



Fish Sampling Methodology for Monitoring Programs in the Northwest Territories

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Slave River Environmental Quality Monitoring Program

Methodology:

The Yellowknife Fisheries and Oceans Canada's (DFO) Fisheries Biologist collects and processes fish for the Slave River Program with support from Indian and Northern Affairs Canada (INAC) district and regional staff.

Fish are collected in the Slave River below the Rapids of the Drowned and at two control sites, Leland Lake and Chitty Lake. Walleye (Pickerel), Northern Pike (Jackfish) and Whitefish are caught during open water season using gill nets. Burbot (Loche) are collected during the winter under the ice using hooks and bait. During the open water season, fish are caught using gill nets; hooks and bait are used under ice.

Once the fish are caught, the biologist measures and records the length, weight, sex, maturity of gonads, individual organ weights and the overall health of the fish (i.e. does the liver look healthy).

The fish tissue, liver and/or bile samples are then extracted and prepared according to the protocol of the lab carrying out the analysis. Some labs require that the tissue be wrapped in hexane-washed foil while others prefer that the tissue be bagged in a contaminant free bag.

Adjusting methodology is usually a function of what parameters are being analyzed in each sample. It is very important to maintain Quality Assurance and Quality Control (QA/QC) in the field with the QA/QC of the lab performing the analysis. The samples are shipped to the individual labs on dry ice.

Table 1 is a summary of the types of fish caught and the parameters that were measured or will be measured from the Slave River Program.

Fish Sampling Methodology for Monitoring Programs in Alberta (including the Northern Rivers Study)

Methodology:

1. Alberta Environment, Alberta Fish and Wildlife and personnel from the National Dioxin Survey collect fish in Alberta.
2. Captured species include Walleye, Northern Pike, Burbot, Goldeye, Longnose Sucker, White Sucker, Lake Whitefish, Mountain Whitefish, Bull Trout, Arctic Grayling, Flathead Chub and Northern Squawfish.
3. Fish collected throughout the Peace-Athabasca-Slave Basin are caught using angling, gill-netting and electrofishing methods.
4. Captured whole fish are placed in clean stainless steel buckets. Details regarding species, length, weight, general health of the fish, location and method of capture are recorded.
5. Fish are then prepared as recommended by the different labs (i.e. fillets, whole fish or livers). All fish being analyzed for dioxins and furans are placed in contaminant free plastic bags, frozen and shipped to Edmonton. Upon arrival in Edmonton, samples are checked for verification, inspected to ensure sample quality control (QA\QC) and stored in coolers at -20 C prior to shipment to the labs.
6. Table 2 summarizes the fish caught and analyzed for dioxins and furans from 1987 to 1989. Data from 1990 and 1991 are forthcoming. A total of 771 fish were captured and archived in 1990/91. In early 1992, Alberta expanded their analyses of fish (due to funding from the Northern Rivers Study) to include hydrocarbons, PCB's, resin acids, chlorinated phenols (organochlorines) and total metals.

SUMMARY

The methodology and analysis of fish sampling in the Northwest Territories and in Alberta are similar. This was intentional so that data collected could be compared. Territorial, Provincial and Federal government scientists and other scientific experts provided input into the development of each monitoring program. Moreover, there are only a few labs in Canada that perform dioxin and furan analysis on fish, so the same labs are used in both monitoring programs. This provides consistency and continuity and will provide an overall picture of contaminants throughout the whole Mackenzie River Basin.

TABLE 1

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1988/89	Site Collected	Lab Analysis
Trace Metals	Year 1 of 3 - Mercury in Fish Tissue Study	Slave River	Cantest muscle/tissue 100g
Extractable Organic Chlorine	---	---	---
Chlorophenols	---	---	---
Dioxins/Furans	5 longnose suckers (whole fish)* 5 burbot (liver)▶	Slave River	DFO Lab
MFO	21 Whitefish 21 burbot 2 inconnu (all livers)▶	Slave River	DFO Lab
PCB's, Pesticides, Organochlorines	5 longnose suckers (whole fish)* 5 burbot (liver)▶	Slave River	DFO Lab
Toxaphene	---	---	---
Hydrocarbons	---	---	---

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ◆ Composite Fish
Tissue Each composite contains 3 or 4 tissue samples

TABLE 1 continued

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1989/90	Site Collected	Lab Analysis
Trace Metals	Year 2 of 3	Slave River	Cantest
Extractable Organic Chlorine	10 walleye (tissue)▲ 7 burbot (tissue)▲	Slave River	Envirotest
Chlorophenols	2 walleye 1 burbot (tissue)▲	Slave River	Envirotest
Dioxins/Furans	10 burbot (whole fish - excluding livers)* 10 burbot (livers)▶	Slave River	DFO Lab
MFO	25 walleye 7 burbot (liver only)▶	Slave River	DFO Lab
PCB's, Pesticides, Organochlorines	5 suckers (tissue)▲ 5 burbot (liver)▶	Slave River	DFO Lab
Toxaphene	10 burbot (whole fish)* 10 burbot (liver)▶	Slave River	DFO Lab
Hydrocarbons	11 walleye (bile)• 7 burbot (bile)•	Slave River	DFO Lab

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ◆ Composite Fish Tissue Each composite contains 3 or 4 tissue samples

TABLE 1 continued

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1990/91	Site Collected	Lab Analysis
Trace Metals	Year 3 of 3 major ions and metals 29 fish 7 fish	Slave River Leland Lake	Cantest
Extractable Organic Chlorine	10 fish (bile)• 85 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake	Envirotest
Chlorophenols	35 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake	Envirotest
Dioxins/Furans	5 whitefish (composite)◆ 15 walleye (whole fish)* 16 burbot (liver)▶	Slave River Leland Lake Chitty Lake	Envirotest DFO Lab
MFO	20 walleye (liver)▶ 20 pike (liver)▶ 20 whitefish (liver)▶	Slave River Leland Lake	DFO Lab
PCB's, Pesticides, Organochlorines	15 walleye (whole)* 16 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Toxaphene	15 walleye (whole)* 16 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Hydrocarbons	---	---	---

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ◆ Composite Fish Tissue Each composite contains 3 or 4 tissue samples

TABLE 1 continued

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1991/92 Up to Jan. 10/92	Site Collected	Lab Analysis
Trace Metals	61 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake Chitty Lake	Cantest
Extractable Organic Chlorine	20 fish (bile)• 75 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake Chitty Lake	Envirotest
Chlorophenols	25 fish (tissue)▲ 15 fish - walleye, burbot, whitefish, pike (liver)▶	Slave River Leland Lake Chitty Lake	Envirotest
Dioxins/Furans	10 (composite fish tissue)◆ 15 walleye (whole fish)* 16 burbot (liver)▶	Slave River Leland Lake Chitty Lake	Envirotest DFO Lab
MFO	60 fish - walleye, burbot, whitefish, pike (liver)▶	Slave River Leland Lake Chitty Lake	DFO Lab
PCB's, Pesticides, Organochlorines	15 walleye (whole)* 15 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Toxaphene	15 walleye (whole)* 16 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Hydrocarbons	---	---	---

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ◆ Composite Fish Tissue Each composite contains 3 or 4 tissue samples

TABLE 2

DIOXIN/FURAN FISH SAMPLING IN ALBERTA

DATE	LOCATION	LAB	FISH SPP.
Oct 1987	Wapiti R. d/s Procter & Gamble	ECO Logic Ltd.	longnose suckers (5) whole fish
Oct 1987	Athabasca R. d/s Weldwood	Fisheries & Oceans Canada	longnose suckers (5) whole fish
Sept 1988	Peace R. u/s Daishowa mill site	DFO, Burlington	pike (1), walleye (2), goldeye (1), all fillets
Oct 1988	Smoky R. in Watino area	DFO, Burlington	goldeye (2)
Sept & Dec 1988	Slave River, NWT near Ft. Fitzgerald, AB & Ft. Smith, NT	DFO Lab	burbot livers longnose suckers whole fish
Sept 1989	Rock Lake		mountain whitefish 5 fillets
Oct 1989	Wapiti R. d/s Procter & Gamble	Fisheries & Oceans Canada, Burlington	composite samples: white sucker, 5 whole fish white sucker, 5 fillets white sucker, 5 fillets walleye, 5 fillets mountain whitefish, 5 fillets pike, 4 fillets pike, 1 fillet
Oct 1989	Athabasca R. d/s Weldwood	Fisheries & Oceans Canada, Burlington	composite samples: mountain whitefish, 5 whole fish mountain whitefish, 5 fillets mountain whitefish 5 whole fish mountain whitefish 5 fillets mountain whitefish 5 whole fish mountain whitefish 5 fillets longnose suckers 5 whole fish longnose suckers 5 fillets longnose suckers 5 fillets burbot, 4 fillets burbot, 4 fillets bull trout, 5 whole fish bull trout, 5 fillets individual samples: burbot, 1 whole fish burbot, 1 fillet rainbow trout, 3 fillets
Oct 1990	Athabasca d/s Weldwood	Chemex/Mann	longnose sucker, 6 fillets mountain whitefish 6 fillets mountain whitefish, 6 fillets

Δ'β'Δ' ΠΓ'Υ' β'Δ'Υ'CD'σ'Υ'μ' Λ'α'α'Δ'Υ'Δ'
μ'α'Υ'Δ' Δ'Δ'σ'

FISH SAMPLING METHODOLOGY FOR MONITORING PROGRAMS
IN THE NORTHWEST TERRITORIES

Υ'α'Δ' α'β'-Γ' Δ'Σ'Π'α'α'σ'Υ'Δ' (Υ'α'Π'α'α'σ'Υ'Δ') β'μ'β' Α'Δ'Π'Υ'Λ'Υ'β'C β'Δ'Υ'Δ'Π'

β'μ'β' β'Δ'Υ'Δ'β'C'σ'Λ'Υ'β'C:

Υ'α'α'Δ'Γ' Δ'β'ε'φ'α'Δ'Δ' Δ'Λ'Υ'Γ'Δ'C'α'α'β'Δ'α' β'α'C'Υ' β'Δ'Υ'Δ'Π'Υ'C β'Π'Υ'β'ε'C'α'Δ'Υ'LC
β'Δ'Υ'Δ'Υ'CD'ε'ε'Δ'α'Π'β' Δ'β'α'α'α'β'Δ'Δ'μ'C CL'Δ'Λ' Λ'α'α'Δ'Υ'Δ'σ'Υ'β' Δ'β'α'Δ'α'β'C'Δ'Υ'Λ'β'C Δ'Υ'ε'σ'C
Δ'Υ'Λ' Δ'μ'α'α'β'α'β'Δ'σ'C Δ'Υ'Λ' Δ'Δ'β'Υ'β'Υ'Λ'Δ'Υ'σ' Δ'β'α'Δ'β'Π'Δ'σ'C.

Δ'β'Δ' Λ'β'Δ'ε'ε'Δ'Δ' Slave River -Γ' Δ'C'σ' Rapids of the Drowned Δ'Υ'Λ' Δ'
Λ'α'α'Δ'Υ'Δ'σ' Λ'Υ'β'σ', Leland Lake Δ'Υ'Λ' Chitty Lake-Γ. Walleye (Pickerel),
Northern Pike (Jackfish) Δ'Υ'Λ' β'Δ'Υ'ε' Δ'β'β'β'C'Δ'β'C'Υ'C' Δ'β'α'β'Υ'Δ'ε'Υ'Π'ε'Δ'Υ' Δ'Δ'β'Δ'
Λ'Υ'Π'C'Δ'Π'μ'C. Burbot (Loche) C'Δ'Δ' Δ'β'α'β'C'Δ'β'C'Υ'C' Δ'Υ'Δ'Δ' Υ'Δ' Δ'C'Υ'C' β'ε'Υ'β'Υ'μ'C Δ'Υ'Λ' Δ'
Λ'ε'μ'C Δ'Υ'C'Δ'β'C'Υ'LC Υ'Δ' Δ'C'Υ'C'.

Δ'β'α'β'C'Δ'β'Υ'β'C C'Δ'Λ, Δ'β'α'α'α'β' β'β'α'β'ε'α'σ'Υ'C' Δ'Υ'Λ' C'Υ'σ'Υ'β' Π'Π'β'ε'α'β'Υ', Δ'β'C'α'β'σ'Υ'β' Δ'Υ'Λ' Δ'
Δ'ε'Δ'σ'Υ'β' Δ'Υ'C'Δ'σ'Υ'β', Δ'ε'α'Δ'Υ'Δ'β'Υ'β'σ'β', β'β'α'β'ε'C'Δ'α'Π'β' Δ'β'α'Δ'α' Δ'ε'σ'Δ'σ'β'α'Δ'β'Υ'ε'σ'β'
β'Δ'Υ'Δ'Υ'CD'ε'α'Π'β' Π'Υ'Δ'α'.

Δ'β'Δ' σ'Υ'β'β', Π'Υ'Δ'α' Δ'Υ'Λ' Δ'ε'Υ'α'Υ'C' Λ'ε'C'Δ'ε'α'Π'β' Δ'Υ'Λ' Δ'Υ'Υ'Υ'C'Δ'ε'α'Π'β' β'Δ'Υ'Δ'Υ'CD'α'β'Υ'C'
Λ'α'α'Δ'Υ'Δ'σ'Δ'ε'α'Π'β' β'σ'β'β'C'Δ'β'ε'σ'ε'α'Π'β' Δ'β'α'β'C'Δ'β'C' Δ'ε'Υ'C' >ε'Υ'μ'β'β'ε'C'Υ'C' Υ'Π'ε'Υ'C'Υ'Δ'C'
Δ'ε'Υ'C' Δ'β'Δ'Υ'Δ'Δ'C' Υ'Υ'ε'β'Υ'μ'C >ε'Υ'μ'β'β'ε'C'Υ'C'α'Π'β'.

Δ'Υ'Υ'Υ'C'Δ'ε'ε'Δ'ε'α'Π'β' β'Δ'Υ'Δ'Υ'CD'σ'Υ'C' Δ'β'α'Δ' σ'Υ'β'Υ'C'C' Δ'Υ'σ' β'Δ'Υ'Δ'Υ'CD'ε'ε'Δ'β'ε'C'Υ'LC.
Δ'Υ'σ'β'ε'α'α'β'C' β'Δ'Υ'Δ'β'Δ'ε'Υ'Δ'α'Δ'β'ε'σ'Υ'C'C' CL'Δ'Δ'C' β'Δ'Υ'Δ'Υ'CD'ε'ε'Δ'Δ'C' Δ'Υ'Λ' Δ'Δ'ε'C'Δ'ε'Υ'Δ'ε'α'Π'β'
β'Δ'Υ'Δ'α'β'σ'. CL'Δ'Δ'C' Δ'Δ'ε'Υ'Π'C'Δ'σ'Δ'ε'C' Δ'ε'β'Δ'Υ'Λ'β'ε'C'Υ'C'C' Υ'Υ'ε'Υ'C'Υ'σ' Δ'Δ'ε'Υ'Π'C'Δ'Υ'Λ'ε'α'Π'β'.

Υ'Υ'ε' Π'Π'β'ε'Υ'Λ'ε'β' Δ'σ'β'ε'Υ'Λ'ε'β' β'μ'β'Δ'C'σ'Υ'C' Δ'β'α'Δ' Λ'β'Δ'ε'ε'Δ'Δ'C' Δ'Υ'Λ' Δ'β'α'β'ε'C'Δ'ε'ε'Δ'Δ'C'
Δ'ε'α'σ'C' β'Δ'Υ'Δ'Υ'CD'σ'Δ'ε'C' Slave River-Δ'σ' Λ'α'α'Δ'Υ'Δ'μ'C.

Δᖅᓗᓃᑦ ᖃᓃᓃᓂᖅᓃᑦᓂᖅ ᓃᓂᓂᑦ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᓃᑦ Δᖅᓗᓃᑦ
(ᓃᓃᓃᓂᖅᓃᑦ ᓃᓃᓃᓂᖅᓃᑦᓂᖅ ᓃᓃᓃᑦ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᓃᑦ)
FISH SAMPLING METHODOLOGY FOR MONITORING PROGRAMS IN ALBERTA

Δᖅᓗᓃᑦ ᓂᖅᖅᖅ ᖃᓃᓃᓂᖅᓃᑦᓂᖅ:

1. ᓃᓂᓂᑦ ᓃᓃᓃᓂᖅᓃᑦᓂᖅ, ᓃᓂᓂᑦ Δᖅᓗᓃᓂᓂᓂᑦ ᓃᓃᓃᓂ ᓃᓃᓃᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂ Δᖅᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᑦ Dioxin Survey ᓂᑦ Δᖅᓗᓃᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᑦ.
2. Δᖅᓗᓃᑦ ᓃᓃᓃᓂᖅᓃᑦ ᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᖅᓃᑦᓂᖅ Walleye, Northern Pike, Burbot, Goldeye, Longnose Sucker, White Sucker, Lake Whitefish, Mountain Whitefish, Bull Trout, Arctic Grayling, Flathead Chub and Northern Squawfish.
3. Δᖅᓗᓃᑦ ᓂᓂᓂᓂᑦᓂᓂᓂᑦ ᓃᓃᓂᑦ Peace-Athabasca-Slave Basin-ᑦ ᓂᓂᓂᓂᓂᓂᓂᑦ, ᓃᓃᓃᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ Δᖅᓂᓂᓂᓂᓂᓂᓂᑦᓂᖅ.
4. Δᖅᓗᓃᑦ ᓃᓃᓃᓂᖅᓃᑦ ᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᖅᓃᑦᓂᖅ ᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓂᓂᓂᓂᑦ. ᓃᓂᓂᓂᓂᓂᓂᑦ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᓃᑦ Δᖅᓗᓃᑦ, ᓃᓂᓂᖅᓂᖅ, ᓃᓂᓂᓂᖅᓂᖅᓂᖅ, ᓃᓂᓂᓂᖅᓂᖅ Δᖅᓗᓃᑦ, ᓂᓂᓂᑦ ᓂᓂᓂᓂᓂᓂᖅᓂᖅ ᓃᓃᓃᓂ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅ.
5. Δᖅᓗᓃᑦ ᓃᓂᓂᓂᖅᓃᑦᓂᖅᓂᖅ ᓃᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᖅᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᑦ (ᓂᓂᓂᓂᓂᓂᓂᓂᑦ, ᓂᓂᓂᓂᓂᓂᓂᓂᑦ, ᓃᓂᓂᓂᓂᓂᓂᓂᑦ). Δᖅᓗᓃᑦ ᓃᓃᓂᖅᓂᖅ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅᓂᖅ ᓃᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅ ᓃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅ ᓃᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅ ᓃᓃᓃᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ. ᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ, ᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂ ᓂᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ -20C ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅᓂᖅ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᓂᑦ.
6. ᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᖅᓃᑦᓂᖅᓂᖅ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ ᓃᓃᓃᓂᓂᓂᓂᓂᓂᑦ 1987-ᑦ 1989-ᑦ. ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅᓂᖅ ᓃᓃᓃᓂᓂᓂᓂᓂᑦ 1990-ᑦ 1991-ᑦ ᓂᓂᓂᓂᓂᓂᓂᑦ. ᓂᓂᓂᓂᓂᓂᓂᑦ 771 Δᖅᓂᓂᓂᓂᓂᓂᓂᑦ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅᓂᖅ 1990/81. ᓃᓂᓂᓂᓂᓂᓂᓂᑦ 1992, ᓃᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᖃᓃᓃᓂᓂᓂᓂᓂᓂᑦ (ᓂᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ Northern Rivers Study-ᓂᓂᓂᑦ) ᓃᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᖃᓃᓃᓂᖅᓃᑦᓂᖅᓂᖅᓂᖅ, ᓂᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ, ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓂᓂᓂᓂᓂᓂᓂᓂᓂᑦ, ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ ᓃᓂᓂᓂᓂᓂᓂᓂᓂᑦ.

TABLE 1**Fish Sampling and Analyses From the NWT Slave River Monitoring Program**

Parameter	1988/89	Site Collected	Lab Analysis
Trace Metals	Year 1 of 3 - Mercury in Fish Tissue Study	Slave River	Cantest muscle/tissue 100g
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Dioxins/Furans	5 longnose suckers (whole fish)* 5 burbot (liver)▶	Slave River	DFO Lab
MFO	21 Whitefish 21 burbot 2 inconnu (all livers)▶	Slave River	DFO Lab
PCB's, Pesticides, Organochlorines	5 longnose suckers (whole fish)* 5 burbot (liver)▶	Slave River	DFO Lab
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Hydrocarbons	---	---	---

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ◆ Composite Fish
Tissue Each composite contains 3 or 4 tissue samples

TABLE 1 continued

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1989/90	Site Collected	Lab Analysis
Trace Metals	Year 2 of 3	Slave River	Cantest
Extractable Organic Chlorine	10 walleye (tissue)▲ 7 burbot (tissue)▲	Slave River	Envirotest
Chlorophenols	2 walleye 1 burbot (tissue)▲	Slave River	Envirotest
Dioxins/Furans	10 burbot (whole fish - excluding livers)* 10 burbot (livers)▶	Slave River	DFO Lab
MFO	25 walleye 7 burbot (liver only)▶	Slave River	DFO Lab
PCB's, Pesticides, Organochlorines	5 suckers (tissue)▲ 5 burbot (liver)▶	Slave River	DFO Lab
Toxaphene	10 burbot (whole fish)* 10 burbot (liver)▶	Slave River	DFO Lab
Hydrocarbons	11 walleye (bile)• 7 burbot (bile)•	Slave River	DFO Lab

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ◆ Composite Fish Tissue Each composite contains 3 or 4 tissue samples

TABLE 1 continued

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1990/91	Site Collected	Lab Analysis
Trace Metals	Year 3 of 3 major ions and metals 29 fish 7 fish	Slave River Leland Lake	Cantest
Extractable Organic Chlorine	10 fish (bile)• 85 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake	Envirotest
Chlorophenols	35 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake	Envirotest
Dioxins/Furans	5 whitefish (composite)♦ 15 walleye (whole fish)* 16 burbot (liver)▶	Slave River Leland Lake Chitty Lake	Envirotest DFO Lab
MFO	20 walleye (liver)▶ 20 pike (liver)▶ 20 whitefish (liver)▶	Slave River Leland Lake	DFO Lab
PCB's, Pesticides, Organochlorines	15 walleye (whole)* 16 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Toxaphene	15 walleye (whole)* 16 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Hydrocarbons	---	---	---

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ♦ Composite Fish Tissue Each composite contains 3 or 4 tissue samples

TABLE 1 continued

Fish Sampling and Analyses From the NWT Slave River Monitoring Program

Parameter	1991/92 Up to Jan. 10/92	Site Collected	Lab Analysis
Trace Metals	61 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake Chitty Lake	Cantest
Extractable Organic Chlorine	20 fish (bile)• 75 fish - walleye, burbot, whitefish, pike (tissue)▲	Slave River Leland Lake Chitty Lake	Envirotest
Chlorophenols	25 fish (tissue)▲ 15 fish - walleye, burbot, whitefish, pike (liver)▶	Slave River Leland Lake Chitty Lake	Envirotest
Dioxins/Furans	10 (composite fish tissue)♦ 15 walleye (whole fish)* 16 burbot (liver)▶	Slave River Leland Lake Chitty Lake	Envirotest DFO Lab
MFO	60 fish - walleye, burbot, whitefish, pike (liver)▶	Slave River Leland Lake Chitty Lake	DFO Lab
PCB's, Pesticides, Organochlorines	15 walleye (whole)* 15 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Toxaphene	15 walleye (whole)* 16 burbot (livers)▶	Slave River Leland Lake Chitty Lake	DFO Lab
Hydrocarbons	---	---	---

- * Whole Fish A subsample is taken of the homogenized whole fish (organs and bones included)
- ▲ Tissue Flesh only (also referred to as fillets), no skin tissue and no bones
- ▶ Liver Single liver is analyzed
- Bile Bile extracted from liver
- ♦ Composite Fish Tissue Each composite contains 3 or 4 tissue samples

TABLE 2

DIOXIN/FURAN FISH SAMPLING IN ALBERTA

DATE	LOCATION	LAB	FISH SPP.
Oct 1987	Wapiti R. d/s Procter & Gamble	ECO Logic Ltd.	longnose suckers (5) whole fish
Oct 1987	Athabasca R. d/s Weldwood	Fisheries & Oceans Canada	longnose suckers (5) whole fish
Sept 1988	Peace R. u/s Daishowa mill site	DFO, Burlington	pike (1), walleye (2), goldeye (1), all fillets
Oct 1988	Smoky R. in Watino area	DFO, Burlington	goldeye (2)
Sept & Dec 1988	Slave River, NWT near Ft. Fitzgerald, AB & Ft. Smith, NT	DFO Lab	burbot livers longnose suckers whole fish
Sept 1989	Rock Lake		mountain whitefish 5 fillets
Oct 1989	Wapiti R. d/s Procter & Gamble	Fisheries & Oceans Canada, Burlington	composite samples: white sucker, 5 whole fish white sucker, 5 fillets white sucker, 5 fillets walleye, 5 fillets mountain whitefish, 5 fillets pike, 4 fillets pike, 1 fillet
Oct 1989	Athabasca R. d/s Weldwood	Fisheries & Oceans Canada, Burlington	composite samples: mountain whitefish, 5 whole fish mountain whitefish, 5 fillets mountain whitefish 5 whole fish mountain whitefish 5 fillets mountain whitefish 5 whole fish mountain whitefish 5 fillets longnose suckers 5 whole fish longnose suckers 5 fillets longnose suckers 5 fillets burbot, 4 fillets burbot, 4 fillets bull trout, 5 whole fish bull trout, 5 fillets individual samples: burbot, 1 whole fish burbot, 1 fillet rainbow trout, 3 fillets
Oct 1990	Athabasca d/s Weldwood	Chemex/Mann	longnose sucker, 6 fillets mountain whitefish 6 fillets mountain whitefish, 6 fillets