wind and wave action. Turbidity values varied widely, from 4.1 to 92.3 NTU. There was no consistent relationship between the turbidity and the amount of effluent released; the highest turbidities occurred at the sites of lowest or no discharge. Dissolved oxygen levels were near saturation, ranging from 9.5 to 10.5 at the surface. Conductivity readings were consistently near 0.200 mS/cm, and pH values fell between 8 and 8.5, with most at 8.4. Temperature readings indicated the water column was well mixed, with no stratification. No winter followup work was done at this site.

Water quality work was carried out at Baton Lake twice during the summer; at the discharge site and the reference site measurements were done for turbidity, pH, temperature, conductivity and total suspended solids (TSS). Despite strong wind and wave action, no resuspension of bottom

materials was seen; TSS measurements were at or near detection limits, and turbidity at both study and reference stations was at maximum 2 NTU. Summer benthic animal collection was done at Baton Lake as well, but very low numbers of individuals were seen overall, most likely due to using a different sampling apparatus, and subsampling of the sediment grab, plus seasonal differences in the benthic community. Winter water quality measurements and sediment and benthic collections were done as a followup to the 1997 work. Water quality showed conductivity readings of 111uS/cm, pH ranging from 6.95 to 7.10, and dissolved oxygen values ranging from a low of 1.43 near bottom to 9.37 in the upper water column. Sediment chemistry and benthic results are not yet available.

At Lac de Gras, baseline data was collected prior to the drilling of two short holes at the Diavik site; drilling effluent was released and water quality, sediment and benthic samples collected following discharge. An increase in turbidity was seen at the discharge site after completion of drilling, with highest levels (up to 39.4 NTU) reached at two sites during drilling, although the rest of the stations were in the range of 6.4 to 12.2 NTU. Average water column profile turbidities ranged from 6.1 to 16.2 NTU during discharge. TSS levels were below detection limits before the onset of discharge, but are not available for during discharge due to a sample handling problem. Previous work done on behalf of Diavik to correlate TSS and turbidity in kimberlites would suggest that the turbidity averages measured would correlate to a TSS range of 11.8 to 36.3 mg/L. Various water quality measurements were taken with the Hydrolab meter. pH values stayed within a fairly narrow range (from 6.29 to 6.67) with the highest value of 6.67 occurring in the discharge plume path. Dissolved oxygen levels were from 11.05 to 13.3 mg/L prior to release; following discharge they increased slightly to 11.53 to 13.6 mg/L. Conductivity showed a slight drop at most stations measured after effluent discharge, except in the direction of effluent plume movement, although the increase was modest (10.0 to 10.4 uS/cm). Sediment chemistry and benthic results are not yet available.

Preliminary experiments were carried out in the laboratory to examine the effects of smothering chironomid larvae with varying amounts of drilling wastes. The viability experiments showed little or no mortality associated with the addition of one to seven millimetres of fines to the surface. Two different species were tested, burrowers and surface “sprawlers”, and preliminary testing revealed no direct toxicity of the fines to the larvae. Longer term testing is to be carried out to assess effects on feeding and emergence.

ACKNOWLEDGMENTS

The researcher would like to acknowledge the contribution of the West Kitikmeot/Slave Study Society for funding; Dr. Buster Welch and Kathleen Martin for scientific advice and providing lab equipment; Fisheries and Oceans for providing laboratory facilities; Royal Oak Mines Inc. and Diavik Diamond Mines Inc. for site access and logistical support including accommodation, meals, and transportation; Taiga Environmental Lab for analytical work; and Environment Canada for equipment, summer student support, and lab analyses. Ron Bujold, Bart Blais, Frankie Nitsiza and Dean Halifax spent long hours in equipment preparation, out on the ice sampling, and in the lab processing samples. Bart Blais is to be especially acknowledged for his work in preparing the maps, tables, and statistical analyses for this report.

TABLE OF CONTENTS

OBJECTIVES

The objective of this component of the study is to evaluate impacts of on-ice drilling on water clarity and quality in the immediate area of drilling, as well as to collect data on baseline conditions for turbidity, pH, dissolved oxygen, conductivity and total suspended solids. This study seeks to answer two main water quality-related questions: I) does first-stage exploration drilling significantly impact lake water clarity when effluent is released to the lake bottom, and ii) will materials resuspend in summer due to wind and wave action, affecting water quality. In conjunction with this work, benthic data are being analysed to assess effects of deposition, and sediment chemistry and particle size analyses are being done to look at overall changes.

DESCRIPTION

Background:

Work was initiated in early 1997 to examine the effects of first stage diamond drilling programs working from lake ice surfaces. Samples were taken to assess the changes in water quality and effects on benthic invertebrates for two sites: Baton Lake, where a fairly deep hole was drilled; and Great Slave Lake, where 11 shallow holes were drilled. Reference sites provided baseline data as well as points for comparison. Water clarity and changes to the benthic communities are the main indicators examined to determine magnitude and duration of effects. Initial work dealt with non-kimberlite targets only because of the potential toxicity of kimberlite effluents; however, in 1998 a kimberlite target was examined using two shallow holes at the Diavik lease on Lac de Gras.

Study Area:

The lakes under study are in the Slave River Geological Province, and include Baton Lake (at Colomac Mine), Great Slave Lake (Yellowknife Bay) and Lac de Gras (Diavik Diamond Mines Inc.). Baton Lake is a long narrow lake contained within a bedrock valley; the sediments are highly unconsolidated organic materials. Great Slave Lake and Lac de Gras are both large lakes, and can be classified as oligotrophic. The substrate in the area of drilling at Great Slave Lake consisted of a fine layer of organic material over clay and/or rocks; at Lac de Gras, the sediments were iron-rich, with silty-clay consistency and poorly consolidated for the top 0.5 meter sampled.

Methodology:

During the first stage at each study lake, baseline data were collected for water quality, sediment chemistry and benthic community composition. Discharge of drilling fines was done at five meters above lake bottom using a diffuser pipe for all sites except the Lac de Gras ones, where a one-inch hose was use following plugging problems with the diffuser. Sample stations for Baton Lake and Lac de Gras were set up in a grid pattern, with the discharge point at the centre (See Figure 2) and stations 15 m apart. A map showing the Lac de Gras stations is not available, but an identical sampling setup was used as for Baton Lake, with the addition of one 50 meter hole at E3. Great Slave Lake stations were set up at 0, 15, and 50 metres, in the direction of increasing depth, from the discharge point at each drill hole (Figure 1). Water quality measurements were done using either a Horiba or Hydrolab meter to measure water quality parameters. Water samples were collected using a van dorn type water sampler, and tested by Taiga Environmental Lab for total suspended solids and total metals. Changes in water metals concentrations were evaluated statistically using a nonparametric test (Kruskal-Wallis) to compare before and after concentrations for the discharge site for Lac de Gras.

Drilling effluent samples which had been retained from the previous season were used to do preliminary lab experiments on the effects of addition of drill wastes to the water and sediment surfaces. Chironomid larvae had been collected from Kam Lake and held in test aquaria for use in smothering experiments (Didiuk and Wright 1975); mortality and turbidity were measured following addition of 1, 3, and 7 mm of drilling fines.

ACTIVITIES FOR THE YEAR

During the open water season several trips were made to Great Slave Lake and Baton Lake to collect water quality information. Lab experiments were done during the fall at the Freshwater Institute, and samples from the drill return water were analysed for particle size. For the winter field season, researchers travelled to Baton Lake and collected water, sediment and benthic samples as followup to the work previously done. A new site with drilling into two kimberlite holes was examined at Diavik's Lac de Gras lease. There, researchers took baseline and postimpact water quality measurements, sediment and benthic samples. Short-term measurements of drilling impacts were taken for this site following drilling, with subsequent followup to be done next winter.

RESULTS

Great Slave Lake: Summer followup completed the work on this study site. For Great Slave Lake stations, located near Yellowknife Bay, lake waters were well mixed with temperatures at all depths and stations between 13.3 and 16.7 degrees Celsius. pH values ranged from 7.97 to 8.51, and conductivity values ranged from 0.188 to 0.208 mS/cm. Dissolved oxygen values were at or near saturation for all readings except at one 12 m station (hole 9) where DO was 75% of saturation. Turbidity varied widely, and did not show consistent trends through the water column (Table 1).

Table 1. Great Slave Lake Turbidity Readings, Aug. 29, 1997

Hole	Solids discharged	Average Turbidity (NTU)	Notes
1	None	80.7	Filtration used
2	0.414 m^3	(not measured)	Missing coordinates
3	0.287 m^3	22.2	Rocky substrate
4	0.314 m^3	9.7	Rocky substrate
5	0.171 m^3	25.6	Exposed area
6	0.367 m^3	10.2	Near 1 & 9
7	0.588 m^3	11.3	Moss/boulder bottom
8	None	9.9	Boulder shallows
9	0.496 m^3	10.9	Near 1 & 6
10	0.361 m^3	7.5	
11	0.543 m^3	21.8	Sheltered - islands

Baton Lake

Summer: Temperature measurements for Baton Lake taken at control and discharge sites on June 27th indicated lake stratification, with the thermocline between 4 and 5 meters. Turbidity was measured, with all values below 2 NTU throughout the water column at all stations. Measurements of temperature, pH, conductivity, dissolved oxygen were taken July 30th for the three reference stations, and nine of the stations around the discharge point. Surface pH averaged 8.15, with a range of 8.13 to 8.21. Conductivity averaged 0.0111 mS/cm over the water column at all stations, with a range of 0.0107 to 0.0116 mS/cm. Dissolved oxygen values were at saturation in the top 5 meters of the lake for all stations, declining with depth to values between 22% and 50% near the lake bottom. Benthic counts were done for control and discharge sites, however such low numbers of invertebrates were seen that no differences would be detectable. This most likely arose from subsampling and different sample collection methods, as well as seasonal variability (post-emergence for chironomids, and with zooplankton moving higher in the water column).

Winter: Water quality, sediment chemistry and benthic community samples were taken at the study site one year after discharge. The discharge point was located using triangulation of shore markers, and the thickness of drilling fines seen confirmed the location (Figure 3). Winter water quality results for 1998 are shown on Table 2. Because of icing up of the turbidity meter, results for winter are not available and TSS is used as a measure of water clarity. All TSS values were below detection limits of 3mg/L except for one sample taken at the reference point, which was 4 mg/L (Table 4). Few Hydrolab readings are available for prior to drilling, as it commenced on scant notice. pH before drilling ranged from 7.57 to 8.0; immediately after drilling it ranged from 7.04 to 7.43. In winter of 1998 the pH range was from 6.77 to 7.10, with little variation seen between discharge and reference sites. Water column temperatures exhibited comparable ranges in both 1997 and 1998, from 0.3 below the ice to 3.4 at bottom. Metal levels in the water are summarized in Table 6. As no pre-release data was collected in 1997, values from previous work have been included for comparison. Of note are increased in aluminum and manganese at the discharge site immediately after drilling; however, levels of both were comparable to reference sites by 1998. Benthic and sediment chemistry samples were collected, and lab analyses awaited.

Lac de Gras

Water quality results are shown on Table 3 for measurements taken with the Hydrolab Multiprobe.

Because of dynamic drilling schedules running to the end of ice access, baseline ("Before") water quality data was collected at the first hole (A5-1) and the "During" and "After" data collected at the adjacent second hole (A5-2). Gaps in the turbidity data occurred due to sensor icing; once the problem was identified a methyl alcohol solution was used to clear the sensor between stations. The highest turbidities were seen during discharge, with values reaching up to 39.4 NTU at two sites to the east during discharge. Within 6 days of the end of discharge, turbidity at the discharge site was down to a maximum in the water column of 12.8 NTU. Water column pH values averaged 6.37 before drilling, and 6.39 after drilling, with respective ranges of 6.18 to 6.54 and 6.28 to 6.52. Conductivity averaged 0.0099 mS/cm (before drilling) and 0.0093 mS/cm (after drilling) over the water column, with a range of 0.0094 to 0.0112 mS/cm, and 0.0091 to 0.0102 mS/cm, respectively. Average dissolved oxygen values of 11.5 ppm (before) and 12.67 ppm (after) showed a slight increase after drilling activity, indicating some aeration occurred in the discharge process. TSS and metals for Lac de Gras are shown on Tables 5 and 7, respectively. Changes in water chemistry were seen during discharge, with statistically significant increases in average metal concentrations for barium (from 1.2 to 6.5 ug/L), lithium (1.1 to 1.3 ug/L), and titanium (from 0.02 to 3.36 ug/L). Aluminum levels showed a large increase (from 2.8 to 131.2 ug/L) but tests did not rank this as statistically significant due to the large standard deviation (383.8) and range in values (1.3 to 1540 ug/L).

Results are awaited for sediment chemistry, particle size analysis, and benthic community counts which will be included in the overall study writeup.

Lab Experiments:

Smothering experiments were run using northern chironomid larvae of two species: *Chironomus* spp. and *Derotanypus alaskensis*. Each experiment involved controls plus 3 test aquaria in which sufficient fines were added to form a surface layer 1, 3, or 7 mm thick. For the *Chironomus* spp. the control aquarium had 4% mortality (1 larvae), while the 1, 3, and 7 mm aquaria had respectively, 8, 4, and 8% mortality. This species is a burrower, and was able to construct new burrows in the 1 and 3 mm of fines, but not in the 7 mm. *D. alaskensis* showed similar tolerance, with no mortality in the control, 1, 3 or 7 mm tanks. In the 3 and 7 mm tanks, most larvae remained in the food layer under the fines, but surfaced while the tank was being disturbed; in the 1 mm tank the majority were already at surface.

DISCUSSIONS / CONCLUSIONS

Great Slave Lake

For the study area of Great Slave Lake, which exhibits very high TSS loads due to clay substrate and prevailing wind direction, effects are not clear cut. However, as the sites which received no discharge of drilling fines were among those with the highest turbidities, and the effluent quantities discharged did not correlate with the turbidity levels, it is probable that the wide range in turbidities measured are due to wind and wave action, with variation occurring between different substrates, depths, and wind exposures. Further open water work will be done in 1998 to measure turbidity at the drilling sites as well as at reference sites away from the area.

Baton Lake

Based on the summer water quality results from Baton Lake, it appears unlikely that water quality was adversely affected by the addition of fines to lake depths in the 12 to 15 metre range. Lake stratification indicates there is no mechanical mixing below 5 meters and thus no resuspension of the bottom materials in summer due to wind and wave action. Spring and fall overturn are unlikely to resuspend materials as mixing at lake bottom is thermal rather than mechanical. The dissolved oxygen values are typical of a stratified lake with decomposing organic material on the bottom.

Winter water quality measurements taken in 1998 showed very little variation in parameters compared to reference or pre-drilling values, other than the slight drop in pH to near neutral values. Earlier winter work (Beak 1987) found pH values ranging from 7.3 to 7.8 for the north end of Baton Lake, so there does seem to be some variability. For the metals measured in water samples, short-term increases in aluminum and manganese concentrations were seen; these may have been associated with disturbance of the lake bottom sediments as the geology being drilled should not have contributed these elements to the return water. As expected from the summer work, water clarity was good with no detectable suspended solids at the discharge site. Benthic sample counts and sediment chemistry results are awaited.

Lac de Gras

Two holes were drilled at Lac de Gras, designated A5-1 and A5-2. It had been hoped the first hole would go for a longer time, but it was through the kimberlite early on and so drilling was ended and a second hole drilled about 150 meters to the southeast. The first hole went through considerable bedrock and drilled approximately 60 metres through kimberlite, while the second hole encountered kimberlite immediately and was drilled to 139 meters with interruptions due to problems with the mud-like consistency encountered in A5-2. Larger quantities of additives (viscosifiers) were required for the second hole. Interpretation of data from Lac de Gras will be subject to these differences between the two holes drilled, particularly for sediment chemistry and benthic community data.

Water quality data taken before drilling was comparable between reference and study sites for metals parameters. Followup sampling will have to be done to assess duration of the post-drilling increases seen in aluminum, barium, lithium and titanium.

Water turbidity showed increases primarily in the presumed direction of effluent flow. Depth increased in a trough-like fashion to the east, and it was in this direction the highest turbidities and greatest deposition of fines was seen. It is not known if lake currents exist at this site. Spatial extent of the increase in turbidity in the direction of plume travel was not determined beyond 50 meters, however it was found that within six days the turbidity dropped at most sites to levels averaging from 5.0 to 12.2 NTU. Turbidities of up to about 7 NTU would likely meet the CCME guideline which recommends no more than a 10 mg/L increase in total suspended solids for lakes of low natural TSS levels. It is unfortunate that timing did not permit more comprehensive water sampling for both holes, but indications from the data collected are that settling does occur over a fairly short time period. Behaviour of the A5-2 return water would have been modified by the additives which acted as flocculants, and is also atypical in the extremely muddy consistency of the kimberlite.

Laboratory Experiments

Smothering experiments were very preliminary in nature, and simply showed that the physical addition of the fines did not cause direct mortality, and the burrowing species were able to construct burrows through the 1 mm and 3 mm layers, but not the 7 mm layer. The surface dwelling species was not affected by the addition, and appeared to be able to penetrate the rock solids. Further experimentation should follow to assess interference with completion of the life cycles, i.e. emergence to adults, and with kimberlite effluents.

LINKS WITH PARALLEL STUDIES

There are no links with other studies looking at the effects of drilling waste release to lake beds, as this is the only such work currently underway. Related information and research materials are being provided by industry, such as effluent samples for toxicity testing, results of effluent treatment technology advances, and any field measurements that companies may take.

TRAINING ACTIVITIES AND RESULTS

Local technicians were hired to assist with the field work, and received training on the sampling equipment, sample handling, use of the Hydrolab Multiprobe, recording and entering data, and preparing data for statistical analysis.

EXPENDITURES AND SOURCE OF FUNDS

WKSS Funding:	$8500.00
Comprehensive Liability Insurance policy	$750.00
Technician/ technical help expenses:	$5963.60
Analytical Costs	$465.93
Misc. Equipment & Supplies	$1325.52
Total:	$8505.05

Other resources included: from Environment Canada (EC), provision of summer student help (estimated cost $1500); shipping of chironomids and drilling wastes (about $300); analytical work done by Taiga Environmental Labs ($2500.00); and miscellaneous costs for calibration reagents and fuel estimated at about $250. Royal Oak provided transportation for personnel and equipment, logistic ground support and accommodation at Colomac Mine, for an estimated contribution of $3800. Diavik supplied site transportation and support (clearing, drilling of holes, and accommodation and meals) valued at approximately $6100.00. DFO provided lab equipment and cold room space for smothering experiments at an estimated value of $800, plus use of a boat and lab space for the summer work.

SCHEDULE AND REVISIONS

One year remains in this study, during which summer water quality work will be done at Great Slave Lake and Lac de Gras. Benthic data and sediment chemistry results will be available by mid-summer and will be analysed statistically over the fall with the results to be reported by year end. Winter follow-up work will consist of benthic and water quality samples to be done at Lac de Gras; this should be funded from other sources. Final writeup will follow receipt of those results in mid 1999.

REFERENCES

Beak Consultants Ltd. 1987. Baseline environmental monitoring at the Colomac Project site, 1987. Report prepared for Neptune Resources Corporation.

CCREM (Canadian Council of Resource and Environment Ministers). 1987. Canadian water quality guidelines for total suspended solids. Prepared by the Task Force on Water Quality Guidelines. Ottawa, Canada.

Didiuk, A., and Wright, D. 1975. The effect of a drilling waste on the survival and emergence of the chironomid *Chironomus tentans* (fabricius). Fish. Mar. Serv. Res. Dev. Tech. Rep. 586. 18 pp.

Table 2: Baton Lake Water Quality Measurements Feb. 22, 98

Site C	Temp. (°C)	pH	Sp. Cond. (μs/cm)	T.D.S. (Kmg/l)	D.O. (mg/l)	D.O. (% Sat.)
Max. Value	**3.40**	**7.03**	**116.5**	**0.0746**	**9.32**	**66.2**
Min Value	**0.50**	**6.77**	**109.7**	**0.0702**	**1.43**	**10.7**
Mean	**2.79**	**6.95**	**111.8**	**0.0715**	**6.739**	**49.2**
Std. Deviation	**0.82**	**0.09**	**2.2**	**0.0014**	**2.73**	**19.5**

Site W1	Temp. (°C)	pH	Sp. Cond. (μs/cm)	T.D.S. (Kmg/l)	D.O. (mg/l)	D.O. (% Sat.)
Max Value	**3.40**	**7.04**	**115.0**	**0.0736**	**9.33**	**66.1**
Min. Value	**0.40**	**6.79**	**109.9**	**0.0703**	**1.58**	**11.8**
Mean	**2.69**	**6.96**	**111.8**	**0.0715**	**6.85**	**50.0**
Std. Deviation	**0.89**	**0.09**	**1.9**	**0.0010**	**2.81**	**20.1**

Site W2	Temp. (°C)	pH	Sp. Cond. (μs/cm)	T.D.S. (Kmg/l)	D.O. (mg/l)	(D.O. (% Sat.)
Max. Value	**3.35**	**7.07**	**115.1**	**0.0737**	**9.02**	**63.7**
Min. Value	**0.53**	**6.89**	**110.3**	**0.0706**	**4.56**	**34.0**
Mean	**2.56**	**7.03**	**111.4**	**0.0714**	**7.59**	**55.3**
Std. Deviation	**0.89**	**0.06**	**1.6**	**0.0010**	**1.49**	**10.2**

Site R1	Temp. (°C)	pH	Sp. Cond. (μs/cm)	T.D.S. (Kmg/l)	D.O. (mg/l)	D.O. (% Sat.)
Max. Value	**3.18**	**7.10**	**115.4**	**0.0739**	**9.37**	**66.1**
Min. Value	**0.30**	**6.96**	**110.3**	**0.0706**	**7.46**	**55.4**
Mean	**2.37**	**7.06**	**111.8**	**0.0715**	**8.54**	**62.0**
Std. Deviation	**1.05**	**0.05**	**1.8**	**0.0012**	**0.66**	**4.08**

Site R2	Temp.(°C)	pH	Sp. Cond. (μs/cm)	T.D.S. (Kmg/l))	D.O. (mg/l)	D.O.(% Sat.)
Max. Value	**3.16**	**7.09**	**116.7**	**0.0747**	**9.11**	**65.3**
Min. Value	**0.21**	**7.04**	**110.3**	**0.0706**	**7.57**	**56.2**
Mean	**2.43**	**7.07**	**111.9**	**0.0716**	**8.52**	**62.0**
Std. Deviation	**1.02**	**0.02**	**2.1**	**0.0014**	**0.54**	**3.5**

Table 3: Lac De Gras Water Quality Measurements Before (Mar. 5, 98), During (Apr. 13,98), and After (Apr. 21,98) Effluent Release

Site C	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.59**		**0.99**	**6.37**		**6.52**	**10.6**		**9.7**	**11.92**		**12.82**			**12.8**
Min Value	**0.28**		**0.68**	**6.32**		**6.39**	**9.5**		**9.1**	**11.42**		**11.53**			**11.5**
Mean	**0.42**		**0.85**	**6.35**		**6.45**	**9.9**		**9.3**	**11.57**		**12.20**			**12.2**
Std. Deviation	**0.12**		**0.11**	**0.02**		**0.05**	**0.4**		**0.2**	**0.19**		**0.46**			**0.5**

Site E1	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**1.01**	**1.04**		**6.40**	**6.35**		**10.8**	**10.2**		**13.33**	**13.41**		**12.2**	**7.4**
Min Value		**0.60**	**0.64**		**6.27**	**6.28**		**9.1**	**9.1**		**11.34**	**12.17**		**6.5**	**4.5**
Mean		**0.81**	**0.86**		**6.34**	**6.37**		**9.5**	**9.4**		**12.14**	**12.89**		**7.3**	**5.0**
Std. Deviation		**0.14**	**0.12**		**0.04**	**0.04**		**0.4**	**0.3**		**0.57**	**0.42**		**1.4**	**0.7**

Site E2	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.62**	**1.02**		**6.42**	**6.67**		**11.2**	**16.4**		**12.27**	**12.27**			**39.4**	
Min Value	**0.22**	**0.59**		**6.4**	**6.30**		**9.4**	**9.1**		**11.34**	**11.08**			**11.6**	
Mean	**0.43**	**0.85**		**6.4**	**6.38**		**10.0**	**10.4**		**11.69**	**11.61**			**16.2**	
Std. Deviation	**0.14**	**0.14**		**0.01**	**0.10**		**0.7**	**2.2**		**0.33**	**0.41**			**8.9**	

Site E3	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**1.02**			**6.67**			**15.3**			**12.61**			**37.5**	
Min Value		**0.54**			**6.33**			**9.1**			**11.22**			**11.6**	
Mean		**0.83**			**6.42**			**10.1**			**11.86**			**14.9**	
Std. Deviation		**0.16**			**0.09**			**1.8**			**0.49**			**7.0**	

Site N1	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**0.98**	**0.97**		**6.41**	**6.42**		**9.7**	**9.7**		**12.26**	**13.59**		**7.6**	**6.6**
Min Value		**0.58**	**0.64**		**6.29**	**6.32**		**9.1**	**9.1**		**11.32**	**12.28**		**6.6**	**6.3**
Mean		**0.79**	**0.83**		**6.35**	**6.37**		**9.3**	**9.3**		**11.85**	**12.95**		**7.0**	**6.4**
Std. Deviation		**0.14**	**0.11**		**0.04**	**0.04**		**0.2**	**0.2**		**0.37**	**0.47**		**0.4**	**0.1**

Site N2	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.65**	**0.95**	**0.97**	**6.37**	**6.36**	**6.44**	**10.7**	**9.7**	**9.4**	**12.03**	**11.96**	**13.03**		**11.8**	**11.1**
Min Value	**0.26**	**0.59**	**0.71**	**6.33**	**6.30**	**6.37**	**9.4**	**9.2**	**9.1**	**11.05**	**11.25**	**12.10**		**11.2**	**6.8**
Mean	**0.46**	**0.79**	**0.82**	**6.35**	**6.33**	**6.40**	**9.8**	**9.4**	**9.3**	**11.36**	**11.62**	**12.63**		**11.5**	**7.2**
Std. Deviation	**0.14**	**0.13**	**0.10**	**0.02**	**0.02**	**0.01**	**0.5**	**0.2**	**0.1**	**0.36**	**0.30**	**0.34**		**0.2**	**1.2**

Site NE	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**1.02**			**6.38**			**11.2**			**12.41**			**17.6**	
Min Value		**0.58**			**6.27**			**9.1**			**11.30**			**6.5**	
Mean		**0.83**			**6.33**			**9.5**			**11.89**			**7.8**	
Std. Deviation		**0.15**			**0.03**			**0.5**			**0.41**			**2.7**	

Site NW	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**0.92**			**6.38**			**9.8**			**12.26**			**7.8**	
Min Value		**0.60**			**6.27**			**9.1**			**11.41**			**6.6**	
Mean		**0.77**			**6.33**			**9.4**			**11.90**			**7.0**	
Std. Deviation		**0.04**			**0.04**			**0.2**			**0.35**			**0.3**	

Site S1	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**0.92**			**6.52**			**10.1**			**13.82**			**13.5**	
Min Value		**0.46**			**6.22**			**9.1**			**11.97**			**0.0**	
Mean		**0.77**			**6.35**			**9.4**			**12.57**			**8.1**	
Std. Deviation		**0.14**			**0.10**			**0.3**			**0.55**			**4.7**	

Site S2	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.69**	**0.89**		**6.37**	**6.40**		**10.8**	**9.6**		**11.69**	**12.82**			**7.6**	
Min Value	**0.24**	**0.63**		**6.33**	**6.32**		**9.5**	**9.1**		**11.05**	**11.97**			**5.4**	
Mean	**0.47**	**0.75**		**6.35**	**6.36**		**9.9**	**9.4**		**11.34**	**12.52**			**6.3**	
Std. Deviation	**0.06**	**0.10**		**0.01**	**0.03**		**0.5**	**0.2**		**0.27**	**0.30**			**0.8**	

Site SW	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value		**0.91**			**6.4**			**9.6**			**12.7**			**6.4**	
Min Value		**0.54**			**6.29**			**9.1**			**11.92**			**5.6**	
Mean		**0.75**			**6.36**			**9.3**			**12.35**			**6.1**	
Std. Deviation		**0.13**			**0.04**			**0.2**			**0.29**			**0.3**	

Site W1	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.52**	**0.92**	**0.93**	**6.39**	**6.39**	**6.39**	**11.9**	**9.6**	**9.5**	**13.30**	**12.76**	**12.52**		**6.9**	**7.0**
Min Value	**0.13**	**0.60**	**0.70**	**6.35**	**6.30**	**6.34**	**9.5**	**9.1**	**9.1**	**11.62**	**11.59**	**11.82**		**6.4**	**6.7**
Mean	**0.34**	**0.78**	**0.81**	**6.37**	**6.35**	**6.37**	**10.4**	**9.3**	**9.3**	**12.33**	**12.17**	**12.27**		**6.7**	**6.8**
Std. Deviation	**0.16**	**0.12**	**0.09**	**0.01**	**0.03**	**0.02**	**1.0**	**0.2**	**0.2**	**0.67**	**0.45**	**0.24**		**0.2**	**0.1**

Site W2	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.69**	**0.94**	**0.95**	**6.40**	**6.49**	**6.40**	**10.8**	**10.0**	**9.5**	**13.28**	**12.61**	**12.70**		**11.3**	**12.5**
Min Value	**0.26**	**0.52**	**0.69**	**6.33**	**6.34**	**6.32**	**9.4**	**9.1**	**9.2**	**12.10**	**11.23**	**11.78**		**10.3**	**6.9**
Mean	**0.47**	**0.77**	**0.83**	**6.38**	**6.41**	**6.36**	**9.8**	**9.4**	**9.4**	**12.44**	**11.92**	**12.32**		**10.9**	**7.4**
Std. Deviation	**0.15**	**0.15**	**0.09**	**0.03**	**0.05**	**0.03**	**0.5**	**0.3**	**0.1**	**0.44**	**0.51**	**0.35**		**0.4**	**0.4**

Site R1	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.85**			**6.28**			**10.4**			**12.54**					
Min Value	**0.31**			**6.18**			**9.3**			**12.18**					
Mean	**0.60**			**6.24**			**9.8**			**12.51**					
Std. Deviation	**0.20**			**0.04**			**0.4**			**0.37**					

Site R2	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value	**0.63**			**6.43**			**10.6**			**13.34**					
Min Value	**0.27**			**6.37**			**10.0**			**12.28**					
Mean	**0.44**			**6.40**			**10.3**			**12.51**					
Std. Deviation	**0.05**			**0.02**			**0.2**			**0.37**					

Site R3	Temp. (°C)			pH			Sp. Conductance (µs/cm.)			D.O. (mg/l)			Turbidity.(NTU)		
	Before	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**	**Before**	**During**	**After**
Max. Value				**6.54**			**11.0**			**12.95**					
Min Value				**6.50**			**10.0**			**11.97**					
Mean				**6.52**			**10.4**			**12.43**					
Std. Deviation				**0.02**			**0.5**			**0.43**					

Table 4: Baton Lake Study Area

SITE	DEPTH	T.S.S.
C	2 m	Below Detection Limit
C	8 m	Below Detection Limit
C	12 m	Below Detection Limit
W1	2 m	Below Detection Limit
W1	8 m	Below Detection Limit
W1	10 m	Below Detection Limit
W2	2 m	Below Detection Limit
W2	8 m	Below Detection Limit
W2	12 m	Below Detection Limit
R1	2 m	Below Detection Limit
R1	8 m	Below Detection Limit
R2	2 m	Below Detection Limit
R2	8 m	Below Detection Limit
R3	2 m	Below Detection Limit
R3	8 m	4 mg/l

Table 5: Lac De Gras Study Area

SITE	TIME OF SAMPLING	AVERAGE T.S.S	AVERAGE TURBIDITY
C	Before	Below Detection Limit	0.1 NTU
W1	Before	Below Detection Limit	0.15 NTU
N1	Before	Below Detection Limit	0.15 NTU
R1	Before	Below Detection Limit	0.1 NTU
R2	Before	Below Detection Limit	Below Detection Limit
R3	Before	Below Detection Limit	Below Detection Limit
E1	During	N/A	7.3 NTU
E2	During	N/A	16.2 NTU
E3	During	N/A	15.0 NTU
N1	During	N/A	7.0 NTU
N2	During	N/A	11.5 NTU
NE	During	N/A	7.8 NTU
NW	During	N/A	7.0 NTU
S1	During	N/A	8.1 NTU
S2	During	N/A	6.3 NTU
SW	During	N/A	6.1 NTU
W1	During	N/A	6.7 NTU
W2	During	N/A	10.9 NTU
C	After	N/A	6.3 NTU
E1	After	N/A	5.0 NTU
N1	After	N/A	6.4 NTU
N2	After	N/A	7.2 NTU
W1	After	N/A	6.8 NTU
W2	After	N/A	7.4 NTU

Time of Sampling - before/during/after the drilling effluent release at the site
N/A - data not available

Table 6: Baton Lake Water Quality

	Site C After 1998	Site R1 After 1998	Site C After 1997	Site N2 After 1997	Site R1 1997	Baton 1987
	Mean	**Mean**	**C at 14 m**	**Mean**	**Mean**	**- see below**
Total Silver (µg/l)	**< 0.1**	**< 0.1**	**0.1**	**< 0.1**	**< 0.1**	**N/A**
Total Aluminum (µg/l)	**< 0.5**	**< 0.1**	**119**	**65.6**	**26.3**	**20**
Total Barium (µg/l)	**8.8**	**9.5**	**19.3**	**13.9**	**10.5**	**N/A**
Total Beryllium (µg/l)	**3.3**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 10**
Total Bismuth (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**N/A**
Total Cadmium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**< 5**
Total Chromium (µg/l)	**< 0.2**	**< 0.2**	**< 2**	**< 2**	**N/A**	**< 10**
Total Iron (mg/l)	**0.030**	**< 0.012**	**0.278**	**0.136**	**0.045**	**< 20**
Total Cobalt (µg/l)	**< 0.1**	**< 0.1**	**0.2**	**0.1**	**< 0.1**	**< 10**
Total Cesium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**<0.1**	**N/A**
Total Copper(µg/l)	**1.1**	**0.9**	**1.0**	**1.0**	**1.5**	**N/A**
Total Lithium (µg/l)	**0.8**	**0.8**	**0.7**	**0.7**	**0.7**	**N/A**
Total Manganese (µg/l)	**5.2**	**5.1**	**695**	**154.8**	**7.7**	**< 10**
Total Molybdenum (µg/l)	**0.3**	**0.2**	**0.2**	**0.2**	**0.3**	**< 10**
Total Nickel (µg/l)	**0.7**	**0.7**	**1.4**	**1.1**	**0.8**	**< 10**
Total Lead (µg/l)	**0.4**	**0.3**	**0.3**	**< 0.2**	**0.3**	**< 50**
Total Selenium (µg/l)	**< 1.00**	**< 1.00**	**<10**	**< 10**	**< 10**	**< 1**
Total Antimony (µg/l)	**< 0.1**	**< 0.1**	**N/A**	**N/A**	**N/A**	**N/A**
Total Strontium (µg/l)	**33.9**	**32.3**	**33**	**30.9**	**30.0**	**30**
Total Titanium (µg/l)	**< 0.1**	**< 0.1**	**N/A**	**N/A**	**N/A**	**N/A**
Total Thallium (µg/l)	**0.1**	**0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**N/A**
Total Uranium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 50**
Total Vanadium (µg/l)	**< 0.1**	**< 0.1**	**0.1**	**0.2**	**0.3**	**< 5**
Total Zinc (µg/l)	**0.8**	**0.5**	**< 5**	**< 5**	**5.5**	**< 20**

- Means were three averaged water column readings
- after 1997 refers to readings taken just after drill effluent release
- Baton 1987 - data from 1987 (Beak)
- N/A refers to data not being available

Table 7: Lac De Gras Water Quality **April, 1998**

	Site C Before	Site N1 Before	Site W1 Before	Site R1 Before	Site R2 Before	Site E1 During	Site E2 During	Site E3 During	Site W1 During	Site W2 During	Site N1 During	Site S1 During
	Mean	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**
Total Silver (µg/l)	**< 0.1**	**< 0.1**	**<0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Aluminum (µg/l)	**2.5**	**2.6**	**3.1**	**2.5**	**2.5**	**12.3**	**332.3**	**518.7**	**9.5**	**16.9**	**12.6**	**15.8**
Total Barium (µg/l)	**1.2**	**1.2**	**1.2**	**1.1**	**1.2**	**3.8**	**13.4**	**21.9**	**1.4**	**1.7**	**1.5**	**1.6**
Total Beryllium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Bismuth (µg/l)	**0.2**	**<0.1**	**<0.1**	**< 0.1**	**< 0.1**	**<0.1**	**<0.1**	**<0.1**	**< 0.1**	**0.1**	**0.1**	**<0.1**
Total Cadmium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Chromium (µg/l)	**0.3**	**0.4**	**0.3**	**0.3**	**0.3**	**< 0.2**	**< 0.2**	**0.2**	**< 0.2**	**0.2**	**< 0.2**	**< 0.2**
Total Iron (mg/l)	**< 0.012**	**0.014**	**< 0.012**	**< 0.012**	**< 0.012**	**0.051**	**0.325**	**0.564**	**< 0.012**	**0.014**	**< 0.012**	**0.014**
Total Cobalt (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**0.4**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Cesium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Copper(µg/l)	**0.9**	**0.6**	**1.2**	**0.8**	**0.9**	**0.9**	**1.4**	**1.4**	**1.2**	**1.2**	**0.7**	**1.1**
Total Lithium (µg/l)	**1.1**	**1.1**	**1.2**	**1.0**	**1.1**	**1.3**	**1.4**	**1.8**	**1.2**	**1.2**	**1.2**	**1.3**
Total Manganese (µg/l)	**1.0**	**1.0**	**1.0**	**1.1**	**1.0**	**2.8**	**8.3**	**11.6**	**1.1**	**1.4**	**1.3**	**1.3**
Total Molybdenum (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**0.3**	**0.5**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Nickel (µg/l)	**0.8**	**0.8**	**0.8**	**0.7**	**0.7**	**1.3**	**5.0**	**7.3**	**0.6**	**0.7**	**0.8**	**0.8**
Total Lead (µg/l)	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**< 0.2**	**0.3**	**0.5**	**0.2**	**< 0.2**	**< 0.2**	**< 0.2**
Total Selenium (µg/l)	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**	**< 1**
Total Antimony (µg/l)	**0.4**	**0.4**	**0.4**	**0.4**	**0.4**	**0.3**	**0.1**	**0.3**	**0.3**	**0.4**	**0.3**	**0.3**
Total Strontium (µg/l)	**5.8**	**5.8**	**6.0**	**5.4**	**5.6**	**7.0**	**13.0**	**16.6**	**5.5**	**5.7**	**5.5**	**5.5**
Total Titanium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**1.2**	**7.8**	**13.2**	**0.2**	**0.1**	**0.2**	**0.4**
Total Thallium (µg/l)	**0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Uranium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**0.2**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Vanadium (µg/l)	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**	**0.1**	**1.1**	**2.0**	**< 0.1**	**< 0.1**	**< 0.1**	**< 0.1**
Total Zinc (µg/l)	**0.7**	**0.5**	**0.5**	**1.7**	**< 0.5**	**1.1**	**< 0.5**	**0.5**	**2.0**	**1.2**	**1.8**	**1.3**

"Before" samples from A5-1, prior to release and "During" samples from A5-2 during drill effluent release.

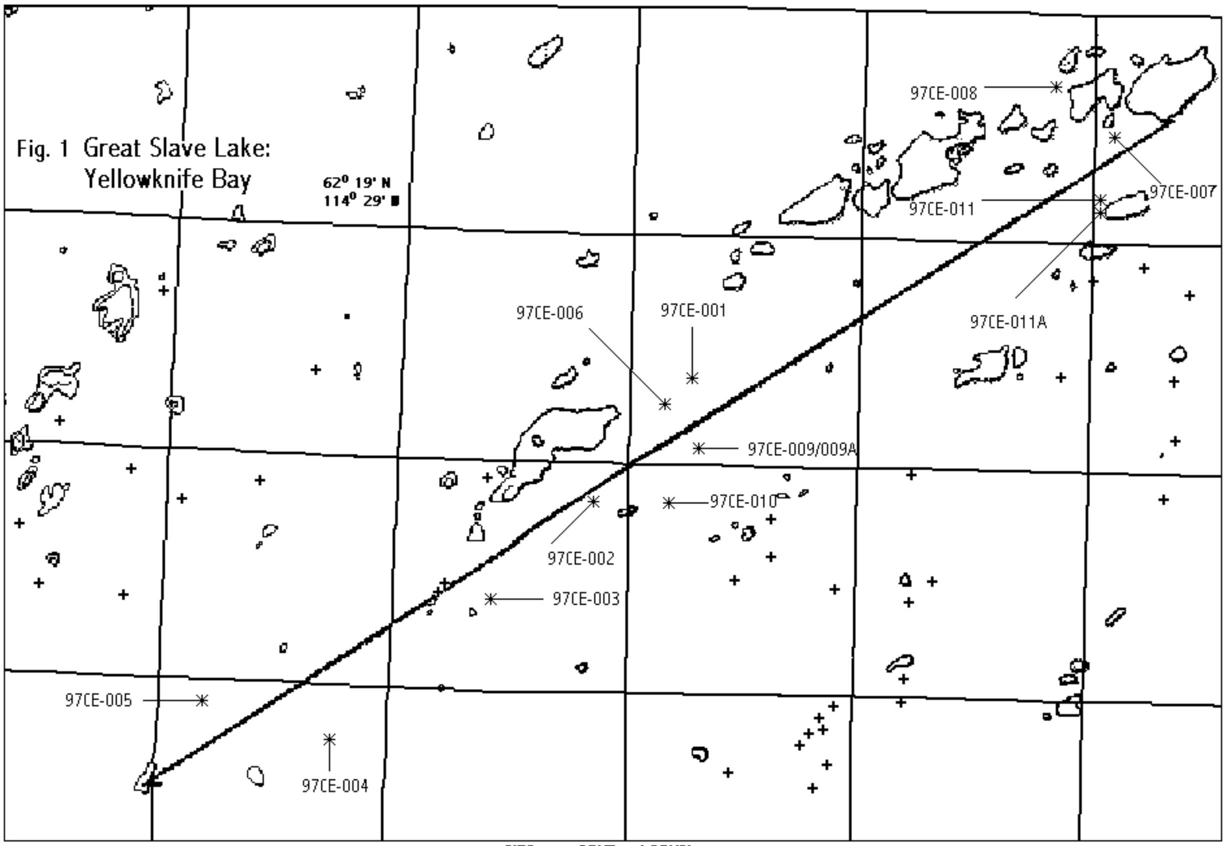
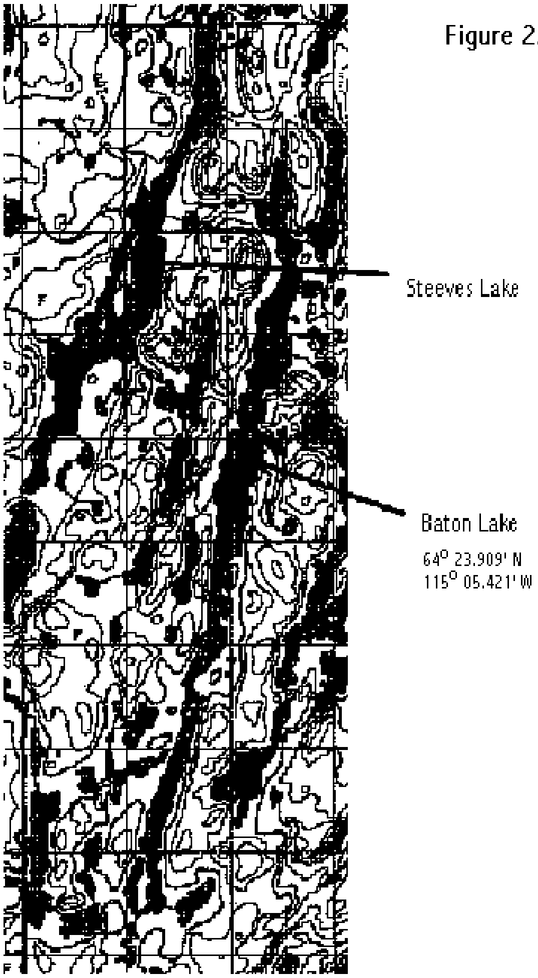


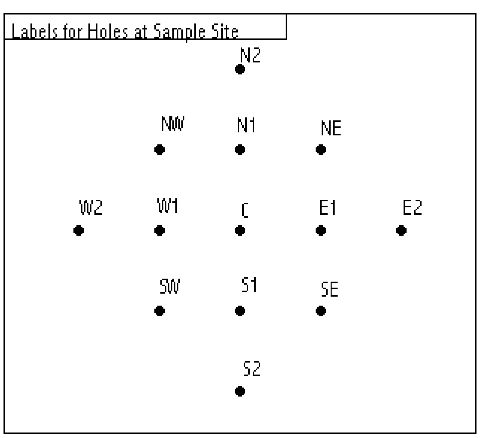
Fig. 1 Great Slave Lake: Yellowknife Bay

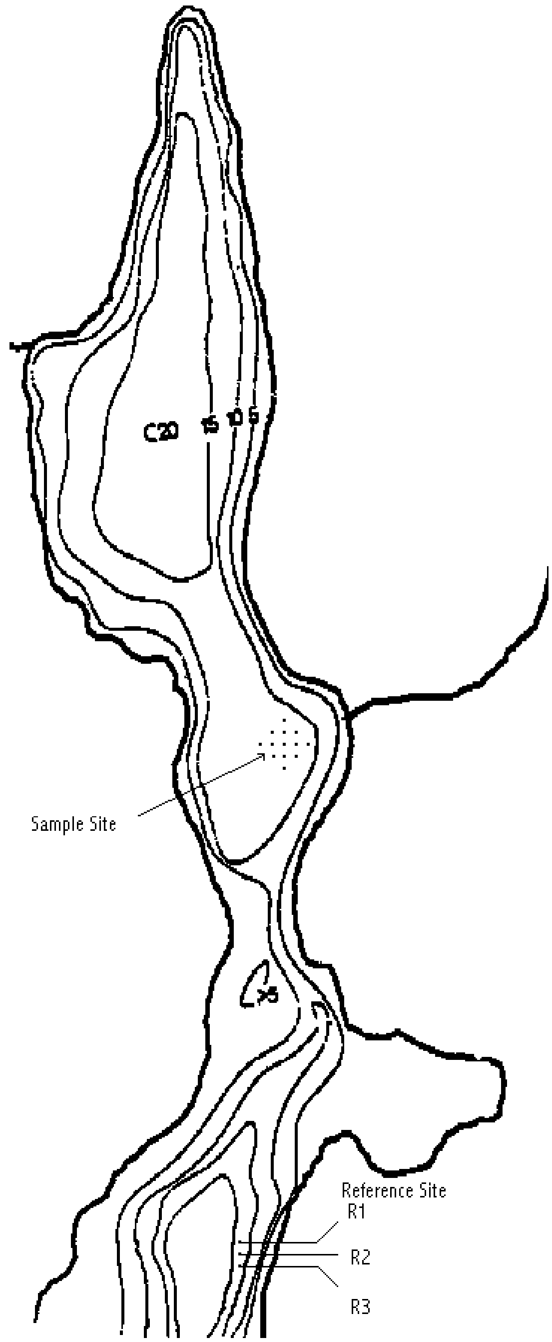
(NTS maps 85J/7 and 85J/8)

Figure 2. Baton Lake Sample Sites



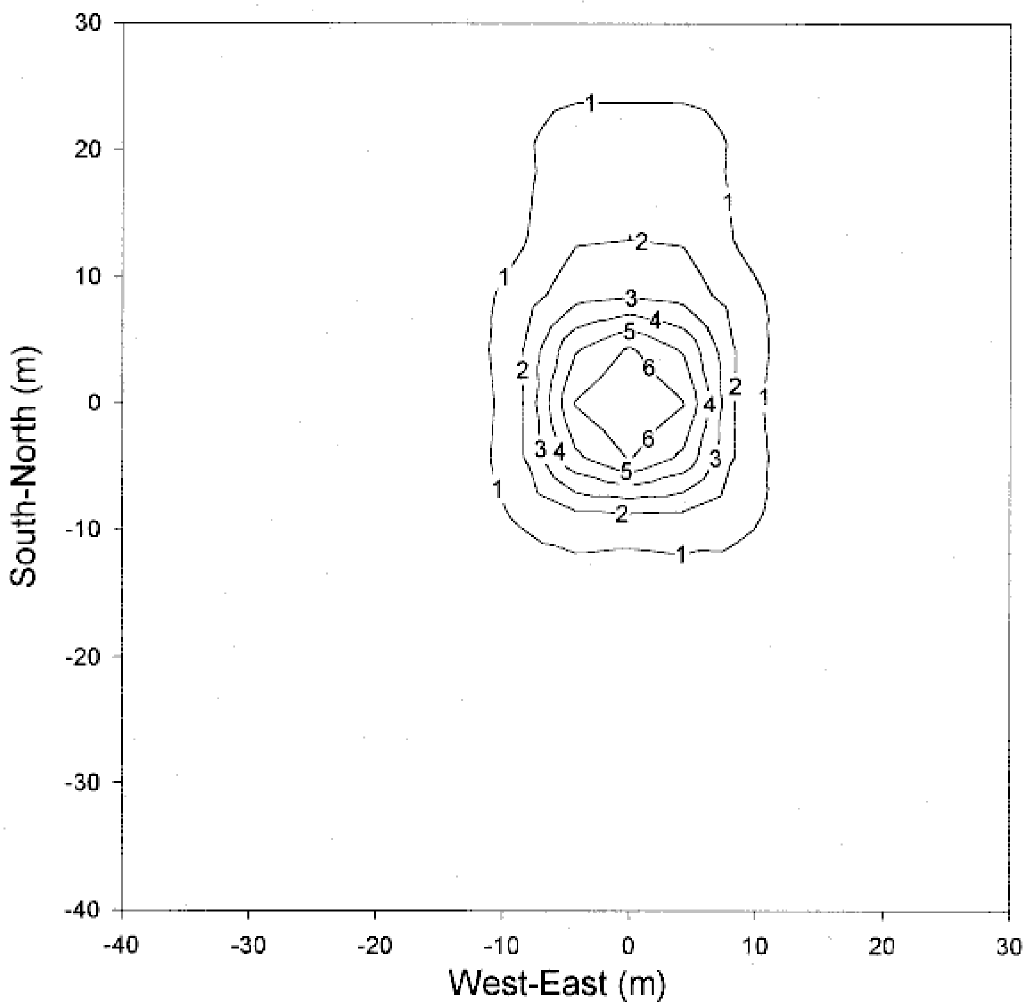
(NTS map # 86B/6)





(After Beak, 1987)

FIG. 3 Deposition of Drill Fines at Baton Lake



______mm of deposition relative to discharge at centre hole (0,0)
West-East (m) - Grid Coordinates from center hole (0,0) in metres
South-North (m) - Grid Coordinates from center hole (0,0) in metres