

ENVIRONMENT CANADA  
CONSERVATION AND PROTECTION  
ENVIRONMENTAL PROTECTION  
PACIFIC AND YUKON REGION  
NORTH VANCOUVER, B.C.

BASELINE MONITORING

SNIP PROJECT

- August 6, 1988 -

Data Report DR 91-01

By Benoit Godin  
and  
Vivian Chamberlain

December 1990

LIBRARY  
ENVIRONMENT CANADA  
CONSERVATION AND PROTECTION  
PACIFIC REGION

TABLE OF CONTENTS

	<u>PAGE</u>
TABLE OF CONTENTS .....	i
LIST OF FIGURES AND TABLES .....	ii
INTRODUCTION .....	1
MATERIAL AND METHODS .....	4
RESULTS .....	5
REFERENCE .....	16

LIST OF FIGURES

		<u>PAGE</u>
FIGURE 1	SNIP PROJECT - SAMPLING SITES .....	3
FIGURE 2	SEDIMENT MULTIPLE COMPARISON PLOT - SNIP 1988 - Al, Ca, Cu, Fe, Hg, Mn, Zn .....	14

LIST OF TABLES

		<u>PAGE</u>
TABLE 1	METAL WATER QUALITY - SNIP PROJECT - AUGUST 6, 1988 ..	6
TABLE 2	WATER QUALITY - SNIP PROJECT - AUGUST 6, 1988 .....	9
TABLE 3	SEDIMENT QUALITY - SNIP PROJECT - AUGUST 6, 1988 .....	10

## INTRODUCTION

The Snip project is located at the confluence of the Iskut River and Bronson Creek. The mine is situated at an elevation of 180 to 680 metres on the north-west side of the base of Johnny Mountain. The Snip property is drained by Monsoon Creek which flows north towards the Iskut River. Dolly Varden char and cutthroat trout are present in Monsoon Lake. Sockeye are known to spawn at the mouth of Bronson Creek and in the side channels in front of the Bronson Creek airstrip. There is no suitable fish habitat upstream of the Cominco property since the creek is characterised by a single channel with fast flows, large boulders and cascading falls. Salmon utilise the lower 1 km of Sky Creek draining the west part of the property to the north west towards the Craig River. Small runs of chinook, pink and sockeye as well as cutthroat trout were identified (Figure 1).

The company is developing an underground mine. The gold and silver extraction will be performed by flotation. The tailings will be discharged in the tailings pond located in the headwaters of Monsoon Creek and Sky Creek.

### Site Description

<u>Station</u>	<u>Location</u>	<u>Remarks</u>
1	Sky Creek upstream of the tailings pond	Mountain creek
2	Sky Creek at the mouth	Tea colour waters
3	Craig River upstream of Sky Creek	Influenced by glaciers
4	Craig River downstream of Sky Creek	Influenced by glaciers

5	Monsoon Creek upstream of Monsoon Lake	Tea colour waters
6	Monsoon Creek downstream	Tea colour waters
7	Bronson Creek upstream of Cominco camp	Influenced by glaciers
8	Iskut River upstream of Bronson Creek	Influenced by glaciers
9	Iskut River downstream of Monsoon Creek	Influenced by glaciers
10	Mine adit	Level 180

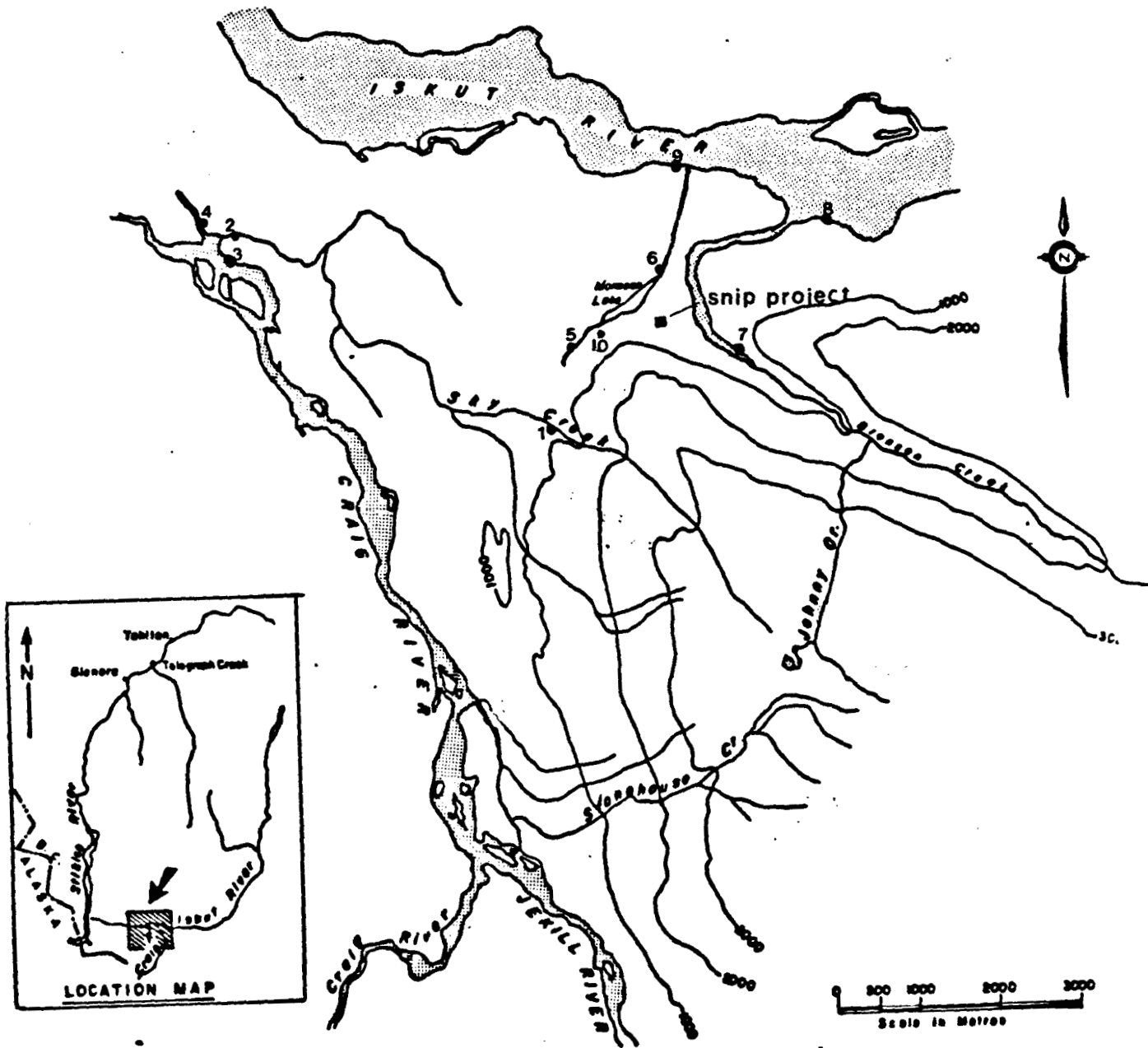


Figure 1 Snip Project - Sampling Sites

## MATERIAL AND METHODS

The site was visited on August 6, 1988. No flow measurements were taken at the sites. Water chemistry and sediment samples were collected at the nine receiving water stations but only water at the mine adit. The following chemical parameters were analysed: alkalinity, pH, conductivity, total residue, non filterable residue, and sulphate. These samples were kept cool with ice until analysed. The total cyanide, weak acid dissociable and thiocyanates were taken only at station 7 on Bronson Creek. Sodium hydroxide was added to the samples to bring the pH above 12. Dissolved metals were filtered the same day through a 0.45 micron cellulose nitrate membrane filter. Total and dissolved metals were preserved with nitric acid (0.5 ml/100 ml of sample ). Samples for total mercury were collected for stations 5, 6 and 10. The samples were preserved with 5 ml of nitric-dichromate. All samples were collected with clean polyethylene bottles. The bottles for metal samples were previously acid washed. The hardness was determined from the dissolved metal sample.

Inductively Coupled Argon Plasma (ICAP) was used for the total and dissolved metal analysis and gave a reading of twenty-eight metals. For cadmium, copper, and lead the samples were reanalysed with the graphite furnace when the values were below two times the detection limit on the ICAP procedure. For analytical method details refer to the Environment Canada Pacific Region Laboratory Manual (Anon, 1979).

Sediment samples were collected from the streambed, below the water level, with a clean acrylic corer. Four replicates were taken at each site, except for station 10. The samples were transferred into kraft bags and kept cool until analysed. The samples were air dried, sieved to <150 um, digested with aqua regia, and analysed for heavy metals using ICAP. A portion of the sediments were also ignited at 550° C in a muffle furnace. The loss of weight was reported as volatile residue and the remaining residue was reported as fixed residue.

## RESULTS

The water metal results can be found in Table 1, while the other water quality results are found in Table 2. The sediment data are reported in Table 3.

Several parameters were higher at station 2 than at station 1 upstream. High non filterable residues and filterable residues were found at station 2, resulting in the following increased parameters: Ba, Ca, Fe, Mg, Mn, Na, Si, Sr, alkalinity, hardness, and conductivity.

The water quality at station 4 is affected by the influent of station 2. The strong humic matter content of the waters in Sky Creek seemed to influence the values of dissolved iron and manganese at station 3. The higher values of calcium of station 2 in comparison to both station 3 and 4 may be due to some limestone showings or other carbonate sources between the upstream and downstream stations.



Table 1

Metal Water Quality - Snip Project -  
August 6, 1988

Station Number	AG		AL		AS		BA		CA		CD		CO		CR	
	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L	TOTICP MG/L	DISICP MG/L
1	<.01	<.01	<.05	<.05	<.05	<.05	0.007	0.005	6.5	5.8	<.0001	<.005	<.0001	<.005	<.005	<.005
2	<.01	<.01	0.15	<.05	<.05	0.040	0.032	15.6	14.5	<.0001	<.005	<.0001	<.005	<.005	<.005	<.005
3	<.01	<.01	2.12	0.14	<.05	0.061	0.018	8.5	7.4	<.0001	<.005	<.0001	<.005	<.005	<.005	<.005
4	<.01	<.01	1.52	0.09	<.05	0.057	0.019	9.6	8.3	<.0001	<.005	<.0001	<.005	<.005	<.005	<.005
5	<.01	<.01	<.05	<.05	<.05	0.033	0.029	26.6	24.9	<.0001	<.005	<.0001	<.005	<.005	<.005	<.005
6	Repl.1	<.01	0.07	<.05	<.05	0.094	0.082	53.7	50.9	<.0001	<.005	<.0001	<.005	<.005	<.005	<.005
	Repl.2	<.01	<.05	<.05	0.081	0.081	50.9	50.0	<.0001	<.005	<.0001	<.005	<.0001	<.005	<.005	<.005
	Repl.3	<.01	<.05	<.05	0.088	0.080	52.2	49.8	<.0001	<.005	<.0001	<.005	<.0001	<.005	<.005	<.005
	Average	---	---	---	---	0.088	0.081	52.3	50.2	---	---	---	---	---	---	---
S.D.	---	---	---	---	0.007	0.001	1.4	0.6	---	---	---	---	---	---	---	
7	Repl.1	<.01	6.00	0.11	<.05	0.130	0.029	22.6	19.0	<.0001	<.005	<.0001	<.005	<.005	0.008	<.005
	Repl.2	<.01	5.26	<.05	0.121	0.028	22.6	19.3	<.0001	<.005	<.0001	<.005	<.0001	<.005	0.006	<.005
	Repl.3	<.01	5.55	<.05	0.127	0.028	22.9	18.9	<.0001	<.005	<.0001	<.005	<.0001	<.005	0.008	<.005
	Average	---	5.60	---	---	0.126	0.028	22.7	19.1	---	---	---	---	---	---	---
S.D.	---	0.37	---	---	0.005	0.001	0.2	0.2	---	---	---	---	---	---	---	
8	<.01	<.01	11.70	<.05	<.05	0.205	0.035	24.5	19.1	<.0001	<.005	<.0001	<.005	<.005	0.014	<.005
9	<.01	<.01	9.79	<.05	<.05	0.171	0.038	22.3	19.1	<.0001	<.005	<.0001	<.005	<.005	0.012	<.005
10	<.01	<.01	18.60	0.07	<.05	0.279	0.048	68.3	50.9	<.0001	<.005	<.0001	<.005	<.005	0.015	<.005



Table 1 (cont.)

Metal Water Quality - Snip Project -  
August 6, 1988

Station Number	TOTICP P MG/L	DISICP P MG/L	TOTICP PB MG/L	TOTICP PB MG/L	DISICP PB MG/L	DISICP PB MG/L	TOTICP SI MG/L	DISICP SI MG/L	TOTICP SN MG/L	DISICP SN MG/L	TOTICP SR MG/L	DISICP SR MG/L	TOTICP TI MG/L	DISICP TI MG/L	TOTICP V MG/L	DISICP V MG/L	TOTICP ZN MG/L	DISICP ZN MG/L
1	0.1	0.1	0.05	0.05	0.0005	0.05	1.12	0.98	0.05	0.05	0.034	0.031	0.009	0.002	0.01	0.01	0.002	0.003
2	0.1	0.1	0.05	0.05	0.0005	0.05	2.40	2.16	0.05	0.05	0.072	0.066	0.016	0.002	0.01	0.01	0.002	0.002
3	0.1	0.1	0.05	0.05	0.0005	0.05	4.02	0.97	0.05	0.05	0.040	0.028	0.164	0.008	0.01	0.01	0.004	0.002
4	0.1	0.1	0.05	0.05	0.0005	0.05	3.01	1.09	0.05	0.05	0.043	0.032	0.130	0.007	0.01	0.01	0.002	0.002
5	0.1	0.1	0.05	0.05	0.0005	0.05	1.23	1.19	0.05	0.05	0.129	0.120	0.002	0.002	0.01	0.01	0.002	0.002
6	Repl.1 0.1	0.1	0.05	0.05	0.0005	0.05	2.37	2.18	0.05	0.05	0.263	0.250	0.009	0.002	0.01	0.01	0.002	0.002
	Repl.2 0.1	0.1	0.05	0.05	0.0005	0.05	2.09	2.12	0.05	0.05	0.247	0.246	0.002	0.002	0.01	0.01	0.002	0.002
	Repl.3 0.1	0.1	0.05	0.05	0.0005	0.05	2.22	2.11	0.05	0.05	0.256	0.244	0.002	0.002	0.01	0.01	0.002	0.002
	Average ---	---	---	---	---	---	2.23	2.14	---	---	0.255	0.247	0.006	---	---	---	---	---
	S.D. ---	---	---	---	---	---	0.14	0.04	---	---	0.008	0.003	0.005	---	---	---	---	---
7	Repl.1 0.2	0.1	0.05	0.0011	0.05	0.0005	9.76	1.08	0.05	0.05	0.126	0.097	0.360	0.004	0.02	0.01	0.031	0.002
	Repl.2 0.2	0.1	0.05	0.0005	0.05	0.0005	8.43	1.02	0.05	0.05	0.122	0.099	0.333	0.002	0.02	0.01	0.033	0.002
	Repl.3 0.2	0.1	0.05	0.0005	0.05	0.0005	8.79	0.99	0.05	0.05	0.127	0.097	0.346	0.002	0.02	0.01	0.032	0.002
	Average 0.2	---	---	---	---	---	8.99	1.03	---	---	0.125	0.098	0.346	---	0.02	---	0.032	---
	S.D. 0.0	---	---	---	---	---	0.69	0.05	---	---	0.003	0.001	0.014	---	0.00	---	0.001	---
8	0.3	0.1	0.05	0.0012	0.05	0.0005	18.50	1.11	0.05	0.05	0.147	0.103	0.445	0.002	0.03	0.01	0.030	0.002
9	0.2	0.1	0.05	0.0005	0.05	0.0005	15.70	1.16	0.05	0.05	0.130	0.107	0.303	0.002	0.03	0.01	0.018	0.002
10	1.3	0.1	0.05	0.0051	0.05	0.0005	28.50	4.29	0.05	0.05	0.755	0.655	2.090	0.005	0.11	0.01	0.194	0.002

Table 2  
Water Quality - Snip Project -  
August 6, 1988

Station Number	ALK MG/L	PH REL.U.	DISICP HC MG/L	DISICP HT MG/L	COND UMHO/C	TR MG/L	NFR MG/L	CN MG/L	CNWD MG/L	CNS MG/L	SO4 MG/L
1	16.5	7.6	17.9	17.8	39.0	29	5	---	---	---	5
2	40.0	7.9	42.8	43.9	93.0	68	249	---	---	---	5
3	19.5	7.7	20.3	21.3	45.5	103	9	---	---	---	3
4	22.0	7.7	23.0	23.8	50.0	94	63	---	---	---	3
5	51.5	8.1	67.6	67.7	138.0	104	13	---	---	---	15
6	Repl.1 101.0	8.3	142.0	143.0	270.0	181	7	---	---	---	34
	Repl.2 101.0	8.3	139.0	140.0	270.0	181	45	---	---	---	40
	Repl.3 101.0	8.3	139.0	140.0	270.0	181	6	---	---	---	40
	Average 101.0	8.3	140.0	141.0	270.0	181	7	---	---	---	38
	S.D. 0.0	0.0	1.7	1.7	0.0	0	1	---	---	---	3
7	Repl.1 36.5	8.0	54.9	55.8	118.0	211	118	<0.03	<0.03	<0.03	21
	Repl.2 36.0	8.0	55.3	55.7	120.0	223	129	<0.03	<0.03	<0.03	21
	Repl.3 36.0	8.0	54.4	54.8	120.0	214	137	<0.03	<0.03	<0.03	21
	Average 36.2	8.0	54.9	55.4	119.3	216	128	---	---	---	21
	S.D. 0.3	0.0	0.5	0.6	1.2	6	10	---	---	---	0
8	43.5	8.1	57.8	58.1	123.0	277	193	---	---	---	17
9	45.5	8.1	59.0	59.3	123.0	277	175	---	---	---	18
10	112.0	8.3	153.0	154.0	290.0	678	403	---	---	---	47

Table 3

Sediment Quality - Snip Project -  
August 6, 1988

Station Number	AG UG/G	AL UG/G	AS UG/G	BA UG/G	BE UG/G	CA UG/G	CD UG/G	CO UG/G	CR UG/G	CU UG/G	FE UG/G	HG UG/G	MG UG/G	MM UG/G	MO UG/G	
1	Repl.1	<2	28200	64	244	0.6	8720	1.0	<20	61.2	180.0	65600	0.028	18300	1780	7
	Repl.2	<2	27200	77	237	0.6	8500	1.0	<20	54.4	199.0	67500	0.026	17600	1680	9
	Repl.3	<2	28900	66	250	0.6	8850	<.8	<20	68.6	182.0	68000	0.023	18800	1740	8
	Repl.4	<2	27700	66	246	0.5	8730	1.0	<20	65.5	178.0	65200	0.022	18200	1690	7
	Average	---	28000	68	244	0.6	8700	1.0	---	62.4	184.8	66575	0.025	18225	1723	8
S.D.	---	726	6	5	0.0	146	0.0	---	6.2	9.6	1382	0.003	492	46	1	
2	Repl.1	<2	11200	<8	129	0.2	8250	<.8	<20	18.0	44.8	34900	0.014	6390	369	4
	Repl.2	<2	10900	<8	132	0.2	7810	<.8	<20	20.6	48.3	42900	0.046	6200	406	4
	Repl.3	<2	11900	<8	147	0.2	8450	<.8	<20	20.7	53.8	47400	0.023	7250	430	4
	Repl.4	<2	10000	<8	118	0.2	8000	<.8	<20	18.3	43.9	38700	0.012	6020	381	4
	Average	---	11000	---	132	0.2	8128	---	---	19.4	47.7	40975	0.024	6465	397	4
S.D.	---	787	---	12	0.0	281	---	---	1.4	4.5	5387	0.016	545	27	0	
3	Repl.1	<2	8820	<8	116	<.2	8860	<.8	<20	26.0	42.9	80000	0.009	5370	587	7
	Repl.2	<2	9010	<8	111	<.2	9640	<.8	<20	28.0	53.3	89400	0.015	5700	469	8
	Repl.3	<2	9170	<8	111	<.2	10100	<.8	<20	28.2	56.1	86200	0.015	5540	462	8
	Repl.4	<2	8540	<8	100	<.2	9060	<.8	<20	27.0	46.8	84100	0.016	5230	453	6
	Average	---	8885	---	109	---	9415	---	---	27.4	49.8	84925	0.014	5460	493	7
S.D.	---	271	---	7	---	564	---	---	1.1	6.0	3941	0.003	204	63	1	
4	Repl.1	<2	9500	10	126	<.2	13100	<.8	<20	13.0	48.0	26200	0.008	5960	310	3
	Repl.2	<2	9510	<8	122	<.2	13300	<.8	<20	13.0	59.6	27100	0.010	5890	315	4
	Repl.3	<2	9250	<8	119	<.2	11900	<.8	<20	12.0	49.8	23000	0.010	5900	304	3
	Repl.4	<2	9340	<8	116	<.2	12400	<.8	<20	12.0	50.2	24400	0.010	5860	303	3
	Average	---	9400	---	121	---	12675	---	---	12.5	51.9	25175	0.010	5903	308	3
S.D.	---	127	---	4	---	645	---	---	0.6	5.2	1834	0.001	42	6	1	
5	Repl.1	<2	22000	80	916	0.4	16900	2.0	<20	51.6	159.0	128000	0.059	13800	7980	44
	Repl.2	<2	24400	57	640	0.4	17400	<.8	<20	39.4	127.0	107000	0.037	15700	7550	34
	Repl.3	2	21900	70	752	0.4	16800	1.0	<20	43.3	138.0	118000	0.039	13700	7550	41
	Repl.4	<2	20300	82	893	0.3	17200	<.8	<20	42.4	136.0	127000	0.040	13800	7750	47
	Average	---	22150	72	800	0.4	17075	1.5	---	44.2	140.0	120000	0.044	14250	7708	42
S.D.	---	1690	11	129	0.0	275	0.7	---	5.2	13.5	9764	0.010	968	205	6	
6	Repl.1	<2	18300	54	462	0.3	12400	<.8	<20	22.2	162.0	52600	0.017	8710	3000	10
	Repl.2	<2	17400	44	487	0.3	12100	<.8	<20	22.0	174.0	56700	0.034	8470	3710	10
	Repl.3	<2	17100	50	488	0.3	12100	<.8	<20	21.5	155.0	57300	0.017	8100	3290	20
	Repl.4	<2	17600	43	400	0.3	11800	<.8	<20	22.3	170.0	51600	0.017	8600	2530	10
	Average	---	17600	48	459	0.3	12100	---	---	22.0	165.3	54550	0.021	8470	3133	13
S.D.	---	510	5	41	0.0	245	---	---	0.4	8.5	2869	0.009	265	496	5	

Table 3 (cont.) Sediment Quality - Snip Project - August 6, 1988

Station Number	MA UG/G	MI UG/G	P UG/G	PB UG/G	SI UG/G	SN UG/G	SR UG/G	TI UG/G	V UG/G	ZM UG/G	SFR MG/KG	SVR MG/KG	
1	Repl.1	280	60	1840	42	901	<8	78.6	2710	130	503	944000	55500
	Repl.2	1100	58	1910	43	960	<8	79.3	2430	130	525	951000	48900
	Repl.3	170	63	1870	46	817	<8	85.7	2940	130	521	947000	53400
	Repl.4	800	63	1870	38	852	<8	81.1	2730	130	541	953000	47100
	Average	588	61	1873	42	888	---	81.2	2703	130	523	948750	51225
S.D.	438	2	29	3	71	---	3.1	209	0	16	4031	3891	
2	Repl.1	390	10	1500	<8	484	<8	51.4	1370	65	60	984000	16100
	Repl.2	450	10	1400	<8	503	<8	49.6	1310	100	65	979000	20700
	Repl.3	710	10	1500	<8	740	<8	53.1	1420	110	72	981000	19400
	Repl.4	460	10	1500	<8	633	<8	52.1	1210	99	48	987000	13300
	Average	503	10	1475	---	590	---	51.6	1328	99	61	982750	17375
S.D.	142	0	50	---	120	---	1.5	90	10	10	3500	3336	
3	Repl.1	610	10	1660	<8	564	<8	55.9	1200	212	41	995000	5400
	Repl.2	880	10	1720	<8	625	<8	51.8	1310	238	43	994000	5900
	Repl.3	440	10	1670	<8	611	<8	55.2	1270	236	34	994000	6100
	Repl.4	440	10	1600	<8	616	<8	52.2	1160	224	28	995000	5500
	Average	593	10	1663	---	604	---	53.8	1235	228	36	994500	5725
S.D.	208	0	49	---	27	---	2.1	68	12	7	577	330	
4	Repl.1	410	8	1400	<8	598	<8	63.7	1100	79	29	995000	5300
	Repl.2	410	8	1400	20	547	<8	64.2	1180	82	28	995000	5000
	Repl.3	390	8	1200	<8	577	<8	60.2	1010	69	29	994000	6400
	Repl.4	410	8	1300	<8	526	<8	62.0	1100	73	24	994000	5640
	Average	405	8	1325	---	562	---	62.5	1098	76	27	994500	5585
S.D.	10	0	96	---	32	---	1.8	69	6	3	577	603	
5	Repl.1	210	72	3760	20	781	<8	126.0	2870	150	337	792000	208000
	Repl.2	220	51	3380	20	1010	<8	135.0	3490	160	271	831000	169000
	Repl.3	190	58	3460	17	1190	<8	128.0	2820	150	290	790000	210000
	Repl.4	250	62	3590	9	1360	<8	131.0	2600	140	278	798000	202000
	Average	218	61	3548	17	1085	---	130.0	2945	150	294	802750	197250
S.D.	25	9	166	5	248	---	3.9	382	8	30	19138	19138	
6	Repl.1	710	22	1860	47	803	<8	99.0	1300	79	261	980000	19900
	Repl.2	660	24	1870	38	891	<8	95.6	1240	77	275	973000	26700
	Repl.3	670	23	1960	38	773	<8	94.8	1230	78	253	980000	19800
	Repl.4	640	25	1670	39	790	<8	89.6	1240	76	257	980000	20200
	Average	670	24	1840	41	814	---	94.8	1253	78	262	978250	21650
S.D.	29	1	122	4	53	---	3.9	32	1	10	3500	3371	

Table 3 (cont.) Sediment Quality - Snip Project - August 6, 1988

Station Number	AG UG/G	AL UG/G	AS UG/G	BA UG/G	BE UG/G	CA UG/G	CD UG/G	CO UG/G	CR UG/G	CU UG/G	FE UG/G	HG UG/G	MG UG/G	MM UG/G	MO UG/G	
7	Repl.1	<2	16200	110	211	0.3	19800	<.8	20	21.6	324.0	86600	0.019	7930	959	21
	Repl.2	3	16100	210	182	0.3	15900	<.8	30	23.1	425.0	122000	0.015	8110	987	33
	Repl.3	<2	16300	188	178	0.3	16700	<.8	30	23.3	352.0	112000	0.025	8230	986	25
	Repl.4	<2	17400	89	242	0.3	26800	<.8	<20	22.2	309.0	78300	0.022	8610	1100	16
	Average	---	16500	149	203	0.3	19800	---	26.6667	22.6	352.5	99725	0.020	8220	1008	24
S.D.	---	606	59	30	0.0	4961	---	5.7735	0.8	51.5	20641	0.004	288	63	7	
8	Repl.1	<2	16100	80	241	0.3	14700	<.8	<20	27.2	234.0	73300	0.016	8750	874	10
	Repl.2	<2	16100	110	187	0.3	16200	<.8	<20	29.7	248.0	103000	0.021	9100	862	20
	Repl.3	<2	15800	73	214	0.3	15200	<.8	<20	28.3	228.0	79200	0.019	8930	878	16
	Repl.4	<2	16600	100	200	0.3	16300	<.8	<20	31.1	231.0	82400	0.034	9810	881	10
	Average	---	16150	91	211	0.3	15600	---	---	29.1	235.3	84475	0.023	9148	874	14
S.D.	---	332	17	23	0.0	779	---	---	1.7	8.8	12912	0.008	464	8	5	
9	Repl.1	<2	18200	26	280	0.4	16900	<.8	<20	42.0	89.3	53500	0.036	12200	752	9
	Repl.2	<2	17400	59	303	0.4	17300	<.8	<20	49.6	98.9	78000	0.040	11800	793	10
	Repl.3	<2	17400	53	287	0.4	17600	<.8	<20	48.7	114.0	76800	0.036	11600	754	10
	Repl.4	<2	17400	49	287	0.4	17000	<.8	<20	49.7	117.0	81400	0.042	11500	749	10
	Average	---	17600	49	289	0.4	17200	---	---	47.5	104.8	72425	0.039	11775	762	10
S.D.	---	400	18	10	0.0	316	---	---	3.7	13.0	12766	0.003	310	21	1	

Sediment Quality - Snip Project - August 6, 1988

Station Number	MA UG/G	MI UG/G	P UG/G	PB UG/G	SI UG/G	SN UG/G	SR UG/G	TI UG/G	V UG/G	ZN UG/G	SFR MG/KG	SVR MG/KG	
7	Repl.1	630	43	1870	86	716	<8	92.6	1160	82	429	968000	31800
	Repl.2	660	56	2150	160	849	<8	82.5	1220	93	380	948000	52000
	Repl.3	590	53	1800	89	763	<8	81.7	1190	89	371	962000	37800
	Repl.4	680	40	1820	110	689	<8	111.0	1220	87	429	973000	26700
	Average	640	48	1910	111	754	---	92.0	1198	88	402	962750	37075
S.D.	39	8	163	34	70	---	13.6	29	5	31	10813	10935	
8	Repl.1	540	37	1750	51	791	<8	77.8	1140	93	253	983000	17100
	Repl.2	500	48	1600	76	855	<8	77.0	1240	110	262	970000	30300
	Repl.3	580	40	1720	70	842	<8	74.6	1140	98	233	983000	16600
	Repl.4	570	43	1500	75	867	<8	72.5	1150	100	266	976000	24500
	Average	548	42	1643	68	839	---	75.5	1168	100	254	978000	22125
S.D.	36	5	115	12	33	---	2.4	49	7	15	6272	6538	
9	Repl.1	420	40	1100	20	801	<8	68.2	1120	110	111	985000	14800
	Repl.2	420	45	1200	31	875	<8	66.9	1230	160	143	981000	18900
	Repl.3	430	44	1300	17	809	<8	69.3	1250	160	163	980000	19500
	Repl.4	390	44	1300	29	808	<8	68.8	1270	171	127	981000	19200
	Average	415	43	1225	24	823	---	68.3	1218	150	136	981750	18100
S.D.	17	2	96	7	35	---	1.0	67	27	22	2217	2214	

The following water quality parameters were higher at station 6 downstream of Monsoon Lake than at station 5: Ba, Ca, Fe, Mg, Mn, Si, Sr, alkalinity, hardness, conductivity, and sulphates. The influence of the mine adit at station 10 could explain some of these increases due to the higher concentration of dissolved metals (Fe, Mg, Si, Sr,), and for the following parameters: alkalinity, hardness, conductivity, total residues, and sulphates. The calcium levels of station 10 and station 6 were fairly similar. The only contaminant present in substantial amount in the mine adit was copper. The total value was 0.121 mg/l while the dissolved was 0.053 mg/l.

Water quality in the Iskut River is characterised by high suspended solids with associated total metal values. High dissolved values were found for calcium, and strontium. Total copper values were high with 18 ug/l upstream of Bronson Creek and 12 ug/l downstream of Monsoon Creek.

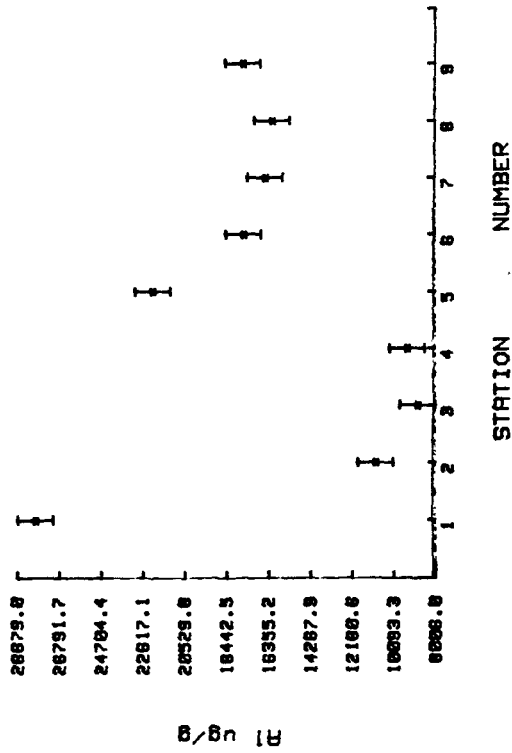
Several sediment analysis are graphically represented in Figure 2. Most contaminant are shown in Figure 2 except for As, Cd, and Pb which were below detection limit values in the data set. This would have introduced inconsistency in the multiple comparison plot. Cadmium was below the detection limit for most stations. Arsenic and lead were below the detection limit for stations 2, 3, and 4. Lead and arsenic were highest at the Bronson Creek station and Monsoon Creek stations had the lowest concentrations.

Copper and zinc generally follow the same pattern as the arsenic and lead with low level on the Craig River side, intermediary levels in Monsoon Creek, and highest concentrations in Bronson Creek. Mercury concentrations were fairly low throughout the system ranging from 8 to 59 ng/g.

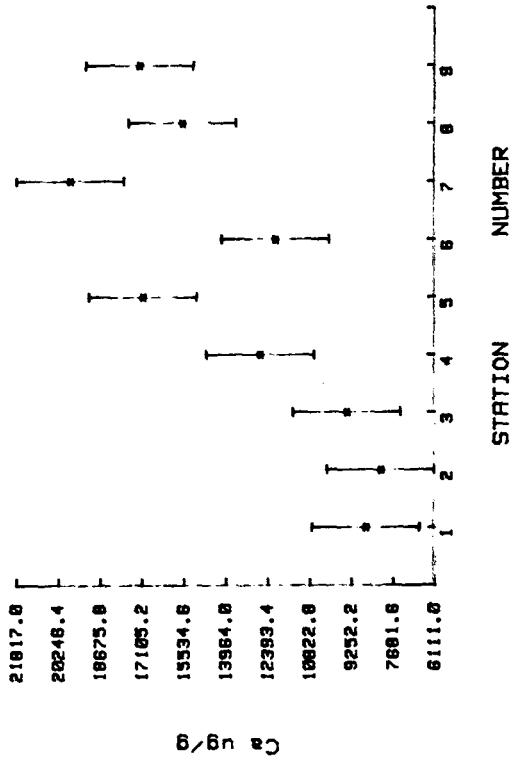
Organic carbon was very high at station 5, being 20% of the sediments, reflecting the influence of the marshes in the upper portion of the Monsoon Creek.



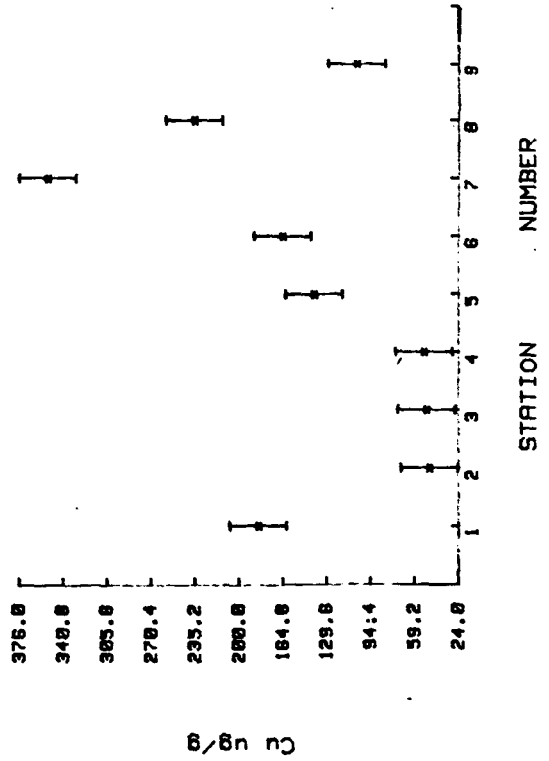
MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988



MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988



MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988



MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988

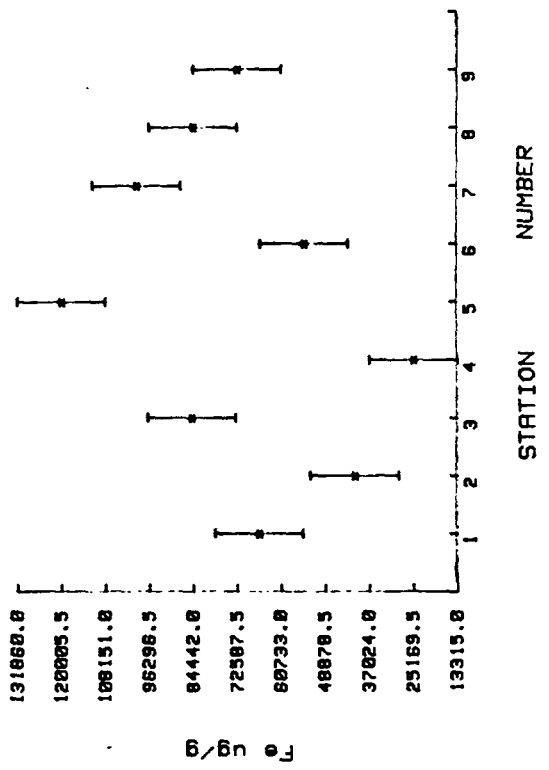
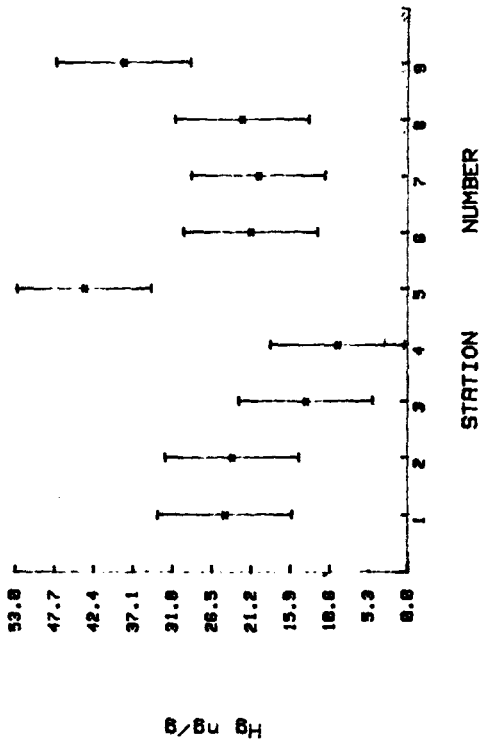
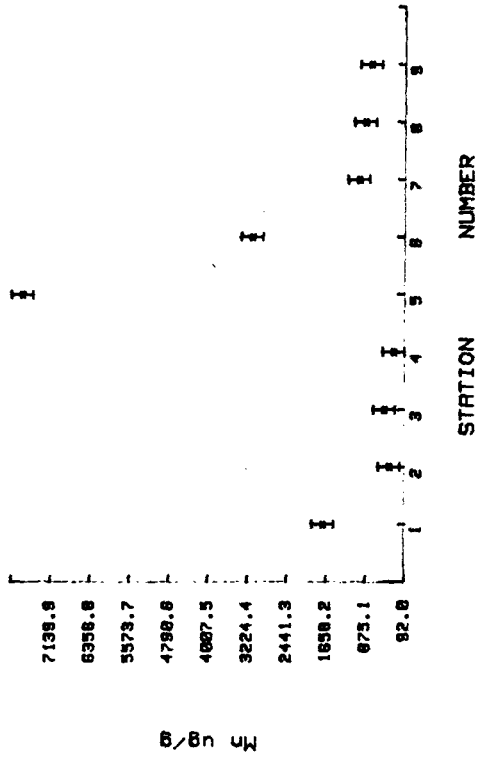


Figure 2 - Sediment Multiple Comparison Plot SNIP 1988 - Al, Ca, Cu, Fe

MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988



MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988



MULTIPLE COMPARISON PLOT : TUKEY'S HSD  
SEDIMENT QUALITY SNIP 1988

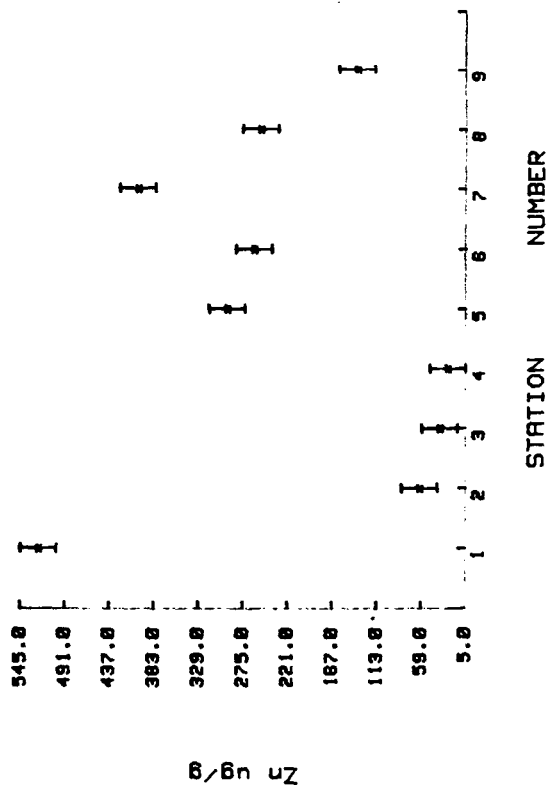


Figure 2 - Sediment Multiple Comparison Plot SNIP 1988 - Hg, Mn, Zn

REFERENCE

Anonymous. 1979. Laboratory Manual. Department of the Environmental Protection Service. Department of Fisheries and Oceans (Pacific Region).