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PACIFIC AND YUKON REGION

SITE INSPECTION AUGUST 18, 1982
WATER QUALITY SAMPLING PROGRAM
AT NORTHAIR MINE,
BRANDYWINE FALLS

DR 86-04

Regional Data Report DR 86-04

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SUMMARY

Water quality (physical and chemical) data were obtained from mine and mill water and receiving waters on August 18, 1982.

Settling ponds were effective in reducing copper, zinc, lead, manganese and iron levels. High chemical values were found downstream of the mine on Water Licence Creek. Water chemical levels at the Callaghan Creek station were below the Inland Water Directorate recommended surface freshwater quality objectives for aquatic life protection. The mine did not impact Callaghan Creek.

1 INTRODUCTION

Northair Mine Ltd. is a small 300 ton/day copper, lead, zinc, silver, and gold mine. The mine, located approximately 56 km due north of Squamish, B.C., opened in 1976. Two flotation concentrates, copper-lead and zinc, were produced. Silver and gold were recovered by mercury amalgamation and refined in dore bars on site.

Sampling was conducted on August 18, 1982 following the shutdown of the mill activities in June 1982. The mine is drained by Anomaly Creek and Water Licence Creek, both tributaries to Callaghan Creek and the Cheakmus River above the B.C. Hydro Daisy Reservoir (Figures 1 and 2). Callaghan Creek supports populations of dolly varden char, cutthroat trout, and rainbow trout. Important runs of chinook, coho, chum, and pink salmon as well as steelhead trout are found below the B.C. Hydro Reservoir.

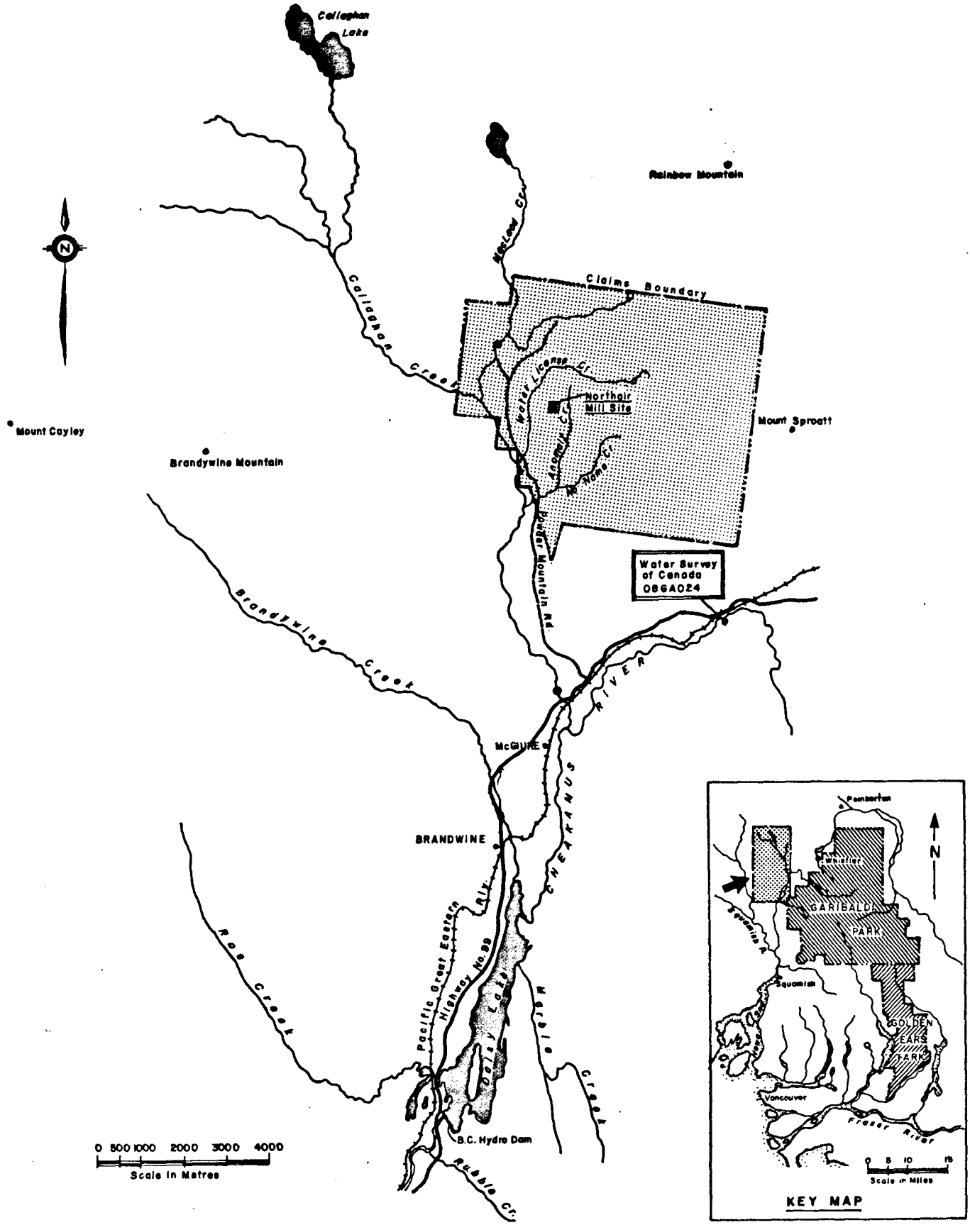

FIGURE 1 LOCATION MAP OF NORTHAIR MINES LTD. (N.P.L.)

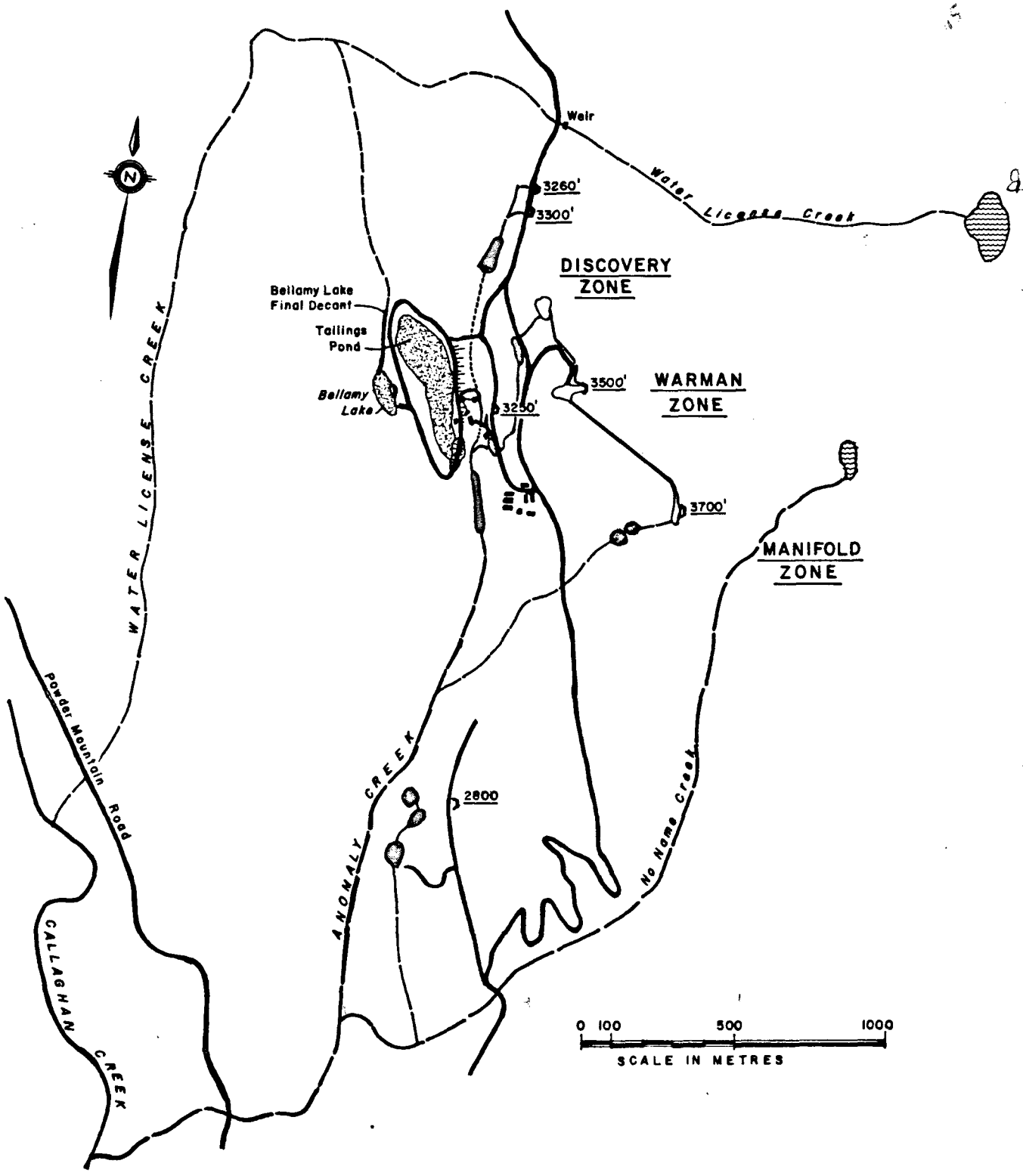

FIGURE 2 NORTHAIR MINES LTD. SITE PLAN AND SAMPLING STATIONS

2 MATERIAL AND METHOD

Water samples were taken on August 18, 1982 at Northair Mine Ltd. Receiving water samples were obtained from three sequential grab samples, while only one grab sample was taken for the mine and mill effluents. The following chemical parameters were analysed for both mine and receiving water: pH, sulphate, total phosphate, nitrate, nitrite, total cyanide, hardness, total and dissolved metals. In addition receiving water samples were analysed for total residues, filterable residue, turbidity, conductivity, and alkalinity while mine water was analysed for cyanide weak acid dissociable, thiocyanide, and ammonia.

The samples for conductivity, turbidity, residue, sulphates, phosphates, nitrates, nitrites, and ammonia were kept cool with wet ice until analysed. Total metal samples of 250 ml each were preserved on site with 1 ml of nitric acid. Dissolved metal samples of 100 ml each were filtered on site through a 0.45 micron cellulose nitrate filter and then preserved with 0.5 ml nitric acid. All samples were delivered to the Environmental Protection Service Laboratory in West Vancouver.

The Inductively Coupled Argon Plasma or ICAP scan, an automatic atomic emissions spectrophotometer, was used for the total and dissolved metal analysis and gave a reading of twenty-six metals. If the copper, lead, or cadmium readings were below the ICAP detection limit, the samples were rerun on the graphite furnace of the atomic absorption spectrophotometer to obtain lower detection limit.

Total cyanide samples were collected in 500 ml bottles, preserved with sodium hydroxide pellets, and stored in the dark at 4°C. The samples were analysed at EPS, West Vancouver lab with the tetracyanonickelate colorimetric method. The detection limit of the analysis is 0.03 mg/l.

Buffered samples to pH 5 are used for cyanide weak acid dissociable complexed with nickel and read by colorimetric method. The detection limit is 0.03 mg/l. Thiocyanide samples are complexed with iron and analysed by colorimetric method. The detection limit is 2.0 mg/l.

3 RESULTS

3.1 Temporal Variation

The results of the present study have been compared mainly to information gathered by EPS in March 1981 and June 1978 and reported in an unpublished report by Hallam in 1981. That report takes into consideration a baseline study undertaken by the same author in 1975.

3.1.1 Receiving Water. The control station for the survey is Station 1, on McLeod Creek above Alexandra Falls. Water quality data shown in Table 1 were similar to previous studies (Hallam 1981) except for cyanide with an average level of 0.10 ppm and a standard deviation of $\pm$ 0.12. It is suspected that there is contamination or interference from other chemicals in the chemical analyses.

Anomaly Creek drains the property from North to South through the mining facilities and joins Callaghan Creek about 3 km below the mining complex. The sampling site above the mine (Station 2) showed relatively high conductivity of 207 umhos/cm compared to 118 in 1981. It was nevertheless reduced compared to the baseline study where 460 umhos/cm was found (Hallam 1976). The sulfate level increased from 13.6 mg/l in 1981 to 30.3 mg/l in 1982. Hardness and total residue also increased from 45.7 mg $CaCO_3$/l and 31 mg/l in 1981 to 90.2 mg $CaCO_3$/l and 142 mg/l in 1981 respectively.

The Anomaly Creek below the mine (Station 3) was most influenced in 1982. In spite of the high background level of the creek the water conductivity was 450 umhos/cm compared to 340 umhos/cm in 1981. Total residues reached 305 mg/l, sulphate 140 mg/l compared to 96 mg/l and 107 mg/l in 1981.

Water Licence Creek drains the north part of Northair property and joins Callaghan Creek on the southwest of the property. Station 4 on Water Licence Creek above the mine influence had changed for few parameters over the years. Most significant is the reduction of conductivity which was 600 umhos/cm in 1978 (Hallam 1981) to 78 umhos/cm in 1982.

The alkalinity doubled to attain 31.5 mg $CaCO_3$/l. The total residue and non-filterable residues follow the same pattern with values of 51 mg/l and 12 mg/l respectively in 1982.

Water License Creek below the mine influence (Station 5) had increased levels of total residues, hardness, sulphate, and conductivity compared to 1981. The values were rising from 1978 through 1982 except for conductivity for which the 1978 value was 223 umhos/cm.

Station 6 on Callaghan Creek is situated 5 km downstream of the Anomaly Creek junction and 6.5 km below Water License Creek. The only level that increased significantly was for total residue which changed from 24 mg/l in 1981 to 42 mg/l in 1982. Conductivity and sulphate levels were comparatively similar.

Metal analysis performed at the same stations described above revealed many undetectable trace elements. The detection limit and parameter is given on Table 2.

Water Licence Creek above (Station 4) and below the mining activity (Station 5) did not show major change in metal composition of the receiving water. All parameters were below the Inland Waters Directorate (IWD) recommended surface freshwater quality objectives for heavy metals.

The only elements to increase from 1981 data were iron, aluminum, calcium, and magnesium. Iron levels were higher at McLeod Creek (Station 1), Anomaly Creek above mine site (Station 2) and Callaghan Creek (Station 6) while the level was reduced at Anomaly Creek below the mine (Station 3). The calcium levels increased on Anomaly Creek at Station 2 and 3 while on Callaghan Creek (Station 6) the values were lower.

3.1.2 Mine and Mill Water. Comparison of the tailings pond supernatant, Station 7 and 8, did not reveal any differences in water quality. The heavy metal levels in 1982 were similar to those in 1981 except for dissolved iron which was 0.006 mg/l (Table 3) compared to 0.035 in 1981. The Bellamy Lake final discharge (Station 9) was found to be higher in total lead with 0.03 mg/l compared to an average of 0.008 mg/l taken from 30 replicate samples throughout 1981 (Hallam 1981).

The office pond (Station 10), part of the Anomaly Creek drainage, was slightly higher in dissolved metals with 0.031 mg/l (Table 3) compared to 0.01 mg/l in March 1981. Lead, zinc, and iron were lower in 1982. The 3700' mine adit (Station 13), was found to be higher in dissolved iron with 0.152 mg/l compared to 0.034 mg/l in 1981. The 2800' mine adit (Station 11) was higher in dissolved zinc with 0.025 mg/l compared to 0.007 mg/l while significantly lower in sulphate with 12 mg/l compared to 321 mg/l in March 1981. All the parameters not mentioned were found to be in the same range values.

The heavy metal values below the detection limit for the mine and mill water can be found in Table 4.

3.2 Spatial Variation

3.2.1 Water Licence Creek Drainage. The mine water is directed to the tailings pond and discharge to Bellamy Lake from which it flows into Water Licence creek. The pH rose through the system as lime was added to control heavy metal. The level of total iron, zinc, lead, and manganese were reduced throughout the system while total copper concentration of the tailings pond supernatant increased from 0.036 mg/l to 0.097 mg/l, with a final discharge of 0.087 mg/l (Table 3).

The effect of Bellamy Lake final discharge on Water Licence Creek was seen on the pH. A very slight pH drop from 7.9 to 7.8 was seen after the input of the effluent at a pH of 9.4. The alkalinity changed from 31.5 mg $CaCO_3$/l above the discharge to 14.8 mg $CaCO_3$/l below the discharge.

The increase of total residue, hardness, sulphate, strontium, iron, barium, calcium, and sodium downstream of the effluent was a result of the discharge. Conductivity was also elevated downstream as a result of an increase in sulphate, calcium, sodium, and strontium. No influence of copper in the downstream station could be perceived. The element was below detection limit.

3.2.2 Anomaly Creek Drainage. The 2800' portal settling pond reduced the sulfate level significantly. The heavy metal levels were rather low for

an influent and the settling pond did not significantly reduce them. The total manganese level was reduced, and a slight increase of iron was noticeable. The high hardness (403 mg/l) has been reduced slightly.

The 3700' portal settling ponds worked more efficiently to reduce sulfate levels. The pH was closer to neutral. Heavy metals were depressed especially, copper, zinc, lead, aluminum, and iron (Table 3). The manganese level on the other hand was higher at the outlet of the settling ponds. The depression of heavy metals is believed to occur by the action of sulphate reducing bacteria. During anoxic conditions the bacteria uses the sulphate to convert it to sulfide which in turn precipates with heavy metals.

The office pond received water from the 3250' and 3500' portal as well as Discovery mine water discharge. Compared to the tailings pond supernatant the water is closer to neutral in the office pond, the sulphate, phosphate, hardness, copper, and iron levels are lower than the tailings pond. The manganese and zinc levels were elevated in comparison.

The influence of No Name Creek might be responsible for the high levels of pH and sulphate at Anomaly Creek below the mine since all effluent levels for sulfate and pH were below those found at Station 3 on Anomaly Creek. The influence of the 2800' portal can be recognized by the increase of hardness, strontium, silicon, calcium, and sodium. For heavy metals, the total concentration of copper, manganese, lead, zinc, and iron decreased from above to below the mine on Anomaly Creek (Table 1). Conductivity (450 umhos/cm) and total residue (305 mg/l), were elevated below the mine site on Anomaly Creek, but no effluent data for these parameters were available.

3.2.3 Callaghan Creek Drainage. Callaghan Creek station did not seem to be affected by Water Licence and Anomaly Creeks. The increase of non-filterable residue, turbidity, iron, and aluminum might be related to the river shed erosion. Most of the heavy metal levels in Callaghan Creek were below those found in McLeod and below the IWD recommended surface water quality objectives for protection of aquatic life (Reeden 1979).

REFERENCES

Hallam, R.L., 1976. Baseline Studies of the Watershed Adjacent to Northair Mines Ltd., Brandywine, B.C. Pollution Abatement Branch, Environmental Protection Service, Pacific Region, Report Number EPS 5-PR-76-1.

Hallam, R.L., 1981. Northair Mines Limited, Brandywine Falls, B.C. Notes from A Reveiw of Aquatic Environmental Information, Site Inspection and Water Quality Audits Conducted June 20, 1979 and March 4, 1981, EPS, Pacific Region, unpublished report.

Reeder, S.W., 1979. Guidelines for Surface Water Quality, Volume 1 Inorganic Chemical Substances - Preamble. Inland Waters Directorage, Water Quality Branch, Ottawa, 1979.

TABLE 1 WATER QUALITY ANALYSES OF TRIPLICATE SAMPLES COLLECTED AUGUST 18, 1982 FROM THE WATERSHED ADJACENT TO NORTHAIR MINES LTD.

PARAMETER (mg/l)[1]	MACLEOD CREEK ABOVE ALEXANDRA FALLS (Station 1)				ANOMALY CREEK ABOVE THE MINE SITE (Station 2)				ANOMALY CREEK BELOW THE MINE SITE (Station 3)			
	$\bar{x}$		s		$\bar{x}$		s		$\bar{x}$		s	
pH	7.3		0		7.3		0		8.2		0	
total residue	25		4		142		1		305		4	
NFR[2]	< 5		0		11		6		11		2	
turbidity	0.3		0		2.7		0		0.5		0	
conductivity	36.3		0.2		207		0		450		3	
total alkalinity	11.8		0.3		65.0		0		76.0		0	
sulphate	6.3		0.3		30.3		0.6		140.0		1	
total PO_4	< 0.005		0		< 0.005		0		< 0.005		0	
nitrite	< 0.005		0		< 0.005		0		< 0.005		0	
nitrate	< 0.01		0		< 0.01		0		< 0.01		0	
CN	0.10		0.12		< 0.03		0		< 0.03		0	
Hardness, Ca,Mg	13.9		0.2		88.7		0.8		213		1	
Hardness, Total	13.9		0.4		90.2		0.9		215		1	
	Total	Diss.[3]	Total	Diss.	Total	Diss.	Total	Diss.	Total	Diss.	Total	Diss.
Ba	0.007	0.006	0.001	0	0.019	0.019	0	0	0.017	0.017	0	0
Cd	< 0.0006	< 0.0005	0	0	0.0006	0.0010	0.0001	0.0006	< 0.0006	< 0.0005	0	0
Cu	0.005	0.002	0.006	0.003	0.006	0.004	0.002	0.001	0.004	< 0.001	0.006	0.001
Mn	0.004	0.003	0.001	0	0.516	0.449	0.005	0.008	0.035	0.032	0.001	0.001
Pb	< 0.001	< 0.001	0.001	0	0.022	0.008	0.002	0.002	< 0.001	< 0.001	< 0.001	0
Sr	0.029	0.031	0	0.001	0.130	0.133	0.001	0.002	1.29	1.3	0.02	0
Ti	< 0.002	< 0.002	0	0	0.003	< 0.002	0.001	0	< 0.002	< 0.002	0	0
Zn	0.004	0.006	0.003	0.005	0.055	0.039	0.004	0.002	0.014	0.009	0.002	0.001
Al	0.05	< 0.05	0.02	0	0.10	< 0.05	0.01	0	< 0.06	< 0.05	0.02	0.02
Fe	0.119	0.016	0.071	0.004	0.589	0.232	0.002	0.010	0.102	0.008	0.011	0.002
Si	1.3	1.3	0.1	0.1	1.	0.9	0	0	3.9	4	0	0
Ca	4.8	5.0	0	0.1	33.7	33.7	0.1	0.4	81.4	80.7	0.7	0.2
Mg	0.4	0.3	0.1	0	1.2	1.1	0	0	2.8	2.8	0	0
Na	0.6	0.5	0.1	0	0.9	0.9	0	0	3.3	3.2	0.1	0

1 pH is measured in relative units; conductivity is measured in umhos/cm; turbidity is in Formazin Turbidity Units
2 NFR = non-filterable residue
3 Diss. = dissolved

TABLE 1 WATER QUALITY ANALYSES OF TRIPLICATE SAMPLES COLLECTED AUGUST 18, 1982 FROM THE WATERSHED ADJACENT TO NORTHAIR MINES LTD. (Continued)

PARAMETER (mg/l)[1]	WATER LICENCE CREEK ABOVE THE MINE SITE (Station 4)		WATER LICENCE CREEK BELOW THE MINE SITE (Station 5)		CALLAGHAN CREEK NEAR HWY 99 (Station 6)	
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s
pH	7.9	0	7.8	0	7.6	0
total residue	51	2	79	3	42	2
NFR[2]	12	2	10	3	18	3
turbidity	< 0.1	0	0.1	0	8.8	0
conductivity	78.0	0.6	125	1	43.1	0.1
total alkalinity	31.5	0	14.8	0.3	12.5	0
sulphate	6.4	0.2	19.3	0.1	7.2	0.2
total PO_4	< 0.005	0	< 0.005	0	< 0.005	0
nitrite	< 0.005	0	< 0.005	0	< 0.005	0
nitrate	< 0.01	0	0.06	0	< 0.01	0
total CN	< 0.03	0	< 0.03	0	< 0.03	0
Hardness, Ca,Mg	34.6	0.2	49.1	0.1	16.7	0.2
Hardness, Total	34.8	0.2	49.3	0.1	16.9	0.2

	Total	Diss.[3]	Total	Diss.	Total	Diss.	Total	Diss.	Total	Diss.	Total	Diss.
Ba	0.007	0.007	0	0.001	0.011	0.011	0	0	0.009	0.005	0	0.001
Cd	< 0.0006	< 0.0005	0	0	< 0.0006	< 0.0005	0	0	< 0.0006	< 0.0005	0	0
Cu	< 0.001	< 0.001	0.001	0	0.001	< 0.001	0.001	0.001	0.001	0.002	0.001	0.003
Mn	0.005	0.005	0.001	0	0.006	0.003	0	0	0.008	0.002	0.001	0.001
Pb	0.002	< 0.001	0.003	0	< 0.001	< 0.001	0	0	< 0.001	< 0.001	0.001	0
Sr	0.069	0.069	0.002	0	0.099	0.099	0.002	0	0.056	0.053	0.001	0.001
Ti	< 0.002	< 0.002	0	0	< 0.002	< 0.002	0	0	0.012	< 0.002	0.003	0
Zn	0.003	< 0.002	0.002	0	< 0.002	< 0.002	0.002	0	0.005	< 0.002	0.006	0
Al	< 0.06	< 0.05	0	0	< 0.06	< 0.05	0	0	0.48	< 0.05	0.05	0
Fe	0.024	0.012	0.026	0.001	0.033	0.021	0.021	0	0.215	0.020	0.024	0.002
Si	1.6	1.7	0.1	0	1.8	1.9	0	0	2.3	1.6	0.1	0.1
Ca	13.2	13.0	0.1	0.1	19.1	18.6	0.2	0.1	6.4	6.1	0.1	0.1
Mg	0.6	0.5	0	0	0.7	0.6	0.1	0	0.5	0.4	0	0
Na	0.9	0.7	0.1	0	1.7	1.5	0	0	1.	0.8	0	0.1

1 pH is measured in relative units; conductivity is measured in umhos/cm; turbidity is in Formazin Turbidity Units
2 NFR = non-filterable residue
3 Diss. = dissolved

TABLE 2 HEAVY METALS THAT WERE BELOW DETECTION LIMIT (mg/l) AT ALL RECEIVING WATER SITES

METAL	DETECTION LIMIT
As	0.06
B[1]	0.001
Be	0.001
Co	0.006
Cr	0.006
Hg	0.06
Mo	0.006
Ni	0.02
P	0.06
Sb	0.06
Se	0.06
Sn	0.01
V	0.01

[1] One of the triplicate water samples from Macleod Creek had a boron concentration of 0.025 mg/l

TABLE 3 MINE AND MILL EFFLUENT QUALITY FROM SINGLE GRAB SAMPLES COLLECTED AUGUST 18, 1982 AT NORTHAIR MINES LTD.

PARAMETER (mg/l)[1]	TAILINGS POND SUPERNATANT				BELLAMY LAKE FINAL DISCHARGE		OFFICE POND FINAL DECANT	
	Input to Pond (Station 7)		Pump to Bellamy Lake (Station 8)		(Station 9)		(Station 10)	
pH	7.8		9.0		9.4		7.8	
SO_4	169		165		158		94	
Total PO_4	-		0.145		0.145		0.031	
NO_2	-		0.220		0.200		< 0.005	
NO_3	-		1.54		1.39		0.02	
NH_3	-		0.029		0.008		0.007	
CN	-		< 0.03		< 0.03		< 0.03	
CNS	-		< 2.0		< 2.0		< 2.0	
CNwad[2]	-		< 0.03		< 0.03		< 0.03	
Hardness, Ca,Mg	232		223		209		160	
Hardness, Total	233		224		210		162	
	Total	Diss.	Total	Diss.	Total	Diss.	Total	Diss.
B	0.091	-	0.121	-	0.091	-	0.030	-
Ba	0.029	0.030	0.022	0.024	0.021	0.024	0.027	0.031
Cu	0.036	0.012	0.097	0.044	0.087	0.027	0.010	0.005
Mn	0.354	0.285	0.170	0.090	0.103	0.014	0.745	0.614
Mo	0.009	0.009	-	0.008	0.009	0.01	< 0.006	< 0.005
P	0.06	0.05	0.13	0.14	0.12	0.13	< 0.06	< 0.05
Pb	0.17	0.02	0.1	< 0.02	0.03	< 0.02	0.05	< 0.02
Sr	0.313	0.324	0.324	0.336	0.293	0.301	0.272	0.281
Ti	0.008	< 0.002	0.004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Zn	0.114	0.027	0.076	0.011	0.032	0.004	0.103	0.08
Al	0.35	< 0.05	0.25	0.06	0.17	0.10	0.10	< 0.05
Fe	1.19	0.143	0.348	0.006	0.149	0.013	0.207	0.034
Si	1.3	0.8	1.8	1.4	1.5	1.5	0.9	0.8
Ca	91.9	91.3	90.0	88.0	84.5	82.3	61.6	60.9
Mg	1.3	1.0	1.0	0.9	0.8	0.8	2.1	2.0
Na	9.4	9.1	9.3	8.9	8.8	8.5	8.4	8.0

1 pH is measured in relative units
2 Cyanide, weak acid dissociable

TABLE 3 MINE AND MILL EFFLUENT QUALITY FROM SINGLE GRAB SAMPLES COLLECTED AUGUST 18, 1982 AT NORTHAIR MINES LTD.

PARAMETER (mg/l)[1]	2800'				3700'			
	Before Settling (Station 11)		After Settling (Station 12)		Before Settling (Station 13)		After Settling (Station 14)	
pH	8.0		8.1		8.1		7.7	
SO_4	245		12		254		9.1	
Total PO_4	-		-		0.007		0.009	
NO_2	-		-		< 0.005		< 0.005	
NO_3	-		-		0.06		< 0.01	
NH_3	-		-		0.008		0.022	
CN	-		< 0.03		< 0.03		< 0.03	
CNS	-		-		< 2.0		-	
CNwad[2]	-		-		< 0.03		-	
Hardness, Ca,Mg	396		388		58		44	
Hardness, Total	403		393		65		46	
	Total	Diss.	Total	Diss.	Total	Diss.	Total	Diss.
B	0.030	-	0.028	-	< 0.001	-	0.020	-
Ba	0.015	0.016	0.015	0.016	0.009	0.005	0.005	0.006
Cu	< 0.006	< 0.005	< 0.006	< 0.005	0.063	< 0.005	< 0.006	< 0.005
Mn	0.208	0.074	0.136	0.08	0.195	0.011	0.649	0.602
Mo	< 0.006	< 0.005	< 0.006	< 0.005	< 0.006	< 0.005	< 0.006	< 0.005
P	0.08	< 0.05	< 0.06	< 0.05	0.14	< 0.05	< 0.06	< 0.05
Pb	0.06	< 0.02	0.04	< 0.02	0.06	< 0.02	< 0.02	< 0.02
Sr	2.54	2.59	2.51	2.59	0.125	0.112	0.107	0.112
Ti	0.006	< 0.002	0.008	< 0.002	0.04	< 0.002	< 0.002	< 0.002
Zn	0.058	0.023	0.052	0.025	0.039	< 0.002	0.004	0.002
Al	0.17	< 0.05	0.22	< 0.05	0.76	< 0.05	0.09	< 0.05
Fe	0.394	0.006	0.428	0.007	1.140	< 0.005	0.195	0.152
Si	5.8	5.7	5.9	5.7	2.9	1.7	1.5	1.4
Ca	150.0	145.0	147.0	145.0	21.3	15.4	16.4	16.3
Mg	5.2	5.0	5.2	5.0	1.1	0.6	0.8	0.8
Na	5.7	5.3	5.6	5.3	2.6	1.0	0.9	0.9

1 pH is measured in relative units
2 Cyanide weak acid dissociable

TABLE 4 HEAVY METALS THAT WERE BELOW DETECTION LIMIT (mg/l) AT ALL MINE AND MILL SITES

METAL	DETECTION LIMIT	
As	0.06 (total)	0.05 (dissolved)
Be	0.001	
Cd	0.002	
Co[1]	0.006 (total)	0.005 (dissolved)
Cr	0.006 (total)	0.005 (dissolved)
Hg	0.05	
Ni	0.02	
Sb	0.05	
Se	0.05	
Sn	0.01	
V	0.01	

[1] The single grab sample from the 3700' audit before settling had a cobalt concentration of 0.009 mg/l