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WATER QUALITY SAMPLING IN MYRA CREEK AT WESTMIN RESOURCES LTD. MINE ON VANCOUVER ISLAND

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By

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ABSTRACT

The Environmental Protection Service conducted a monitoring program in October, 1985 to determine whether the relocation of the groundwater collection system at Westmin had resulted in improvement in Myra Creek water quality. Very high heavy metal concentrations were found in the creek during a high rainfall period (October 22 to October 24, 1985). Seepages from the tailings line road, built with waste rock, were characterized and recognized as a major contributor to the heavy metal loading in Myra Creek.

RÉSUMÉ

Le Service de Protection de l'Environnement a conduit un programme de surveillance en octobre 1985, pour déterminer si la relocation du système de collecte des eaux souterraines à la companie Westmin, s'est suivi d'une amélioration de la qualité de l'eau dans le ruisseau Myra. De très hautes concentrations de métaux lourds furent identifiées dans le ruisseau durant de fortes précipitations (22 octobre au 24 octobre 1985). Des suintements provenants d'une route construite de résidus miniers ont été caracterisés et reconnus comme des contributeurs majeurs au chargement le métaux lourds dans le ruisseau Myra.

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1 INTRODUCTION

In August, 1985, Westmin Resources Ltd., situated on Vancouver Island in Strathcona Park (Figure 1), completed the expansion of the surface and groundwater collection and treatment system for leachate and surface runoff. The extension of the tailings pond area was necessary due to the increased processing capacity of the mine.

The present study, fourth of a series of progress reports, focussed on the assessment of the water quality in Myra Creek as a result of the mine effluent discharges, groundwater seepages and surface runoff. The first survey done in December, 1982, was reported by Kelso and Jones, 1983. The second was conducted in May, 1983 and published by Ross and Jones, 1983, while the survey in September, 1983 was reported by Godin et al. (1985).

The survey consisted of three sampling days (October 22 to October 24, 1985) during significant precipitation. Seven stations along Myra Creek were sampled for heavy metals and immediates, road seepages and temporal variation at Station 7 (M2) were analysed.

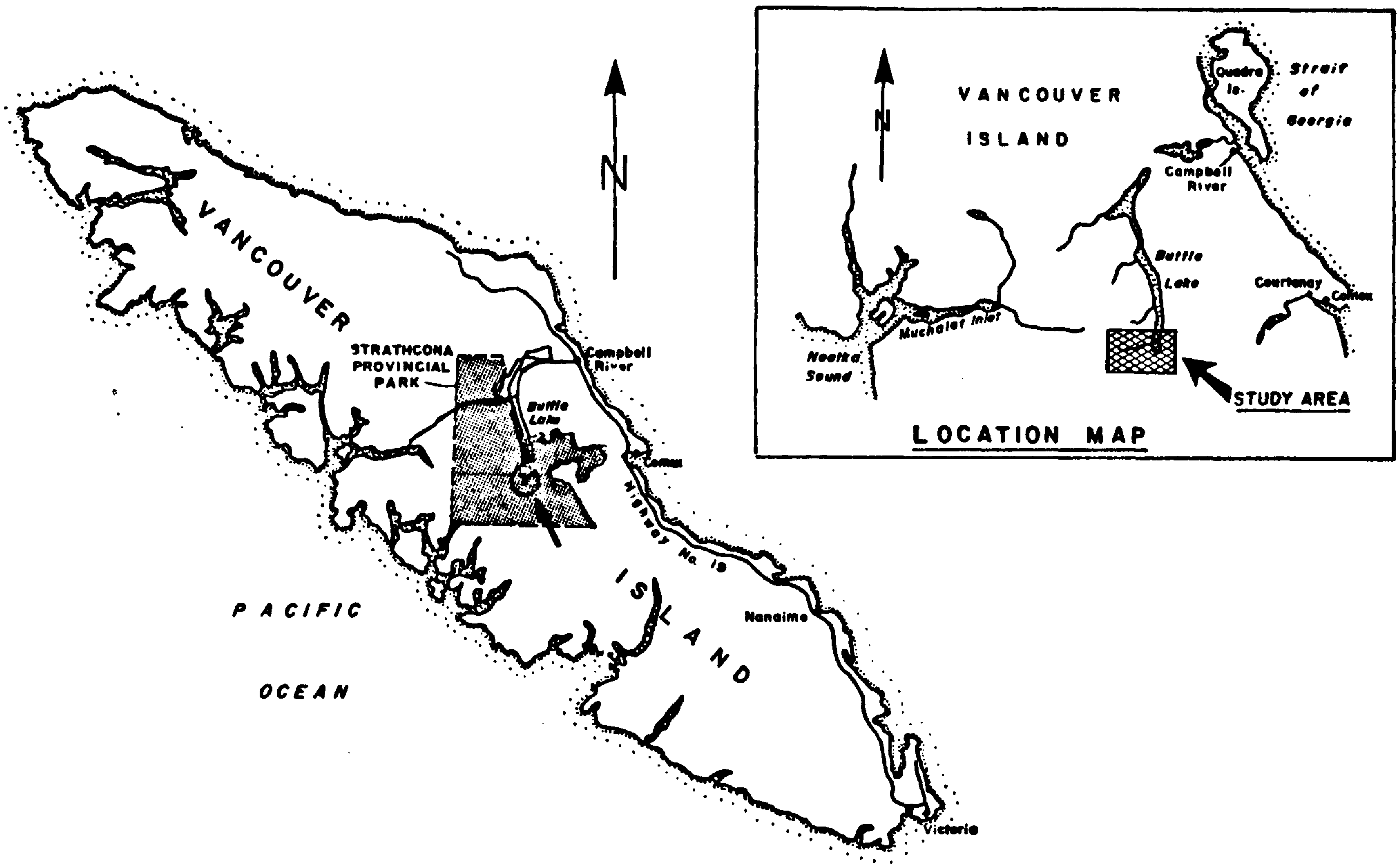

FIGURE I LOCATION OF WESTMIN RESOURCES LTD. MINING OPERATION

2 MATERIAL AND METHODS

Water chemistry data were collected from October 24 to October 25, 1985. Seven sampling sites (Figure 2) were sampled in triplicate, once a day, for water chemistry. Conductivity and temperature were recorded with a Hydrolab digital 4041 indicator unit and 4021 sonde unit. Six, one litre samples (the sample bottles were rinsed three times) were collected simultaneously at each site. Three litres of the water were transferred to separate one litre bottles and analysed for conductivity, turbidity, total residue, non-filterable residue, sulfate, alkalinity, acidity, pH and hardness (referred to as "immediate analysis"). The remaining water was placed in three acid washed 100 ml bottles for total metals and three acid washed 250 ml bottles for dissolved metals. The filtration of dissolved metals was performed the same day in Campbell River away from potential contamination from the mine site, with a 0.45 micron cellulose nitrate filter and placed in acid washed 100 ml polyethylene bottles.

Grab samples were taken from seepages along the old tailings line road (Figure 3) for total and dissolved metals and immediates. No replication was taken due to the suspected high concentration of the elements. Flows from the seepages were taken when possible using an electronic current meter (Marsh-McBirney Model 201 Portable Water Current Meter).

A Sirco model #MK-7 automatic sampler was set at Station 7 (M2) to collect one sample per hour over a 24 hour period. Samples from three consecutive hours were combined, mixed and divided to provide three replicate samples for total metal analysis.

Replicated grab samples were collected from the Campbell River at the Gold River Bridge and the Elk Falls Provincial Park on October 25, 1985 (Figure 4).

All metal samples were preserved with 0.5 ml of HNO_3 and shipped to the Environmental Protection Service Laboratory in West Vancouver. The Inductively Coupled Argon Plasma (ICAP) was used for the total and dissolved metal analysis and gave results for 26 metals. Copper, lead and cadmium were rerun on the graphite furnace of the atomic absorption spectrophotometer to

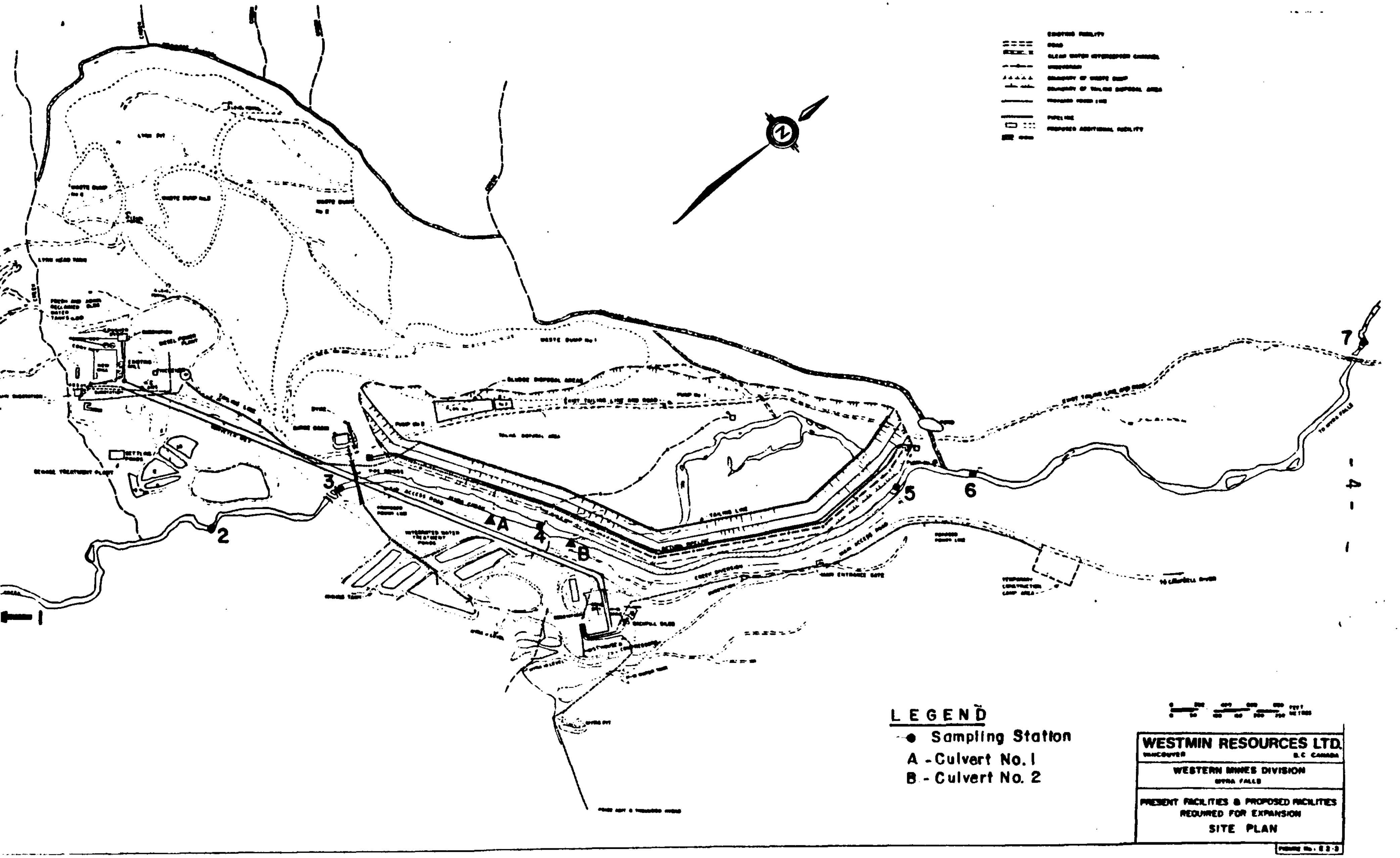

FIGURE 2 LOCATION OF WATER SAMPLING STATIONS IN MYRA CREEK - October 22 to October 24, 1985

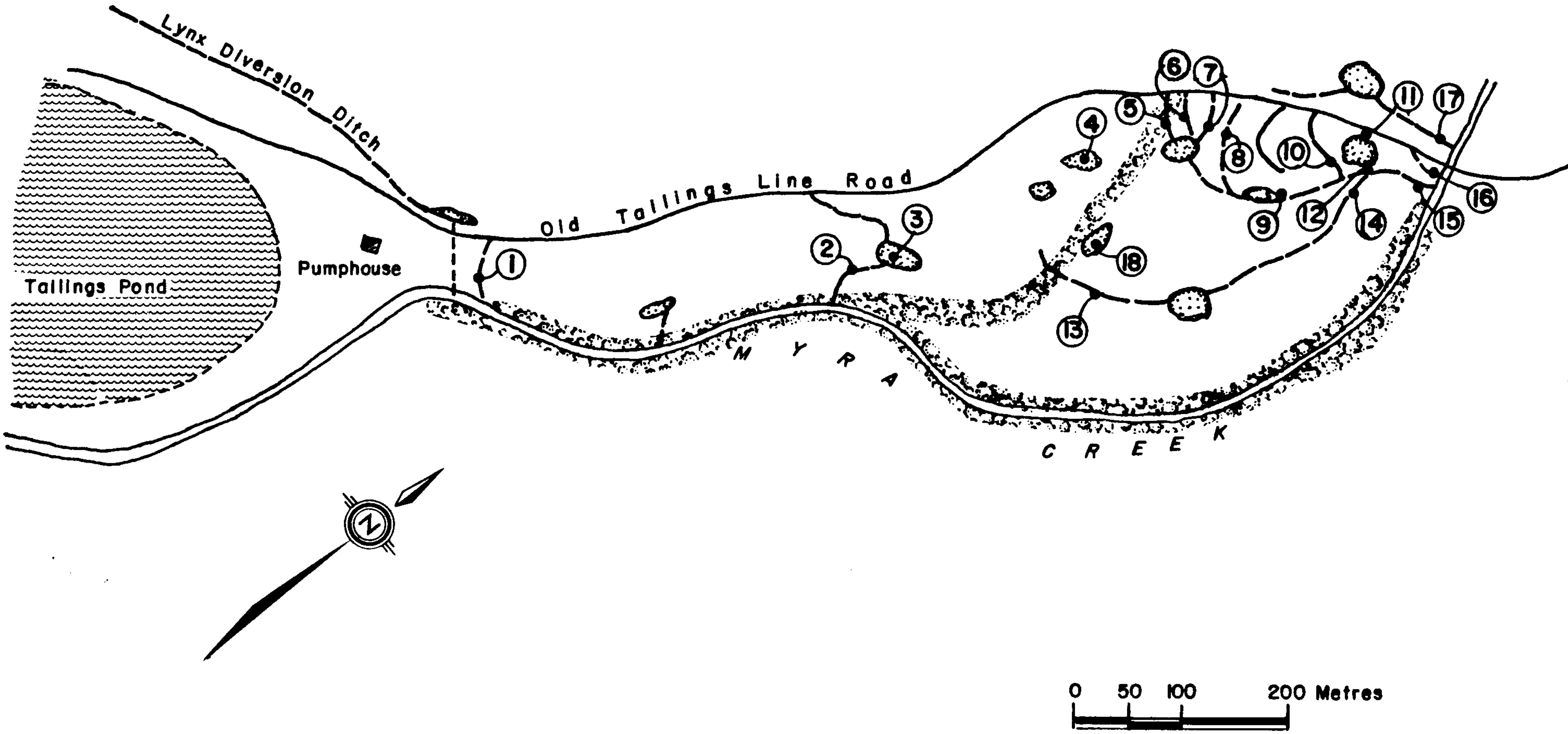

FIGURE 3 STATION LOCATIONS OF SEEPAGES FROM THE OLD TAILINGS LINE ROAD INTO MYRA CREEK

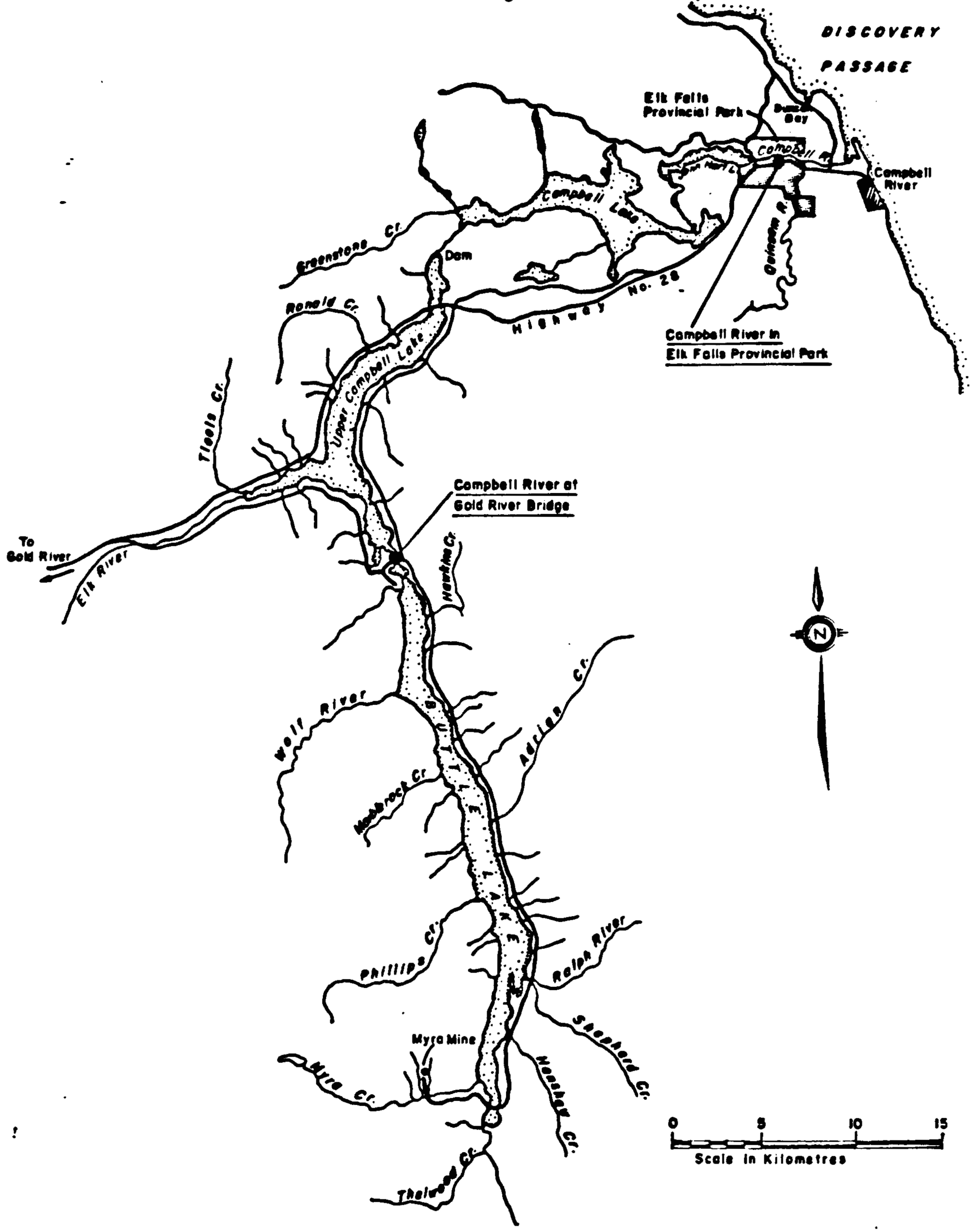

FIGURE 4 LOCATION OF CAMPBELL RIVER SITES

obtain a lower detection limit if the ICAP reading was below detection limit. For analytical methods details refer to the Environment Canada Pacific Region Environmental Laboratory Manual (Anon, 1979).

Comparisons between metals on a spatial basis were performed using the Student's t-test on log transformed data. The comparison between dates were carried out using a paired comparison test and verify the deviation from zero.

3 RESULTS AND DISCUSSION

3.1 Water Chemistry Results

The results of the water chemistry monitoring program are summarized here while all data can be found in the Appendices. Appendix I includes receiving water data in Myra Creek; Appendix II contains the old tailings line road seepages and Appendix III contains the continuous sampler data at Station 7 (M2) in Myra Creek.

3.1.1 Aluminum.

The total aluminum concentrations showed significant differences ($p < 0.05$) between Station 7 and all the other stations on the three sampling days. There is about 0.20 mg/l increase at Station 7 from Station 6 for the three days while increases are more gradual from Station 1 to Station 6 (Appendix I, Tables 1-3). The influence of the road seepages contributed to the elevation of concentration at Station 7 in the form of total metal. The dissolved aluminum fraction might have precipitated from the seepage while entering Myra Creek, which had a higher pH, and therefore measured as total aluminum.

On October 22 and 23, 1985, the total values upstream (Stations 1 and 3) were lower than the values downstream (Stations 5, 6 and 7). The sources of aluminum input were from the Myra pond effluent, the Lynx diversion ditch and the old tailings line roads seepages which all had a measurable concentration of total aluminum. The high volume of effluent in the treatment system at the Myra and Lynx ponds did not allow enough retention time for the precipitation of all the aluminum hydroxide which would account for the difference between dissolved and total aluminum values. The difference between dissolved and total aluminum in the Lynx diversion ditch may be explained by erosional processes where water velocities were above 400 cm/sec.

The possibility of input from the tailings dam and/or waste rock seepages is not eliminated but the present survey data do not measure any input.

There was no difference between levels of aluminum for different dates ($p > 0.05$).

TABLE 1 SUMMARY OF WESTMIN RESOURCES - MYRA CREEK MINE EFFLUENT QUALITY - OCTOBER 22, 1985*

PARAMETER**	LYNX POND	CULVERT NO. 1	CULVERT NO. 2	MYRA PONDS	LYNX DIVERSION
pH	10.2	7.1	6.6	9.1	7.8
NO_3-N	6.5	-	-	1.15	-
NH_3-N	4.4	-	-	0.257	-
T. SO_4	410	44	56	530	1
NFR	17	< 5	< 5	< 5	< 5
TR	1100	130	120	990	40
T. Alk.	90.5	-	-	22.7	-
T. Hardness	601	93.5	89.9	683	42.5
Bioassay	NT	-	-	NT	-
D. As	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cd	< 0.002	< 0.002	0.003	0.003	< 0.002
Cu	< 0.005	0.008	0.091	< 0.005	< 0.005
Ni	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	0.07	< 0.02	< 0.02	< 0.02	< 0.02
Zn	0.033	0.17	1.01	0.047	0.005
Al	0.07	< 0.05	< 0.05	0.09	< 0.05
Fe	0.008	0.011	0.012	0.009	< 0.005
Mn	0.012	0.025	0.08	0.556	0.004
T. As	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cd	0.004	0.003	0.006	0.015	0.002
Cu	0.293	0.014	0.142	0.125	< 0.005
Ni	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	0.18	< 0.02	< 0.02	< 0.02	< 0.02
Zn	0.697	0.232	1.32	2.4	0.004
Al	0.34	0.12	0.13	0.28	0.09
Fe	0.557	0.082	0.194	0.184	0.047
Mn	0.032	0.032	0.117	1.0	0.005
Flow	71.0	61.3	92.0	367	-

*Results provided by K. Ferguson (EPS)
**Units are mg/l except pH - pH units; bioassay - NT - non-toxic (Rainbow trout 96 h-LT_{50} on 100% effluent); flow - l/sec.

TABLE 2 SUMMARY OF WESTMIN RESOURCES - MYRA CREEK MINE EFFLUENT QUALITY - OCTOBER 23, 1985*

PARAMETER**	LYNX POND	CULVERT NO. 1	CULVERT NO. 2	MYRA PONDS	LYNX DIVERSION
pH	10.6	7.6	7.0	9.7	7.8
NO_3-N	6.43	-	-	1.27	-
NH_3-N	3.8	-	-	0.257	-
T. SO_4	370	510	43	590	2
NFR	< 5	7	< 5	16	< 5
TR	120	900	120	1100	52
T. Alk.	61.9	-	-	17.2	-
T. Hardness	546	637	89.2	710	47.6
Bioassay	NT	-	-	NT	-
D. As	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cd	< 0.002	< 0.002	0.008	0.01	< 0.002
Cu	< 0.005	0.007	0.169	< 0.051	< 0.005
Ni	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	0.1	< 0.02	0.02	0.04	< 0.02
Zn	0.065	0.039	1.65	1.16	0.004
Al	< 0.05	0.11	< 0.05	0.24	< 0.05
Fe	0.007	0.009	0.01	0.142	< 0.005
Mn	< 0.001	0.004	0.154	0.79	0.002
T. As	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cd	0.004	0.008	0.007	0.011	< 0.002
Cu	0.024	0.056	0.177	0.04	< 0.005
Ni	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	0.16	< 0.02	< 0.02	< 0.02	< 0.02
Zn	0.878	1.09	1.67	1.13	0.004
Al	0.13	0.26	0.18	0.23	0.11
Fe	0.143	0.213	0.14	0.165	0.123
Mn	0.038	.534	0.177	0.797	0.003
Flow	trickle	44.7	36.8	361	387

*Results provided by K. Ferguson (EPS)
**Units are mg/l except pH - pH units; bioassay - NT - non-toxic (Rainbow trout 96 h-LT_{50} on 100% effluent); flow - l/sec.

TABLE 3 SUMMARY OF WESTMIN RESOURCES - MYRA CREEK MINE EFFLUENT QUALITY - OCTOBER 24, 1985*

PARAMETER**	LYNX POND	CULVERT NO. 1	CULVERT NO. 2	MYRA PONDS	LYNX DIVERSION
pH	9.4	7.6	7.0	7.1	8.0
NO_3-N	6.51	-	-	1.19	-
NH_3-N	4	-	-	0.37	-
T. SO_4	360	43	33	410	1
NFR	15	9	6	15	< 5
TR	793	134	87	929	55
T. Alk.	-	-	-	-	-
T. Hardness	642	101	71	575	47.7
Bioassay	NT	-	-	NT	-
D. As	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cd	< 0.002	< 0.002	0.004	0.013	< 0.002
Cu	< 0.005	0.031	0.146	0.007	< 0.005
Ni	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	0.38	< 0.02	< 0.02	< 0.02	< 0.02
Zn	0.014	0.209	0.985	0.741	0.004
Al	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fe	< 0.005	0.019	0.01	0.008	< 0.005
Mn	< 0.001	0.042	0.093	1.28	0.001
T. As	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Cd	< 0.002	0.002	0.008	0.029	< 0.002
Cu	0.111	0.069	0.307	0.227	< 0.005
Ni	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pb	0.07	< 0.02	< 0.02	< 0.04	< 0.02
Zn	0.58	0.458	2.15	5.11	< 0.002
Al	0.25	0.11	0.72	0.59	0.12
Fe	0.163	0.162	0.696	0.412	0.099
Mn	0.025	0.079	0.202	2.53	0.007
Flow	29.2	56.4	49.7	361	383

*Results provided by K. Ferguson (EPS)
**Units are mg/l except pH - pH units; bioassay - NT - non-toxic (Rainbow trout 96 h-LT_{50} on 100% effluent); flow - l/sec.

3.1.2 Calcium. Calcium concentrations (total and dissolved) were significantly different ($p < 0.05$) from station to station on October 24, 1985 and at most stations on October 22 and 23. Changes were expected because of the Lynx effluent lime treatment. The most drastic change was between Stations 3 and 4 where at the latter the Lynx effluent was presumed completely mixed with Myra Creek. No changes in water quality were found between surveys as observed by calcium concentrations.

3.1.3 Cadmium. Cadmium concentrations were not detectable above the Myra pond effluent both days but were detectable at Stations 5, 6 and 7 with average total concentrations ranging from 0.0009 to 0.0037 mg/l (Appendix I, Tables 1-3). The level found at Stations 5, 6 and 7 were above the recommended surface freshwater quality objective for protection of the aquatic life set at 0.0002 mg/l total cadmium (Reeder, 1979). The effluent from the Myra ponds and the seepages from the old tailings line road were 5 to 40 times more concentrated than the creek and contributed to elevating the level of cadmium above the safe level for aquatic life.

The cadmium 7-day LC_{50} for rainbow trout was 0.008 to 0.01 mg/l (Ball, 1967) and the 10-day LC_{50} was similar at 0.005 to 0.007 mg/l. While Roch and McCarter (1984) found that the combined toxicity of metal in a mixture of cadmium, copper and zinc (ratio 1:20:400 respectively) was additive to rainbow trout, Eaton (1973) determined that a lethal threshold was attained in a mixture when each metal was present at a concentration of 0.4 or less of its individual lethal threshold for fathead minnows.

The reduction or elimination of these sources of contaminant should have a definite positive effect on the cadmium level in Myra Creek.

3.1.4 Copper. Further changes in water quality in Myra Creek were evident by the increase of copper concentrations as one progressed downstream. The total and dissolved values were similar between Stations 1 and 2 and also between Stations 3 and 4 (Appendix I, Tables 1-3). Dissolved copper was not different between Stations 5, 6 and 7 on October 22, while on October 23 the concentration at Station 6 was significantly less than the concentration at Station 5 ($p < 0.05$). This reduction may be related to the input of uncontaminated stormwater from the Lynx diversion ditch (Table 3).

The copper concentration in Myra Creek on October 22 and 23 were similar but both were significantly higher ($p < 0.05$) than reported for October 24, 1985, for both total and dissolved. The reduction of runoff, as expressed as a reduction of flow in Myra Creek (Table 4), caused an increase in concentration in the creek on October 24, 1985, as the concentrations in the seepages did not significantly change. The concentration levels of total copper varied from 0.011 mg/l to 0.459 mg/l at Station 7 (M2) (Appendix III, Table 1-3) during the three days of sampling.

The 96 h-LC_{50} for rainbow trout was 0.102 mgCu/l in water of hardness of 200 mg/l as $CaCO_3$ (Fogels and Sprague, 1977) and with steelhead trout the 96 h-LC_{50} was 0.020 mg/l in water hardness of 20-25 mg/l as $CaCO_3$. In a mixture there seemed to be a more than additive effect at higher concentrations of zinc and copper but with low concentrations, the toxicity appeared to be less additive (Demayo and Taylor, 1981).

3.1.5 Iron. No specific pattern of iron distribution along Myra Creek was evident. However, differences were evident for total and dissolved iron which ranged from 0.019 to 0.757 mg/l and 0.006 to 0.137 mg/l respectively.

The creek conditions changed on October 24 from the previous day for total iron but not for dissolved iron; the concentrations were significantly reduced ($p < 0.05$) by an average of 0.13 mg/l.

3.1.6 Manganese. On October 22, the total and dissolved manganese levels were significantly different between Stations 2 and 3; Station 2 levels being higher than Station 3. This decrease of manganese concentration could not be explained by the present set of data.

On October 23, total manganese concentrations at Station 7 were found to be significantly reduced ($p < 0.05$) when compared to Stations 5 and 6. The introduction of manganese from the Myra pond effluent could only explain 14% of the concentration at Station 5, based on dilution ratio of 1:30 in the creek at that time. The other source of total manganese may be from groundwater seepages (Table 5).

TABLE 4 FLOW MEASURMENTS IN MYRA CREEK AND THE OLD TAILINGS LINE ROAD SEEPAGE (l/sec.)

STATION	OCTOBER 22	OCTOBER 23	OCTOBER 24
Myra Creek Station 7	15 000	12 200	7 800
Old Tailings Line Road 1	-	14	-
2	-	24	-
5	-	3.8	-
7	-	4.8	-
8	-	14.9	-
9	-	20.0	-
10	-	0.5	-
12	-	9.0	-
13	-	2.2	-
14	-	13.1	-
15	-	54.1	38.8
16	-	3.7	-
17	-	0.2	-

3.1.7 Strontium. On October 23, the same distribution pattern was found for total strontium as with total manganese described above. In addition the creek's strontium concentrations were found to be significantly higher ($p < 0.05$) on October 23 (ranging from 0.012 to 0.167 mg/l total Sr) than on October 22 and October 24, 1985 (ranging from 0.009 to 0.05 mg/l total Sr).

3.1.8 Zinc. On October 22, 1985, all levels were significantly different ($p < 0.05$) between stations for total zinc. On October 23 and 24 both Stations 1 and 2 were similar while significant differences were found between the other stations. The total zinc concentration in the creek varies between < 0.022 mg/l to 0.711 mg/l.

Seepages from the tailings dam and/or waste rock were suspected at Station 5. The total and dissolved values were very similar suggesting no particulate fraction; consistent with a groundwater rather than surface water source. The dilution of Myra effluent, with a concentration of 1.16 mg Zn/l

TABLE 5 SUMMARY OF WESTMIN RESOURCES - MYRA CREEK MINE WASTE ROCK AND COLLECTION SYSTEM WATER QUALITY - OCTOBER 22-24, 1985*

PARAMETER	OCTOBER 22, 1985				OCTOBER 23, 1985		OCTOBER 24, 1985	
	WASTE ROCK	SUPER-NATANT	PUMP NO. 2 (upstream)	PUMP NO. 4 (downstream)	PUMP NO. 2	PUMP NO. 4	PUMP NO. 2	PUMP NO. 4
pH	3.8	6.2	4.3	6.0	4.0	6.2	5.0	6.8
SO_4	1300	180	870	180	970	160	450	160
T. Alk.	Nil	14.9	Nil	Nil	Nil	Nil	-	-
T. Acid.	397	Nil	252	31.5	258	15.8	66.1	23.4
T. Al	35.7	0.42	25.3	2.08	30.4	1.16	10.1	0.76
D. Al	28.6	< 0.05	17.7	0.23	31.6	0.23	5.03	0.11
T. Ca	257	67.2	194	69.9	192	60.2	225	61.7
D. Ca	214	12.3	143	56.0	196	61.9	216.0	61.0
T. Cd	0.305	0.008	0.104	0.010	0.131	0.018	0.112	0.014
D. Cd	0.25	< 0.002	0.076	0.006	0.138	0.010	0.071	0.009
T. Cu	12.6	0.115	4.4	0.266	5.53	0.23	5.03	0.486
D. Cu	10.0	< 0.005	3.07	0.191	5.95	0.247	2.99	0.333
T. Fe	9.52	0.212	1.59	0.057	1.41	0.104	0.843	0.088
D. Fe	2.22	< 0.005	1.08	0.036	1.35	0.04	0.343	0.031
T. Mg	119.0	6.2	61	8.7	73.8	7.5	38.7	7.8
D. Mg	95.5	0.4	43.0	6.7	76.5	7.9	36.9	7.7
T. Mn	13.0	1.96	14.9	2.17	16.9	1.57	13.9	3.35
D. Mn	10.8	0.004	10.9	1.73	18.2	1.77	7.97	1.82
T. Na	4.9	5.4	11.1	3.9	10.9	4.0	27.3	4.7
D. Na	3.9	0.5	7.7	3.0	11.3	4.3	25.7	4.6
T. Pb	0.17	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.04	< 0.02
D. Pb	0.11	< 0.02	< 0.02	< 0.02	< 0.02	0.02	0.04	< 0.02
T. Sr	0.488	0.146	0.489	0.159	0.489	0.145	1.1	0.306
D. Sr	0.392	0.01	0.342	0.120	0.511	0.155	0.559	0.146
T. Zn	73.6	1.75	29.0	2.89	36.3	2.58	32.9	5.03
D. Zn	60.4	0.005	21.0	2.3	34.9	2.72	16.1	2.37

*Results provided by K. Ferguson (EPS)

and a flow of 0.361 m^3/sec. on October 23, in Myra Creek would result in a concentration of about 0.11 mg/l dissolved zinc at Station 5, based on a dilution ratio of 1:30 in the creek. The actual value was 0.493 mg/l of dissolved zinc in the creek at that station. Thermography recordings showed the Myra effluent run tightly along the east side of the creek (K. Ferguson, personal communication).

Water concentrations sampled in the creek at pumphouse No. 4 at the end of the ground water collection system, showed an average of 3.5 mg/l and 2.5 mg/l total and dissolved zinc, which were high enough to substantially increase the concentrations at Station 5 (Table 5).

On October 23, 1985 at Stations 4 and 5, the total zinc did not show the same range of values (0.35 to 0.501 mg/l and 0.487 to 0.497 mg/l respectively) but were not significantly different due to the high standard deviation.

Seepages from the tailings line road significantly increased the zinc concentrations at Station 7 (0.769 mg/l total zinc average). The high concentrations found in the seepages, the proximity of the source and the sampling point and the high background level (Station 6, 0.446 mg/l total zinc average) were all factors contributing to the elevation of zinc at Station 7.

According to Bradley and Sprague (1985) the acute lethality of dissolved zinc for rainbow trout is 0.11 mg/l at a pH 6.97 ($\pm$ .1), alkalinity 10.8 mg/l as $CaCO_3$ ($\pm$ 1.0) and hardness of 31.3 mg/l as $CaCO_3$ ($\pm$ 1.9).

Temporal variation of zinc in the creek was different for the total and dissolved zinc. Total values in the creek on October 23 were significantly higher than that on October 22 (0.13 mg/l higher in average) and 24 (0.28 mg/l higher in average) while the dissolved values were higher (0.14 mg/l on average) on October 22 compared to October 24.

3.1.9 pH. On October 22 no significant differences of pH between the stations could be found. However, the levels on that day were the lowest found in the creek during the survey and were significantly different from the two other days. On October 23 Station 1 pH was higher (7.1) than most stations except 2 and 6 while Station 7 was significantly lower than all stations. On October 24, Stations 4 and 7 were significantly lower from Stations 1, 2 and 6. The general pH of the creek was rising during those three days of sampling from a range of 6.4 to 6.9; to 6.9 to 7.2 (Appendix I, Tables 1-3).

3.1.10 **Alkalinity.** Stations 4 and 6 were significantly higher than all other stations on October 22, (13.3 to 13.7 mg/l compared to 8.6 to 11.8 mg/l), while on October 23 Station 1 was significantly lower (12.5 mg/l) than all stations (13.3 to 16.5 mg/l). The alkalinity level seemed to increase at Station 5 and decrease by Station 7 along the creek. On Thursday October 24 only Station 6 (18 mg/l) was significantly higher than all other stations. Alkalinity at Station 7 (15.7 to 16.5 mg/l) was higher than Stations 1 and 2 (11.0 to 12.5 mg/l). The alkalinity level in Myra Creek was significantly lower on October 22 than on October 23 and 24.

3.1.11 **Conductivity.** Laboratory conductivity levels were similar between Station 1 and Stations 2 and 3 (ranging from 24.0 to 40.5 umhos/cm), as well as between Stations 5, 6 and 7 (ranging between 68 and 105 umhos/cm) on October 22. On October 23 and October 24 the conductivity levels were different with all stations, increasing downstream (from 28.5 to 140.0 umhos/cm), with Station 5 being higher (143.7 umhos/cm) than Stations 6 and 7 on October 23, and Station 4 being similar to all stations due to the high variability of the laboratory measurement on October 24. No significant difference was found between the three days surveyed.

3.2 Tailing Line Road

Results can be found in Appendix II, Tables 1-3. Figure 3 shows the relative position of seepages from the old tailings line road. Appendix II, Table 1 gives an idea of the seepage metal concentrations on October 22. Total copper concentrations range from 0.584 to 84.7 mg/l; total zinc from 2.760 to 301.0 mg/l.

Appendix II, Table 2 shows the metal concentrations and loadings on October 23. The major contributor of metal to Myra Creek is sample Site #15 with 23 kg/day of total copper and 291.6 kg/day of total zinc. A replicated sample was taken on October 24 at Site #15 evaluating the variability of the total metal since only grab samples were taken at the other sites. The coefficient of variation range from 0% to 8% for all metals analysed.

The metal loading on Thursday October 24 was greatly reduced compared to the previous day as both the metal concentrations and flow were lower.

The total copper and zinc concentrations permitted by the Metal Mining Liquid Effluent Regulations (MMLER) in a grab sample is 0.6 mg/l and 1.0 mg/l respectively. Only 3 samples were below the stipulated level for copper while all of them were above 1 mg/l for zinc.

TABLE 6 COMPARISON BETWEEN THE SAMPLES TAKEN WITH THE REPLICATE SAMPLER AND CONTINUOUS SAMPLER AT STATION 7 (M2)

DATE AND TIME	METAL (total) (mg/l)	CONTINUOUS SAMPLER		REPLICATE SAMPLER		PROBABILITY OF EQUALITY
		$\bar{x}$	s	$\bar{x}$	s	x = 95%
October 22 9:00	Cu Zn	0.123 0.827	0.001 0.002	0.138 0.711	0.004 0.006	$p < 0.05$ $p < 0.05$
October 23 9:30	Cu Zn	0.113 0.872	0.001 0.006	0.131 0.769	0.001 0.002	$p < 0.05$ $p < 0.05$
October 24 10:00	Cu Zn	0.040 0.203	0.018 0.169	0.079 0.526	0.008 0.012	$p > 0.05$ $p > 0.05$

3.3 Continuous Samplers

Replicated samples were (Appendix I, Tables 1-3) compared to the samples taken at the same time from the continuous sampler (Appendix III, Tables 1-3). This comparison between Sirco samples and replicated samples at Station 7 (M2) revealed significant differences for total copper and zinc (Table 6). The total copper concentration was higher in the replicated samples. On the contrary, the reverse was true for zinc on October 22 and 23. These variations tend to indicate different plumes of heavy metal concentration may occur in the creek.

Some variations during the day were found in the concentration of elements from the analysis of the Sirco samples. On October 22, the concentration of calcium, magnesium and manganese were showing an increase from the morning to the afternoon. The copper and iron were stable for the first part of the day and then decreased. All other metals were not showing differences during the first 18 hours of sampling. On October 24, calcium, magnesium and manganese were also increasing during the day. A sharp drop in concentration occurred at noon for those three metals and the increase resumed shortly after. A sharp total zinc increase was noticeable at Station 7 on October 24 between 4 and 6 a.m. with a sample average of 0.708 mg/l compared to an overall average of 0.354 mg/l (Appendix III, Table 3). All the other metals were not changing all day.

3.4 Loadings in Myra Creek

The creek discharge during the survey varied considerably on Tuesday October 22, the flow was 15,000 l/sec., the following day 12,200 l/sec., and the third day 7800 l/sec. (Table 4). These flows were recorded at Station 7 (M2) using the staff gauge reading and converted to flow rates using stage discharge curve 3 for Myra Creek as prepared by Norecol in 1982.

Table 7 presents loading data for effluents, seepage from the old tailings line road and Station 7. Zinc loading at Station 7 were considerably high compared to the previous study (Godin et al., 1985) since the water treatment system is in operation. On the other hand, the variability of the measurements across Station 7 was not evaluated. This would have given a better evaluation of Myra Creek metal loading. The analysis of zinc loadings on October 23, 1985 showed that 44.8 kg/d (6%) were due to the total effluents while the old tailings line road contributed 308.2 kg/d (38%). This latter input greatly contributed to the loading at Station 7. Fifty-five percent of the loading that cannot be explained by these inputs suggests either a significant contribution from the groundwater collection systems or a skewed distribution of the metal in the creek.

TABLE 7 LOADINGS OF SELECTED CONTAMINANTS TO MYRA CREEK FROM EFFLUENTS AND SEEPAGES (kg/d) - OCTOBER 22-24, 1985

	LYNX POND	CULVERT NO. 1	CULVERT NO. 2	MYRA PONDS	MYRA DIVERSION	EFFLUENT TOTAL+	OLD TAILINGS LINE ROAD	STATION 7 (M2)
October 22								
Flow (l/s)	71.0	61.3	92.0	367	385*	976.3	-	15,000
D. Zn	0.20	0.90	8.0	1.5	0.17	0.17	-	953.4
T. Zn	4.3	1.2	10.5	76.1	0.13	0.13	-	-
D. Cu	< 0.03	0.04	0.72	0.16	< 0.17	< 0.17	-	115.3
T. Cu	1.8	0.07	1.1	4.0	< 0.17	< 0.17	-	178.4
October 23								
Flow (l/s)	Trickle	44.7	36.8	361	387	829.5	95.9	12,200
D. Zn	NS	0.15	5.2	36.2	0.13	41.7	101.7	757.8
T. Zn	NS	4.2	5.3	35.2	0.13	44.8	308.2	810.2
D. Cu	NS	0.03	0.53	1.6	< 0.17	2.3	34.7	67.8
T. Cu	NS	0.22	0.56	1.2	< 0.17	2.2	22.8	137.7
October 24								
Flow (l/s)	29.2	56.4	49.7	361	383	879.3	38.8**	7800
D. Zn	0.035	1.02	4.23	23.1	0.13	28.5	48.2	296.6
T. Zn	1.46	2.23	9.23	159.4	< 0.07	172.4	57.1	354.6
D. Cu	< 0.01	0.15	0.63	0.22	< 0.16	1.17	10.5	26.5
T. Cu	0.28	0.34	1.32	7.1	< 0.16	9.2	12.8	53.5

+ Results from K. Ferguson (EPS)

* Flow assumed average of October 23 and 24 - 385 l/s

** From the major seepage only (Site #15).

ND - not significant

3.5 Gold River Bridge and Elk Falls

There is an improvement of the water quality at the discharge of Buttle Lake. The concentrations of sulfate were decreased at the Gold River Bridge and Elk Falls (4.0 mg/l and 3.0 mg/l) compared to previous data (4.5 and 4.0 mg/l) respectively (Godin, 1985), while total zinc decrease was only seen at Elk Falls Park (0.026 in 1983 and 0.019 mg/l in 1985). Copper, cadmium and lead levels were unchanged. An increase in pH was noticed as well as hardness, total aluminum and total iron.

3.6 Water Quality Retrospective

The Environmental Protection Service have published three progress reports on the Westmin operation. The main concerns at the time were seepages from the groundwater collection system, seepages from the old tailings line road and metal loadings in the creek.

In December, 1982, four months after the start-up of the collection system, some indications of groundwater collection system seepages were already identified (Kelso, 1983). In May, 1983 (Ross) no detectable seepages from the collection system were observed, but in September 1983 Godin (1985) showed that there was still a significant impact of the zinc concentration in the creek which was attributed to the groundwater during that low flow period.

In every progress report the indication of the tailings line road contamination was suggested. In December, 1982 the sampling survey indicated that 50% of the contamination was coming from the road. The company recognized in the Stage II Submission Addendum I (1982) that the zinc loading in the creek, after the implementation of the groundwater collection system, should mainly originated between groundwater pumps and Station 7 (M2). Significant runoff from the tailings line road was observed in May, 1983 (Ross, 1983) and an increase in metals at M2 was noted due to the tailings pipeline road runoff. In Progress Report No. 3 (Godin, 1985) definite increases were noticed between Stations 5 and 7 during the dry season.

The copper and zinc loading in Myra Creek in October, 1985 is comparable to that found in April, 1982 before the collection system was on line (Table 8). It was noted that the sampling survey occurred in the middle of a storm event but such precipitation is not uncommon in the area, and

TABLE 8 TOTAL ZINC AND COPPER CONCENTRATIONS AND LOADINGS AT M2

METAL	Apr. 16 1982	Sept. 8 1982	Dec. 7 1982	May 1983	Sept. 1983	Spring 1985	Oct. 1985
Concentration (mg/l)		START-UP OF GROUND-WATER COLLECTION SYSTEM				START-UP OF NEW GROUND-WATER COLLECTION SYSTEM	
Zn	1.90		0.290	0.052	0.208		0.669
Cu	0.217		0.024	0.005	0.010		0.116
Loadings (kg/day)							
Zn	502.3		101.5	29.83	41.91		695.4
Cu	57.4		8.4	2.87	2.08		123.1

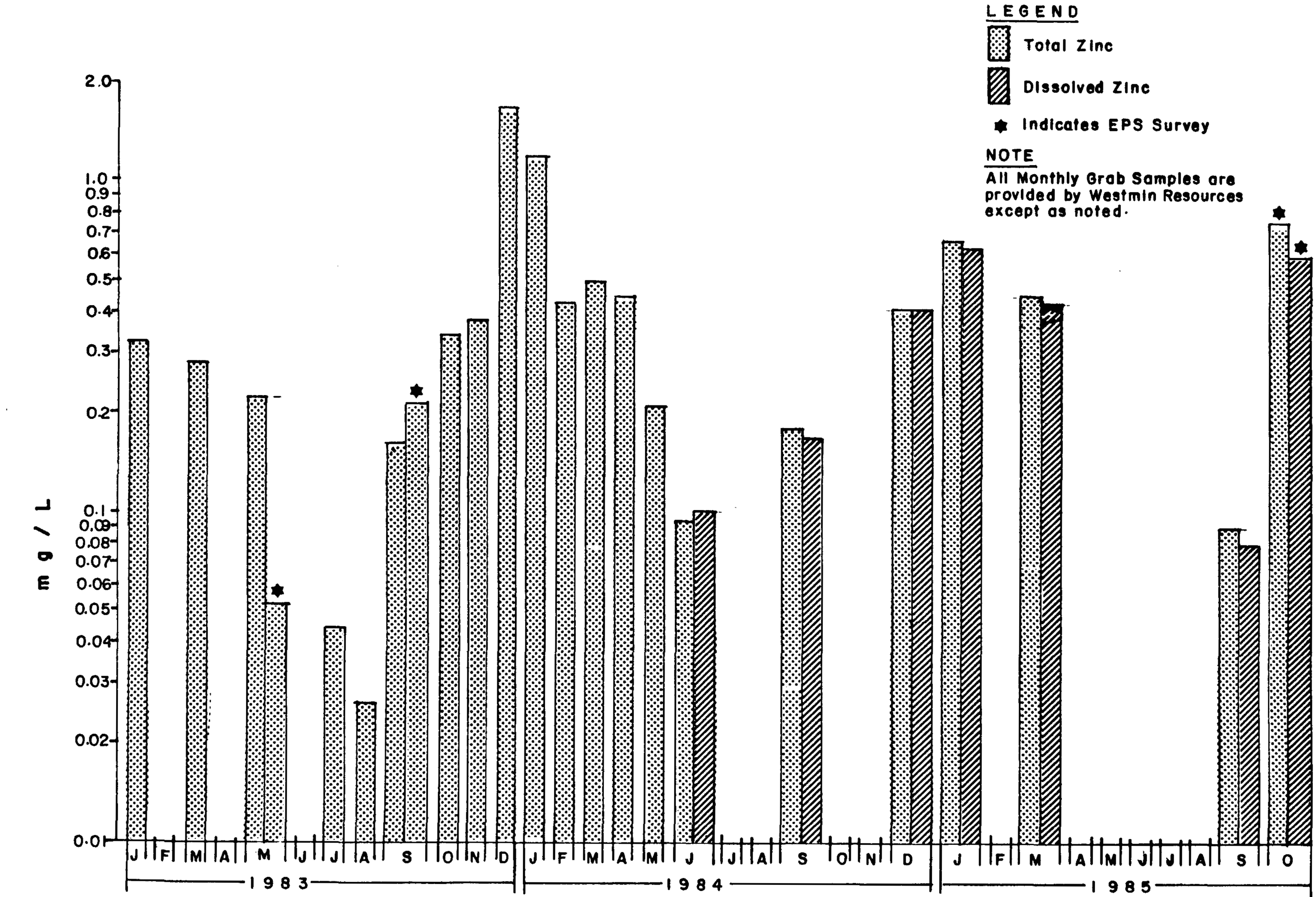

FIGURE 5 TOTAL ZINC CONCENTRATION (mg/L) IN MYRA CREEK AT STATION 7 (M2)

therefore should not be considered unique. Observations of total zinc concentrations on a monthly basis at Station 7 (M2) showed a definite cycle of the values (Figure 5) which correspond to the general precipitation cycle in the region. It is therefore suspected that events like the survey in October 1985 and associated impairment of water quality will occur in the future if remedial actions are not taken.

4 CONCLUSIONS

Very high heavy metal concentrations were found in the creek during this survey from October 22 to October 24, 1985. The loading of copper and zinc varied from 53.5 to 178.4 kg/d and 354.7 to 921.5 kg/d respectively for the three sampling days at Station 7 (M2). Loadings were the highest surveyed since the groundwater collection system start-up in September 1982.

The sources of contaminants included the Lynx and Myra effluent, the old tailings road seepages and possibly groundwater collection system seepages.

Seepages from the old tailings line road were characterized and recognized as a major contributor to the heavy metal loading in Myra Creek.

However, sampling stations on the Campbell River showed the improvement on a long-term basis of the groundwater collection system over the pollution of the whole system.

Future surveys should focus on the characterization of groundwater collection system seepage. Improved control of tailings pipeline road seepage, groundwater collection system escapement and mine effluent should bring Myra Creek into an acceptable water quality for aquatic life.

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APPENDIX I

RECEIVING WATER QUALITY DATA IN MYRA CREEK

APPENDIX I Receiving Water Quality Data in Myra Creek
Table 1 Tuesday october 22, 1985

Station Number	Sample Number	AL TOTICP UG/ML	AL DISICP UG/ML	BA TOTICP UG/ML	BA DISICP UG/ML	CA TOTICP UG/ML	CA DISICP UG/ML	CD TOTGF UG/ML	CD DISGF UG/ML	CU TOTGF UG/ML	CU DISGF UG/ML	FE TOTICP UG/ML	FE DISICP UG/ML	MG TOTICP UG/ML	MG DISICP UG/ML	MN TOTICP UG/ML	MN DISICP UG/ML
1	1	0.10	0.06	0.005	0.004	3.7	3.6	<.0006	<.0005	<.001	<.001	0.024	0.009	0.2	0.1	<.001	<.001
(M1)	2	0.10	0.06	0.004	0.004	3.7	3.5	<.0006	<.0005	<.001	<.001	0.019	0.008	0.2	0.2	<.001	<.001
	3	0.11	0.07	0.004	0.004	3.8	3.5	<.0006	<.0005	<.001	<.001	0.037	0.010	0.2	0.2	<.001	0.001
	AVERAGE	0.10	0.06	0.004	0.004	3.7	3.5	----	----	----	----	0.027	0.009	0.2	0.2	----	----
	S.D.	0.01	0.01	0.001	0.000	0.1	0.1	----	----	----	----	0.009	0.001	0.0	0.1	----	----
2	4	0.13	0.07	0.005	0.005	5.2	4.8	<.0006	<.0005	<.001	<.001	0.048	0.012	0.4	0.3	0.014	0.011
	5	0.12	0.08	0.005	0.004	5.2	5.1	<.0006	<.0005	<.001	<.001	0.042	0.012	0.4	0.4	0.014	0.011
	6	0.12	0.07	0.005	0.005	5.2	4.9	<.0006	<.0005	<.001	<.001	0.046	0.012	0.4	0.3	0.013	0.011
	AVERAGE	0.12	0.07	0.005	0.005	5.2	4.9	----	----	----	----	0.045	0.012	0.4	0.3	0.014	0.011
	S.D.	0.01	0.01	0.000	0.001	0.0	0.2	----	----	----	----	0.003	0.000	0.0	0.1	0.001	0.000
3	7	0.11	0.08	0.006	0.005	5.9	5.8	<.0006	<.0005	0.007	0.006	0.097	0.050	0.3	0.3	0.008	0.008
	8	0.14	0.09	0.006	0.005	5.9	5.9	<.0006	<.0005	0.008	0.005	0.106	0.050	0.3	0.3	0.008	0.007
	9	0.08	0.07	0.006	0.005	5.9	5.6	<.0006	<.0005	0.007	0.005	0.101	0.041	0.3	0.3	0.008	0.006
	AVERAGE	0.11	0.08	0.006	0.005	5.9	5.8	----	----	0.007	0.005	0.101	0.047	0.3	0.3	0.008	0.007
	S.D.	0.03	0.01	0.000	0.000	0.0	0.2	----	----	0.001	0.001	0.005	0.005	0.0	0.0	0.000	0.001
4	10	0.09	0.06	0.009	0.008	10.5	9.3	<.0006	<.0005	0.010	0.008	0.102	0.049	0.4	0.4	0.042	0.031
	11	0.08	0.06	0.009	0.008	10.5	9.5	<.0006	<.0005	0.010	0.008	0.100	0.051	0.5	0.4	0.035	0.032
	12	0.08	0.07	0.010	0.008	9.7	9.4	<.0006	<.0005	0.009	0.007	0.107	0.050	0.5	0.4	0.034	0.030
	AVERAGE	0.08	0.06	0.009	0.008	10.2	9.4	----	----	0.010	0.008	0.106	0.050	0.5	0.4	0.037	0.031
	S.D.	0.01	0.01	0.001	0.000	0.5	0.1	----	----	0.001	0.001	0.003	0.001	0.1	0.0	0.004	0.001
5	13	0.27	0.07	0.011	0.009	14.3	13.5	0.0021	0.0020	0.098	0.050	0.359	0.034	1.2	1.1	0.186	0.156
	14	0.29	0.09	0.011	0.009	13.9	13.5	0.0022	0.0019	0.097	0.054	0.356	0.066	1.1	1.1	0.161	0.154
	15	0.26	<.05	0.011	0.009	13.5	13.1	0.0020	0.0021	0.097	0.050	0.429	0.030	1.1	1.1	0.158	0.151
	AVERAGE	0.27	0.08	0.011	0.009	13.9	13.4	0.0021	0.0020	0.097	0.051	0.381	0.043	1.1	1.1	0.168	0.154
	S.D.	0.02	0.01	0.000	0.000	0.4	0.2	0.0001	0.0001	0.001	0.002	0.041	0.020	0.1	0.0	0.015	0.003
6	16	0.31	0.12	0.011	0.008	15.3	14.6	0.0019	0.0019	0.099	0.049	0.455	0.090	1.1	1.1	0.141	0.124
	17	0.33	0.11	0.012	0.008	15.1	14.8	0.0023	0.0018	0.080	0.048	0.465	0.075	1.1	1.1	0.133	0.125
	18	0.32	0.08	0.011	0.008	15.5	14.6	0.0018	0.0018	0.079	0.042	0.437	0.032	1.2	1.1	0.132	0.122
	AVERAGE	0.32	0.10	0.011	0.008	15.3	14.7	0.0020	0.0018	0.086	0.046	0.452	0.066	1.1	1.1	0.135	0.124
	S.D.	0.01	0.02	0.001	0.000	0.2	0.1	0.0003	0.0001	0.011	0.004	0.014	0.030	0.1	0.0	0.005	0.002
7	27	0.49	0.08	0.011	0.009	14.1	13.8	0.0040	0.0040	0.142	0.127	0.731	0.028	1.3	1.6	0.173	0.218
(M2)	28	0.49	0.11	0.012	0.009	14.2	13.6	0.0030	0.0030	0.136	0.064	0.757	0.115	1.3	1.2	0.172	0.156
	29	0.52	<.05	0.011	0.007	14.3	13.5	0.0030	0.0030	0.135	0.042	0.738	0.034	1.3	1.2	0.170	0.121
	AVERAGE	0.50	0.10	0.011	0.008	14.2	13.6	0.0033	0.0033	0.138	0.078	0.742	0.059	1.3	1.3	0.172	0.165
	S.D.	0.02	0.02	0.001	0.001	0.1	0.2	0.0006	0.0006	0.004	0.044	0.013	0.049	0.0	0.2	0.002	0.049
	Load,Kg/d	648.00	123.12	14.688	10.800	18403.2	17668.8	4.3200	4.3200	178.416	100.656	961.632	76.464	1684.8	1728.0	222.480	213.840

APPENDIX I Receiving Water Quality Data in Myra
Table 1 Tuesday october 22, 1985

Station Number	Sample Number	NA TOTICP UG/ML	NA DISICP UG/ML	P TOTICP UG/ML	P DISICP UG/ML	PB TOTGF UG/ML	PB DISGF UG/ML	SI TOTICP UG/ML	SI DISICP UG/ML	SR TOTICP UG/ML	SR DISICP UG/ML	TI TOTICP UG/ML	TI DISICP UG/ML	ZN TOTICP UG/ML	ZN DISICP UG/ML
1	1	0.6	0.6	<.05	<.05	0.002	<.001	0.6	0.6	0.008	0.008	0.006	0.004	<.002	<.002
(M1)	2	0.6	0.7	<.05	<.05	<.001	<.001	0.6	0.6	0.009	0.009	0.008	0.011	<.002	0.004
	3	0.6	0.6	<.05	<.05	<.001	<.001	0.6	0.6	0.009	0.008	0.008	0.018	<.002	<.002
	AVERAGE	0.6	0.6	---	---	---	---	0.6	0.6	0.009	0.008	0.007	0.011	---	---
	S.D.	0.0	0.1	---	---	---	---	0.0	0.0	0.001	0.001	0.001	0.007	---	---
2	4	0.6	0.6	<.05	<.05	<.001	<.001	0.6	0.6	0.010	0.010	0.008	0.018	0.023	0.019
	5	0.6	0.7	0.05	0.05	<.001	<.001	0.6	0.6	0.011	0.009	0.007	0.004	0.024	0.020
	6	0.6	0.7	0.06	0.08	<.001	<.001	0.6	0.6	0.010	0.010	0.010	0.016	0.020	0.018
	AVERAGE	0.6	0.7	0.06	0.07	---	---	0.6	0.6	0.010	0.010	0.008	0.013	0.022	0.019
	S.D.	0.0	0.1	---	---	---	---	0.0	0.0	0.001	0.001	0.002	0.008	0.002	0.001
3	7	0.8	0.8	<.05	<.05	<.001	<.001	0.6	0.6	0.014	0.014	0.005	0.006	0.038	0.034
	8	0.8	0.8	<.05	0.06	<.001	<.001	0.6	0.6	0.014	0.014	0.007	0.005	0.037	0.033
	9	0.8	0.8	<.05	<.05	<.001	<.001	0.6	0.6	0.015	0.013	0.008	0.012	0.038	0.032
	AVERAGE	0.8	0.8	---	0.06	---	---	0.6	0.6	0.014	0.014	0.007	0.008	0.038	0.033
	S.D.	0.0	0.0	---	---	---	---	0.0	0.0	0.001	0.001	0.002	0.004	0.001	0.001
4	10	1.0	1.0	<.05	0.06	<.001	<.001	0.6	0.6	0.026	0.022	0.003	0.014	0.064	0.057
	11	0.9	1.0	<.05	<.05	<.001	<.001	0.7	0.6	0.024	0.022	0.003	0.017	0.062	0.056
	12	0.9	1.0	<.05	<.05	<.001	<.001	0.6	0.6	0.024	0.022	0.011	0.013	0.063	0.057
	AVERAGE	0.9	1.0	---	---	---	---	0.6	0.6	0.025	0.022	0.006	0.015	0.063	0.057
	S.D.	0.1	0.0	---	---	---	---	0.1	0.0	0.001	0.000	0.005	0.002	0.001	0.001
5	13	1.1	1.1	<.05	<.05	<.001	<.001	0.6	0.6	0.035	0.033	0.005	0.005	0.500	0.466
	14	1.0	1.0	<.05	<.05	<.001	<.001	0.7	0.6	0.034	0.032	0.006	0.003	0.508	0.470
	15	1.0	1.0	<.05	<.05	<.001	<.001	0.6	0.6	0.033	0.031	0.017	0.011	0.496	0.452
	AVERAGE	1.0	1.0	---	---	---	---	0.6	0.6	0.034	0.032	0.009	0.006	0.501	0.463
	S.D.	0.1	0.1	---	---	---	---	0.1	0.0	0.001	0.001	0.007	0.004	0.006	0.009
6	16	0.9	1.0	<.05	<.05	<.001	<.001	0.7	0.6	0.035	0.033	0.006	0.007	0.440	0.404
	17	0.9	1.0	0.05	<.05	<.001	<.001	1.1	0.7	0.035	0.034	0.020	0.005	0.429	0.411
	18	1.0	1.0	<.05	0.07	<.001	<.001	1.4	0.6	0.035	0.034	0.006	0.006	0.442	0.400
	AVERAGE	0.9	1.0	---	---	---	---	1.1	0.6	0.035	0.034	0.011	0.006	0.437	0.405
	S.D.	0.1	0.0	---	---	---	---	0.4	0.1	0.000	0.001	0.008	0.001	0.007	0.006
7	27	1.0	1.0	<.05	<.05	<.001	<.001	1.3	0.7	0.029	0.033	0.013	0.003	0.709	0.915
(M2)	28	0.9	1.0	<.05	<.05	<.001	<.001	1.1	0.6	0.029	0.032	0.008	0.003	0.718	0.600
	29	0.9	1.0	<.05	<.05	<.001	<.001	1.1	0.6	0.033	0.024	0.016	0.002	0.706	0.470
	AVERAGE	0.9	1.0	---	---	---	---	1.2	0.6	0.030	0.030	0.012	0.003	0.711	0.662
	S.D.	0.1	0.0	---	---	---	---	0.1	0.1	0.002	0.005	0.004	0.001	0.006	0.229
	Load,Kg/d	1209.6	1296.0	---	---	---	---	1512.0	820.8	39.312	38.448	15.984	3.456	921.456	857.520

APPENDIX I Receiving Water Quality Data in Myra Creek
Table 1 Tuesday october 22, 1985

Station Number	Sample Number	TR MG/L	FR MG/L	NFR MG/L	TURBIDITY FTU	SO4 PPM	pH pH units	ALKALINITY MG/L	HARDNESS MG/L	ACIDITY MG/L	CONDUC. umhos/cm	CONDUC. (F) umhos/cm	TEMP. (F) C
1	1	19	19	<5	0.23	<1	6.9	9.8	10.8	2.0	24.0		
(M1)	2	18	18	<5	0.18	<1	6.8	9.4	10.7	1.0	25.0		
	3	18	18	<5	0.20	1	6.6	8.6	10.9	2.0	34.0		
	AVERAGE	18	18	—	0.20	1	—	9.3	10.8	1.7	27.7	18.9	5.2
	S.D.	1	1	—	0.03	—	—	0.6	0.1	0.6	5.5		
2	4	15	15	<5	0.23	3	6.9	9.8	10.8	2.0	24.0		
	5	18	18	<5	0.18	3	6.8	9.4	10.7	1.0	25.0		
	6	16	16	<5	0.20	3	6.6	8.6	10.9	2.0	34.0		
	AVERAGE	16	16	—	0.20	3	—	9.3	10.8	1.7	27.7	26.9	5.7
	S.D.	2	2	—	0.03	0	—	0.6	0.1	0.6	5.5		
3	7	18	18	<5	0.40	5	6.6	10.2	17.0	1.0	40.5		
	8	23	23	<5	0.40	5	6.5	11.0	17.2	2.0	40.5		
	9	22	22	<5	0.43	5	6.5	11.0	16.4	1.5	40.5		
	AVERAGE	21	21	—	0.41	5	—	10.7	16.9	1.5	40.5	38.5	5.8
	S.D.	3	3	—	0.02	0	—	0.5	0.4	0.5	0.0		
4	10	37	37	<5	0.40	11	6.5	13.3	29.0	2.0	68.0		
	11	34	34	<5	0.38	13	6.5	13.3	29.1	2.0	70.0		
	12	33	39	<5	0.38	13	6.6	13.7	27.1	2.0	70.0		
	AVERAGE	35	37	—	0.39	12	—	13.4	28.4	2.0	69.3	89.0	6.1
	S.D.	2	3	—	0.01	1	—	0.2	1.1	0.0	1.2		
5	13	58	58	<5	2.50	26	6.4	10.2	43.8	2.0	98.0		
	14	60	60	<5	2.50	26	6.4	10.2	42.7	3.1	100.0		
	15	59	59	<5	2.50	26	6.5	10.2	41.6	2.0	100.0		
	AVERAGE	59	59	—	2.50	26	—	10.2	42.7	2.4	99.3	132.2	6.2
	S.D.	1	1	—	0.00	0	—	0.0	1.1	0.6	1.2		
6	16	55	55	<5	2.80	26	6.6	13.3	46.3	2.5	105.0		
	17	62	62	<5	2.80	26	6.7	13.3	46.0	2.0	103.0		
	18	59	59	<5	4.80	27	6.6	13.3	46.9	3.1	105.0		
	AVERAGE	59	59	—	3.47	26	—	13.3	46.4	2.5	104.3	128.5	6.2
	S.D.	4	4	—	1.15	1	—	0.0	0.5	0.6	1.2		
7	27	67	67	<5	4.80	26	6.8	11.8	46.0	7.1	103.0		
(M2)	28	67	67	<5	4.80	27	6.8	9.8	46.5	6.1	103.0		
	29	63	63	<5	5.30	27	6.5	10.2	46.7	5.1	103.0		
	AVERAGE	66	66	—	4.97	27	—	10.6	46.4	6.1	103.0	127.8	5.7
	S.D.	2	2	—	0.29	1	—	1.1	0.4	1.0	0.0		
	Load, Kg/d	85104	85104	—	—	34560							

APPENDIX I Receiving Water Quality Data in Myra Creek
Table 2 Wednesday october 23, 1985

Station Number	Sample Number	AL TOTICP UG/ML	AL DISICP UG/ML	BA TOTICP UG/ML	BA DISICP UG/ML	CA TOTICP UG/ML	CA DISICP UG/ML	CD TOTGF UG/ML	CD DISGF UG/ML	CU TOTGF UG/ML	CU DISGF UG/ML	FE TOTICP UG/ML	FE DISICP UG/ML	MG TOTICP UG/ML	MG DISICP UG/ML	MN TOTICP UG/ML	MN DISICP UG/ML
1	1	0.13	(.05	0.014	0.005	4.4	4.3	(.0006	(.0005	(.001	(.001	0.114	0.006	0.2	0.2	0.003	(.001
(M1)	2	0.12	(.05	0.008	0.005	4.4	4.4	(.0006	(.0005	(.001	(.001	0.076	0.006	0.2	0.2	0.001	(.001
	3	0.09	0.06	0.012	0.004	4.4	4.2	(.0006	(.0005	(.001	(.001	0.058	0.006	0.2	0.2	(.001	(.001
	AVERAGE	0.11	0.06	0.011	0.005	4.4	4.3	—	—	—	—	0.083	0.006	0.2	0.2	0.002	—
	S.D.	0.02	—	0.003	0.001	0.0	0.1	—	—	—	—	0.029	0.000	0	0	0.001	—
2	4	0.07	(.05	0.012	0.005	5.5	5.3	(.0006	(.0005	(.001	(.001	0.056	0.007	0.3	0.3	0.002	0.004
	*5	0.19	0.25	0.017	0.005	5.5	5.7	(.0006	(.0005	(.001	0.005	0.056	0.390	0.3	0.4	0.003	0.018
	6	0.07	(.05	0.008	0.005	5.5	5.4	(.0006	(.0005	(.001	(.001	0.056	0.007	0.3	0.2	0.001	0.003
	AVERAGE	0.11	—	0.010	0.005	5.5	5.4	—	—	—	—	0.056	0.007	0.3	0.3	0.002	0.004
	S.D.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	10	0.08	0.08	0.015	0.006	6.4	6.4	(.0006	(.0005	0.012	0.006	0.189	0.053	0.3	0.3	0.015	0.009
	11	0.08	(.05	0.020	0.005	6.5	6.4	(.0006	(.0005	0.009	0.006	0.099	0.056	0.3	0.3	0.021	0.008
	12	0.08	(.05	0.021	0.006	6.5	6.3	(.0006	(.0005	0.010	0.007	0.100	0.055	0.3	0.3	0.023	0.009
	AVERAGE	0.08	0.08	0.019	0.006	6.5	6.4	—	—	0.010	0.006	0.129	0.055	0.3	0.3	0.020	0.009
	S.D.	0.00	—	0.003	0.001	0.1	0.1	—	—	0.002	0.001	0.052	0.002	0	0	0.004	0.001
4	7	0.10	0.09	0.030	0.008	9.7	9.8	(.0006	(.0005	0.011	0.015	0.109	0.137	0.5	0.5	0.055	0.027
	8	0.08	0.06	0.028	0.008	9.5	9.7	(.0006	(.0005	0.011	0.008	0.106	0.056	0.4	0.5	0.054	0.025
	9	0.09	0.06	0.030	0.009	9.6	9.7	(.0006	(.0005	0.013	0.011	0.109	0.060	0.5	0.4	0.058	0.026
	AVERAGE	0.09	0.07	0.029	0.008	9.6	9.7	—	—	0.012	0.011	0.108	0.084	0.5	0.5	0.056	0.026
	S.D.	0.01	0.02	0.001	0.001	0.1	0.1	—	—	0.001	0.004	0.002	0.046	0.1	0.1	0.002	0.001
5	13	0.28	(.05	0.047	0.012	20.4	20.0	0.0030	0.0030	0.090	0.048	0.324	0.034	1.6	1.5	0.594	0.231
	14	0.28	0.06	0.048	0.012	20.6	20.5	0.0030	0.0020	0.091	0.051	0.325	0.055	1.6	1.5	0.600	0.236
	15	0.30	0.06	0.047	0.012	20.6	20.5	0.0030	0.0020	0.093	0.049	0.323	0.039	1.6	1.6	0.599	0.236
	AVERAGE	0.29	0.06	0.047	0.012	20.5	20.3	0.0030	0.0023	0.091	0.049	0.324	0.043	1.6	1.5	0.598	0.234
	S.D.	0.01	0.00	0.001	0.000	0.1	0.3	0.0000	0.0006	0.002	0.002	0.001	0.011	0	0.1	0.003	0.003
6	16	0.30	0.07	0.037	0.009	19.0	18.5	0.0030	0.0020	0.088	0.041	0.389	0.063	1.3	1.2	0.376	0.143
	17	0.28	0.06	0.036	0.010	18.9	18.5	0.0040	0.0020	0.091	0.037	0.375	0.041	1.3	1.2	0.373	0.143
	18	0.28	0.06	0.036	0.010	18.8	18.7	0.0040	0.0030	0.092	0.038	0.374	0.040	1.3	1.2	0.371	0.145
	AVERAGE	0.29	0.06	0.036	0.010	18.9	18.6	0.0037	0.0023	0.090	0.039	0.379	0.048	1.3	1.2	0.373	0.144
	S.D.	0.01	0.01	0.001	0.001	0.1	0.1	0.0006	0.0006	0.002	0.002	0.008	0.013	0	0	0.003	0.001
7	27	0.47	0.07	0.012	0.011	19.9	20.0	0.0040	0.0030	0.131	0.066	0.574	0.046	1.7	1.6	0.224	0.212
(M2)	28	0.47	(.05	0.012	0.011	20.0	20.0	0.0030	0.0030	0.130	0.062	0.572	0.045	1.8	1.6	0.224	0.210
	29	0.47	0.08	0.012	0.011	20.0	19.8	0.0030	0.0030	0.131	0.065	0.593	0.076	1.8	1.6	0.225	0.207
	AVERAGE	0.47	0.08	0.012	0.011	20.0	19.9	0.0033	0.0030	0.131	0.064	0.580	0.056	1.8	1.6	0.224	0.210
	S.D.	0.00	0.01	0.000	0.000	0.1	0.1	0.0006	0.0000	0.001	0.002	0.012	0.018	0	0	0.001	0.003
	Load,Kg/d	495.42	79.06	12.549	11.595	21046.5	21011.3	3.5136	3.1622	137.733	67.012	611.015	58.677	1862.2	1686.5	236.465	221.005

* Sample contamination

APPENDIX I Receiving Water Quality Data in Myra Creek
Table 2 Wednesday october 23, 1985

Station Number	Sample Number	NA TOTICP UG/ML	NA DISICP UG/ML	PB TOTGF UG/ML	PB DISGF UG/ML	SI TOTICP UG/ML	SI DISICP UG/ML	SN TOTICP UG/ML	SN DISICP UG/ML	SR TOTICP UG/ML	SR DISICP UG/ML	TI TOTICP UG/ML	TI DISICP UG/ML	ZN TOTICP UG/ML	ZN DISICP UG/ML
1	1	0.7	0.6	0.002	<.001	0.7	0.6	<.01	<.01	0.018	0.010	0.017	0.008	<.002	<.002
(M1)	2	0.7	0.6	<.001	<.001	0.5	0.6	<.01	<.01	0.012	0.010	0.007	0.005	<.002	<.002
	3	0.7	0.6	<.001	<.001	0.6	0.6	<.01	<.01	0.019	0.010	0.025	0.013	<.002	<.002
	AVERAGE	0.7	0.6	---	---	0.6	0.6	---	---	0.016	0.010	0.016	0.009	---	---
	S.D.	0.0	0.0	---	---	0.1	0.0	---	---	0.004	0.000	0.009	0.004	---	---
2	4	0.7	0.6	<.001	<.001	0.7	0.6	<.01	<.01	0.021	0.011	0.011	0.014	<.002	<.002
	*5	0.7	0.7	<.001	<.001	0.6	0.6	0.03	<.01	0.033	0.011	0.064	0.008	0.007	0.008
	6	0.7	0.6	<.001	<.001	0.6	0.6	<.01	<.01	0.013	0.011	0.054	0.013	0.008	0.005
	AVERAGE	0.7	0.6	---	---	0.6	0.6	---	---	0.017	0.011	0.033	0.014	---	---
	S.D.	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	10	0.8	0.8	<.001	<.001	0.5	0.6	<.01	<.01	0.040	0.016	0.014	0.008	0.206	0.032
	11	0.8	0.8	<.001	<.001	0.5	0.6	0.01	<.01	0.053	0.014	0.053	0.008	0.312	0.026
	12	0.8	0.7	<.001	<.001	0.5	0.6	<.01	0.01	0.053	0.015	0.067	0.012	0.299	0.031
	AVERAGE	0.8	0.8	---	---	0.5	0.6	0.01	0.01	0.049	0.015	0.045	0.009	0.272	0.030
	S.D.	0.0	0.1	---	---	0.0	0.0	---	---	0.008	0.001	0.027	0.002	0.058	0.003
4	7	0.9	0.9	<.001	<.001	0.8	0.6	0.10	<.01	0.076	0.022	0.079	0.008	0.350	0.092
	8	0.9	1.0	<.001	<.001	0.6	0.6	0.07	<.01	0.075	0.022	0.096	0.010	0.471	0.069
	9	0.9	0.9	<.001	<.001	0.9	0.6	<.01	<.01	0.078	0.022	0.061	0.009	0.501	0.065
	AVERAGE	0.9	0.9	---	---	0.8	0.6	0.09	---	0.076	0.022	0.079	0.009	0.441	0.075
	S.D.	0.0	0.1	---	---	0.2	0.0	0.02	---	0.002	0.000	0.018	0.001	0.080	0.015
5	13	1.3	1.2	<.001	<.001	1.1	0.7	<.01	<.01	0.166	0.047	0.075	0.011	0.494	0.484
	14	1.3	1.3	<.001	<.001	1.1	1.0	<.01	<.01	0.165	0.047	0.058	0.006	0.487	0.497
	15	1.3	1.3	<.001	<.001	1.1	1.1	<.01	<.01	0.167	0.048	0.053	0.004	0.489	0.498
	AVERAGE	1.3	1.3	---	---	1.1	0.9	---	---	0.166	0.047	0.062	0.007	0.490	0.493
	S.D.	0.0	0.0	---	---	0.0	0.2	---	---	0.001	0.001	0.012	0.004	0.004	0.008
6	16	1.1	1.0	<.001	<.001	1.1	0.7	<.01	<.01	0.152	0.043	0.059	0.010	0.445	0.431
	17	1.0	1.0	<.001	<.001	1.1	0.6	0.07	<.01	0.150	0.042	0.113	0.013	0.448	0.424
	18	1.0	1.0	<.001	<.001	1.1	0.8	0.06	<.01	0.149	0.043	0.128	0.011	0.446	0.433
	AVERAGE	1.0	1.0	---	---	1.1	0.7	0.07	---	0.150	0.043	0.100	0.011	0.446	0.429
	S.D.	0.1	0.0	---	---	0.0	0.1	0.01	---	0.002	0.001	0.036	0.002	0.002	0.005
7	27	1.1	1.1	0.001	<.001	0.8	1.0	0.02	<.01	0.047	0.048	0.010	0.005	0.766	0.735
(M2)	28	1.1	1.1	0.001	<.001	0.8	1.1	<.01	<.01	0.047	0.047	0.004	0.007	0.770	0.718
	29	1.1	1.1	0.002	<.001	0.8	1.1	<.01	<.01	0.048	0.047	0.007	0.008	0.770	0.704
	AVERAGE	1.1	1.1	0.001	---	0.8	1.1	0.02	---	0.047	0.047	0.007	0.007	0.769	0.719
	S.D.	0.0	0.0	0.001	---	0.0	0.1	---	---	0.001	0.001	0.003	0.002	0.002	0.016
	Load, Kg/d	1159.5	1159.5	1.405	---	843.3	1124.4	21.08	---	49.893	49.893	7.379	7.027	810.236	757.884

* Sample contamination

APPENDIX I Receiving Water Quality Data in Myra Creek
Table 2 Wednesday october 23, 1985

Station Number	Sample Number	TR MG/L	FR MG/L	NFR MG/L	TURBIDITY FTU	SO4 PPM	pH pH units	ALKALINITY MG/L	HARDNESS MG/L	ACIDITY MG/L	CONDUC. umhos/cm	CONDUC.(F) umhos/cm	TEMP.(F) C
1 (M1)	1	21	21	<5	0.13	1	7.1	12.5	12.8	2.0	28.5	24.3	5.3
	2	13	13	<5	0.13	<1	7.1	12.5	12.9	1.5	28.5		
	3	15	15	<5	0.13	2	7.1	12.5	12.3	2.5	28.5		
	AVERAGE	16	16	—	0.13	2	—	12.5	12.7	2.0	28.5		
	S.D.	4	4	—	0.00	1	—	0.0	0.3	0.5	0.0		
2	4	22	22	<5	0.18	2	7.1	14.1	15.4	2.0	36.0	30.6	6.1
	5	17	17	<5	0.18	2	6.9	14.1	15.9	3.1	35.0		
	6	17	17	<5	0.18	2	7	14.1	15.2	3.1	35.0		
	AVERAGE	19	19	—	0.18	2	—	14.1	15.5	2.7	35.3		
	S.D.	3	3	—	0.00	0	—	0.0	0.4	0.6	0.6		
3	10	27	27	<5	0.35	5	6.9	13.7	18.4	3.1	44.5	43.1	5.9
	11	28	28	<5	0.38	5	6.9	13.7	18.6	3.1	44.5		
	12	33	33	<5	0.38	5	6.9	13.7	18.7	3.1	44.5		
	AVERAGE	29	29	—	0.37	5	—	13.7	18.6	3.1	44.5		
	S.D.	3	3	—	0.02	0	—	0.0	0.2	0.0	0.0		
4	7	45	45	<5	0.38	12	6.9	16.5	27.6	4.1	73.0	70.4	6
	8	47	47	<5	0.38	13	6.9	16.5	27.2	4.1	75.0		
	9	43	43	<5	0.38	12	6.9	16.5	27.5	5.1	73.0		
	AVERAGE	45	45	—	0.38	12	—	16.5	27.4	4.4	73.7		
	S.D.	2	2	—	0.00	1	—	0.0	0.2	0.6	1.2		
5	13	89	89	<5	2.30	40	6.8	14.9	65.8	5.1	145.0	203	6.4
	14	91	91	<5	2.30	41	6.8	14.5	66.5	4.1	143.0		
	15	84	84	<5	2.30	40	6.9	16.5	66.6	4.1	143.0		
	AVERAGE	88	88	—	2.30	40	—	15.3	66.3	4.4	143.7		
	S.D.	4	4	—	0.00	1	—	1.1	0.4	0.6	1.2		
6	16	75	75	<5	2.30	34	6.9	16.5	60.7	3.1	120.0	159.9	7.7
	17	79	79	<5	2.30	32	6.9	16.5	60.3	4.1	120.0		
	18	78	78	<5	2.50	34	6.8	16.5	60.0	3.6	120.0		
	AVERAGE	77	77	—	2.37	33	—	16.5	60.3	3.6	120.0		
	S.D.	2	2	—	0.12	1	—	0.0	0.4	0.5	0.0		
7 (M2)	27	97	97	<5	3.80	37	6.7	13.7	69.1	4.6	140.0	182.7	5.6
	28	84	84	<5	3.80	38	6.7	13.3	69.9	4.6	140.0		
	29	79	79	<5	3.30	39	6.7	13.3	69.4	4.1	140.0		
	AVERAGE	87	87	—	3.63	38	—	13.4	69.5	4.4	140.0		
	S.D.	9	9	—	0.29	1	—	0.2	0.4	0.3	0.0		
	Load,Kg/d	91704	91357	—	—	40055	—						

APPENDIX I Receiving Water Quality Data in Myra Creek
Table 3 Thursday October 24, 1985

Station	Sample Number	AL TOTICP UG/ML	AL DISICP UG/ML	BA TOTICP UG/ML	BA DISICP UG/ML	CA TOTICP UG/ML	CA DISICP UG/ML	CD TOTGF UG/ML	CD DISGF UG/ML	CU TOTGF UG/ML	CU DISGF UG/ML	FE TOTICP UG/ML	FE DISICP UG/ML	MG TOTICP UG/ML	MG DISICP UG/ML	MN TOTICP UG/ML	MN DISICP UG/ML
1	1	0.13	0.07	0.008	0.004	3.8	3.8	<.0006	<.0005	<.001	<.001	0.054	0.009	0.2	0.2	0.002	<.001
(M1)	2	0.09	0.06	0.005	0.005	3.8	3.7	<.0006	<.0005	<.001	<.001	0.040	0.007	0.2	0.2	0.001	<.001
	3	0.09	0.06	0.005	0.005	3.8	3.7	<.0006	<.0005	<.001	<.001	0.025	0.007	0.2	0.2	0.001	<.001
	AVERAGE	0.10	0.06	0.006	0.005	3.8	3.7	----	----	----	----	0.040	0.008	0.2	0.2	0.001	----
	S.D.	0.02	0.01	0.002	0.001	0.0	0.1	----	----	----	----	0.015	0.001	0.0	0.0	0.001	----
2	4	0.12	<.05	0.006	0.005	4.7	4.5	<.0006	<.0005	0.002	<.001	0.037	0.008	0.3	0.2	0.005	0.004
	5	0.07	0.06	0.005	0.005	4.5	4.5	<.0006	<.0005	<.001	<.001	0.019	0.008	0.2	0.2	0.003	0.003
	6	0.08	0.06	0.006	0.004	4.6	4.4	<.0006	<.0005	<.001	<.001	0.027	0.008	0.3	0.2	0.005	0.002
	AVERAGE	0.09	0.06	0.006	0.005	4.6	4.5	----	----	----	----	0.028	0.008	0.3	0.2	0.004	0.003
	S.D.	0.03	----	0.001	0.001	0.1	0.1	----	----	----	----	0.009	0.000	0.1	0.0	0.001	0.001
3	7	0.09	0.07	0.006	0.001	5.2	5.0	<.0006	<.0005	0.004	0.004	0.078	0.042	0.3	0.2	0.005	0.001
	8	0.10	0.08	0.006	0.004	5.2	5.0	<.0006	<.0005	0.005	0.005	0.092	0.043	0.3	0.2	0.005	0.005
	9	0.13	0.07	0.005	0.004	5.2	5.0	<.0006	<.0005	0.005	0.003	0.087	0.042	0.3	0.2	0.005	0.004
	AVERAGE	0.11	0.07	0.006	0.003	5.2	5.0	----	----	0.005	0.004	0.086	0.042	0.3	0.2	0.005	0.003
	S.D.	0.02	0.01	0.001	0.002	0.0	0.0	----	----	0.001	0.001	0.007	0.001	0.0	0.0	0.000	0.002
4	10	0.14	0.09	0.010	0.006	9.7	8.3	<.0006	<.0005	0.004	0.004	0.148	0.047	0.4	0.4	0.037	0.020
	11	0.15	0.08	0.008	0.007	9.7	9.1	<.0006	<.0005	0.007	0.005	0.098	0.045	0.4	0.4	0.035	0.033
	12	0.14	0.07	0.007	0.006	8.6	8.3	<.0006	<.0005	0.006	0.005	0.091	0.042	0.4	0.3	0.026	0.023
	AVERAGE	0.14	0.08	0.008	0.006	9.3	8.6	----	----	0.006	0.005	0.112	0.045	0.4	0.4	0.033	0.025
	S.D.	0.01	0.01	0.002	0.001	0.6	0.5	----	----	0.002	0.001	0.031	0.003	0.0	0.1	0.006	0.007
5	13	0.19	0.10	0.012	0.009	12.1	12.2	0.0007	<.0005	0.014	0.010	0.246	0.045	0.9	0.9	0.120	0.126
	14	0.15	0.08	0.011	0.009	12.6	12.1	<.0006	<.0005	0.012	0.010	0.390	0.045	0.9	0.9	0.138	0.127
	15	0.12	0.07	0.010	0.009	12.6	12.0	<.0006	0.0005	0.014	0.009	0.123	0.038	0.9	0.9	0.132	0.127
	AVERAGE	0.15	0.08	0.011	0.009	12.4	12.1	----	----	0.013	0.010	0.253	0.043	0.9	0.9	0.130	0.127
	S.D.	0.04	0.02	0.001	0.000	0.3	0.1	----	----	0.001	0.001	0.134	0.004	0.0	0.0	0.009	0.001
6	16	0.19	0.08	0.015	0.010	16.8	16.0	0.0008	0.0009	0.031	0.013	0.207	0.039	1.2	1.1	0.137	0.127
	17	0.20	0.06	0.015	0.010	16.8	16.0	0.0009	0.0009	0.030	0.012	0.200	0.028	1.2	1.1	0.136	0.128
	18	0.17	0.08	0.015	0.010	16.7	16.0	0.0009	0.0009	0.031	0.012	0.207	0.038	1.2	1.1	0.136	0.125
	AVERAGE	0.19	0.07	0.015	0.010	16.8	16.0	0.0009	0.0009	0.031	0.012	0.205	0.035	1.2	1.1	0.136	0.127
	S.D.	0.02	0.01	0.000	0.000	0.1	0.0	0.0	0.0	0.001	0.001	0.004	0.006	0.0	0.0	0.001	0.002
7	27	0.36	0.11	0.015	0.012	21.0	20.1	0.0050	0.0022	0.088	0.040	0.362	0.085	1.7	1.6	0.221	0.211
(M2)	28	0.34	0.10	0.016	0.012	20.9	20.0	0.0008	0.0019	0.075	0.040	0.364	0.079	1.7	1.6	0.220	0.209
	29	0.34	0.11	0.015	0.012	21.0	20.2	0.0019	0.0019	0.075	0.038	0.360	0.078	1.7	1.6	0.216	0.209
	AVERAGE	0.35	0.11	0.015	0.012	21.0	20.1	0.0026	0.0020	0.079	0.039	0.362	0.081	1.7	1.6	0.219	0.210
	S.D.	0.01	0.01	0.001	0.000	0.1	0.1	0.0	0.0	0.008	0.001	0.002	0.004	0.0	0.0	0.003	0.001
	Load,Kg/d	233.63	71.88	10.333	8.087	14129.9	13545.8	1.7297	1.3478	53.464	26.580	243.959	54.363	1145.7	1078.3	147.588	141.299
Gold River	30	0.13	<.05	0.018	0.017	9.9	9.8	<.0006	<.0005	0.013	<.001	0.119	0.005	0.9	0.8	0.007	0.002
Bridge	31	0.19	<.05	0.019	0.016	10.0	9.5	<.0006	<.0005	0.003	<.001	0.176	<.005	0.9	0.8	0.007	0.001
	32	0.12	<.05	0.019	0.016	10.0	9.3	<.0006	<.0005	0.003	<.001	0.110	0.006	0.9	0.8	0.006	0.001
	AVERAGE	0.15	----	0.019	0.016	10.0	9.5	----	----	0.006	----	0.135	0.006	0.9	0.8	0.007	0.001
	S.D.	0.04	----	0.001	0.001	0.1	0.3	----	----	0.006	----	0.036	----	0.0	0.0	0.001	0.001
Elk Falls	33	0.12	<.05	0.014	0.012	7.6	7.2	<.0006	<.0005	0.002	<.001	0.040	0.010	1.0	0.9	0.013	0.003
	34	<.05	<.05	0.013	0.012	7.5	7.0	<.0006	<.0005	0.002	<.001	0.042	0.008	0.9	0.8	0.006	0.002
	35	<.05	<.05	0.013	0.012	7.5	7.1	<.0006	<.0005	0.002	<.001	0.057	0.008	0.9	0.8	0.007	0.002
	AVERAGE	----	----	0.013	0.012	7.5	7.1	----	----	0.002	----	0.046	0.009	0.9	0.8	0.009	0.002
	S.D.	----	----	0.001	0.000	0.1	0.1	----	----	0.0	----	0.009	0.001	0.1	0.1	0.004	0.001

APPENDIX I Receiving Water Quality Data in Myra Creek.
Table 3 Thursday october 24, 1985

Station	Sample Number	NA TOTICP UG/ML	NA DISICP UG/ML	PB TOTGF UG/ML	PB DISGF UG/ML	SI TOTICP UG/ML	SI DISICP UG/ML	SN TOTICP UG/ML	SN DISICP UG/ML	SR TOTICP UG/ML	SR DISICP UG/ML	TI TOTICP UG/ML	TI DISICP UG/ML	ZN TOTICP UG/ML	ZN DISICP UG/ML
1	1	0.7	0.6	0.002	<.001	0.7	0.7	<.01	<.01	0.009	0.008	0.003	<.002	0.007	0.002
(M1)	2	0.6	0.6	<.001	<.001	0.7	0.7	<.01	<.01	0.009	0.008	0.003	<.002	0.003	0.003
	3	0.6	0.6	<.001	<.001	0.7	0.7	<.01	<.01	0.009	0.008	0.004	<.002	0.004	<.002
	AVERAGE	0.6	0.6	---	---	0.7	0.7	---	---	0.009	0.008	0.003	----	0.005	0.003
	S.D.	0.1	0.0	---	---	0.0	0.0	---	---	0.000	0.000	0.001	----	0.002	----
2	4	0.6	0.6	<.001	<.001	0.7	0.7	<.01	<.01	0.009	0.009	0.003	<.002	0.010	0.007
	5	0.6	0.6	<.001	<.001	0.5	0.7	0.04	<.01	0.009	0.008	0.020	<.002	0.007	0.007
	6	0.6	0.6	0.002	<.001	0.5	0.6	0.05	<.01	0.009	0.007	0.017	<.002	0.010	0.005
	AVERAGE	0.6	0.6	---	---	0.6	0.7	0.05	---	0.009	0.008	0.013	----	0.009	0.006
	S.D.	0.0	0.0	---	---	0.1	0.1	---	---	0.000	0.001	0.009	----	0.002	0.001
3	7	0.8	0.7	<.001	<.001	0.5	0.8	0.04	<.01	0.013	0.003	0.017	<.002	0.029	0.003
	8	0.7	0.7	<.001	<.001	0.5	0.8	0.02	<.01	0.011	0.010	0.014	<.002	0.028	0.022
	9	0.7	0.7	<.001	<.001	0.5	0.8	<.01	<.01	0.011	0.011	0.011	<.002	0.026	0.021
	AVERAGE	0.7	0.7	---	---	0.5	0.8	0.03	---	0.012	0.008	0.014	----	0.028	0.015
	S.D.	0.1	0.0	---	---	0.0	0.0	---	---	0.001	0.004	0.003	----	0.002	0.011
4	10	1.0	0.9	0.001	<.001	0.7	0.7	0.09	<.01	0.024	0.016	0.033	<.002	0.053	0.028
	11	1.0	1.0	0.001	<.001	0.7	0.7	0.08	<.01	0.021	0.021	0.028	<.002	0.040	0.034
	12	0.9	0.9	<.001	<.001	0.6	0.7	0.04	<.01	0.020	0.018	0.017	<.002	0.046	0.033
	AVERAGE	1.0	0.9	---	---	0.7	0.7	0.07	---	0.022	0.018	0.026	----	0.046	0.032
	S.D.	0.1	0.1	---	---	0.1	0.0	0.03	---	0.002	0.003	0.008	----	0.007	0.003
5	13	1.1	1.1	0.001	<.001	0.9	0.7	0.05	<.01	0.028	0.028	0.032	<.002	0.137	0.125
	14	1.1	1.1	<.001	<.001	0.9	0.8	0.02	<.01	0.028	0.028	0.014	<.002	0.146	0.124
	15	1.1	1.1	<.001	<.001	0.9	0.8	<.01	<.01	0.027	0.028	<.002	<.002	0.132	0.118
	AVERAGE	1.1	1.1	---	---	0.9	0.8	0.04	---	0.028	0.028	0.023	----	0.138	0.122
	S.D.	0.0	0.0	---	---	0.0	0.1	---	---	0.001	0.000	----	----	0.007	0.004
6	16	1.1	1.1	<.001	<.001	0.9	0.8	0.06	<.01	0.039	0.035	0.025	<.002	0.238	0.175
	17	1.1	1.1	<.001	<.001	0.9	0.8	0.07	<.01	0.038	0.037	0.021	<.002	0.237	0.175
	18	1.1	1.2	0.002	<.001	1.0	0.8	0.06	<.01	0.039	0.035	0.024	<.002	0.237	0.171
	AVERAGE	1.1	1.1	---	---	0.9	0.8	0.06	---	0.039	0.036	0.023	----	0.237	0.174
	S.D.	0.0	0.1	---	---	0.1	0.0	0.01	---	0.001	0.001	0.002	----	0.001	0.002
7	27	1.3	1.3	<.001	<.001	1.4	1.2	0.03	<.01	0.050	0.047	0.007	<.002	0.536	0.443
(M2)	28	1.3	1.3	<.001	<.001	1.4	1.2	0.03	<.01	0.051	0.047	0.006	<.002	0.530	0.440
	29	1.3	1.3	<.001	<.001	1.1	1.2	0.03	<.01	0.050	0.047	0.005	<.002	0.513	0.433
	AVERAGE	1.3	1.3	---	---	1.3	1.2	0.03	---	0.050	0.047	0.006	----	0.526	0.439
	S.D.	0.0	0.0	---	---	0.2	0.0	0.00	---	0.001	0.000	0.001	----	0.012	0.005
	Load,Kg/d	876.1	876.1	---	---	876.1	808.7	20.22	---	33.921	31.674	4.044	----	354.707	295.626
Gold River	30	0.7	0.7	<.001	<.001	0.9	0.8	0.06	0.04	0.015	0.013	0.033	<.002	0.038	0.028
Bridge	31	0.7	0.7	<.001	<.001	0.9	0.8	0.04	0.04	0.016	0.014	0.038	<.002	0.041	0.028
	32	0.7	0.7	<.001	<.001	0.9	0.8	0.06	0.04	0.016	0.013	0.030	0.003	0.038	0.027
	AVERAGE	0.7	0.7	---	---	0.9	0.8	0.05	0.04	0.016	0.013	0.034	-----	0.039	0.028
	S.D.	0.0	0.0	---	---	0.0	0.0	0.01	0.00	0.001	0.001	0.004	-----	0.002	0.001
Elk Falls	33	0.8	0.8	<.001	<.001	1.2	1.2	0.03	0.04	0.012	0.010	0.020	<.002	0.020	0.017
	34	0.8	0.7	<.001	<.001	1.0	1.0	0.04	0.03	0.012	0.010	0.019	0.005	0.019	0.014
	35	0.8	0.8	<.001	<.001	1.0	1.0	0.05	0.04	0.012	0.010	0.021	<.002	0.018	0.016
	AVERAGE	0.8	0.8	---	---	1.1	1.1	0.04	0.04	0.012	0.010	0.023	-----	0.019	0.016
	S.D.	0.0	0.1	---	---	0.1	0.1	0.01	0.01	0.000	0.000	0.005	-----	0.001	0.002

APPEN[illegible] Rece[illegible] ater [illegible], Data [illegible] Creek
Table 3 Thursday october 24, 1985

Station Number	Sample Number	TR MG/L	FR MG/L	NFR MG/L	TURBIDITY FTU	SO4 PPM	pH pH units	ALKALINITY MG/L	HARDNESS MG/L	ACIDITY MG/L	CONDUC. umhos/cm	CONDUC.(F) umhos/cm	TEMP.(F) C
1	1	27	20	7	0.18	2	7.1	11.0	11.1	1.5	26.0		
(M1)	2	(25	20	(5	0.18	1	7.1	10.2	10.8	2.0	27.0		
	3	28	19	9	0.18	1	7.2	12.5	10.9	1.0	27.5		
	AVERAGE	28	20	8	0.18	1	—	11.2	10.9	1.5	26.8	19.8	5.2
	S.D.	—	1	—	0.00	1	—	1.2	0.2	0.5	0.8		
2	4	28	23	6	0.18	2	7.0	12.5	13.7	2.0	31.5		
	5	(22	17	(5	0.18	2	7.0	12.2	12.7	1.0	31.5		
	6	(27	22	(5	0.18	2	7.0	11.8	13.3	2.0	30.0		
	AVERAGE	—	21	—	0.18	2	—	12.2	13.2	1.7	31.0	24.7	5.5
	S.D.	—	3	—	0.00	0	—	0.4	0.5	0.6	0.9		
3	7	(28	23	(5	0.28	4	7.0	11.8	14.7	1.0	36.0		
	8	29	24	5	0.28	4	7.0	11.0	14.9	2.0	35.0		
	9	(29	24	(5	0.25	4	6.9	13.3	15.1	2.0	35.0		
	AVERAGE	—	24	—	0.27	4	—	12.0	14.9	1.7	35.3	31.7	5.5
	S.D.	—	1	—	0.02	0	—	1.2	0.2	0.6	0.6		
4	10	52	45	7	0.28	11	6.9	14.1	27.1	1.0	65.0		
	11	(46	41	(5	0.33	9	6.9	13.7	27.2	2.0	175.0		
	12	48	38	10	0.30	10	6.9	12.5	24.1	1.0	58.0		
	AVERAGE	50	41	9	0.30	10	—	13.4	26.1	1.3	99.3	63.7	5.8
	S.D.	—	4	—	0.03	1	—	0.8	1.8	0.6	65.6		
5	13	(57	52	(5	0.40	19	6.9	12.5	38.8	2.0	85.0		
	14	65	54	10	0.33	19	6.9	12.5	36.7	1.0	85.0		
	15	59	54	5	0.43	19	7.0	17.6	36.6	2.0	85.0		
	AVERAGE	62	53	8	0.39	19	—	14.2	37.4	1.7	85.0	107.1	6
	S.D.	—	1	—	0.05	0	—	2.9	1.2	0.6	0.0		
6	16	(77	72	(5	0.90	25	7.0	18.0	49.1	1.0	113.0		
	17	(79	74	(5	0.98	23	7.0	18.0	49.0	3.1	113.0		
	18	(74	69	(5	0.73	25	7.0	18.0	48.6	2.0	113.0		
	AVERAGE	—	72	—	0.87	24	—	18.0	48.9	2.0	113.0	139.3	5.9
	S.D.	—	3	—	0.13	1	—	0.0	0.3	1.1	0.0		
7	27	(99	94	(5	2.30	40	6.9	16.5	63.3	2.0	143.0		
(M2)	28	(98	93	(5	2.30	36	6.9	15.7	62.9	2.0	143.0		
	29	(100	95	(5	2.30	29	6.9	15.7	63.4	2.0	143.0		
	AVERAGE	—	94	—	2.30	35	—	16.0	63.2	2.0	143.0	183.5	6
	S.D.	—	1	—	0.00	6	—	0.5	0.3	0.0	0.0		
	Load,Kg/d	—	63348	—	——	23587	—						
Gold River	30	45	39	6	0.35	5	7.5	24.8	29.3	1.0	63.0		
Bridge	31	42	36	7	0.30	4	7.4	24.3	30.2	1.0	63.0		
	32	(42	37	(5	0.35	4	7.4	24.3	29.6	2.0	63.0		
	AVERAGE	44	37	7	0.33	4	—	24.5	29.7	1.3	63.0		10
	S.D.	—	2	—	0.03	1	—	0.3	0.5	0.6	0.0		
Elk Falls	33	46	35	11	0.30	3	7.3	20.4	23.9	2.0	53.0		
	34	42	32	10	0.28	3	7.3	20.4	22.8	2.0	73.0		
	35	(33	28	(5	0.28	3	7.3	20.4	22.7	1.0	53.0		
	AVERAGE	44	32	11	0	3	—	20	23	2	60		10.2
	S.D.	—	4	—	0	0	—	0	1	1	12		

APPENDIX II

OLD TAILINGS LINE
ROAD SEEPAGES

APPENDIX II Old Tailings Line Road Seepages
Table 1 Tuesday october 22, 1985

Station Number	AL TOTICP UG/ML	AL DISICP UG/ML	BA TOTICP UG/ML	BA DISICP UG/ML	CA TOTICP UG/ML	CA DISICP UG/ML	CD TOTICP UG/ML	CD DISICP UG/ML	CO TOTICP UG/ML	CO DISICP UG/ML	CU TOTICP UG/ML	CU DISICP UG/ML	FE TOTICP UG/ML	FE DISICP UG/ML	MG TOTICP UG/ML	MG DISICP UG/ML	MN TOTICP UG/ML	MN DISICP UG/ML
1	14.90	14.00	0.031	0.030	26.7	26.9	0.023	0.021	0.128	0.073	2.370	2.250	37.200	11.500	13.9	13.9	6.060	2.920
4	52.10	48.20	0.060	0.020	46.0	43.0	0.210	0.170	0.390	0.410	8.750	7.050	118.000	112.000	38.0	36.0	5.010	3.040
8	0.87	0.08	0.002	0.002	11.3	10.8	0.016	0.012	0.027	(.005	0.636	0.444	7.080	0.172	1.9	1.8	0.121	0.114
9	8.46	8.10	0.016	0.015	21.6	21.0	0.083	0.082	0.053	0.039	4.400	4.010	13.200	4.200	9.2	8.9	1.050	1.020
10	295.00	242.00	0.030	0.020	210.0	168.0	1.210	0.990	1.000	1.170	84.700	70.000	248.000	199.000	312.0	252.0	49.000	39.600
11	1.53	0.42	0.010	0.009	17.4	16.9	0.015	0.016	0.039	0.007	0.907	0.756	12.000	0.824	3.4	3.3	0.344	0.339
13	5.90	5.85	0.004	0.001	57.7	56.7	0.027	0.029	0.122	0.121	0.584	0.565	5.570	5.410	19.7	19.4	15.400	15.300
15	15.80	15.50	0.031	0.031	32.2	32.0	0.090	0.083	0.059	0.051	4.820	4.560	11.500	4.710	17.8	17.7	2.770	2.840
16	4.63	4.29	0.011	0.009	21.0	20.3	0.036	0.039	0.163	0.102	2.210	2.210	49.600	21.100	9.2	8.9	1.150	1.140
17	39.40	38.30	0.010	0.020	38.0	37.0	0.110	0.100	0.970	1.190	11.700	10.600	317.000	293.000	51.0	50.0	4.950	4.750
18	17.30	16.70	0.075	0.071	82.3	77.6	0.071	0.068	0.194	0.202	1.490	1.340	7.280	6.840	26.6	25.3	29.800	17.200

APPENDIX II Old Tailings Line Road Seepages
Table 1 Tuesday october 22, 1985

Station Number	NA TOTICP UG/ML	NA DISICP UG/ML	NI TOTICP UG/ML	NI DISICP UG/ML	P TOTICP UG/ML	P DISICP UG/ML	PB TOTGF UG/L	PB DISGF UG/1	SI TOTICP UG/ML	SI DISICP UG/ML	SR TOTICP UG/ML	SR DISICP UG/ML	TI TOTICP UG/ML	TI DISICP UG/ML	ZN TOTICP UG/ML	ZN DISICP UG/ML
1	0.9	1.0	(.02	(.02	0.38	(.05	(.001	0.004	2.9	2.9	0.128	0.042	0.015	0.004	27.600	5.060
4	1.0	2.0	(.2	(.2	0.60	(.5	(.001	0.008	12.0	6.0	0.190	0.070	0.120	0.040	45.700	37.700
8	0.8	0.8	(.02	(.02	(.05	(.05	(.001	(.001	1.5	1.3	0.014	0.013	0.013	0.009	2.760	2.560
9	0.9	1.0	0.02	0.03	(.05	(.05	0.002	0.002	4.1	3.3	0.034	0.033	0.009	0.008	19.700	18.400
10	4.0	3.0	0.40	0.50	(.5	(.5	0.006	0.037	43.0	30.0	0.580	0.480	0.070	0.050	301.000	240.000
11	0.8	0.8	(.02	(.02	(.05	(.05	0.002	(.001	2.3	1.5	0.023	0.023	0.015	0.003	3.620	3.500
13	2.0	2.0	0.02	0.02	(.05	(.05	(.001	0.002	7.0	6.6	0.093	0.090	0.016	0.006	8.490	8.560
15	1.2	1.2	0.03	0.03	(.05	(.05	0.001	0.003	5.9	5.1	0.066	0.066	0.006	0.004	21.800	21.100
16	0.8	0.9	(.02	(.02	0.53	(.05	0.002	0.001	2.7	2.0	0.038	0.037	0.020	0.004	8.620	8.410
17	(1	1.0	(.2	(.2	2.50	1.40	0.001	0.010	6.0	(1	0.070	0.060	(.02	0.030	27.600	26.500
18	2.5	2.5	0.04	0.04	(.05	(.05	(.001	(.001	13.8	12.8	0.138	0.124	0.006	0.010	15.600	14.500

APPENDIX II Old Tailings Line Road Seepages
Table 1 Tuesday october 22, 1985

Station Number	TR MG/L	FR MG/L	NFR MG/L	TURBIDITY FTU	SO4 PPM	pH pH units	ALKALINITY MG/L	HARDNESS MG/L	ACIDITY MG/L	CONDUC. umhos/cm
1	500	423	85	80	230	3.3	nil	326	7820	730
4	1797	1780	17	43	840	3.0	nil	851	822	1750
8	56	56	<5	18	32	5.5	3	58	15	103
9	323	302	21	33	170	3.3	nil	195	108	500
10	7340	7340	<5	6	3800	2.9	nil	4440	3460	4700
11	129	99	30	33	58	5.0	2.4	94	36	160
13	485	475	10	38	240	4.2	nil	309	212	600
15	490	470	20	53	250	3.4	nil	300	155	600
16	420	307	113	130	190	3.1	nil	221	130	700
17	2348	2270	78	100	1100	2.9	nil	1140	1110	2100
18	783	768	15	33	390	3.8	nil	503	362	800

APPENDIX II Old Tailings Line Road Seepages
Table 2 Wednesday october 23, 1985

Station Number		AL TOTICP UG/ML	AL DISICP UG/ML	BA TOTICP UG/ML	BA DISICP UG/ML	CA TOTICP UG/ML	CA DISICP UG/ML	CD TOTICP UG/ML	CD DISICP UG/ML	CO TOTICP UG/ML	CO DISICP UG/ML	CR TOTICP UG/ML	CR DISICP UG/ML	CU TOTICP UG/ML	CU DISICP UG/ML	FE TOTICP UG/ML	FE DISICP UG/ML	MG TOTICP UG/ML	MG DISICP UG/ML
1		8.30	8.11	0.030	0.032	22.0	23.6	0.013	0.014	0.070	0.019	<.05	<.005	1.380	1.430	20.000	2.060	8.0	8.1
	Load,Kg/d	10.04	9.81	0.036	0.039	26.6	28.5	0.017	0.017	0.085	0.023	—	—	1.669	1.730	24.192	2.492	9.7	9.8
2		4.79	3.03	0.019	0.015	31.1	29.8	0.008	0.009	0.043	0.020	<.005	<.005	4.150	0.424	8.460	2.640	5.5	5.1
	Load,Kg/d	10.18	6.44	0.040	0.032	66.1	63.3	0.017	0.019	0.091	0.043	—	—	8.821	0.901	17.981	5.611	11.7	10.8
3		3.75	1.71	0.016	0.013	29.5	28.3	0.009	0.008	0.027	0.014	<.005	<.005	0.469	0.389	4.400	1.790	5.3	4.9
4		52.60	51.60	0.030	0.030	56.0	58.0	0.100	0.100	0.350	0.340	<.05	<.05	7.920	8.200	96.500	96.300	38.0	37.0
5		3.81	3.54	0.005	0.005	17.4	16.5	0.072	0.074	0.129	0.031	<.005	<.005	4.240	3.610	36.500	6.540	5.8	5.4
	Load,Kg/d	1.25	1.16	0.002	0.002	5.7	5.4	0.024	0.024	0.042	0.010	—	—	1.392	1.185	11.984	2.147	1.9	1.8
6		2.21	1.85	0.003	0.003	18.8	17.8	0.057	0.058	0.076	0.009	<.005	<.005	3.130	2.720	21.400	1.280	4.0	3.6
7		2.82	2.46	0.002	0.002	19.7	18.7	0.046	0.048	0.074	0.009	<.005	<.005	2.690	2.340	20.100	1.270	6.1	5.7
	Load,Kg/d	1.17	1.02	0.001	0.001	8.2	7.8	0.019	0.020	0.031	0.004	—	—	1.116	0.970	8.336	0.527	2.5	2.4
8		0.87	0.07	0.008	0.002	11.5	11.1	0.024	0.011	0.059	<.005	0.008	<.005	0.600	0.396	6.540	0.377	1.8	1.8
	Load,Kg/d	1.50	0.12	0.014	0.003	19.8	19.1	0.041	0.019	0.102	—	0.014	—	1.034	0.682	11.266	0.649	3.1	3.1
9		8.07	8.03	0.054	0.015	21.5	21.6	0.084	0.083	0.063	0.027	0.019	<.005	4.100	4.260	11.700	3.070	8.9	8.9
	Load,Kg/d	10.36	10.31	0.069	0.019	27.6	27.7	0.108	0.107	0.081	0.035	0.024	—	5.264	5.469	15.022	3.942	11.4	11.4
10		3.51	0.60	0.016	0.015	30.7	30.7	0.039	0.037	0.020	0.010	<.005	<.005	1.770	1.660	3.410	1.320	8.1	7.8
	Load,Kg/d	0.15	0.03	0.001	0.001	1.3	1.3	0.002	0.002	0.001	0.000	—	—	0.076	0.072	0.147	0.057	0.3	0.3
12		1.53	0.17	0.021	0.010	18.1	17.6	0.021	0.016	0.050	<.005	<.005	<.005	0.876	0.712	11.700	0.820	3.5	3.3
	Load,Kg/d	1.19	0.13	0.016	0.008	14.0	13.7	0.016	0.012	0.039	—	—	—	0.680	0.552	9.078	0.636	2.7	2.6
13		7.83	7.87	0.227	0.080	55.1	55.7	0.033	0.034	0.125	0.121	0.012	<.005	0.741	0.781	5.200	5.190	17.2	17.2
	Load,Kg/d	1.50	1.50	0.043	0.015	10.5	10.6	0.006	0.006	0.024	0.023	0.002	—	0.141	0.149	1.000	0.991	3.3	3.3
14		7.20	7.34	0.084	0.043	27.9	28.7	0.054	0.046	0.020	0.017	<.005	<.005	1.530	1.710	0.038	0.038	9.3	9.5
	Load,Kg/d	8.15	8.31	0.095	0.049	31.6	32.5	0.061	0.052	0.023	0.019	—	—	1.732	1.935	0.043	0.043	10.5	10.8
15		14.50	14.10	0.055	0.032	32.3	31.8	0.097	0.075	0.075	0.031	0.019	<.005	4.970	4.130	9.850	2.600	16.6	16.2
	Load,Kg/d	67.76	65.89	0.257	0.150	151.0	148.6	0.453	0.351	0.351	0.145	0.089	—	23.227	19.301	46.033	12.151	77.6	75.7
16		3.71	3.47	0.020	0.010	20.5	20.1	0.044	0.032	0.156	0.044	0.007	<.005	2.320	1.890	36.500	9.520	7.4	7.2
	Load,Kg/d	1.19	1.11	0.006	0.003	6.6	6.4	0.014	0.010	0.050	0.014	0.002	—	0.742	0.604	11.668	3.043	2.4	2.3
17		48.00	45.70	<.03	0.010	39.0	42.0	0.120	0.100	1.000	1.160	<.1	<.05	12.500	12.500	333.000	319.000	59.0	56.0
	Load,Kg/d	0.83	0.79	—	0.000	0.7	0.7	0.002	0.002	0.017	0.020	—	—	0.216	0.216	5.754	5.512	1.0	1.0

APPENDIX II Old Tailings Line Road Seepages
Table 2 Wednesday october 23, 1985

Station Number		MN TOTICP UG/ML	MN DISICP UG/ML	NA TOTICP UG/ML	NA DISICP UG/ML	NI TOTICP UG/ML	NI DISICP UG/ML	P TOTICP UG/ML	P DISICP UG/ML	PB TOTGF UG/ML	PB DISGF UG/ML	SE TOTICP UG/ML	SE DISICP UG/ML	SI TOTICP UG/ML	SI DISICP UG/ML	SN TOTICP UG/ML	SN DISICP UG/ML	SR TOTICP UG/ML	SR DISICP UG/ML
1		1.780	1.740	<1	0.9	<.2	<.02	<.5	<.05	0.006	0.008	<.5	<.05	1.0	2.6	0.20	<.01	0.040	0.035
	Load,Kg/d	2.153	2.105	—	1.1	—	—	—	—	0.007	0.010	—	—	1.2	3.1	0.24	—	0.048	0.042
2		1.590	1.530	0.9	0.8	<.02	<.02	<.05	<.05	0.004	0.001	<.05	<.05	2.2	2.4	<.01	0.02	0.050	0.046
	Load,Kg/d	3.379	3.252	1.9	1.7	—	—	—	—	0.008	0.002	—	—	4.7	5.1	—	0.04	0.106	0.098
3		1.390	1.340	0.9	0.9	<.02	<.02	<.05	<.05	0.004	0.001	<.05	<.05	2.0	2.1	<.01	<.01	0.040	0.044
4		3.580	3.570	1.0	2.0	<.2	<.2	<.5	<.5	0.001	<.001	<.5	<.5	8.0	11.0	<.1	<.1	0.110	0.110
5		0.433	0.423	0.9	0.9	<.02	<.02	0.120	<.05	<.001	<.001	<.05	<.05	2.0	1.7	<.01	<.01	0.022	0.021
	Load,Kg/d	0.142	0.139	0.3	0.3	—	—	0.040	—	—	—	—	—	0.7	0.6	—	—	0.007	0.007
6		0.292	0.287	0.9	0.9	<.02	<.02	<.05	<.05	0.001	<.001	<.05	<.05	2.0	1.0	<.01	<.01	0.021	0.020
7		0.540	0.530	0.9	0.9	<.02	<.02	<.05	<.05	<.001	<.001	<.05	<.05	1.9	1.9	<.01	<.01	0.023	0.022
	Load,Kg/d	0.224	0.220	0.4	0.4	—	—	—	—	—	—	—	—	0.8	0.8	—	—	0.010	0.009
8		0.291	0.115	0.8	0.8	<.02	<.02	<.05	<.05	<.001	<.001	<.05	<.05	1.3	1.3	0.06	<.01	0.052	0.014
	Load,Kg/d	0.501	0.198	1.4	1.4	—	—	—	—	—	—	—	—	2.2	2.2	0.10	—	0.090	0.024
9		2.400	1.030	0.9	0.9	0.030	<.02	<.05	<.05	0.001	<.001	<.05	<.05	3.1	3.2	<.01	<.01	0.110	0.035
	Load,Kg/d	3.184	1.322	1.2	1.2	0.039	—	—	—	0.002	—	—	—	4.0	4.1	—	—	0.152	0.045
10		1.000	1.040	1.0	0.9	<.02	<.02	<.05	<.05	0.008	0.006	<.05	<.05	2.5	2.6	<.01	<.01	0.060	0.059
	Load,Kg/d	0.047	0.045	0.0	0.0	—	—	—	—	0.000	0.000	—	—	0.1	0.1	—	—	0.003	0.003
12		0.486	0.333	0.8	0.8	<.02	<.02	0.130	<.05	0.001	<.001	0.120	<.05	1.9	1.5	<.01	<.01	0.047	0.024
	Load,Kg/d	0.377	0.258	0.6	0.6	—	—	0.101	—	0.001	—	0.093	—	1.5	1.2	—	—	0.036	0.019
13		33.500	16.200	1.9	2.0	0.030	<.02	<.05	<.05	<.001	0.001	<.05	<.05	6.7	6.9	<.01	<.01	0.271	0.094
	Load,Kg/d	6.397	3.093	0.4	0.4	0.006	—	—	—	—	0.000	—	—	1.3	1.3	—	—	0.052	0.018
14		2.100	1.590	1.1	1.2	0.040	<.02	<.05	<.05	<.001	0.001	0.080	<.05	4.0	4.0	<.01	<.01	0.111	0.057
	Load,Kg/d	2.467	1.800	1.2	1.4	0.045	—	—	—	—	0.001	0.091	—	5.4	5.4	—	—	0.126	0.065
15		3.250	2.540	2.1	1.1	0.040	<.02	<.05	<.05	0.001	0.002	0.050	<.05	4.7	5.5	<.01	<.01	0.114	0.066
	Load,Kg/d	15.100	11.870	9.8	5.1	0.187	—	—	—	0.005	0.009	0.234	—	22.0	25.7	—	—	0.533	0.308
16		1.100	0.918	0.8	0.8	<.02	<.02	0.400	<.05	<.001	0.002	<.05	<.05	2.0	1.7	<.01	<.01	0.061	0.034
	Load,Kg/d	0.377	0.293	0.3	0.3	—	—	0.153	—	—	0.001	—	—	0.6	0.5	—	—	0.020	0.011
17		5.740	5.530	<3	1.0	<.5	<.2	1.000	1.700	<.001	<.001	<1	<.5	<3	<1	<.3	<.1	0.070	0.000
	Load,Kg/d	0.099	0.096	—	0.0	—	—	0.017	0.029	—	—	—	—	—	—	—	—	0.001	0.001

APPENDIX II Old Tailings Line Road Seepages
Table 2 Wednesday october 23, 1985

Station Number		TI TOTICP UG/ML	TI DISICP UG/ML	ZN TOTICP UG/ML	ZN DISICP UG/ML
1		0.040	0.010	3.000	3.050
	Load, Kg/d	0.048	0.012	3.726	3.689
2		0.007	<.002	2.270	1.930
	Load, Kg/d	0.015	—	4.825	4.102
3		0.008	<.002	2.010	1.770
4		0.050	0.040	43.600	43.500
5		0.012	<.002	16.500	14.700
	Load, Kg/d	0.004	—	5.417	4.826
6		0.008	<.002	13.000	11.600
7		0.006	<.002	10.100	9.090
	Load, Kg/d	0.002	—	4.189	3.770
8		0.092	0.012	16.600	2.520
	Load, Kg/d	0.158	0.021	28.595	4.341
9		0.138	0.010	118.000	18.700
	Load, Kg/d	0.177	0.013	151.500	24.009
10		0.006	0.004	9.680	9.440
	Load, Kg/d	0.001	0.000	0.418	0.408
12		0.013	0.009	12.400	3.530
	Load, Kg/d	0.010	0.007	9.621	2.739
13		0.072	0.008	53.100	10.100
	Load, Kg/d	0.014	0.002	10.139	1.929
14		0.027	0.008	47.000	13.700
	Load, Kg/d	0.031	0.009	54.102	15.506
15		0.023	0.011	62.400	19.500
	Load, Kg/d	0.107	0.051	291.619	91.131
16		0.171	0.010	23.500	7.090
	Load, Kg/d	0.055	0.003	7.512	2.267
17		0.060	0.030	31.500	30.500
	Load, Kg/d	0.001	0.001	0.544	0.527

APPENDIX II Old Tailings Line Road Seepages
Table 2 Wednesday october 23, 1985

Station Number	TR MG/L	FR MG/L	NFR MG/L	TURBIDITY FTU	SO4 PPM	pH pH units	ALKALINITY MG/L	HARDNESS MG/L	ACIDITY MG/L	CONDUC. umhos/cm
1	281	239	42	40	150	3.0	nil	212	87.5	395
Load, Kg/d	340	289	51		181					
2	223	201	23	23	110	6.9	16.5	149	27.5	280
Load, Kg/d	474	427	49		234					
3	191	167	24	25	99	4.7	<1.0	130	18.3	255
4	1610	1610	<5	13	840	7.2	11	830	765	1700
5	332	258	74	65	140	4.2	nil	180	101	550
Load, Kg/d	109	85	24		46					
6	221	174	48	33	93	4.1	nil	134	40.7	255
7	227	179	48	38	100	4.9	2.4	143	43.7	285
Load, Kg/d	94	74	20		41					
8	76	66	10	15	29	4.4	nil	787	12.2	183
Load, Kg/d	132	114	17		50					
9	325	303	23	33	160	5.9	5.5	342	104	490
Load, Kg/d	415	387	29		204					
10	203	185	18	23	110	7.0	13.3	155	41.7	285
Load, Kg/d	9	8	1		5					
12	126	97	29	33	30	5.4	4.7	109	21.4	160
Load, Kg/d	98	75	23		23					
13	463	463	<5	38	250	3.4	nil	404	196	580
Load, Kg/d	88	88	—		48					
14	285	285	<5	0.13	150	4.3	nil	225	80.3	370
Load, Kg/d	323	323	—		170					
15	473	454	19	35	250	5.8	4.7	349	153	630
Load, Kg/d	2211	2122	89		1168					
16	336	252	84	93	150	3.7	nil	206	110	550
Load, Kg/d	107	81	27		48					
17	2608	2580	28	43	1300	3.8	nil	1900	1330	2200
Load, Kg/d	45	45	0		22					

APPENDIX II Old Tailings Line Road Seepages
Table 3 Thursday october 24, 1985

Station Number	Sample Number	AL TOTICP UG/ML	AL DISICP UG/ML	BA TOTICP UG/ML	BA DISICP UG/ML	CA TOTICP UG/ML	CA DISICP UG/ML	CD TOTICP UG/ML	CD DISICP UG/ML	CO TOTICP UG/ML	CO DISICP UG/ML	CR TOTICP UG/ML	CR DISICP UG/ML	CU TOTICP UG/ML	CU DISICP UG/ML	FE TOTICP UG/ML	FE DISICP UG/ML	MG TOTICP UG/ML	MG DISICP UG/ML
15	19	12.6	11.9	0.029	0.023	31.9	30.8	0.065	0.058	0.050	0.025	<.005	<.005	3.480	2.900	11.300	2.000	15.3	14.5
	20	12.6	11.9	0.030	0.024	32.0	30.9	0.064	0.059	0.066	0.027	<.005	<.005	3.980	3.140	11.700	2.080	15.4	14.5
	21	12.8	11.9	0.030	0.026	32.4	30.8	0.064	0.065	0.059	0.029	<.005	<.005	4.030	3.370	12.200	1.990	15.7	14.4
	AVERAGE	12.7	11.9	0.030	0.024	32.1	30.8	0.064	0.061	0.058	0.027	----	----	3.830	3.137	11.733	2.023	15.5	14.5
	S.D.	0.1	0.0	0.001	0.002	0.3	0.1	0.001	0.004	0.008	0.002	----	----	0.304	0.235	0.451	0.049	0.2	0.1
	Load,Kg/d	42.4	39.8	0.099	0.081	107.5	103.2	0.215	0.203	0.195	0.090	----	----	12.823	10.502	39.283	6.774	51.8	48.4

APPENDIX II Old Tailings Line Road Seepages
Table 3 Thursday october 24, 1985

Station Number	Sample Number	MN TOTICP UG/ML	MN DISICP UG/ML	NA TOTICP UG/ML	NA DISICP UG/ML	NI TOTICP UG/ML	NI DISICP UG/ML	P TOTICP UG/ML	P DISICP UG/ML	PB TOTGF UG/ML	PB DISGF UG/ML	SE TOTICP UG/ML	SE DISICP UG/ML	SI TOTICP UG/ML	SI DISICP UG/ML	SN TOTICP UG/ML	SN DISICP UG/ML	SR TOTICP UG/ML	SR DISICP UG/ML
15	19	2.200	1.890	1.1	1.1	0.03	0.02	<.05	<.05	0.002	0.002	<.05	<.05	4.8	4.3	<.01	<.01	0.066	0.051
	20	2.210	1.990	1.1	1.1	0.03	0.03	<.05	<.05	0.001	0.002	<.05	<.05	4.4	4.5	<.01	<.01	0.062	0.053
	21	2.230	2.140	1.1	1.1	0.03	0.03	<.05	<.05	0.001	0.001	<.05	<.05	4.5	4.5	<.01	<.01	0.063	0.058
	AVERAGE	2.213	2.007	1.1	1.1	0.03	0.03	---	---	0.000	0.002	---	---	4.6	4.4	---	---	0.064	0.054
	S.D.	0.015	0.126	0.0	0.0	0.00	0.01	---	---	0.001	0.001	---	---	0.2	0.1	---	---	0.002	0.004
	Load,Kg/d	7.410	6.718	3.7	3.7	0.10	0.09	---	---	0.000	0.006	---	---	15.3	14.8	---	---	0.213	0.181

APPENDIX II Old Tailings Line Road Seepages
Table 3 Thursday october 24, 1985

Station Number	Sample Number	TI TOTICP UG/ML	TI DISICP UG/ML	ZN TOTICP UG/ML	ZN DISICP UG/ML
15	19	0.012	<.002	16.000	13.400
	20	0.009	<.002	17.500	14.200
	21	0.009	<.002	17.700	15.600
	AVERAGE	0.010	----	17.067	14.400
	S.D.	0.002	----	0.929	1.114
	Load,Kg/d	0.033	----	57.139	48.211

APPENDIX II Old Tailings Line Road Seepages
Table 3 Thursday october 24, 1985

Station Number	Sample Number	TR MG/L	FR MG/L	NFR MG/L	TURBIDITY FTU	SO4 MG/L	pH pH units	ALKALINITY MG/L	HARDNESS MG/L	ACIDITY MG/L	CONDUC. umhos/cm
15	19	437	409	28	33	190	3.8	nil	261	110	550
	20	427	406	22	33	210	3.8	nil	265	109	530
	21	430	395	36	33	210	3.4	nil	270	108	530
	AVERAGE	431	403	29		203	3.6				
	S.D.	5	7	7		12					
	Load,Kg/d	1444	1350	96		681					

APPENDIX III

CONTINUOUS SAMPLER DATA
AT STATION 7 (M2) IN
MYRA CREEK

APPENDIX III Continous Sampler Data at Station 7 (M2) in Myra Creek
Table 1 Tuesday october 22, 1985

Time Interval (h)	Sample Number	AL TOTICP UG/ML	BA TOTICP UG/ML	CA TOTICP UG/ML	CD TOTICP UG/ML	CU TOTICP UG/ML	FE TOTICP UG/ML	MG TOTICP UG/ML	MN TOTICP UG/ML	NA TOTICP UG/ML	PB TOTICP UG/ML	SI TOTICP UG/ML	SN TOTICP UG/ML	SR TOTICP UG/ML	TI TOTICP UG/ML	ZN TOTICP UG/ML
9:00	1	0.49	0.013	14.3	0.005	0.124	0.665	1.3	0.176	0.9	<.02	0.9	0.01	0.034	0.005	0.028
-	2	0.46	0.013	14.2	0.004	0.123	0.675	1.3	0.176	0.9	<.02	0.9	<.01	0.033	0.011	0.027
11:00	3	0.49	0.013	14.3	0.004	0.122	0.664	1.3	0.176	0.9	<.02	1.2	<.01	0.033	0.007	0.025
	AVERAGE	0.48	0.013	14.3	0.004	0.123	0.668	1.3	0.176	0.9	—	1.0	—	0.033	0.008	0.027
	S.D.	0.02	0.000	0.1	0.001	0.001	0.006	0.0	0.000	0.0	—	0.2	—	0.001	0.003	0.002
12:00	4	0.47	0.012	15.8	0.003	0.122	0.625	1.4	0.188	1.0	<.02	0.9	<.01	0.037	0.012	0.072
-	5	0.46	0.012	15.7	0.002	0.120	0.617	1.4	0.187	1.0	<.02	1.4	<.01	0.037	0.014	0.077
14:00	6	0.47	0.012	16.2	0.006	0.124	0.638	1.5	0.192	1.0	<.02	1.2	<.01	0.037	0.009	0.900
	AVERAGE	0.47	0.012	15.9	0.004	0.122	0.627	1.4	0.189	1.0	—	1.2	—	0.037	0.012	0.083
	S.D.	0.01	0.000	0.3	0.002	0.002	0.011	0.1	0.003	0.0	—	0.3	—	0.000	0.003	0.015
15:00	7	0.47	0.012	17.6	0.004	0.119	0.591	1.5	0.196	1.0	<.02	1.2	<.01	0.041	0.004	0.085
-	8	0.44	0.012	17.2	0.003	0.116	0.587	1.5	0.192	1.1	<.02	1.2	<.01	0.040	0.010	0.068
17:00	9	0.47	0.015	17.3	0.004	0.119	0.652	1.5	0.194	1.1	<.02	1.2	<.01	0.041	0.009	0.087
	AVERAGE	0.46	0.013	17.4	0.004	0.118	0.610	1.5	0.194	1.1	—	1.2	—	0.041	0.008	0.080
	S.D.	0.02	0.002	0.2	0.001	0.002	0.036	0.0	0.002	0.1	—	0.0	—	0.001	0.003	0.010
18:00	10	0.42	0.012	17.6	0.003	0.112	0.560	1.5	0.204	1.0	<.02	1.3	<.01	0.041	0.015	0.057
-	11	0.43	0.012	17.9	0.003	0.113	0.573	1.6	0.210	1.1	<.02	1.6	<.01	0.043	0.006	0.073
20:00	12	0.45	0.012	17.9	0.002	0.113	0.578	1.6	0.207	1.1	<.02	1.3	<.01	0.042	0.011	0.071
	AVERAGE	0.43	0.012	17.8	0.003	0.113	0.570	1.6	0.207	1.1	—	1.4	—	0.042	0.011	0.067
	S.D.	0.02	0.000	0.2	0.001	0.001	0.009	0.1	0.003	0.1	—	0.2	—	0.001	0.005	0.009
21:00	13	0.46	0.013	18.0	<.002	0.111	0.581	1.6	0.205	1.0	<.02	1.4	<.01	0.042	0.011	0.060
-	14	0.43	0.012	17.9	0.003	0.113	0.572	1.5	0.205	1.0	<.02	1.0	0.03	0.041	0.007	0.057
23:00	15	0.43	0.012	17.7	0.004	0.112	0.571	1.5	0.202	1.0	<.02	1.3	<.01	0.041	0.014	0.052
	AVERAGE	0.44	0.012	17.9	0.004	0.112	0.575	1.5	0.204	1.0	—	1.2	—	0.041	0.011	0.056
	S.D.	0.02	0.001	0.2	—	0.001	0.006	0.1	0.002	0.0	—	0.2	—	0.001	0.004	0.004
24:00	16	0.41	0.012	17.9	0.005	0.110	0.575	1.5	0.203	1.0	<.02	1.0	<.01	0.042	0.017	0.044
-	17	0.44	0.012	18.3	0.002	0.112	0.581	1.6	0.207	1.0	0.02	1.3	<.01	0.043	0.010	0.061
2:00	18	0.51	0.013	18.4	0.002	0.111	0.595	1.6	0.207	1.0	<.02	1.3	0.02	0.042	0.015	0.060
	AVERAGE	0.45	0.012	18.2	0.003	0.111	0.584	1.6	0.206	1.0	—	1.2	—	0.042	0.014	0.055
	S.D.	0.05	0.001	0.3	0.002	0.001	0.010	0.1	0.002	0.0	—	0.2	—	0.001	0.004	0.010

APPENDIX III Continous Sampler Data at Station 7 (M2) in Myra Creek
Table 2 Wednesday october 23, 1985

Time Interval (h)	Sample Number	AL TOTICP UG/ML	BA TOTICP UG/ML	CA TOTICP UG/ML	CD TOTICP UG/ML	CO TOTICP UG/ML	CU TOTICP UG/ML	FE TOTICP UG/ML	MG TOTICP UG/ML	MN TOTICP UG/ML	NA TOTICP UG/ML	P TOTICP UG/ML	SI TOTICP UG/ML	SR TOTICP UG/ML	TI TOTICP UG/ML	ZN TOTICP UG/ML
9:30	1	0.46	0.012	20.2	0.004	0.005	0.114	0.540	1.7	0.22	1.1	0.07	1.6	0.046	<.002	0.866
-	2	0.43	0.014	20.3	0.005	<.005	0.112	0.553	1.7	0.22	1.1	<.05	1.6	0.046	0.002	0.877
11:30	3	0.46	0.013	20.3	0.004	<.005	0.113	0.550	1.7	0.22	1.1	<.05	1.6	0.046	0.002	0.872
	AVERAGE	0.45	0.013	20.3	0.004	—	0.113	0.548	1.7	0.22	1.1	—	1.6	0.046	0.002	0.872
	S.D.	0.02	0.001	0.1	0.001	—	0.001	0.007	0.0	0.00	0.0	—	0.0	0.000	0.000	0.006

APPENDIX III Continous Sampler Data at Station 7 (M2) in Myra Creek

Table 3 Thursday october 24, 1985

Time Interval (h)	Sample Number	AL TOTICP UG/ML	B TOTICP UG/ML	BA TOTICP UG/ML	CA TOTICP UG/ML	CD TOTICP UG/ML	CO TOTICP UG/ML	CU TOTICP UG/ML	FE TOTICP UG/ML	MG TOTICP UG/ML	MN TOTICP UG/ML	MO TOTICP UG/ML	NA TOTICP UG/ML	PB TOTICP UG/ML	SI TOTICP UG/ML	SN TOTICP UG/ML	SR TOTICP UG/ML	TI TOTICP UG/ML	ZN TOTICP UG/ML
10:00	1	0.27	<.001	0.002	15.9	0.0018	<.005	0.043	0.275	1.3	0.025	0.008	1.1	0.001	0.9	<.01	0.006	<.002	0.052
-	2	0.25	0.007	0.006	15.8	0.0018	<.005	0.021	0.277	1.3	0.083	0.009	1.1	0.001	0.9	<.01	0.018	<.002	0.173
12:00	3	0.26	<.001	0.013	15.8	0.0018	<.005	0.056	0.282	1.3	0.164	<.005	1.1	0.001	0.9	<.01	0.030	0.010	0.385
	AVERAGE	0.26	—	0.007	15.8	0.0018	—	0.040	0.278	1.3	0.091	0.009	1.1	0.001	0.9	—	0.018	—	0.203
	S.D.	0.01	—	0.006	0.1	—	—	0.018	0.004	0.0	0.070	—	0.0	0.000	0.0	—	0.012	—	0.169
13:00	4	0.24	<.001	0.014	12.8	0.0014	<.005	0.053	0.267	1.0	0.126	<.005	1.0	0.001	0.9	0.04	0.031	0.020	0.310
-	5	0.24	0.003	0.011	12.8	0.0014	<.005	0.051	0.266	1.0	0.127	<.005	1.0	0.001	0.9	0.04	0.031	0.020	0.313
15:00	6	0.25	<.001	0.011	12.9	0.0014	<.005	0.053	0.262	1.0	0.128	<.005	1.0	0.001	0.9	0.05	0.032	0.020	0.314
	AVERAGE	0.24	—	0.012	12.8	—	—	0.052	0.265	1.0	0.127	—	1.0	0.001	0.9	0.04	0.031	0.020	0.312
	S.D.	0.01	—	0.002	0.1	—	—	0.001	0.003	0.0	0.001	—	0.0	0.000	0.0	0.01	0.001	0.000	0.002
16:00	7	0.25	0.003	0.011	13.7	0.0013	<.005	0.055	0.270	1.1	0.135	<.005	1.1	0.001	0.9	0.05	0.034	0.020	0.330
-	8	0.25	<.001	0.011	13.9	0.0013	0.005	0.055	0.268	1.1	0.137	<.005	1.1	0.001	0.9	0.04	0.034	0.018	0.332
18:00	9	0.40	<.001	0.011	13.9	0.0014	<.005	0.057	0.280	1.1	0.138	<.005	1.0	<.001	1.0	0.04	0.034	0.046	0.335
	AVERAGE	0.30	—	0.011	13.8	0.0013	—	0.056	0.273	1.1	0.137	—	1.1	0.001	0.9	0.04	0.034	0.028	0.332
	S.D.	0.09	—	0.000	0.1	—	—	0.001	0.006	0.0	0.002	—	0.1	—	0.1	0.01	0.000	0.016	0.003
19:00	10	0.24	0.015	0.011	14.5	0.0012	<.005	0.049	0.254	1.1	0.141	<.005	1.1	<.001	0.8	<.01	0.034	0.008	0.325
-	11	0.23	0.008	0.011	14.5	0.0013	<.005	0.058	0.270	1.1	0.141	0.009	1.1	0.001	0.8	<.01	0.034	0.007	0.324
21:00	12	0.24	<.001	0.005	14.5	0.0013	<.005	0.011	0.251	1.1	0.061	<.005	1.0	<.001	0.8	<.01	0.014	<.002	0.118
	AVERAGE	0.24	0.012	0.009	14.5	0.0013	—	0.039	0.258	1.1	0.114	—	1.1	—	0.8	—	0.027	0.008	0.256
	S.D.	0.01	—	0.003	0.0	—	—	0.025	0.010	0.0	0.046	—	0.1	—	0.0	—	0.012	—	0.119
22:00	13	0.22	0.030	0.011	15.4	0.0013	<.005	0.049	0.245	1.2	0.150	<.005	1.1	<.001	0.8	<.01	0.036	0.005	0.346
-	14	0.23	0.005	0.011	15.2	0.0012	<.005	0.048	0.249	1.2	0.147	<.005	1.1	<.001	0.8	<.01	0.036	0.006	0.337
24:00	15	0.22	0.029	0.011	15.5	0.0012	<.005	0.049	0.246	1.2	0.151	<.005	1.1	0.001	0.8	<.01	0.036	0.008	0.344
	AVERAGE	0.22	0.021	0.011	15.4	0.0012	—	0.049	0.247	1.2	0.149	—	1.1	—	0.8	—	0.036	0.006	0.342
	S.D.	0.01	0.014	0.000	0.2	0.0001	—	0.001	0.002	0.0	0.002	—	0.0	—	0.0	—	0.000	0.002	0.005
1:00	16	0.23	<.001	0.013	16.2	0.0012	<.005	0.047	0.239	1.2	0.156	<.005	1.2	<.001	0.8	<.01	0.038	0.008	0.337
-	17	0.25	<.001	0.012	16.1	0.0012	<.005	0.459	0.496	1.2	0.154	0.008	1.1	<.001	0.8	<.01	0.037	0.007	0.346
3:00	18	0.24	<.001	0.012	16.1	0.0010	0.005	0.049	0.238	1.2	0.154	0.008	1.2	<.001	0.8	<.01	0.037	0.006	0.330
	AVERAGE	0.24	—	0.012	16.1	0.0011	—	0.185	0.324	1.2	0.155	0.008	1.2	—	0.8	—	0.037	0.007	0.338
	S.D.	0.01	—	0.001	0.1	0.0001	—	0.237	0.149	0.0	0.001	—	0.1	—	0.0	—	0.001	0.001	0.008
4:00	19	0.27	0.016	0.012	17.2	0.0016	<.005	0.047	0.260	1.3	0.163	<.005	1.2	<.001	0.9	<.01	0.040	0.006	0.700
-	20	0.29	0.002	0.012	17.3	0.0017	<.005	0.046	0.275	1.4	0.164	<.005	1.2	<.001	0.9	<.01	0.040	0.007	0.707
6:00	21	0.28	0.012	0.013	17.2	0.0017	<.005	0.047	0.255	1.3	0.164	<.005	1.2	<.001	0.9	<.01	0.040	0.006	0.716
	AVERAGE	0.28	0.010	0.012	17.2	0.0017	—	0.047	0.263	1.3	0.164	—	1.2	—	0.9	—	0.040	0.006	0.708
	S.D.	0.01	0.007	0.001	0.1	0.0001	—	0.001	0.010	0.1	0.001	—	0.0	—	0.0	—	0.000	0.001	0.008
7:00	22	0.24	<.001	0.013	17.6	0.0013	<.005	0.047	0.238	1.3	0.168	<.005	1.2	<.001	0.9	<.01	0.042	0.007	0.342
-	23	0.25	0.024	0.013	17.6	0.0012	<.005	0.044	0.238	1.3	0.165	<.005	1.2	<.001	0.9	<.01	0.041	0.004	0.335
9:00	24	0.24	0.019	0.013	17.5	0.0012	<.005	0.047	0.245	1.4	0.168	<.005	1.2	<.001	0.9	<.01	0.041	0.006	0.344
	AVERAGE	0.24	0.022	0.013	17.6	0.0012	—	0.046	0.240	1.3	0.167	—	1.2	—	0.9	—	0.041	0.006	0.340
	S.D.	0.01	—	0.000	0.1	0.0001	—	0.002	0.004	0.1	0.002	—	0.0	—	0.0	—	0.001	0.002	0.005