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

BASELINE MONITORING

SNIP PROJECT

- July 21, 1990 -

Data Report DR 91-04

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August 1991

TABLE OF CONTENTS

	PAGE
TABLE OF CONTENTS	i
INTRODUCTION	1
MATERIAL AND METHODS	3
RESULTS	4
REFERENCES	19

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 base of Johnny Mountain. The Snip property is drained by Monsoon Creek flowing northwardly towards the Iskut River. Dolly Varden char and Cutthroat trout are present in Monsoon Lake. Sockeye is known to spawning 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 boulder and cascading falls. Salmon are utilising 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

Station	Location	Remarks
1	Sky Creek at the mouth	Tea colour waters
2	Bronson Creek upstream of Cominco camp	Influenced by glaciers
3	Monsoon Creek downstream	Tea colour waters
4	Iskut River upstream of Bronson Creek	Influenced by glaciers
5	Iskut River downstream of Monsoon Creek	Influenced by glaciers
6	Mine adit	Level 130
7	Mine adit	Level 180
8	Mine adit	Level 300

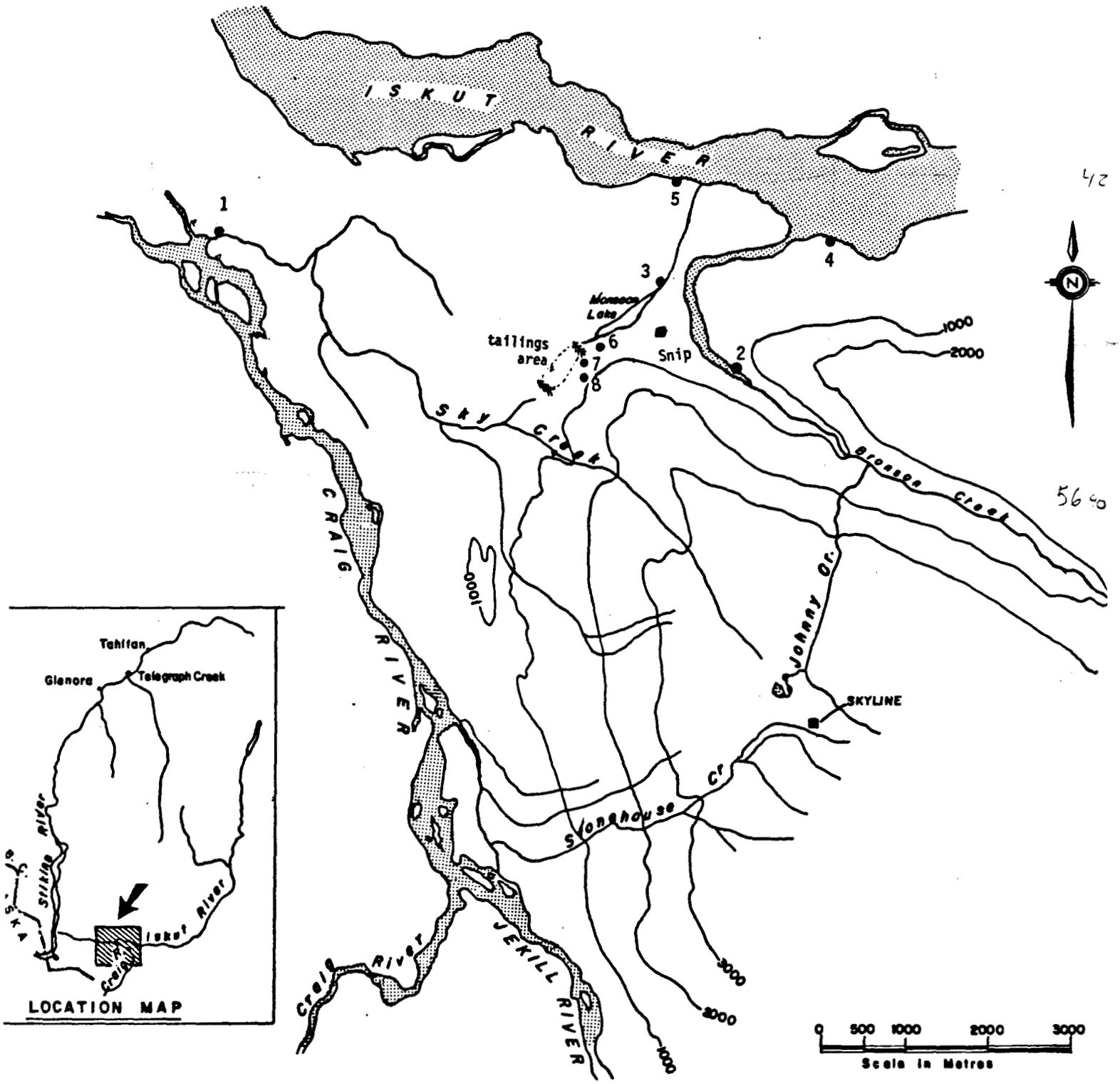


FIGURE 1 Snip Project - Sampling Sites

MATERIAL AND METHODS

The site was visited on July 30, 1990. No flow measurements were taken at the sites. Water chemistry and sediment samples were collected at the six receiving water stations but only water at the mine adit. The following chemical parameters were analysed: alkalinity, pH, filterable residue, non-filterable residue, and sulphate. These samples were kept cool with ice until analysed. 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). 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 copper, 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 sites, except for stations 6, 7 and 8. 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.

Statistical analysis consisted of averages and standard deviation for the water quality data and one way analysis of variance was performed on selected sediment data. The ANOVA was performed on a Hewlett Packward Model 9826. Multiple comparison procedures using the Tukey's harmonic significant differences were used to produce the various plots. Contaminants with values below the detection limit were used as equal to the detection limit. However stations with standard deviations equal to zero were given some lower value in order to introduce variability. A standard deviation equal to zero introduced an error in the Tukey's separation procedure. Such modification of the sediment data was necessary for cadmium at station 4 and mercury at station 3. Figure 2 shows the multiple comparison plots for sediment quality stations. the metal analysed are Al, Ca, Cd, Cu, Hg, Fe, Mn, Pb and Zn.

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.

Table 1

Metal Water Quality - Snip Project -
July 21, 1990

Station Number		TOTICP AG MG/L	DISICP AG MG/L	TOTICP AL MG/L	DISICP AL MG/L	TOTICP AS MG/L	DISICP AS MG/L	TOTICP BA MG/L	DISICP BA MG/L	TOTICP CA MG/L	DISICP CA MG/L	TOTICP CD MG/L	TOTGF CD MG/L	DISICP CD MG/L	DISGF CD MG/L	TOTICP CO MG/L	DISICP CO MG/L
	Repl.1	<.01	<.01	0.23	<.05	<.05	<.05	0.041	0.037	15.8	16.2	<.005	<.0001	<.005	<.0001	<.005	<.005
1	Repl.2	<.01	<.01	0.20	<.05	<.05	<.05	0.042	0.037	15.6	16.4	<.005	<.0001	<.005	<.0001	<.005	<.005
	Repl.3	<.01	<.01	0.32	<.05	0.07	<.05	0.042	0.037	15.9	15.9	<.005	<.0001	<.005	<.0001	<.005	<.005
	Average	---	---	0.25	---	---	---	0.042	0.037	15.8	16.2	---	---	---	---	---	---
	S.D.	---	---	0.06	---	---	---	0.001	0.000	0.2	0.3	---	---	---	---	---	---
	Repl.1	<.01	<.01	31.90	0.08	0.07	<.05	0.598	0.024	40.1	16.1	<.005	0.0017	<.005	0.0001	0.095	<.005
2	Repl.2	<.01	<.01	37.10	0.08	0.08	<.05	0.676	0.024	47.1	16.2	<.005	0.0016	<.005	<.0001	0.104	<.005
	Repl.3	<.01	<.01	39.60	0.08	<.05	<.05	0.762	0.024	59.1	16.0	<.005	0.0020	<.005	<.0001	0.111	<.005
	Average	---	---	36.20	0.08	0.08	---	0.679	0.024	48.8	16.1	---	---	---	---	0.103	---
	S.D.	---	---	3.93	0.00	0.01	---	0.082	0.000	9.6	0.1	---	---	---	---	0.008	---
	Repl.1	<.01	<.01	<.05	<.05	<.05	<.05	0.101	0.096	55.7	54.3	<.005	<.0001	<.005	<.0001	<.005	<.005
3	Repl.2	<.01	<.01	<.05	<.05	<.05	<.05	0.103	0.095	56.0	54.4	<.005	<.0001	<.005	<.0001	<.005	<.005
	Repl.3	<.01	<.01	0.06	<.05	<.05	<.05	0.102	0.098	56.0	56.6	<.005	<.0001	<.005	<.0001	<.005	<.005
	Average	---	---	---	---	---	---	0.102	0.096	55.9	55.1	---	---	---	---	---	---
	S.D.	---	---	---	---	---	---	0.001	0.002	0.2	1.3	---	---	---	---	---	---
	Repl.1	<.01	<.01	16.10	<.05	<.05	<.05	0.223	0.034	22.3	16.9	<.005	<.0001	<.005	<.0001	0.036	<.005
4	Repl.2	<.01	<.01	17.50	0.06	0.08	<.05	0.258	0.035	22.3	16.5	<.005	<.0001	<.005	<.0001	0.042	<.005
	Repl.3	<.01	<.01	15.90	0.09	<.05	<.05	0.228	0.035	22.0	16.4	<.005	<.0001	<.005	<.0001	0.038	<.005
	Average	---	---	16.50	0.08	---	---	0.236	0.035	22.2	16.6	---	---	---	---	0.039	---
	S.D.	---	---	0.87	0.02	---	---	0.019	0.001	0.2	0.3	---	---	---	---	0.003	---
	Repl.1	<.01	<.01	17.80	<.05	<.05	<.05	0.265	0.035	24.1	17.0	<.005	0.0002	<.005	<.0001	0.045	<.005
5	Repl.2	<.01	<.01	16.80	0.06	<.05	<.05	0.254	0.034	23.9	17.0	<.005	0.0002	<.005	<.0001	0.045	<.005
	Repl.3	<.01	<.01	17.40	0.07	0.08	<.05	0.257	0.035	24.1	16.7	<.005	<.0001	<.005	<.0001	0.047	<.005
	Average	---	---	17.33	0.07	---	---	0.259	0.035	24.0	16.9	---	---	---	---	0.046	---
	S.D.	---	---	0.50	0.01	---	---	0.006	0.001	0.1	0.2	---	---	---	---	0.001	---
6		<.01	<.01	22.10	<.05	0.16	<.05	0.752	0.048	110.0	54.6	0.006	0.0013	<.005	0.0002	0.310	<.005
7		<.01	<.01	0.09	<.05	<.05	<.05	0.052	0.044	59.8	59.7	<.005	<.0001	<.005	0.0003	<.005	<.005
8		<.01	<.01	0.14	<.05	<.05	<.05	0.047	0.044	53.4	52.3	<.005	<.0001	<.005	0.0001	<.005	<.005
Blank		<.01	<.01	<.05	<.05	<.05	<.05	<.001	<.001	<.1	<.1	<.005	<.0001	<.005	<.0001	<.005	<.005

Table 1 (cont.)

Metal Water Quality - Snip Project -
July 21, 1990

Station Number		TOTICP CR MG/L	DISICP CR MG/L	TOTICP CU MG/L	TOTGF CU MG/L	DISICP CU MG/L	DISGF CU MG/L	TOTICP FE MG/L	DISICP FE MG/L	TOTICP K MG/L	DISICP K MG/L	TOTICP MG MG/L	DISICP MG MG/L	TOTICP MN MG/L	DISICP MN MG/L	TOTICP MO MG/L	DISICP MO MG/L
	Repl.1	<.005	<.005	<.005	0.0010	<.005	<.0005	1.400	0.494	<2	<2	1.8	1.8	0.233	0.232	<.01	<.01
1	Repl.2	<.005	<.005	<.005	0.0013	<.005	<.0005	1.340	0.515	<2	<2	1.8	1.8	0.229	0.235	<.01	<.01
	Repl.3	<.005	<.005	0.007	0.0018	<.005	<.0005	1.470	0.475	<2	<2	1.8	1.7	0.234	0.228	<.01	<.01
	Average	---	---	--↓	0.0014	---	---	1.403	0.495	---	---	1.8	1.8	0.232	0.232	---	---
	S.D.	---	---	--↓	0.0004	---	---	0.065	0.020	---	---	0.0	0.1	0.003	0.004	---	---
	Repl.1	0.032	<.005	0.130	---	<.005	<.0005	35.700	0.034	12	<2	13.4	1.3	1.610	0.088	<.01	<.01
2	Repl.2	0.032	<.005	0.102	---	<.005	<.0005	40.900	0.037	13	<2	15.1	1.3	1.800	0.089	<.01	<.01
	Repl.3	0.041	<.005	0.118	---	<.005	<.0005	44.100	0.032	16	<2	16.4	1.3	2.070	0.087	<.01	<.01
	Average	0.035	---	0.117	---	---	---	40.233	0.034	14	---	15.0	1.3	1.827	0.088	---	---
	S.D.	0.005	---	0.014	---	---	---	4.239	0.003	2	---	1.5	0.0	0.231	0.001	---	---
	Repl.1	<.005	<.005	<.005	<.0006	<.005	<.0005	0.660	0.083	5	5	4.4	4.3	0.373	0.372	<.01	<.01
3	Repl.2	<.005	<.005	<.005	<.0006	<.005	<.0005	0.663	0.070	5	5	4.4	4.3	0.380	0.373	<.01	<.01
	Repl.3	<.005	<.005	0.018	0.0173	<.005	<.0005	0.645	0.088	5	6	4.4	4.4	0.375	0.389	<.01	<.01
	Average	---	---	---	---	---	---	0.656	0.080	5	5	4.4	4.3	0.376	0.378	---	---
	S.D.	---	---	---	---	---	---	0.010	0.009	0	1	0.0	0.1	0.004	0.010	---	---
	Repl.1	0.021	<.005	0.036	---	<.005	<.0005	15.600	0.018	4	<2	8.4	2.5	0.367	0.013	<.01	<.01
4	Repl.2	0.024	<.005	0.049	---	<.005	<.0005	16.700	0.034	4	<2	8.7	2.5	0.376	0.013	<.01	<.01
	Repl.3	0.021	<.005	0.039	---	<.005	<.0005	15.100	0.044	4	<2	8.1	2.5	0.355	0.014	<.01	<.01
	Average	0.022	---	0.041	---	---	---	15.800	0.032	4	---	8.4	2.5	0.366	0.013	---	---
	S.D.	0.002	---	0.007	---	---	---	0.819	0.013	0	---	0.3	0.0	0.011	0.001	---	---
	Repl.1	0.019	<.005	0.027	---	<.005	<.0005	17.200	0.029	4	<2	8.7	2.4	0.439	0.020	<.01	<.01
5	Repl.2	0.016	<.005	0.025	---	<.005	<.0005	16.500	0.032	4	<2	8.5	2.4	0.431	0.019	<.01	<.01
	Repl.3	0.022	<.005	0.027	---	<.005	<.0005	17.500	0.060	5	<2	8.7	2.4	0.435	0.020	<.01	<.01
	Average	0.019	---	0.026	---	---	---	17.067	0.040	4	---	8.6	2.4	0.435	0.020	---	---
	S.D.	0.003	---	0.001	---	---	---	0.513	0.017	1	---	0.1	0.0	0.004	0.001	---	---
6	19	<.005	<.005	1.330	---	<.005	0.0027	152.000	0.008	21	9	19.5	6.2	3.930	0.704	0.1	0.0
7	17	<.005	<.005	0.016	0.0169	<.005	<.0005	0.153	0.007	5	6	9.2	9.2	0.052	0.049	0.0	0.0
8	18	<.005	<.005	<.005	<.0006	<.005	<.0005	0.216	<.005	5	5	6.9	6.9	0.014	0.008	0.0	0.0
Blank	1	<.005	<.005	<.005	0.0010	<.005	<.0005	<.005	<.005	<2	<2	<.1	<.1	<.001	<.001	<.01	<.01

Table 1 (cont.)

Metal Water Quality - Snip Projet -
July 21, 1990

Station Number		TOTICP NA MG/L	DISICP NA MG/L	TOTICP NI MG/L	DISICP NI MG/L	TOTICP P MG/L	DISICP P MG/L	TOTICP PB MG/L	TOTGF PB MG/L	DISICP PB MG/L	DISGF PB MG/L	TOTICP SB MG/L	DISICP SB MG/L	TOTICP SI MG/L	DISICP SI MG/L	TOTICP SE MG/L	DISICP SE MG/L
	Repl.1	1.4	1.5	<.02	<.02	<.1	<.1	<.05	0.0006	<.05	<.0005	<.05	<.05	3.19	2.82	<.05	<.05
1	Repl.2	1.4	1.5	<.02	<.02	<.1	<.1	<.05	0.0006	<.05	<.0005	<.05	<.05	3.11	2.85	<.05	<.05
	Repl.3	1.4	1.5	<.02	<.02	<.1	<.1	<.05	0.0009	<.05	<.0005	<.05	<.05	3.39	2.78	<.05	<.05
	Average	1.4	1.5	---	---	---	---	---	0.0007	---	---	---	---	3.23	2.82	---	---
	S.D.	0.0	0.0	---	---	---	---	---	0.0002	---	---	---	---	0.14	0.04	---	---
	Repl.1	4.2	0.4	0.03	<.02	1.6	<.1	0.08	0.1060	<.05	<.0005	<.05	<.05	48.00	0.89	<.05	<.05
2	Repl.2	4.5	0.5	0.03	<.02	2.1	<.1	0.06	0.1230	<.05	<.0005	<.05	<.05	50.60	0.90	<.05	<.05
	Repl.3	4.5	0.4	0.03	<.02	2.6	<.1	0.09	0.1100	<.05	<.0005	<.05	<.05	73.50	0.89	<.05	<.05
	Average	4.4	0.4	0.03	---	2.1	---	0.08	0.1130	---	---	---	---	57.37	0.89	---	---
	S.D.	0.2	0.1	0.00	---	0.5	---	0.02	0.0089	---	---	---	---	14.03	0.01	---	---
	Repl.1	2.1	2.4	<.02	<.02	<.1	<.1	<.05	0.0009	<.05	<.0005	<.05	<.05	2.96	2.91	<.05	<.05
3	Repl.2	2.1	2.3	<.02	<.02	<.1	<.1	<.05	0.0007	<.05	<.0005	<.05	<.05	2.98	2.90	<.05	<.05
	Repl.3	2.1	2.4	<.02	<.02	<.1	<.1	<.05	0.0019	<.05	<.0005	<.05	<.05	2.98	3.01	<.05	<.05
	Average	2.1	2.4	---	---	---	---	---	0.0012	---	---	---	---	2.97	2.94	---	---
	S.D.	0.0	0.1	---	---	---	---	---	0.0006	---	---	---	---	0.01	0.06	---	---
	Repl.1	3.0	1.1	<.02	<.02	0.4	<.1	<.05	0.0060	<.05	<.0005	<.05	<.05	27.90	1.25	<.05	<.05
4	Repl.2	3.2	1.1	<.02	<.02	0.4	<.1	<.05	0.0065	<.05	<.0005	<.05	<.05	30.00	1.24	<.05	<.05
	Repl.3	3.1	1.1	<.02	<.02	0.4	<.1	<.05	0.0063	<.05	<.0005	<.05	<.05	28.10	1.26	<.05	<.05
	Average	3.1	1.1	---	---	0.4	---	---	0.0063	---	---	---	---	28.67	1.25	---	---
	S.D.	0.1	0.0	---	---	0.0	---	---	0.0003	---	---	---	---	1.16	0.01	---	---
	Repl.1	3.4	1.0	<.02	<.02	0.4	<.1	<.05	0.0085	<.05	<.0005	<.05	<.05	33.00	1.21	<.05	<.05
5	Repl.2	3.2	1.0	<.02	<.02	0.3	<.1	<.05	0.0096	<.05	<.0005	<.05	<.05	29.60	1.20	<.05	<.05
	Repl.3	3.3	1.1	<.02	<.02	0.4	<.1	<.05	0.0093	<.05	<.0005	<.05	<.05	30.80	1.21	<.05	<.05
	Average	3.3	1.0	---	---	0.4	---	---	0.0091	---	---	---	---	31.13	1.21	---	---
	S.D.	0.1	0.1	---	---	0.1	---	---	0.0006	---	---	---	---	1.72	0.01	---	---
6	19	2.2	1.8	0.02	<.02	2.7	<.1	0.13	0.0016	<.05	<.0005	<.05	<.05	38.00	2.86	<.05	<.05
7	17	5.4	6.1	<.02	<.02	<.1	<.1	<.05	0.0021	<.05	0.0005	<.05	<.05	4.54	4.53	<.05	<.05
8	18	2.7	2.9	<.02	<.02	<.1	<.1	<.05	0.0012	<.05	0.0006	<.05	<.05	4.23	4.03	<.05	<.05
Blank		<.1	<.1	<.02	<.02	<.1	<.1	<.05	<.0006	<.05	<.0005	<.05	<.05	0.07	<.05	<.05	<.05

Table 1 (cont.) Metal Water Quality - Snip Project - July 21, 1990

Station Number		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
	Repl.1	<.05	<.05	0.076	0.074	<.002	<.002	<.01	<.01	<.002	<.002
1	Repl.2	<.05	<.05	0.076	0.075	<.002	<.002	<.01	<.01	<.002	<.002
	Repl.3	<.05	<.05	0.077	0.074	<.002	<.002	<.01	<.01	<.002	<.002
	Average	---	---	0.076	0.074	---	---	---	---	---	---
	S.D.	---	---	0.001	0.001	---	---	---	---	---	---
	Repl.1	<.05	<.05	0.270	0.082	1.840	<.002	0.10	<.01	0.560	<.002
2	Repl.2	<.05	<.05	0.301	0.082	2.010	<.002	0.11	<.01	0.260	<.002
	Repl.3	<.05	<.05	0.342	0.082	2.110	<.002	0.13	<.01	0.282	<.002
	Average	---	---	0.304	0.082	1.987	---	0.11	---	0.367	---
	S.D.	---	---	0.036	0.000	0.137	---	0.02	---	0.167	---
	Repl.1	<.05	<.05	0.396	0.386	<.002	<.002	<.01	<.01	<.002	<.002
3	Repl.2	<.05	<.05	0.397	0.384	<.002	<.002	<.01	<.01	<.002	<.002
	Repl.3	<.05	<.05	0.396	0.394	<.002	<.002	<.01	<.01	<.002	<.002
	Average	---	---	0.396	0.388	---	---	---	---	---	---
	S.D.	---	---	0.001	0.005	---	---	---	---	---	---
	Repl.1	<.05	<.05	0.145	0.099	0.477	<.002	0.04	<.01	0.034	<.002
4	Repl.2	<.05	<.05	0.147	0.098	0.548	<.002	0.05	<.01	0.037	<.002
	Repl.3	<.05	<.05	0.145	0.098	0.450	<.002	0.04	<.01	0.034	<.002
	Average	---	---	0.146	0.098	0.492	---	0.04	---	0.035	---
	S.D.	---	---	0.001	0.001	0.051	---	0.01	---	0.002	---
	Repl.1	<.05	<.05	0.155	0.098	0.655	<.002	0.05	<.01	0.075	<.002
5	Repl.2	<.05	<.05	0.154	0.097	0.543	<.002	0.04	<.01	0.048	<.002
	Repl.3	<.05	<.05	0.155	0.098	0.581	<.002	0.05	<.01	0.049	<.002
	Average	---	---	0.155	0.098	0.593	---	0.05	---	0.057	---
	S.D.	---	---	0.001	0.001	0.057	---	0.01	---	0.015	---
6		<.05	<.05	0.682	0.362	1.390	<.002	0.13	<.01	0.386	<.002
7		<.05	<.05	1.110	1.100	<.002	<.002	<.01	<.01	0.035	<.002
8		<.05	<.05	0.576	0.570	<.002	<.002	<.01	<.01	0.022	0.003
Blank		<.05	<.05	<.001	<.001	<.002	<.002	<.01	<.01	<.002	<.002

Table 2 Water Quality - Snip Project - July 21, 1990

Station Number		ALK MG/L	DISICP HC MG/L	DISICP HT MG/L	PH REL.U.	NFR MG/L	TR MG/L	SO4 MG/L
	Repl.1	51	47.8	49.2	7.8	6	70	6.1
1	Repl.2	---	48.4	49.9	---	---	---	---
	Repl.3	45	47.0	48.4	7.6	6	80	6.6
	Average	48	47.7	49.2	7.7	6	75	6.4
	S.D.	4	0.7	0.8	0.1	0	7	0.4
	Repl.1	43	45.6	46.3	8.0	563	740	19.4
2	Repl.2	44	45.9	46.6	8.1	625	810	20.2
	Repl.3	41	45.4	46.2	8.0	581	850	19.3
	Average	43	45.6	46.4	8.0	590	800	19.6
	S.D.	2	0.3	0.2	0.1	32	56	0.5
	Repl.1	124	153.0	155.0	7.8	<5	230	45.7
3	Repl.2	125	153.0	155.0	7.8	<5	220	45.1
	Repl.3	127	160.0	161.0	8.3	<5	210	45.3
	Average	125	155.3	157.0	8.0	---	220	45.4
	S.D.	2	4.0	3.5	0.3	---	10	0.3
	Repl.1	47	52.5	52.9	7.9	255	330	14.9
4	Repl.2	46	51.5	52.0	8.1	251	360	14.9
	Repl.3	47	51.3	52.0	7.9	261	360	14.8
	Average	47	51.8	52.3	8.0	256	350	14.9
	S.D.	1	0.6	0.5	0.1	5	17	0.1
	Repl.1	46	52.3	52.8	7.9	292	390	14.7
5	Repl.2	47	52.2	52.7	7.9	290	380	15.3
	Repl.3	46	51.7	52.3	7.9	261	380	15.6
	Average	46	52.1	52.6	7.9	281	383	15.2
	S.D.	1	0.3	0.3	0.0	17	6	0.5
6		106	162.0	164.0	7.7	2370	3150	72.4
7		126	187.0	188.0	8.1	<5	230	63.4
8		121	159.0	160.0	8.3	<5	220	58.1
Blank		<1	<.4	<.4	5.4	<5	<10	0.5

Table 3

Sediment Quality - Snip Project -
July 21, 1990

Station Number		SEDICP AG UG/G	SEDICP AL UG/G	SEDICP AS UG/G	SEDICP BA UG/G	SEDICP BE UG/G	SEDICP CA UG/G	SEDICP CD UG/G	SEDICP CO UG/G	SEDICP CR UG/G	SEDICP CU UG/G	SEDICP FE UG/G	SEDHG HG UG/G	SEDICP K UG/G	SEDICP MG UG/G	SEDICP MN UG/G
	Repl.1	<2	14800	18	970	0.5	7530	4.3	<20	34.2	51.3	87600	0.040	2700	6630	14200
	Repl.2	<2	13500	<8	259	0.5	6900	2.0	<20	24.4	45.7	54100	0.010	2400	5900	2440
1	Repl.3	<2	11100	<8	203	0.4	6740	2.1	<20	27.9	34.6	74100	0.010	1800	4690	2450
	Repl.4	<2	13100	<8	960	0.4	7020	4.4	<20	25.0	45.5	72400	0.053	2100	5460	15900
	Average	---	13125	---	598	0.5	7048	3.2	---	27.9	44.3	72050	0.028	2250	5670	8748
	S.D.	---	1533	---	424	0.1	342	1.3	---	4.5	7.0	13764	0.022	387	812	7311
	Repl.1	<2	14900	100	304	0.4	17200	5.0	<20	20.0	221.0	93300	0.009	5100	6460	917
	Repl.2	<2	14300	120	310	0.3	16600	5.5	<20	19.8	183.0	82300	0.010	4800	6200	893
2	Repl.3	<2	15200	120	294	0.3	16100	5.1	<20	19.4	147.0	67600	0.020	5300	6580	882
	Repl.4	<2	14200	90	279	0.2	14400	5.4	<20	18.2	169.0	72600	0.010	4800	6140	836
	Average	---	14650	108	297	0.3	16075	5.3	---	19.4	180.0	78950	0.012	5000	6345	882
	S.D.	---	480	15	14	0.1	1204	0.2	---	0.8	31.1	11347	0.005	245	209	34
	Repl.1	<2	18900	17	556	0.4	8180	2.9	<20	25.4	191.0	58400	0.010	4500	7190	2430
	Repl.2	<2	17400	10	492	0.4	7290	3.5	<20	21.7	175.0	55200	0.010	4400	6600	1230
3	Repl.3	<2	21300	42	629	0.5	9490	2.8	<20	27.7	232.0	64500	0.010	5200	8200	3730
	Repl.4	<2	22300	28	713	0.6	10100	3.0	<20	28.5	275.0	69100	0.010	5600	8630	4930
	Average	---	19975	24	598	0.5	8765	3.1	---	25.8	218.3	61800	0.010	4925	7655	3080
	S.D.	---	2232	14	95	0.1	1268	0.3	---	3.0	44.8	6210	0.000	574	927	1601
	Repl.1	<2	20200	<8	389	0.7	13600	<.8	<20	49.4	58.5	43300	0.046	2000	11000	689
	Repl.2	<2	20000	<8	344	0.6	13800	<.8	<20	45.9	49.1	38200	0.044	1000	10800	684
4	Repl.3	<2	21400	<8	332	0.6	14400	<.8	<20	48.5	57.8	38500	0.052	1800	11200	719
	Repl.4	<2	19400	<8	373	0.6	14500	<.8	<20	47.0	56.4	40200	0.042	1000	11100	687
	Average	---	20250	---	360	0.6	14075	---	---	47.7	55.5	40050	0.046	1450	11025	695
	S.D.	---	839	---	26	0.0	443	---	---	1.6	4.3	2339	0.004	526	171	16
	Repl.1	<2	21500	19	461	0.6	11000	2.1	<20	51.6	98.9	60600	0.030	2300	10800	770
	Repl.2	<2	23100	50	384	0.7	11500	<.8	<20	50.1	130.0	60300	0.020	2900	11500	864
5	Repl.3	<2	22900	<8	448	0.7	9820	1.0	<20	56.3	82.0	54000	0.038	2500	11100	772
	Repl.4	<2	22100	<8	501	0.6	12200	1.8	<20	50.0	116.0	60000	0.064	2600	10600	802
	Average	---	22400	---	449	0.7	11130	1.6	---	52.0	106.7	58725	0.038	2575	11000	802
	S.D.	---	739	---	49	0.1	1002	0.6	---	3.0	20.8	3160	0.019	250	392	44
NBS 1646		<2	23000	<8	52	1.0	4300	<.8	<20	49.2	16.0	27600	0.072	5300	8420	243
NBS 1646		<2	23200	<8	53	1.0	4520	<.8	<20	50.0	16.9	29100	0.069	5400	8910	275
NBS 1646		<2	26500	<8	64	1.0	4750	<.8	<20	54.9	17.6	30400	0.071	6200	9350	269

Table 3 (cont.)

Sediment Quality - Snip Project -
July 21, 1990

Station Number		SEDICP MO UG/G	SEDICP NA UG/G	SEDICP NI UG/G	SEDICP P UG/G	SEDICP PB UG/G	SEDICP SB UG/G	SEDICP SI UG/G	SEDICP SN UG/G	SEDICP SR UG/G	SEDICP TI UG/G	SEDICP V UG/G	SEDICP ZN UG/G	SEDICP SFR MG/KG	SEDICP SVR MG/KG
	Repl.1	10	470	51	1400	<8	<8	1380	<8	52.8	1460	171	314	975000	24600
	Repl.2	<2	470	23	1400	10	<8	1030	<8	46.6	1430	120	166	968000	32300
1	Repl.3	<2	350	17	1500	10	<8	1060	<8	42.7	1280	181	141	974000	26000
	Repl.4	8	860	79	1300	<8	<8	1310	<8	56.0	1300	120	378	978000	21800
	Average	---	538	43	1400	---	---	1195	---	49.5	1368	148	250	973750	26175
	S.D.	---	193	25	71	---	---	152	---	5.2	79	28	99	3631	3846
	Repl.1	4	460	45	1670	267	<8	1250	<8	87.2	1240	99	475	967000	32800
	Repl.2	5	450	43	1600	244	<8	1190	<8	82.4	1150	92	478	968000	32100
2	Repl.3	2	440	34	1400	150	<8	1070	<8	81.4	1160	83	458	973000	26800
	Repl.4	17	430	37	1400	150	<8	1230	<8	72.1	1100	83	481	966000	33700
	Average	7	445	40	1518	203	---	1185	---	80.8	1163	89	473	968500	31350
	S.D.	6	11	4	120	53	---	70	---	5.5	50	7	9	2693	2687
	Repl.1	10	570	29	1750	61	<8	1530	<8	83.2	1290	88	292	976000	24400
	Repl.2	8	530	28	1600	47	<8	1250	<8	72.2	1200	78	293	989000	11300
3	Repl.3	20	650	34	1920	61	<8	1480	<8	94.9	1440	95	334	972000	27800
	Repl.4	20	660	37	2020	61	<8	1550	<8	104.0	1520	95	393	964000	35900
	Average	15	603	32	1823	58	---	1453	---	88.6	1363	89	328	975250	24850
	S.D.	6	54	4	161	6	---	120	---	12.0	125	7	41	9038	8869
	Repl.1	<2	310	50	950	10	<8	1370	<8	57.7	1150	110	111	987000	13400
	Repl.2	<2	350	51	930	<8	<8	1470	<8	54.5	1030	94	107	986000	14400
4	Repl.3	<2	430	53	940	9	<8	1410	<8	56.8	1070	97	107	985000	14800
	Repl.4	<2	360	50	1000	<8	<8	1540	<8	56.3	1120	100	109	987000	12800
	Average	---	363	51	955	10	---	1448	---	56.3	1093	100	109	986250	13850
	S.D.	---	43	1	27	1	---	64	---	1.2	46	6	2	829	792
	Repl.1	4	430	53	1200	32	<8	1460	<8	61.1	1320	140	180	986000	13900
	Repl.2	8	610	52	1300	27	9	1550	<8	64.8	1430	130	231	983000	16600
5	Repl.3	2	580	61	1100	20	<8	1350	<8	56.4	1240	130	178	985000	15100
	Repl.4	<2	430	53	1200	40	<8	1250	<8	67.3	1380	130	225	985000	14900
	Average	5	513	55	1200	30	---	1403	---	62.4	1343	133	204	984750	15125
	S.D.	2	83	4	71	7	---	113	---	4.1	71	4	25	1090	965
NBS 1646		2	11300	24	510	23	<8	1780	<8	30.8	758	53	123	---	---
NBS 1646		<2	12200	24	570	25	<8	2030	<8	32.9	786	55	127	---	---
NBS 1646		2	12500	27	580	27	<8	1760	<8	35.0	851	59	134	---	---

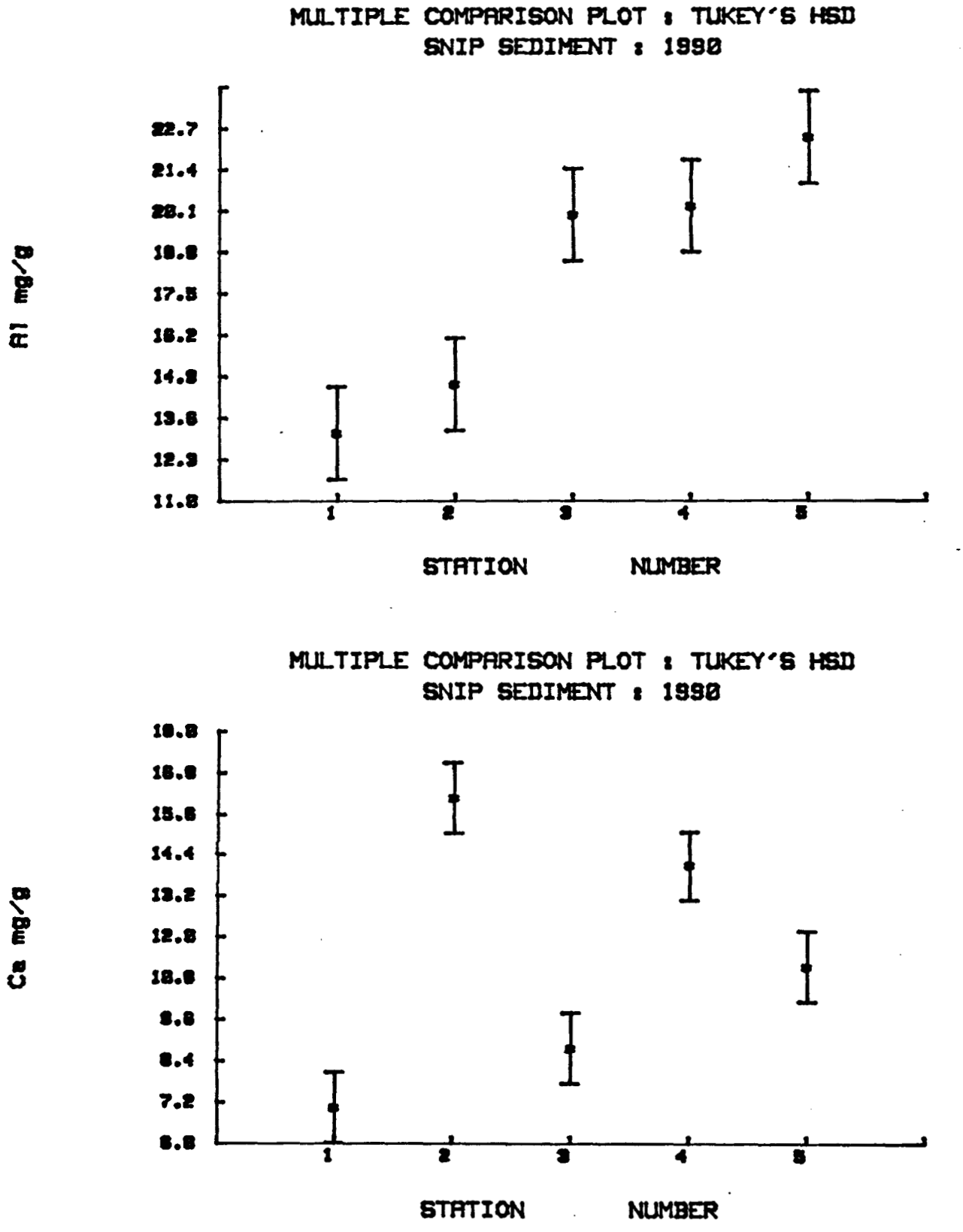
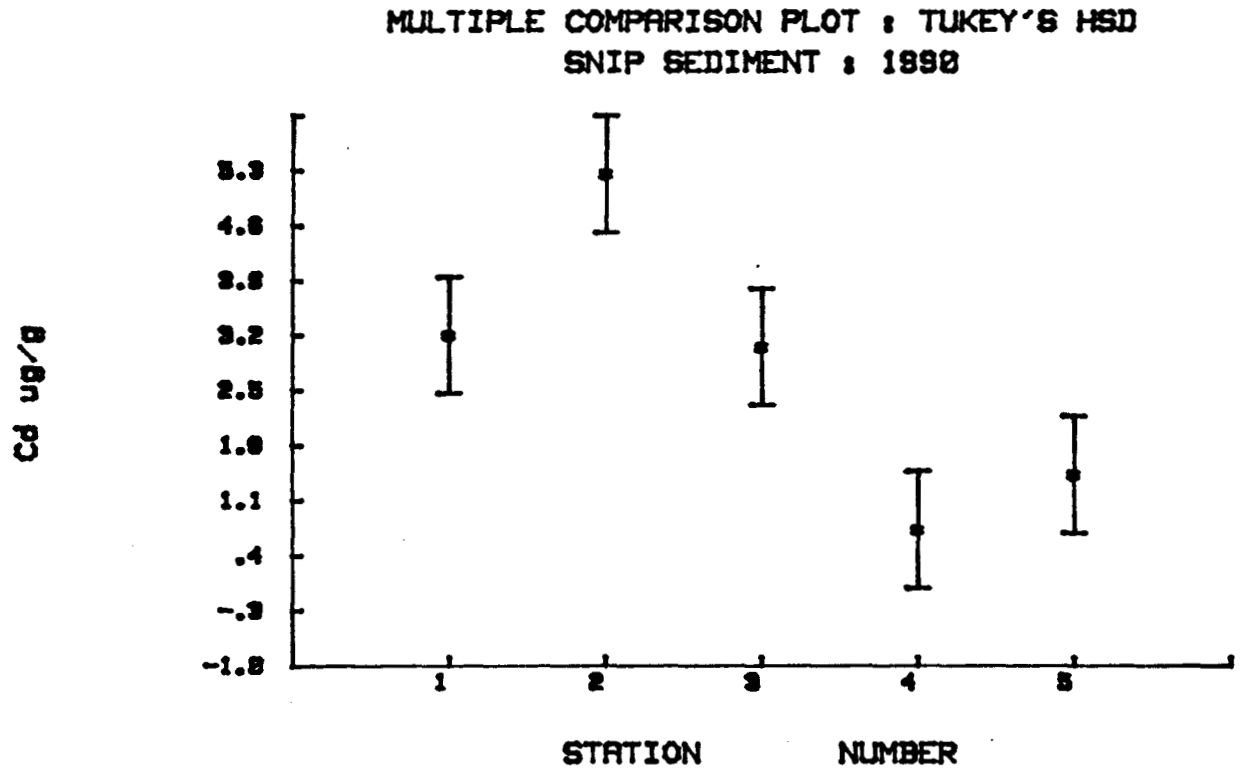


FIGURE 2: SEDIMENT MULTIPLE COMPARISON PLOT - SNIP 1990 - Al, Ca



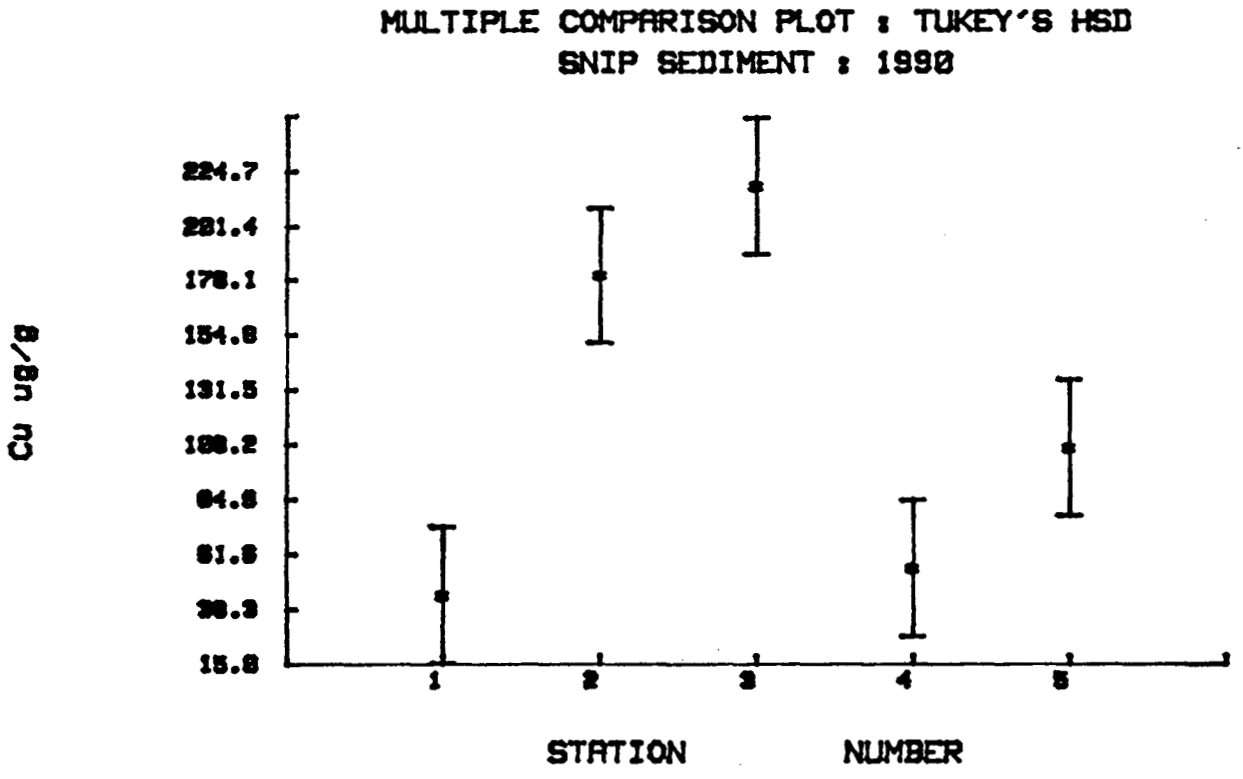
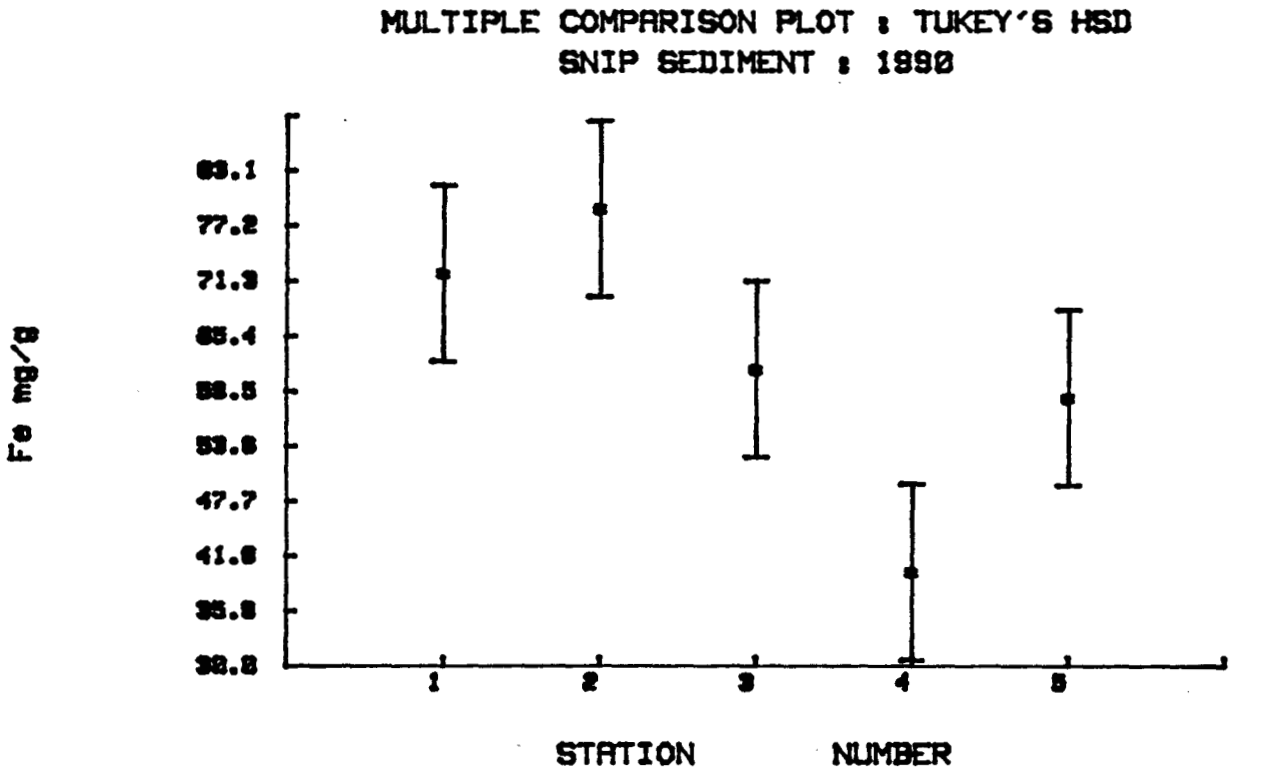


FIGURE 2: SEDIMENT MULTIPLE COMPARISON PLOT - SNIP 1990 - Cd, Cu



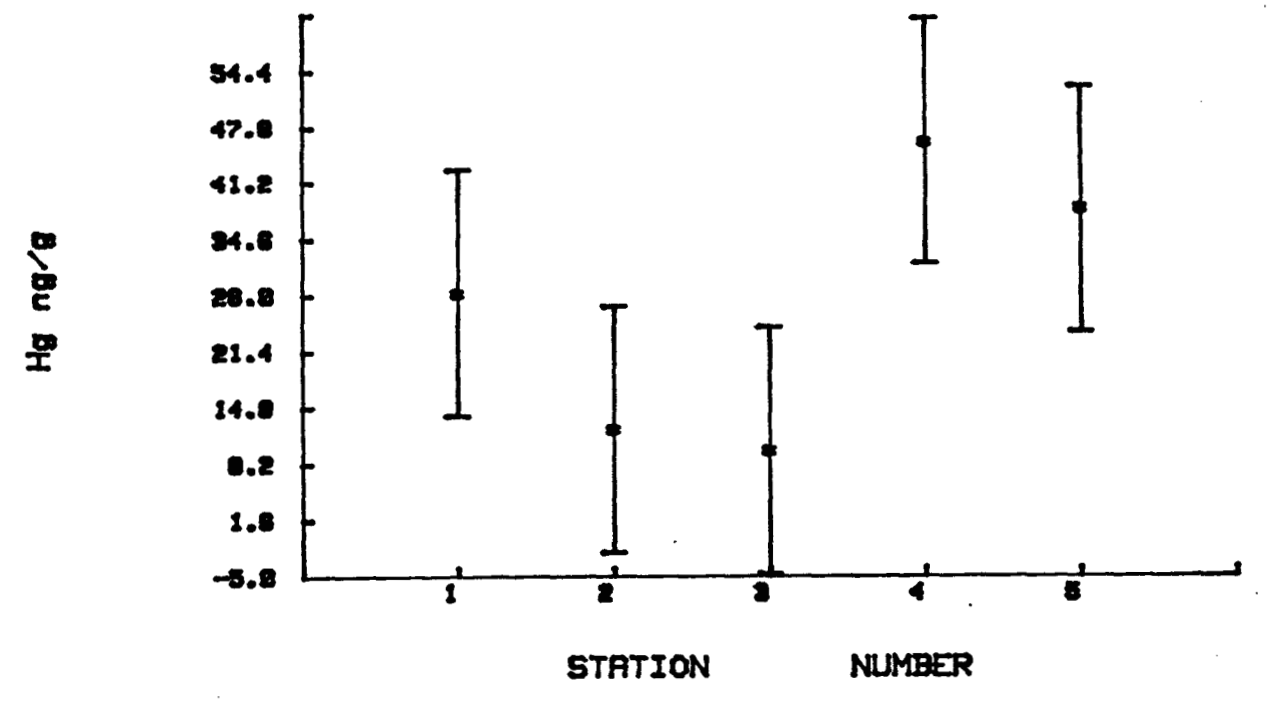


FIGURE 2: SEDIMENT MULTIPLE COMPARISON PLOT - SNIP 1990 - Fe, Hg

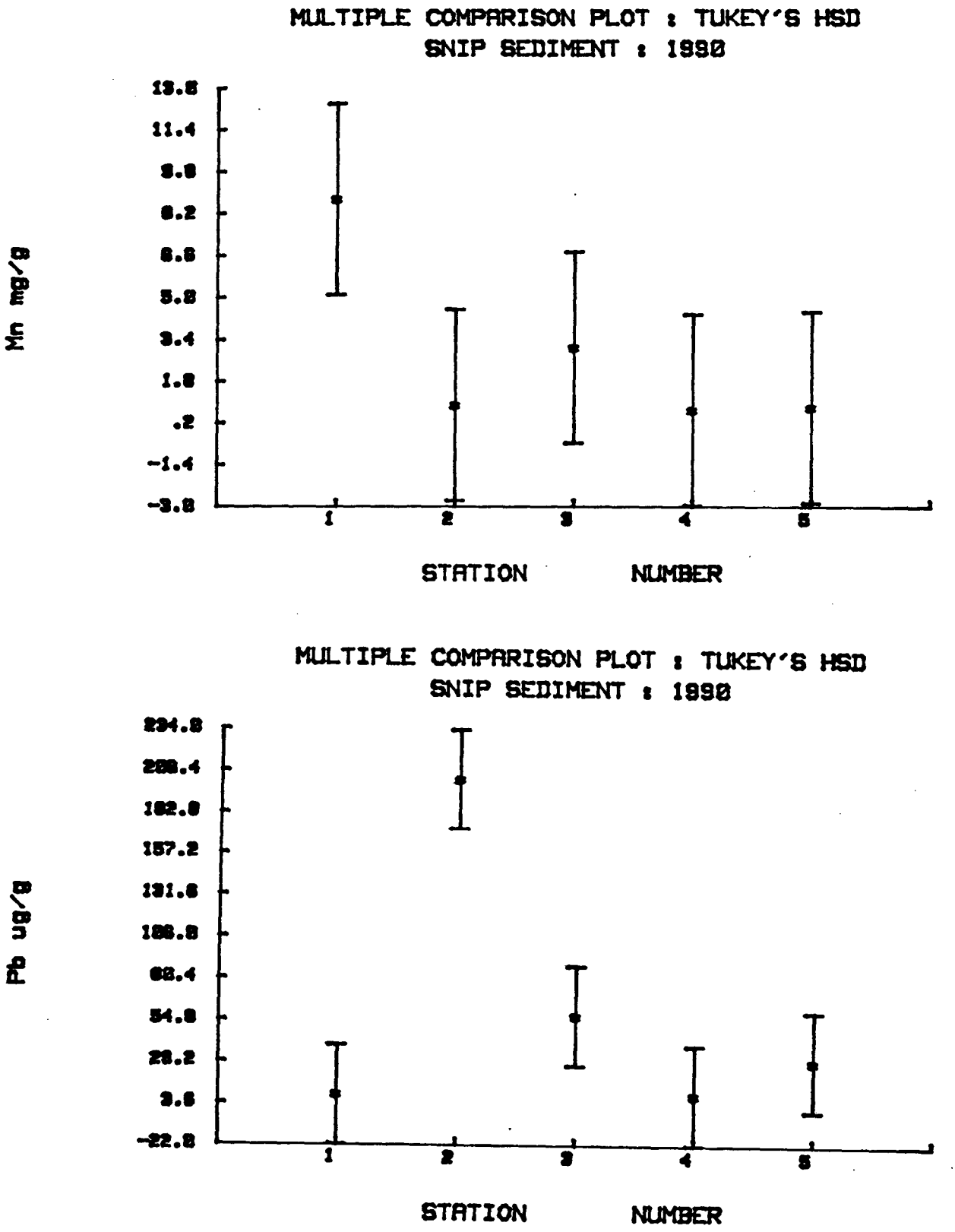


FIGURE 2: SEDIMENT MULTIPLE COMPARISON PLOT - SNIP 1990 - Mn, Pb

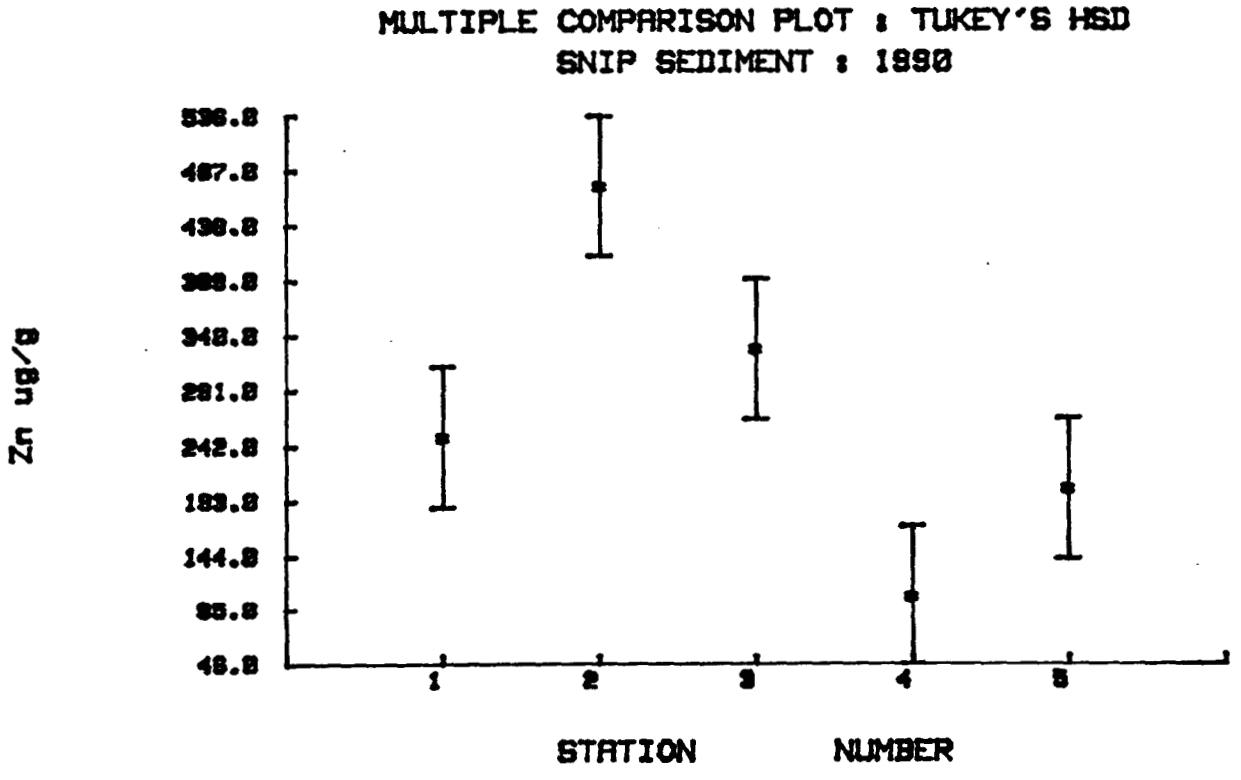


FIGURE 2: SEDIMENT MULTIPLE COMPARISON PLOT - SNIP 1990 - Zn

Sky Creek site (station 1) is characterised by relatively low aluminum, calcium, copper, lead, and zinc sediment concentrations in comparison with the other sites in this survey. This is a reflection of good water quality with low metal content, adequate buffering capacity and low hardness.

The Bronson Creek site (station 2) upstream of the Cominco camp is located about 3 km from the mouth of the creek. The area is influenced by the Bronson Glacier, Johnny Creek (receiving Skyline mine discharge) and natural acid rock drainage generated from the canyon walls in the lower part of the system. Sediment content showed detectable values for arsenic with an average of 108 ug/g. Except for mercury, high sediment values were found for most metals with the following averages: Cd 5.3 ug/g; Cu 180.0 ug/g; Pb 203 ug/g; Zn 473 ug/g. Water quality showed detectable total cadmium levels of 1.8 ug/l, and high total copper values with 117 ug/l. No detectable dissolved cadmium or copper could be found with the graphite furnace.

The Monsoon Creek site (station 3) sediment content showed only significantly higher aluminum, and copper values than station 1 for these fairly humic creeks. No significant difference could be detected between the two stations with any other metals. Station 3 showed higher alkalinity (125 mg/l) and hardness (157 mg/l) levels than any other stations in the survey. Sulphate levels were the highest of the receiving water stations surveyed with 45 mg/l.

The Iskut River site upstream of the Bronson Creek (station 4) and Iskut River site downstream of Monsoon Creek (station 5) did not show significant differences in the sediment metal analysis. These two sites had also the lower cadmium contentration in the sediments. The water quality at these two stations was dominated by the high suspended solids content which was in average 268 mg/l. Total metals were generally high for many contaminants such as aluminum, copper, and zinc however the dissolved fraction was close to or below the detection limit.

Mine water collected at the level 130 (station 6) showed very high level of non-filterable residue (2370 mg/l) as compared to the two other levels 180 (station 7) and 300 (station 8) where the NFR levels were <5 mg/l. The levels 180, and 300 were not active at the time of the sampling, while active drilling was occurring at level 130. This explains the high total metal content for Al, Ca, Co, Cu, Fe, Mn, Si, and Zn, as compared to the other two levels. The metal contaminants (Al, As, Cd, Cu, Pb, Zn) were however close or below the detection limit for all levels in the dissolved fraction, except for station 6, Diss. Cu where the level was 0.0027 mg/l.

REFERENCES

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