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ROSS RIVER CONTAMINANTS STUDY



A DIAND Contaminants Study



Indian and Northern
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March 1999

ROSS RIVER CONTAMINANTS STUDY

A Contaminants Evaluation for the Ross River Dene First Nation

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Report # 99-001**

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BACKGROUND

The town of Ross River was named in 1843 for Donald Ross, chief trader for the Hudson's Bay Company. It is located on the southwest bank of the Pelly River with a population of 400. Access to Ross River was made easier with the construction of the Canol Pipeline service road built during World War II, and the Campbell Highway in 1964. (Bridges, 1996)

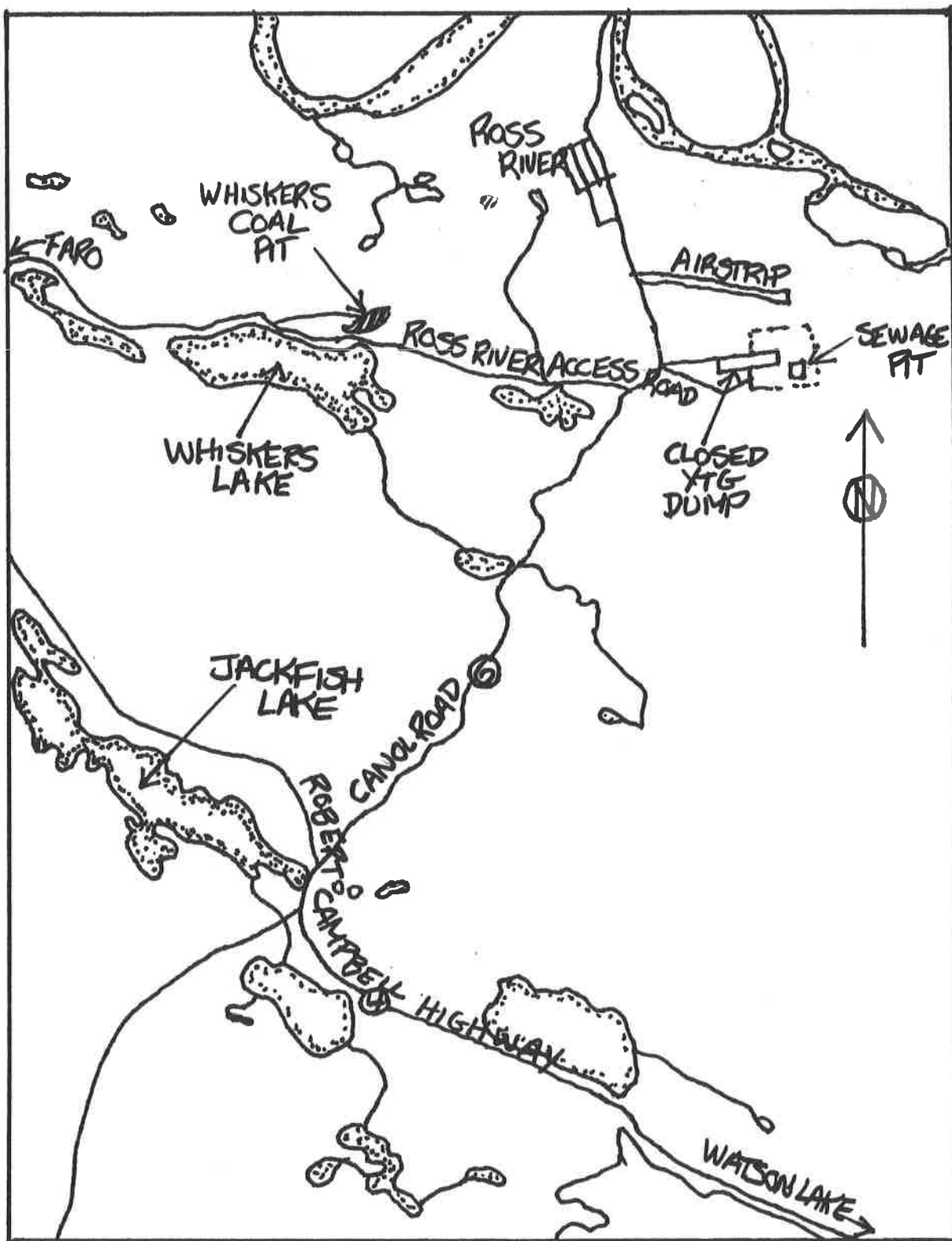
The Ross River Dene Council approached the Department of Indian and Northern Affairs with concerns of safety and water usage in the Ross River area. Their concerns were about three particular areas: Whisker's Lake Coal Property, Jackfish Lake and a closed Yukon Territorial Government (YTG) Municipal Dump Site. (Map 1)

The Whiskers Lake Coal Property had produced concerns about the general state of reclamation of the mine site. In addition there are recent concerns regarding transportation of airborne coal dust, water runoff from the site, and the water quality of Whiskers Lake. The Contaminants Division investigated the latter two concerns and collected samples from both the mine site and Whiskers Lake.

Several Ross River Dene elders complained of poor fish quality in Jackfish Lake. On further investigation several barrels and an old tar bucket were found at the bottom of the lake. The contents of the bucket were analyzed.

Ross River First Nation have traditionally collected water from a seasonal spring along the Canol Road. The headwaters are above an old, abandoned YTG Municipal dump and a sewage pit. There were concerns of possible contamination from the dump and sewage pit into the spring water. Wells were installed by YTG in the drainage and a sample collected by the Contaminants Division.

MAP 1: OVERVIEW MAP OF ROSS RIVER AREA INCLUDING WHISKER'S LAKE COAL PROPERTY, JACKFISH LAKE AND THE CLOSED YTG DUMP SITE



WHISKERS LAKE COAL PROPERTY

BACKGROUND

The Whiskers Lake Coal Property is located approximately 2.0 kilometers west of the Town of Ross River (Map 1). It is situated within the traditional territory of the Ross River Dene. The mined area terminates to the southwest at the highway running along the shore of Whiskers Lake.

Nadahini Mining Corporation owns the property with the mine being operated by Pelly Construction of Whitehorse. The mine operated intermittently from 1986 to 1992. The coal was used to heat the mill and for drying concentrate at the Faro mill site in Faro, YT. The coal rank ranges from low volatile bituminous to semi-anthracite and is of high grade. (Langdon, 1998)

George Smith of the Ross River Dene Council brought concerns forth on the general state of reclamation of the Whiskers Lake Property. The first concern was of the airborne coal dust blowing into the Town of Ross River and causing Black Lung. The second concern was of the water pooled in the bottom of the northeastern portion of the open pit and possible heavy metal contamination. The third concern was possible contamination of Whiskers Lake from runoff from the mine site.

AIRBORNE COAL DUST

A site visit in June 1998 could not visually confirm an airborne coal dust problem. However, the air quality has not been monitored and tested. Surficial reclamation of the site should have reduced the potential for airborne coal dust by covering all coal outcrops and temporary stock-piles, thus protecting them from the erosional processes. An air quality assessment after site reclamation may be required (Langdon, 1998).

OPEN PIT WATER

Water has pooled in the bottom of the northeastern portion of the open pit, within an open coal seam. It appears that the water will not fill the pit and overflow. The sides of the mine are steep but appear stable and groundwater movement likely occurs along bedding planes. The coal is of good quality, low sulphur bituminous (Langdon, 1998). An analysis of the coal and waste rock is provided in Appendix I. The waste rock is chemically stable not acid generating so the metals present will not easily transport. The analysis of the pit water supports this with a low conductivity, low metal levels, and a pH of 7.5. The cadmium level is within accepted effluent guidelines, and while zinc and copper are higher than most guidelines, there is no discharge directly from the site to the Lake. Sulphates are high in the sample and reflect the magnesium and iron sulphates present in the rock. (Table 1&2).

MAP 1: LOCATION MAP OF THE WHISKERS LAKE COAL PROPERTY

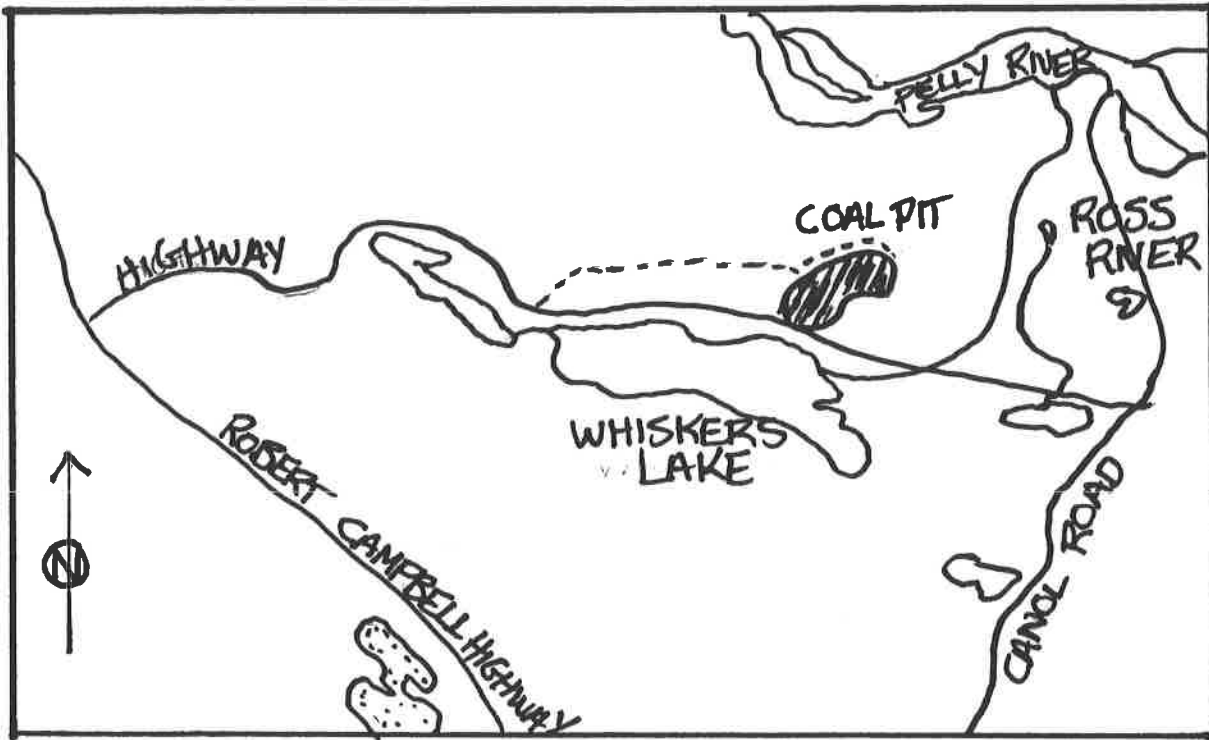


TABLE 1: PHYSICAL PROPERTIES OF THE OPEN PIT VERSUS WHISKERS LAKE WATER SAMPLES

Physical Properties	Canadian Water Guidelines	Open Pit Water	Whiskers Lake Water
Acidity (mgCaCO ₃ /L)		not detected	not detected
Alkalinity-Total (mgCaCO ₃ /L)		30	266
Ammonium (mg/L)	1.37-2.2	not detected	not detected
Chloride (mg/L)		0.63	3.52
Electrical Conductivity (uS/cm)		240	590
Fluoride (mg/L)		not detected	not detected
Hardness (mg/L)		109	301
Nitrate + Nitrite Nitrogen (mg/L)		0.72	not detected
Nitrite Nitrogen (mg/L)	0.06	0.003	not detected
pH	8	7.5	8.6
Phosphorus-Total (mg/L)		0.008	0.007
Sulphate (mg/L)		84.3	78.5
Total Dissolved Solids (mg/L)		157	445
Total Suspended Solids (mg/L)		6	not detected

TABLE 2: LEVELS OF DISSOLVED METALS IN OPEN PIT VERSUS WHISKERS LAKE WATER SAMPLES

Trace Metals (mg/L)	Canadian Water Guidelines	Open Pit Water	Whiskers Lake Water
Aluminum	0.005-0.1	0.12	not detected
Antimony		not detected	not detected
Arsenic	0.05	not detected	not detected
Barium		0.028	0.0844
Beryllium		not detected	not detected
Bismuth		not detected	not detected
Cadmium	0.0002-0.0018	0.0013	not detected
Calcium	0.00006	12.2	36
Chromium	0.002-0.02	not detected	not detected
Cobalt		0.002	not detected
Copper	0.002-0.004	0.008	0.005
Iron	0.3	0.164	0.008
Lead	0.001-0.007	not detected	not detected
Lithium		0.022	0.007
Magnesium		19	49.8
Manganese		0.0035	0.0048
Molybdenum		not detected	not detected
Nickel	0.025-0.15	0.045	0.003
Phosphorus		not detected	not detected
Potassium		4.3	8.9
Selenium	0.001	0.06	not detected
Silicon		1.1	0.27
Silver	0.0001	not detected	not detected
Sodium		2.63	16.2
Strontium		0.02	0.243
Sulfur		27.9	26.3
Thorium		not detected	not detected
Tin		not detected	not detected
Titanium		not detected	not detected
Uranium		not detected	not detected
Vanadium		not detected	0.002
Zinc	0.03	0.061	not detected
Zirconium		not detected	not detected

WHISKERS LAKE

Whiskers Lake is an important fishing lake and attracts many avid fishers to the Ross River area (Photo A). In 1977, 20,000 coho salmon were released. In 1982, 17,000 rainbow trout were released. Since 1982, the lake has been stocked six more times with the most recent being in 1994 (Renewable Resources, 1996). The lake is large and deep with the fish showing a good growth rate and high survival. A concern that runoff from the mine might effect water quality and subsequently affect the fish quality was expressed. There is no direct discharge to the lake from the pit (Table 1&2).

Cadmium and zinc were not detected in Whiskers Lake and the copper level is within acceptable levels in the lake. Sulphate levels remain high and are related to the country rock.



PHOTO A: WHISKERS LAKE

CONCLUSION

The results of the study indicate no contamination of Whiskers Lake is occurring from the mine site. The open pit water chemistry is a result of the water sitting on the coal seam, capturing drainage from the waste rock. Continued site reclamation of the mine site would help to insure that the mobilization of metals from the site does not increase.

JACKFISH LAKE

BACKGROUND

The building of the Canol No. 1 pipeline was the sole military activity in the region. The military were present from the winter of 1942/43 through the spring of 1945. Jackfish Lake was used by the U.S. Army for a float plane base, and still is employed for this use today. Several Dene elders report the fish in the lake have spots on them and the meat of the fish is soft and tastes bad (Bisset, 1995).

On September 2 and 3, 1998 a diving survey of Jackfish Lake was undertaken. The team was to locate and sample any barrels or buckets found. The lake depth is 20-38 feet with a visibility of 0 feet below a depth of 25-27 feet. The lake bottom consists of a soft layer of material with a silt layer below. The bottom was easily penetrable with a 1-inch pipe up to a depth of 6 feet.

BARRELS AND BUCKETS

A total of 18 barrels and one bucket were found at the East End of the lake where road access and the float plane docks are located (Map 1). Most of the barrels and the bucket were visible and near the shore. Some of the barrels have the ends missing and the rest are filled with water. A 5-gallon bucket was the only container with visible contents other than water. It was retrieved and the contents analyzed (Photo A&B).

The pail contents were analyzed for organochlorines including DDT, PCP's and pesticides. No organochlorines were found in the sample. A hydrocarbon analysis indicates that it is a heavy oil, possibly a tar compound used on docks (Appendix I).

FISH TISSUE ANALYSIS

A composite fish analysis was performed in 1994 on the flesh of 9 Pike from Jackfish Lake. Organochlorines, DDT's and PCB's were found in the fish at trace amounts (Table 1) common to the long range transport of contaminants and are similar to many fish in the Yukon.

CONCLUSION

The barrels remaining in Jackfish Lake are probably left from past dock construction and pose no hazard to water quality. The bucket containing heavy hydrocarbons was removed and the analysis of the contents suggests it may have been used to "tar" a dock. Jackfish Lake should be included in the study of long range contaminant transport.

MAP 1: LOCATION MAP OF THE BARRELS AND THE TAR BUCKET FOUND IN JACKFISH LAKE

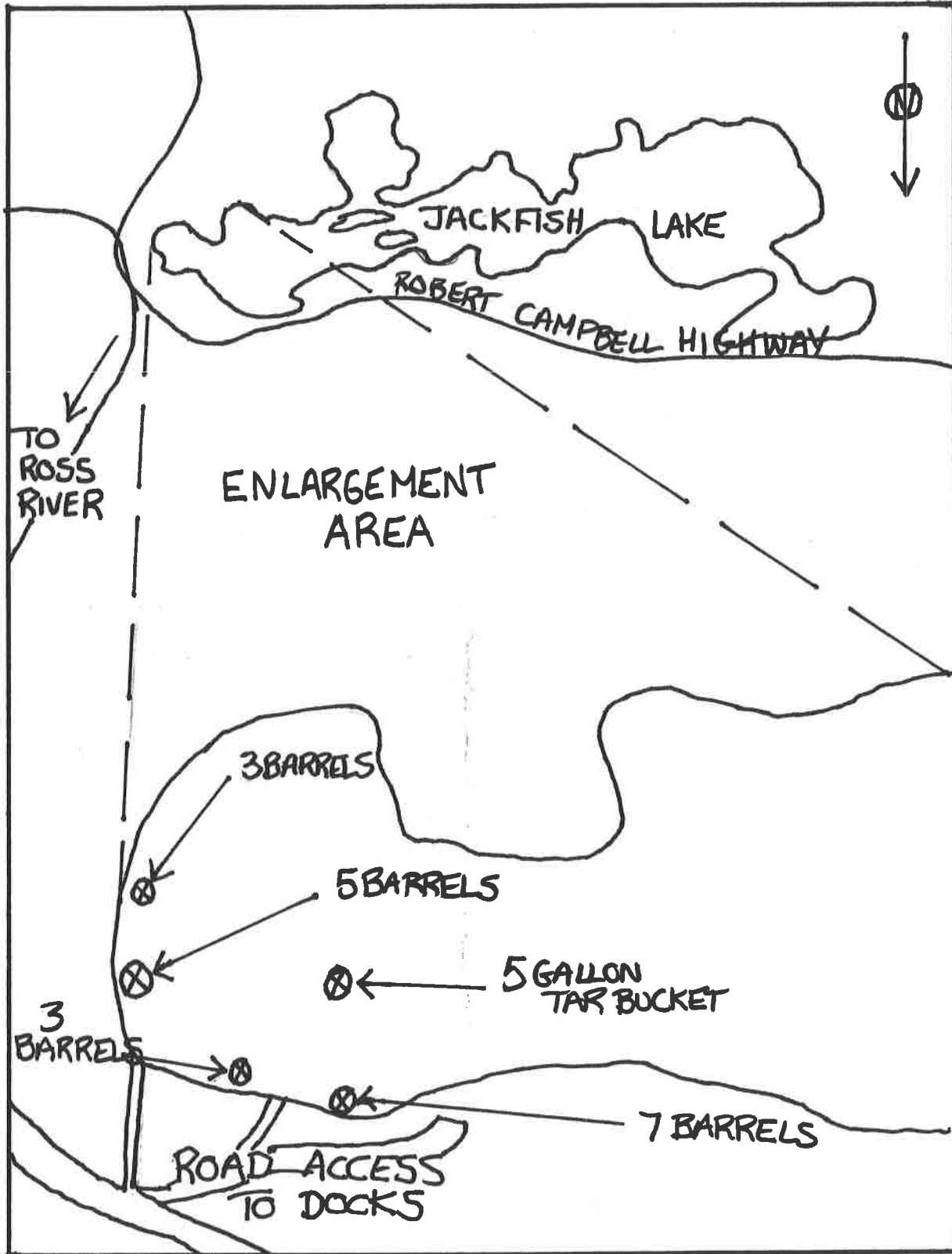


TABLE 1: ORGANOCHLORINE PESTICIDES FOUND IN JACKFISH LAKE PIKE SAMPLES IN 1994

Organochlorine Pesticides (parts per trillion)	Pike Sample #1	Pike Sample #2	Pike Sample 3#
	n=3	n=3	n=3
Total Chlordane	<0.01	<0.014	<0.033
Total DDT's	<0.0136	<0.105	<0.14
Total PCP's	<0.128	<0.338	<0.73
Mirex	<0.03	<0.03	<0.03
Dieldrin	<0.02	<0.02	0.02
Toxaphene	<0.05	<0.04	<0.08

**YTG MUNICIPAL DUMP
AND
SEWAGE PIT**



PHOTO A: RETRIEVED TAR BUCKET FROM JACKFISH LAKE



PHOTO B: GRAB SAMPLING OF TAR

BACKGROUND

An old municipal dump is located approximately 2.5 km from the Ross River town site (Map 1) (Photos A, B&C). It operated from 1968 to approximately 1974.

The Ross River First Nation are concerned with contamination of a seasonal spring, located along the Canol Road, which has been traditionally used for drinking water. The drainage channel for the spring runs directly across the base of the old dumpsite and below the present sewage pit.

On September 10, 1998, four wells were installed below the dump and the sewage pit. The wells used steam cleaned galvanized pipes that were installed by hand with a gravel point. Three of the four wells were frozen at sampling time on September 12, 1998. Well #2 produced approximately 200 ml of liquid for sampling.

Physical description of the wells follows with an elevation map (Map 2)(Burns, 1998):

Well #1 -- Located on an up slope from Well #2 in a sandy, open area. The well depth was 2.4m. Approximately 1 cm of water was produced but due to low volume could not be extracted.

Well #2 – Located on an up slope from Well #3 in a sandy depression. Well depth was 2.29m with 0.35m of standing water contained in the pipe. The water was removed using a Waterra foot valve and tubing. The water was very turbid and contained a fine dark gray suspended sediment with an odour of petroleum products.

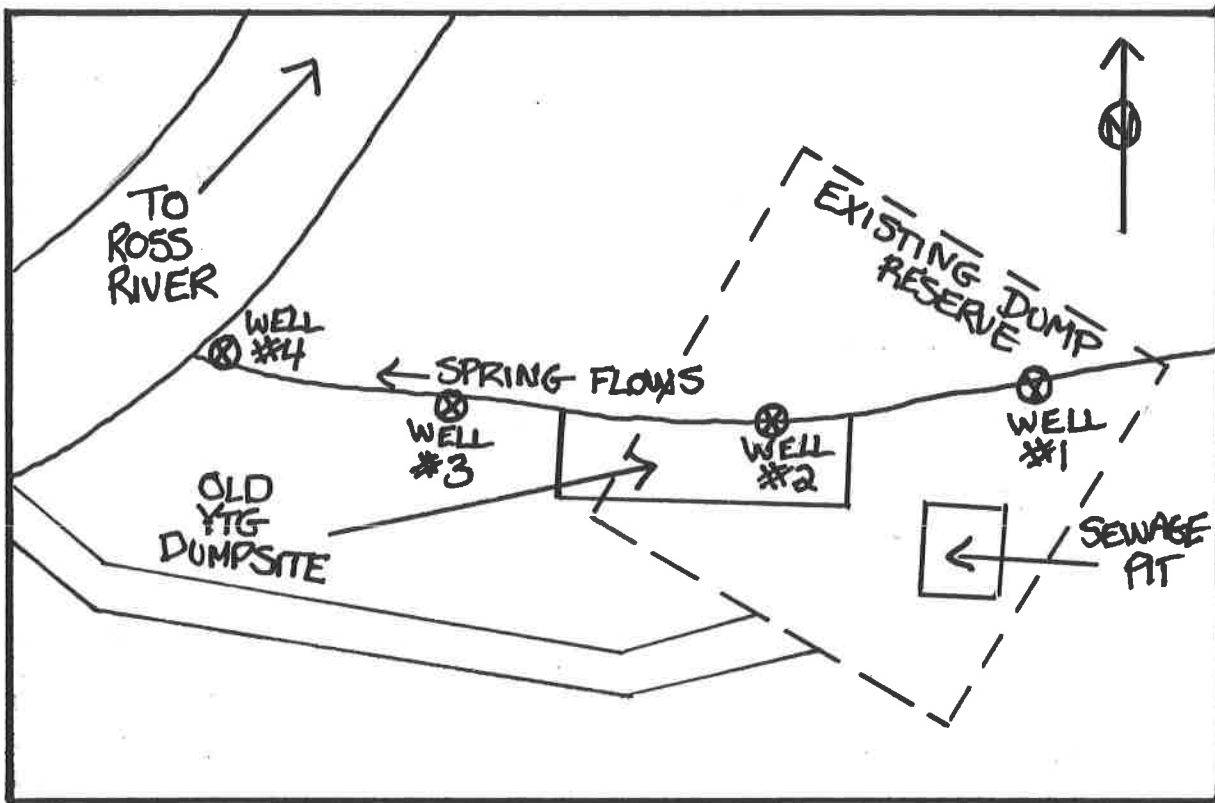
Well #3 – Located in a ravine up from Well #4. Permafrost existed approximately 30 cm below the surface and drilling was not completed.

Well #4 – Located in a ravine near the highway to Ross River. This is where the spring pools and the water is collected for drinking. There was no water on top of the permafrost, which existed several centimeters below the surface. The sleeve of the well could not be sunk.

WELL #2 WATER SAMPLE

No DDT, PCB or other organochlorine compounds were detected in the sample. Hydrocarbons were detected in significant concentration. The hydrocarbon analysis and the associated chromatogram indicates that this contamination is most likely from lubricating oils such as waste motor oil (Appendix I). These may have been deposited in either the dump or the sewage pit, owing to the location of the well.

MAP 1: LOCATION MAP OF CLOSED YTG DUMP AND SEWAGE PIT



MAP 2: ELEVATION MAP OF CLOSED YTG DUMP SITE AND SEWAGE PIT

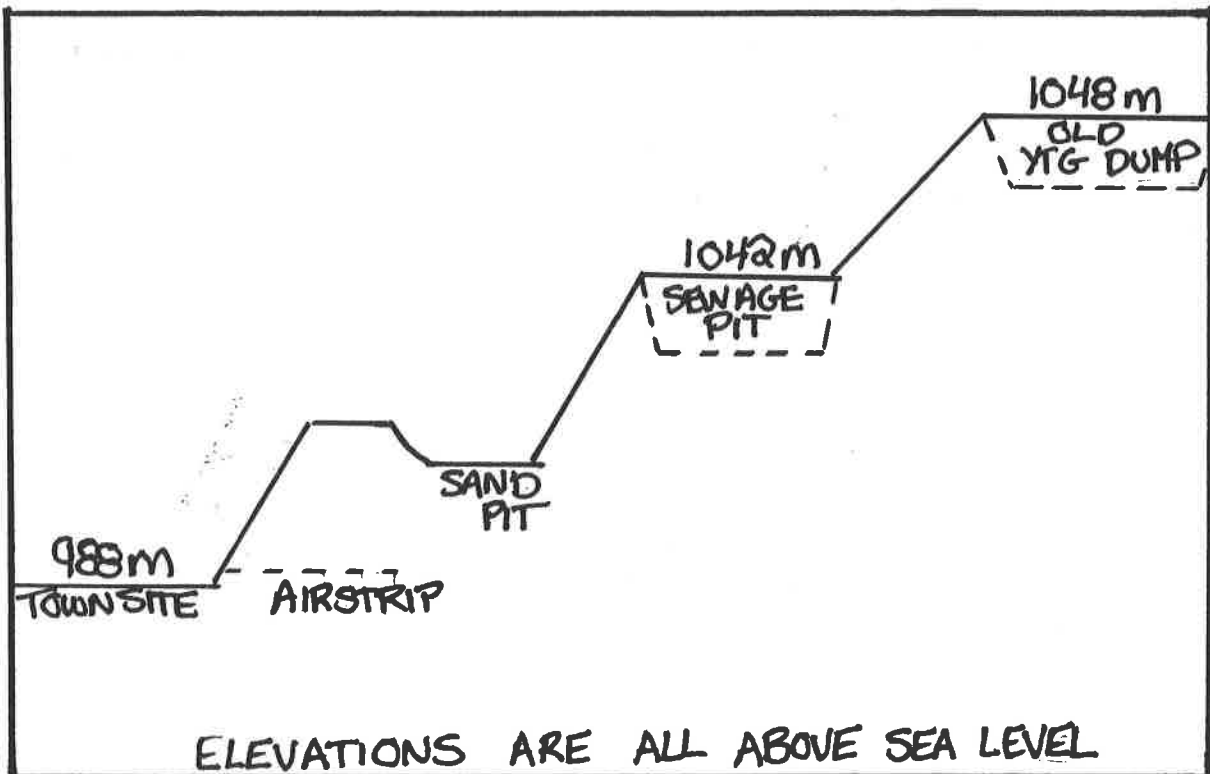




PHOTO A: AREA ADJACENT TO OLD YTG DUMP AND BELOW SEWAGE PIT



PHOTO B: CROSS-SECTION OF TYPICAL SOILS IN THE DUMP AREA



PHOTO C: BACK VIEW OF THE ACTIVE SEWAGE PIT

CONCLUSION

The small sample size, from only one well, limits the range of interpretation. There are no organochlorines in the sample, while there is definitely hydrocarbon contamination. The type of hydrocarbon and the exact source are not known. There may be waste oil in the old dumpsite or it may have come from the sewage pit. More sampling will be undertaken in the Spring of 1999 during spring thaw and additional wells may be required to locate the source. The Ross River First Nation should not drink water from the spring until this sampling has occurred.

SUMMARY

- The Whiskers Lake Coal Property is not a threat to the water quality of Whiskers Lake, but should be monitored for continued site stability. Additional site reclamation would decrease the potential for airborne coal dust blowing into the Town of Ross River.
- The barrels remaining in Jackfish Lake are not a threat to the water quality. The Lake should be incorporated into the fish sampling program which monitors the long range transport of contaminants.
- More investigation into the YTG Dump site will occur in the spring when water is available for sampling. The hydrocarbon contamination type and source needs to be identified and removed.

APPENDIX I



NORWEST LABS

Surrey Ph (604) 514-3322 FAX (604) 514-3323
 Edmonton Ph (403) 438-5522 FAX (403) 438-0396
 Calgary Ph (403) 291-2022 FAX (403) 291-2021
 Lethbridge Ph (403) 329-9266 FAX (403) 327-8527
 Winnipeg Ph (204) 982-8630 FAX (204) 275-6019

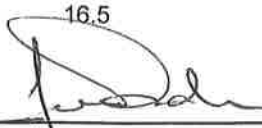
Client Code: NORAFFP

Name: NORTHERN AFFAIRS PROGRAM Address: 345 - 300 Main St. WHITEHORSE YT Y1A5Y5 Attn: PAT ROACH Phone: (867) 667-3102 Fax: (867) 667-3194	Workorder: 37277 WO (Other): PO Num: Project: Date Sampled: Date Received: 04-Aug-98 Date Reported: 13-Aug-98
---	--

Metal Analysis

	Detection Limit	Units	37277-1	37277-2
			WISKER LAKE COAL JULY 30/98	WISKER LAKE WASTE ROCK JULY 30/98
ICP Semi-Trace Metals Scan				
Aluminum	5	µg/g	19000	74300
Antimony	2	µg/g	Not Detected	Not Detected
Arsenic	2	µg/g	Not Detected	Not Detected
Barium	0.05	µg/g	2320	902
Beryllium	0.1	µg/g	1.9	2.1
Bismuth	5	µg/g	Not Detected	Not Detected
Cadmium	0.1	µg/g	0.2	0.8
Calcium	5	µg/g	1770	334
Chromium	0.5	µg/g	31	73.2
Cobalt	0.1	µg/g	5.4	17.4
Copper	0.5	µg/g	20.5	50.1
Iron	1	µg/g	2500	7500
Lead	1	µg/g	10	33
Lithium	0.5	µg/g	18.1	58.6
Magnesium	1	µg/g	1250	4400
Manganese	0.5	µg/g	6	48.7
Molybdenum	1	µg/g	Not Detected	3
Nickel	1	µg/g	24.2	78.4
Phosphorus	5	µg/g	295	322
Potassium	20	µg/g	1550	16300
Selenium	2	µg/g	Not Detected	Not Detected
Silicon	5	µg/g	705	484
Silver	0.5	µg/g	Not Detected	Not Detected
Sodium	5	µg/g	380	617
Strontium	1	µg/g	53	64
Sulphur	10	µg/g	660	120
Thorium	1	µg/g	3	11
Tin	1	µg/g	2	1
Titanium	0.2	µg/g	220	119
Uranium	5	µg/g	Not Detected	Not Detected
Vanadium	1	µg/g	58	170
Zinc	0.5	µg/g	21.6	218
Zirconium	0.1	µg/g	16.5	31.7

Approved By: _____


 John Davidson, Dipl. T., C.P.H.I. (C)
 Supervisor, Inorganics Lab



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 Lethbridge Ph (403) 329-9266 FAX (403) 327-8527
 Winnipeg Ph (204) 982-8630 FAX (204) 275-6019

Client

Name : NORTHERN AFFAIRS PROGRAM
 Address : 345 - 300 Main St.
 WHITEHORSE
 YT
 Y1A5Y5
 Att'n : PAT ROACH
 Phone : 867 667-3139
 Fax : 867 667-3199

WO (Surrey) : **38645**
 Quote No. :
 WO (Other) :
 PO Num :
 Project :
 Date Sampled :
 Date Received : 23-Sep-98
 Date Reported : 09-Oct-98

Petroleum Hydrocarbons

38645-1 Jackfish Lake Sediment/Petroleum

C10 - C60 Hydrocarbon Analysis in Soil

<u>Analyte</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>
C10	Not Detected	1	mg/kg
C11	Not Detected	1	mg/kg
C12	Not Detected	1	mg/kg
C13	Not Detected	1	mg/kg
C14	Not Detected	1	mg/kg
C15	Not Detected	1	mg/kg
C16	Not Detected	1	mg/kg
C17	2	1	mg/kg
C18	10	1	mg/kg
C19	27	1	mg/kg
C20	65	1	mg/kg
C21	87	1	mg/kg
C22	234	1	mg/kg
C23	428	1	mg/kg
C24	639	1	mg/kg
C25	1190	1	mg/kg
C26	1420	1	mg/kg
C27	1780	1	mg/kg
C28	2080	1	mg/kg
C29	2290	1	mg/kg
C30	2010	1	mg/kg
C31	2460	1	mg/kg
C32	2520	1	mg/kg
C33	2610	1	mg/kg
C34	2290	1	mg/kg
C35	2370	1	mg/kg
C36	2890	2	mg/kg
C37	2460	2	mg/kg
C38	2500	2	mg/kg
C39	1960	2	mg/kg
C40	2420	2	mg/kg
C41	2400	2	mg/kg
C42	2410	2	mg/kg
C43	1940	2	mg/kg
C44	2420	2	mg/kg
C45	1450	2	mg/kg
C46	2400	2	mg/kg
C47	1900	2	mg/kg

Initials: CRH



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 Date Reported : 09-Oct-98

C48	1880	2	mg/kg
C49	1850	2	mg/kg
C50	1820	5	mg/kg
C51	1820	5	mg/kg
C52	1370	5	mg/kg
C53	1830	5	mg/kg
C54	1820	5	mg/kg
C55	1360	5	mg/kg
C56	1810	5	mg/kg
C57	1350	5	mg/kg
C58	1790	5	mg/kg
C59	1340	5	mg/kg
C60+	25300	5	mg/kg
C10 - C60+ Total	97000		mg/kg

PCBs in Soil

<u>Analyte</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>
Total PCBs	Not Detected	0.1	mg/kg

Initials: PR

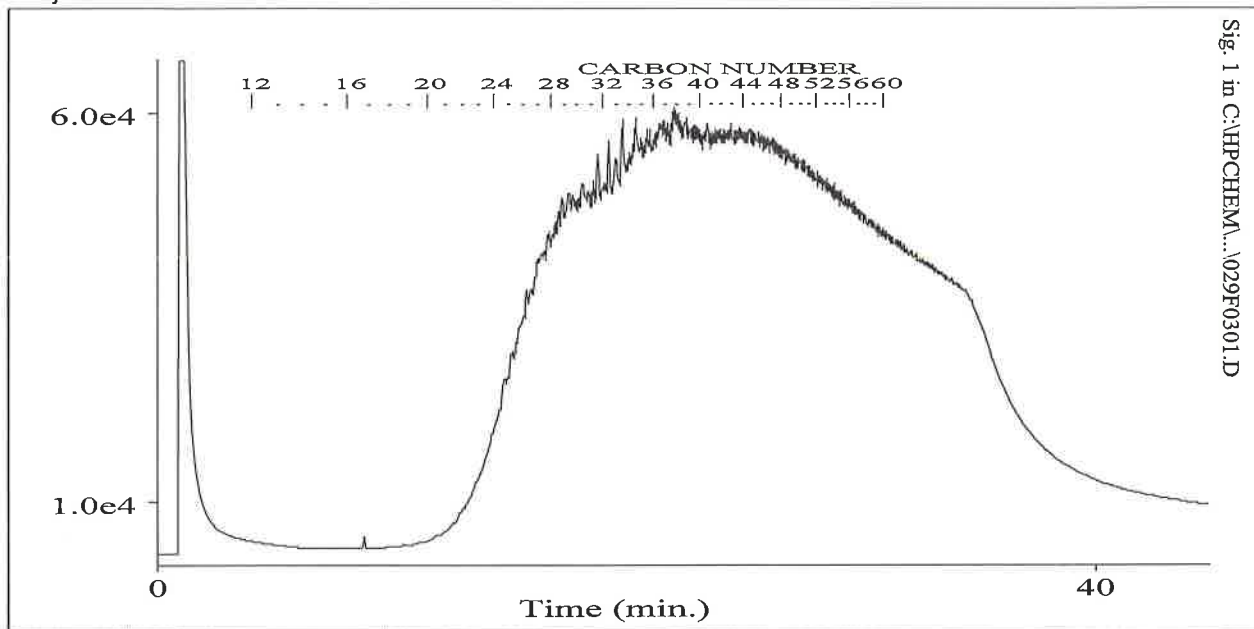


NORWEST LABS

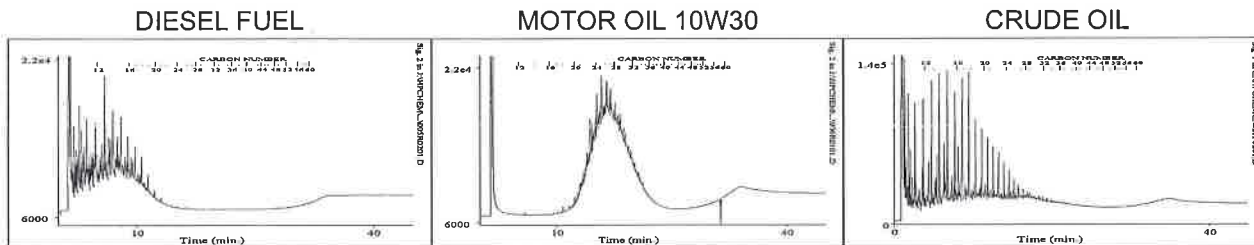
HYDROCARBON CHARACTERIZATION - C60 SCAN

Client: Northern Affairs Program
 Sample ID: Jackfish Lake Sediment/Petroleum
 Lab No.: 38645-1
 Project No:

Work Order No.: 38645
 Date Sampled:
 Date Reported: 09-Oct-98
 Other W.O. No.:



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Diesel	C8-C22
Varsol	C8-C12	Lubricating Oils	C20-C40
Kerosene	C7-C16	Crude Oils	C3-C60+



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 Project :
 Date Sampled :
 Date Received : 23-Sep-98
 Date Reported : 09-Oct-98

38645-2 WATER SAMPLE

C10 - C60 Hydrocarbon Analysis in Water

Analyte	Result	Detection	
		Limit	Units
C10	Not Detected	0.01	mg/L
C11	Not Detected	0.01	mg/L
C12	0.03	0.01	mg/L
C13	0.02	0.01	mg/L
C14	0.01	0.01	mg/L
C15	Not Detected	0.01	mg/L
C16	Not Detected	0.01	mg/L
C17	0.05	0.01	mg/L
C18	0.07	0.01	mg/L
C19	0.14	0.01	mg/L
C20	0.23	0.01	mg/L
C21	0.37	0.01	mg/L
C22	0.68	0.01	mg/L
C23	1.32	0.01	mg/L
C24	1.34	0.01	mg/L
C25	1.75	0.01	mg/L
C26	1.62	0.01	mg/L
C27	1.69	0.01	mg/L
C28	1.7	0.01	mg/L
C29	1.44	0.01	mg/L
C30	1.66	0.01	mg/L
C31	1.82	0.01	mg/L
C32	1.2	0.01	mg/L
C33	1.29	0.01	mg/L
C34	0.98	0.01	mg/L
C35	0.86	0.01	mg/L
C36	0.87	0.02	mg/L
C37	0.49	0.02	mg/L
C38	0.61	0.02	mg/L
C39	0.4	0.02	mg/L
C40	0.31	0.02	mg/L
C41	0.19	0.02	mg/L
C42	0.18	0.02	mg/L
C43	0.1	0.02	mg/L
C44	0.08	0.02	mg/L
C45	0.04	0.02	mg/L
C46	0.02	0.02	mg/L
C47	0.02	0.02	mg/L
C48	Not Detected	0.02	mg/L
C49	Not Detected	0.02	mg/L

Initials: CRH

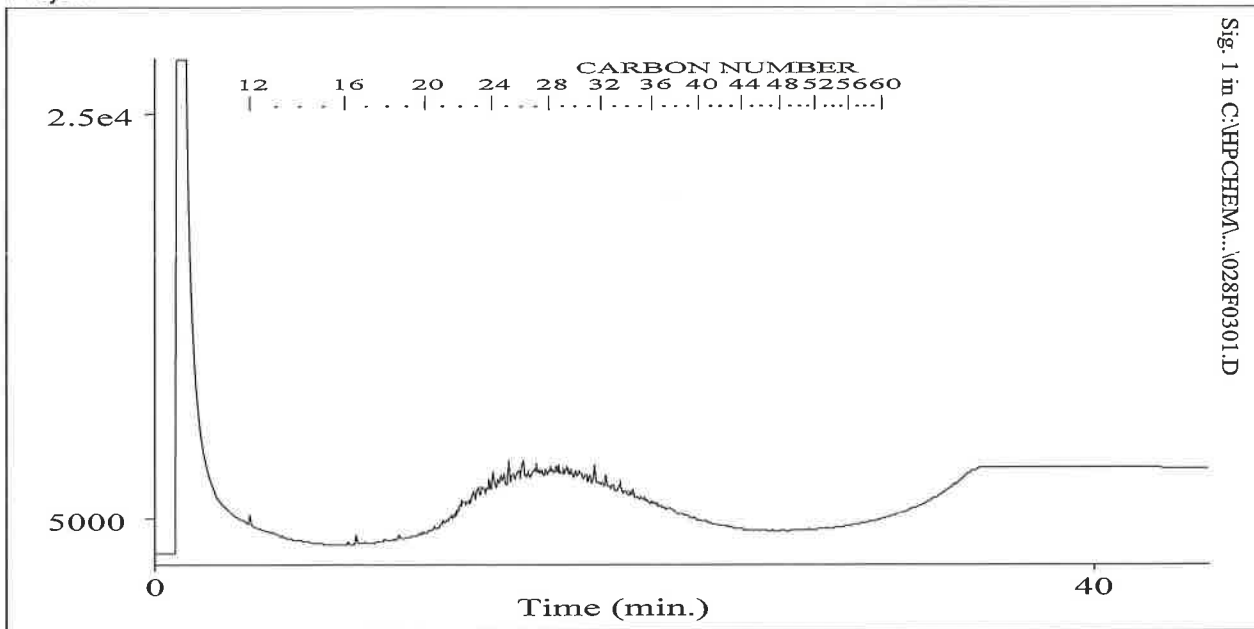


NORWEST LABS

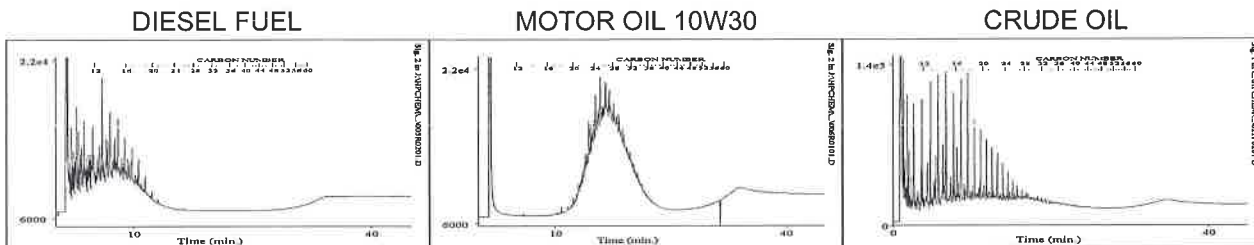
HYDROCARBON CHARACTERIZATION - C60 SCAN

Client: Northern Affairs Program
 Sample ID: Water Sample
 Lab No.: 38645-2
 Project No:

Work Order No.: 38645
 Date Sampled:
 Date Reported: 09-Oct-98
 Other W.O. No.:



TYPICAL PRODUCT CHROMATOGRAMS



Product Carbon Number Ranges

Gasoline	C4-C12	Diesel	C8-C22
Varsol	C8-C12	Lubricating Oils	C20-C40
Kerosene	C7-C16	Crude Oils	C3-C60+

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