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ENVIRONMENTAL PROTECTION SERVICE
ENVIRONMENTAL PROTECTION BRANCH
PACIFIC REGION
(Yukon District Office)

ENVIRONMENTAL QUALITY OF ROSE CREEK
AS AFFECTED BY CYPRUS ANVIL MINING CORPORATION LTD.
(SURVEY DATA FROM 1974, 1975, and 1976)

Regional Program Report No. 79-25

by

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ABSTRACT

Water quality, benthic invertebrate, and fish surveys were conducted within the Rose Creek watershed during 1974 through 1976. The impact of the effluent of the Cyprus Anvil Mining Corporation Ltd. lead-zinc operation at Faro, Yukon, was monitored and compared to Water Use License requirements.

Results have indicated that the water quality of Rose Creek has been adversely affected on many occasions by the activity at the mine. In some cases the effluent concentrations were within acceptable limits. Ongoing monitoring work should be continued to ensure compliance with the Water Use License and to protect the aquatic environment.

RÉSUMÉ

La qualité de l'eau, les invertébrés benthiques et les poissons du bassin du ruisseau Rose ont été étudiés de 1974 à 1976. À Faro (Yukon), les répercussions des rejets de la mine de plomb et de zinc de la Cyprus Anvil Mining Corporation Ltd. ont été évaluées, eu égard aux normes stipulées dans le permis d'utilisation de l'eau.

Les résultats ont montré que, à de nombreuses occasions, l'activité de la mine a eu pour effet de diminuer la qualité de l'eau du ruisseau Rose. Parfois, les teneurs en polluants sont demeurées dans les limites acceptables. Des contrôles devraient se poursuivre en continu, pour s'assurer que les clauses du permis sont respectées et garantir la protection du milieu aquatique.

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SUMMARY

1. Water chemistry results indicate that the Cyprus Anvil Mining Corporation lead-zinc mine at Faro, Yukon, has had a deleterious effect on the water quality and biological community of Rose Creek, especially in close proximity and downstream of the tailings pond.
2. The discharge from the Cyprus Anvil tailings pond was periodically toxic to fish and results show chronic non-compliance with the Water Licence regulations.
3. Numbers of fish appeared to diminish at stations closest to the mine.
4. Invertebrate data indicate an adverse effect from the mine on the biological health of Rose Creek at stations close to and downstream from the tailings pond.

1 INTRODUCTION

The Cyprus Anvil Mining Corporation Ltd. operates a lead-zinc-silver mine located in the Anvil Range near Faro ($62^{\circ}20'N$, $133^{\circ}25'W$), about 150 air miles (241.40 km) north of Whitehorse, Yukon Territory (Figure 1). The mine is at an elevation of 4500 feet (1371.6 metres). The area is drained by Rose Creek, Faro Creek, the north fork of Rose Creek, and Anvil Creek, all of which flow into the Pelly River, about 64 km west of the mine site. The streams are fast-flowing with many riffle areas and numerous stretches of white water. Stream beds vary from coarse boulders to fine gravel and sand.

Approximately $10\ 000$ tons (9×10^6 kg) of ore per day are milled with a recovery rate of about 77% zinc, 87% lead, and about one ounce per ton of silver. The mill requires 4.3×10^6 Imperial gallons (2.9×10^7 litres) of water daily. After the water has been used in the mill process it is discharged to the tailings pond which has a design retention time of 28 days. There is no recycling of tailings supernatent or treatment of the decant or seepage before it is released into Rose Creek.

The mine commenced operation in 1969 and was issued a Water Use License by the Yukon Territorial Water Board in February of 1975 (effective December 1, 1974). Numerous operational problems have occurred since that time.

The diversion of Faro Creek around the pit was undertaken and channelization was completed in May of 1975 but did not stabilize until September, 1975. In the meantime, Faro Creek was carrying a heavy silt load into Rose Creek as a result of mine activity along its course. On March 19, 1975, the tailings dam breached, releasing an estimated 54×10^6 gallons (2.4×10^{10} litres) of tailings slurry to the Rose Creek valley. In November of the same year, a copper-sulphate spill into Rose Creek occurred. In February, 1976, a cyanide spill occurred in the mine tailings pond and in August of 1976, another copper-sulphate spill occurred at the Canadian Industries Ltd. plant located adjacent to the mine and Rose Creek.

The Environmental Protection Service began a monitoring program to assess the quality of the receiving environment at the Cyprus Anvil mine in

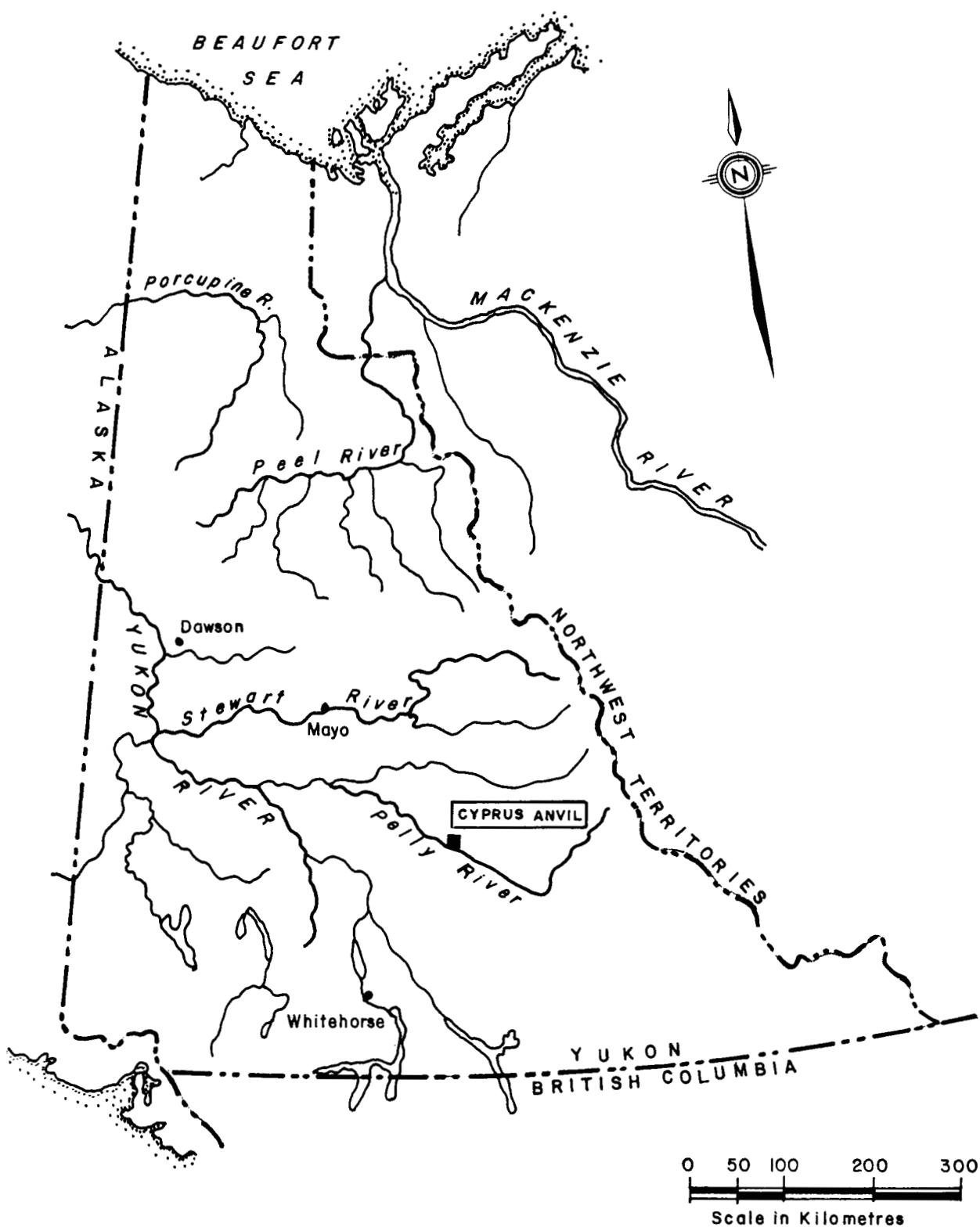


FIGURE 1 CYPRUS ANVIL MINING CORPORATION LTD.

1973, when the Yukon Territory Water Board requested information to deal with the mine's application for a Water Use License. The Water Board issued a Water Use License on February 4, 1975, to Cyprus Anvil Mining Corporation Ltd. (requirements in Table 1). Subsequent monitoring has been conducted each year thereafter by the Environmental Protection Service. As a requirement of the Water Use License, Cyprus Anvil mine must undertake regular water quality analyses and bioassay assessments.

The purpose of this report is to present and briefly review the data collected by the Environmental Protection Service during periodic monitoring surveys, and by Indian and Northern Affairs in compliance with the water licence. Data was collected over the years 1974, 1975, and 1976 from the Rose Creek watershed to assess the impact of the Cyprus Anvil mine on that watershed.

TABLE 1 EXCERPT FROM YUKON TERRITORY WATER BOARD WATER USE LICENSE FOR CYPRUS ANVIL MINING CORPORATION LTD.

- No waste discharge shall exhibit constituents or characteristics exceeding the following limits:
 - Suspended solids - not greater than 15 mg/l
 - pH - not less than 6.5 pH units
 - Colour - not greater than 20 Pt-Co units
 - Turbidity - not greater than 15 Jackson Turbidity Units (JTU)
- No waste discharge* shall contain floating solids.
- No visible or floating oils or grease shall be present in any waste discharge
- No waste discharge shall be toxic to fish
- The concentration of elements which shall not be exceeded in any waste discharge are listed below:

			<u>Concentration - mg/l (ppm)</u>
Ammonia	as N	total	1.00
Antimony	Sb	extractable	0.10
Arsenic	As	dissolved	0.05
Barium	Ba	extractable	1.00
Cadmium	Cd	extractable	0.02
Copper	Cu	extractable	0.2
Cyanide	as CN	total	0.05
Lead	Pb	extractable	0.20
Mercury	Hg	extractable	0.005
Molybdenum	Mo	extractable	0.50
Nickel	Ni	extractable	0.5
Selenium	Se	extractable	0.05
Silver	Ag	extractable	0.10
Zinc	Zn	extractable	0.5

* waste discharge includes tailings pond effluent, tailings pond seepage, all mine water drainage, and contaminated surface drainage prior to entering the receiving waters, and including the Faro Creek diversion waters.

2 METHODS

2.1 Water Chemistry

A description of sample sites is provided in Table 2 and sampling locations are identified in Figure 2.

Temperature, conductivity and pH were measured in the field using a Yellow Springs Instrument direct-reading salinity-conductivity-temperature meter (Model C9089-1) and a Model 296 Radiometer pH meter. Average dissolved oxygen concentrations were obtained from duplicate analyses using the azide modification of the Winkler method (Rand *et al*, 1976). All other analyses were performed at the Pacific Environment Institute laboratory in West Vancouver, B.C. These included pH, non-filterable residue, turbidity, true colour, hardness, total alkalinity, and the following extractable metals: copper, cadmium, iron, vanadium, manganese, molybdenum, lead, zinc, nickel, silver, mercury, arsenic, cyanide, selenium, antimony, calcium, magnesium, and barium. All samples sent to the Pacific Environment Institute laboratory were preserved in accordance with the guidelines prescribed by the Pollution Sampling Handbook (Environment Canada, 1976).

2.2 Bioassay

A total of 24 samples representing five different sample sites from eleven periods between September, 1974, and December, 1976, were submitted to the Pacific Environment Institute for bioassay. Eighteen of these were submitted by the Environmental Protection Service and the remainder by the Cyprus Anvil Mine in compliance with their Water Use License requirements.

A 96 hour LC50, a 96 hour LT50, and/or a 96 hour threshold of toxicity was determined using the procedures outlined in the Pollution Sampling Handbook (Environment Canada, 1976).

TABLE 2 DESCRIPTION OF STATIONS

Station	Year Sampled	Location
1	1974	on Rose Creek above the influence of the mine and mill
	1975	effluent (after construction of diversion ditch to divert
	1976	mine runoff) stream bed consists of boulders, cobbles, coarse and fine gravel
2	1974	decant stream at tailings pond
	1976	stream bed consists of coarse and fine gravel
3	1974	Rose Creek below decant stream
		stream bed consists of cobbles, coarse and fine gravel
3a	1976	same as Station 3 for 1974 but about one mile west due to changes in tailings pond
4	1974	Rose Creek, one-half mile below the entry of the decant stream
	1975	
	1976	stream bed consists of cobbles and coarse gravel
5	1974	Rose Creek, about three miles above the confluence of
	1975	Rose and Anvil creeks
	1976	stream bed consists of cobbles, coarse and fine gravel
6	1974	Anvil Creek, above the confluence with the north fork of
	1975	Anvil Creek
	1976	stream bed consists of boulders, cobbles, and coarse gravel
7	1974	above the mouth of the north fork of Anvil Creek
	1975	stream bed consists of coarse and fine gravel and sand
	1976	
8	1974	Anvil Creek, above its confluence with the Pelly River
	1975	stream bed consists of coarse and fine gravel and sand
	1976	
9	1974	Pelly River, above the mouth of Anvil Creek
	1975	stream bed consists of cobbles, coarse and fine gravel
	1976	
10	1974	Pelly River, below the mouth of Anvil Creek
	1975	stream bed consists of cobbles, coarse and fine gravel
	1976	

TABLE 2 DESCRIPTION OF STATIONS (Continued)

Station	Year Sampled	Location
11	1975	decant stream at road crossing, one mile below tailings pond
	1976	stream bed consists of coarse and fine gravel and sand
12	1975	Rose Creek, below seepage from tailings pond
	1976	stream bed diverted to about 90 metres south of original bed; consists of cobbles, coarse and fine gravel
13	1975	seepage from tailings pond
	1976	

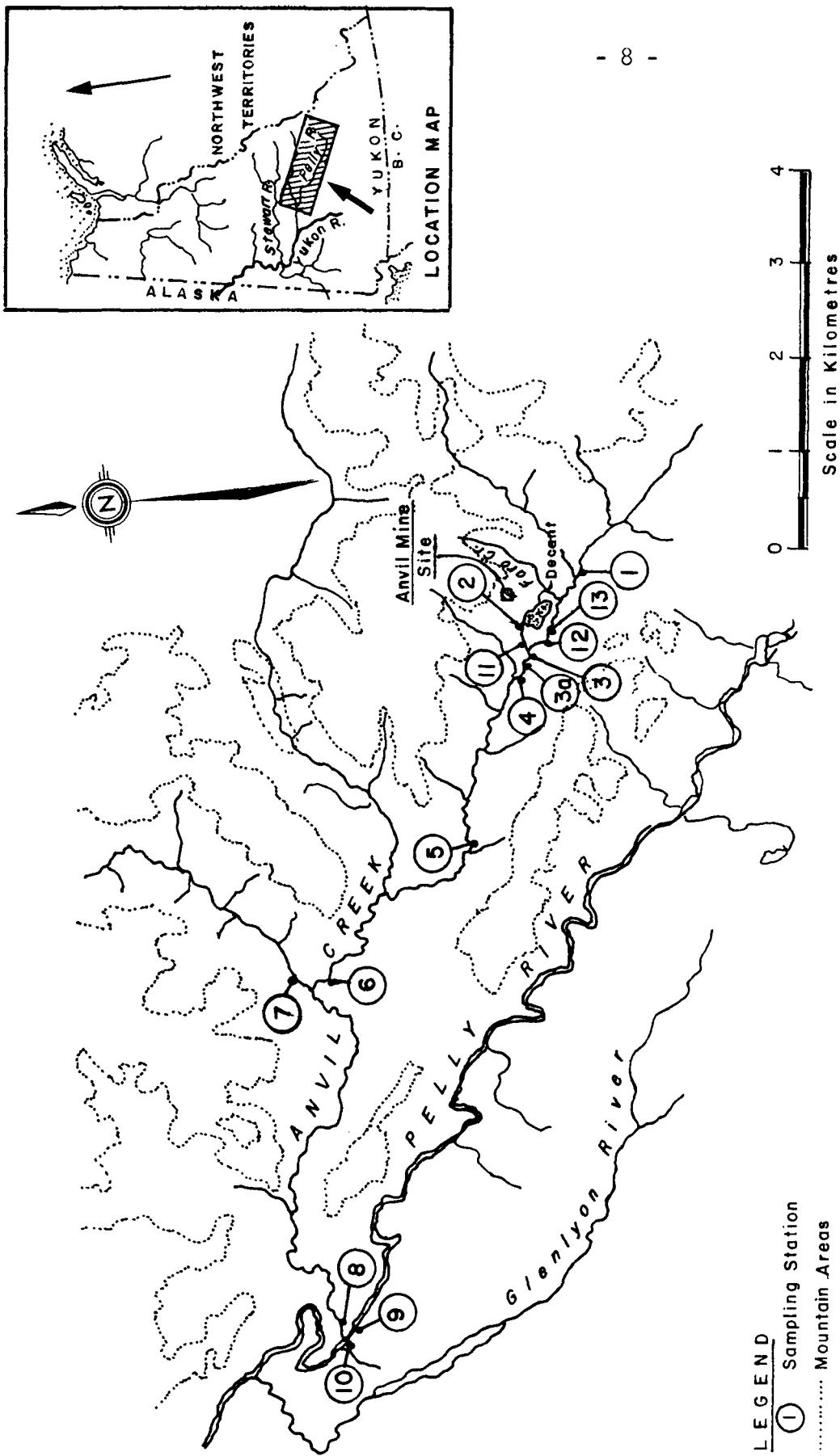


FIGURE 2 SAMPLING STATION LOCATIONS

2.3 Fish Sampling

Fish were collected from stations 1 to 10 using a Smith-Root type VIII Electro-Fisher, with a barrier net downstream. Stretches of not more than about 100 feet (30.48 metres) of the stream were fished before checking the net.

The fish obtained were counted and identified and dorsal muscle tissue and liver tissue were sampled. The samples were divided into two groups; the first group for analysis of copper, zinc, lead, and arsenic concentrations, and the second for analysis of mercury. Metal analyses were done using atomic absorption spectrophotometry or the emission spectrograph method following acid digestions of the tissues. Mercury analysis was done using the cold vapour technique for atomic absorption spectrophotometry.

2.4 Bottom Fauna

Macro-invertebrate populations were sampled at all stations (except 2 and 11) using artificial substrate samplers (ASS). The ASS were constructed from chrome-plated barbecue chicken baskets (17 x 25 cm) filled with local rocks which had been washed clean of any debris or plant material. The surface area provided by this "artificial substrate" was approximately $6000 \pm 1000 \text{ cm}^2$. Three replicate samplers were located at each station and left for one month to allow for invertebrate colonization. When retrieving the ASS, a surber sampler was slipped downstream and under the ASS, and together they were raised to the surface. All organisms were picked from the sampler and preserved immediately with 70% methanol. The samples were sorted into families in Whitehorse and shipped to Dr. Charles Low of Envirocon Limited in Vancouver, B.C., for further identification and counting. Indices of diversity and evenness were calculated for the invertebrates sampled.

The Shannon-Wiener Diversity Index (H') and the Evenness Index (J), as described by Pielou (1966a, 1966b) were calculated according to the following formulae:

(a) Species diversity (H') = $\sum (P_i \log P_i)$

where: $P_i = n_i/N$

n_i = number of individuals in the i th species

N = total number of individuals sampled

(b) Evenness (J) = $n - \frac{\sum (P_i \log P_i)}{\log S}$

where: S = total number of species sampled

$J(\max) = 1$

The dominance of the three main invertebrate groups encountered (Plecoptera, Ephemeroptera, and Tendipedidae) was also examined. The dominance ranking was done on the total number of individuals collected at each station (sum of all three replicate samples) for each year. If a taxonomic group was absent at a station in a particular year, it was not considered in the ranking.

3 RESULTS AND DISCUSSION

3.1 Water Chemistry

All water chemistry results are provided in Appendix I.

3.1.1 Temperature. Temperature fluctuations are mainly associated with climatic and seasonal factors and the results for Rose Creek are within a normal range.

3.1.2 pH. pH is a very significant water quality parameter as it may change the chemical speciation of metals and ligands* in an aquatic system. Fish survive in waters with pH values as low as 4 or as high as 9.5, although their productivity and reproductive success decline as the pH approaches the limits of this range. The field values for pH recorded in Rose Creek (Appendix I) were all within the range prescribed by the Water Use License conditions (as well as USEPA [1973] limits for maximum protection [6.5 - 8.5]), except for two extraordinary values. In the 1974 survey, the result for Station 2 (the tailings decant) was 9.7 and for Station 3 (below decant) was 6.5 pH units.

3.1.3 Dissolved Oxygen. The optimum dissolved oxygen level suitable for aquatic life varies depending on temperature and the level of activity of the organism. USEPA (1973) recommends that dissolved oxygen not fall below 4 ppm. The concentrations of dissolved oxygen observed at most stations in Rose Creek (Appendix I) were acceptable (i.e., greater than 4 ppm) with the exception of results as shown in Table 3 were unacceptable.

* anions or molecules which may form a coordination compound with a metal cation (Stumm and Morgan, 1970).

TABLE 3 REDUCED DISSOLVED OXYGEN RESULTS

Date	Station		Concentration of Dissolved Oxygen (ppm)
	Number	Sample	
1974 September 16	2	Decant	0.15
1975 August 26	13	Seepage	2.1
September 23	13	Seepage	3.5
1976 July 14	2	Decant	0.0
July 14	3	Rose Creek below tailings decant	3.3
July 14	11	Decant stream	0.5
July 14	13	Seepage	1.2
August 17	2	Decant	0.0
August 17	11	Decant Stream	3.1
August 17	13	Seepage	3.9

3.1.4 Conductivity (Specific Conductance). Specific conductance relates to dissolved solids if filterable residue is less than 2000 mg/litre. This does not apply if water contains high concentrations of non-ionized soluble material such as organics and non-ionized colloidal inorganics (Environment Canada, 1976).

Values between 150 and 500 mhos/cm (25°C) are considered acceptable for specific conductance for support of fish populations in streams and rivers. Alkaline western streams can support fish adequately to 2000 mhos/cm (Environment Canada, 1976). The values as detected in Rose Creek (Appendix I) never exceeded 2000 mhos/cm, although Station 2 (the decant) and Station 13 (seepage from the tailings pond) were higher than the acceptable 500 mhos/cm for much of the time.

Station 4, just downstream of the tailings pond, had elevated levels in 1974; in May, 1975; and again in September, 1976. The 1976 increased levels could have been due to a CuSO₄ spill which occurred August 26, 1976. Station 3 also showed an elevated level for September, 1976, although it was still within the acceptable range. The increased level in 1975 may have been due to the tailings dam break but there was little data at other stations from 1975 to confirm this as a reason for the increased conductivity readings.

The conductivity values obtained by Environmental Protection Service are presented in Figures 3, 4, and 5. These show the effects of input of the decant and seepage from the tailings pond as noticeably increasing the conductivity of the water of Rose Creek. The input from Anvil Creek (Station 7) apparently contributes to a reduction of the conductivity, probably by diluting the water.

3.1.5 Turbidity. Turbidity is a measure of the way in which suspended matter causes light to be scattered or absorbed rather than transmitted through the water column. It is caused by clay, silt, fine organic and inorganic particles, and microscopic organisms (Rand *et al*, 1976).

The Water Use License issued by the Yukon Territorial Water Board for the Cyprus Anvil mine states that no waste discharge may have a turbidity of greater than 15 JTU. This level was exceeded on a number of

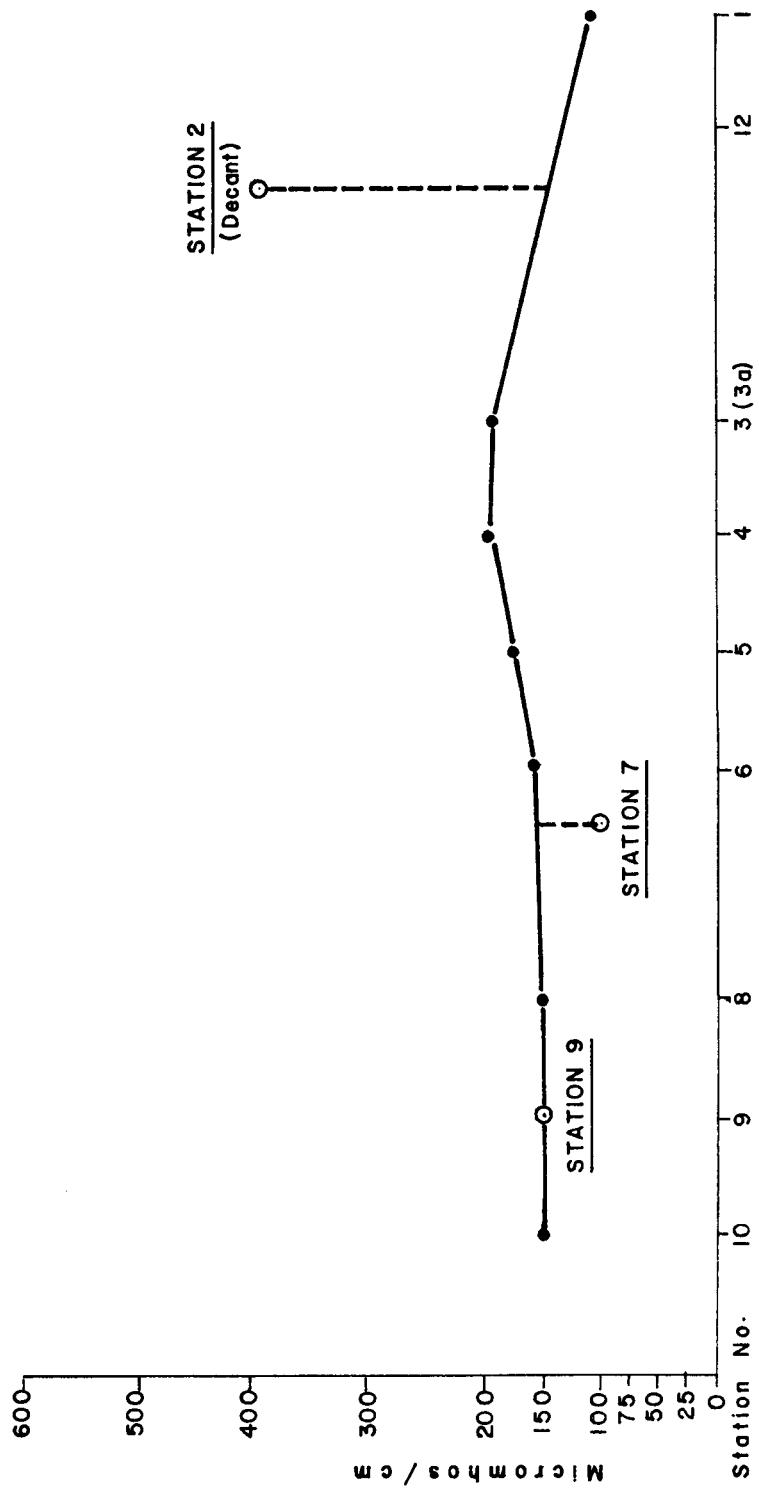


FIGURE 3 CONDUCTIVITY RESULTS, 1974

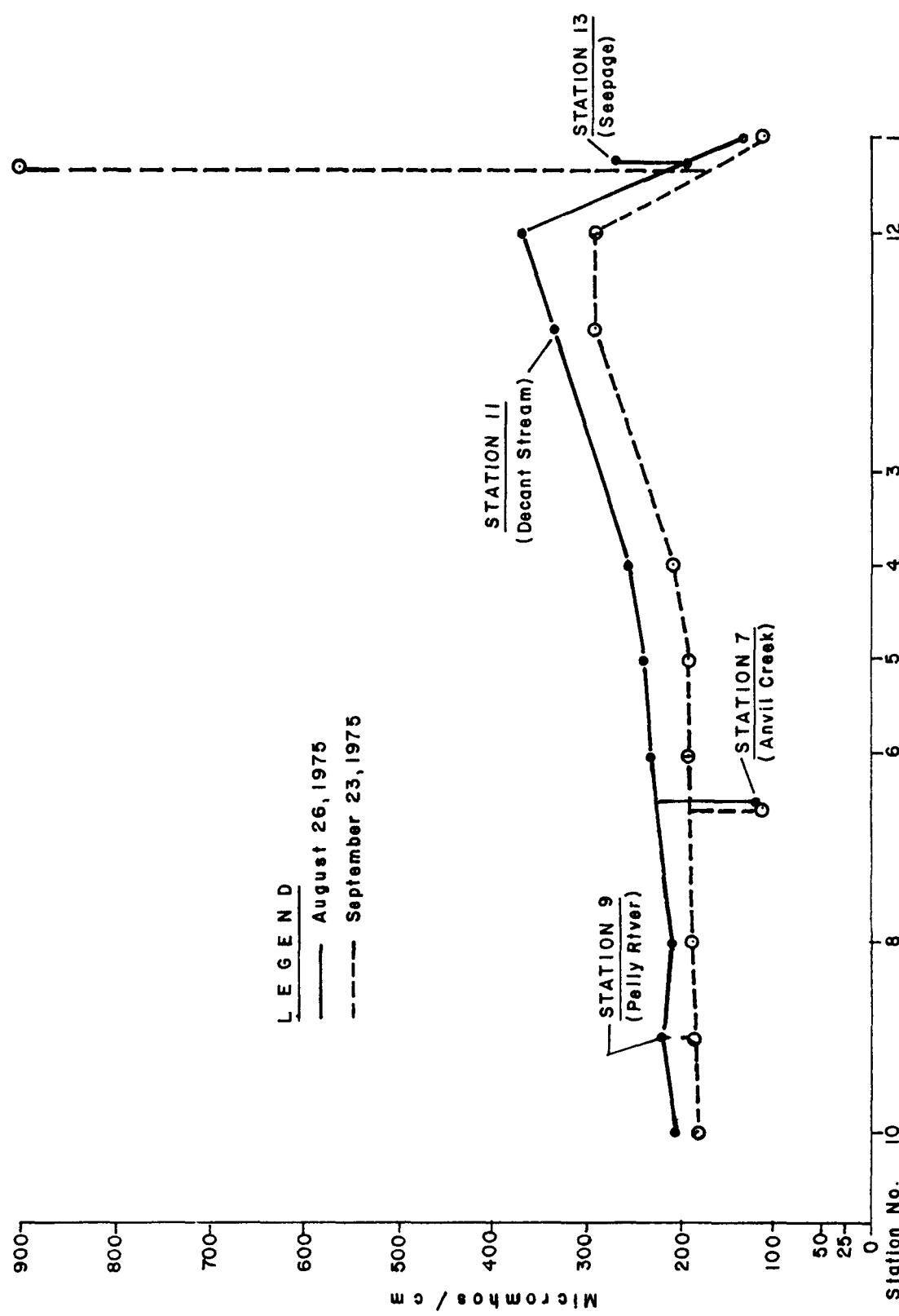


FIGURE 4 CONDUCTIVITY RESULTS, 1975

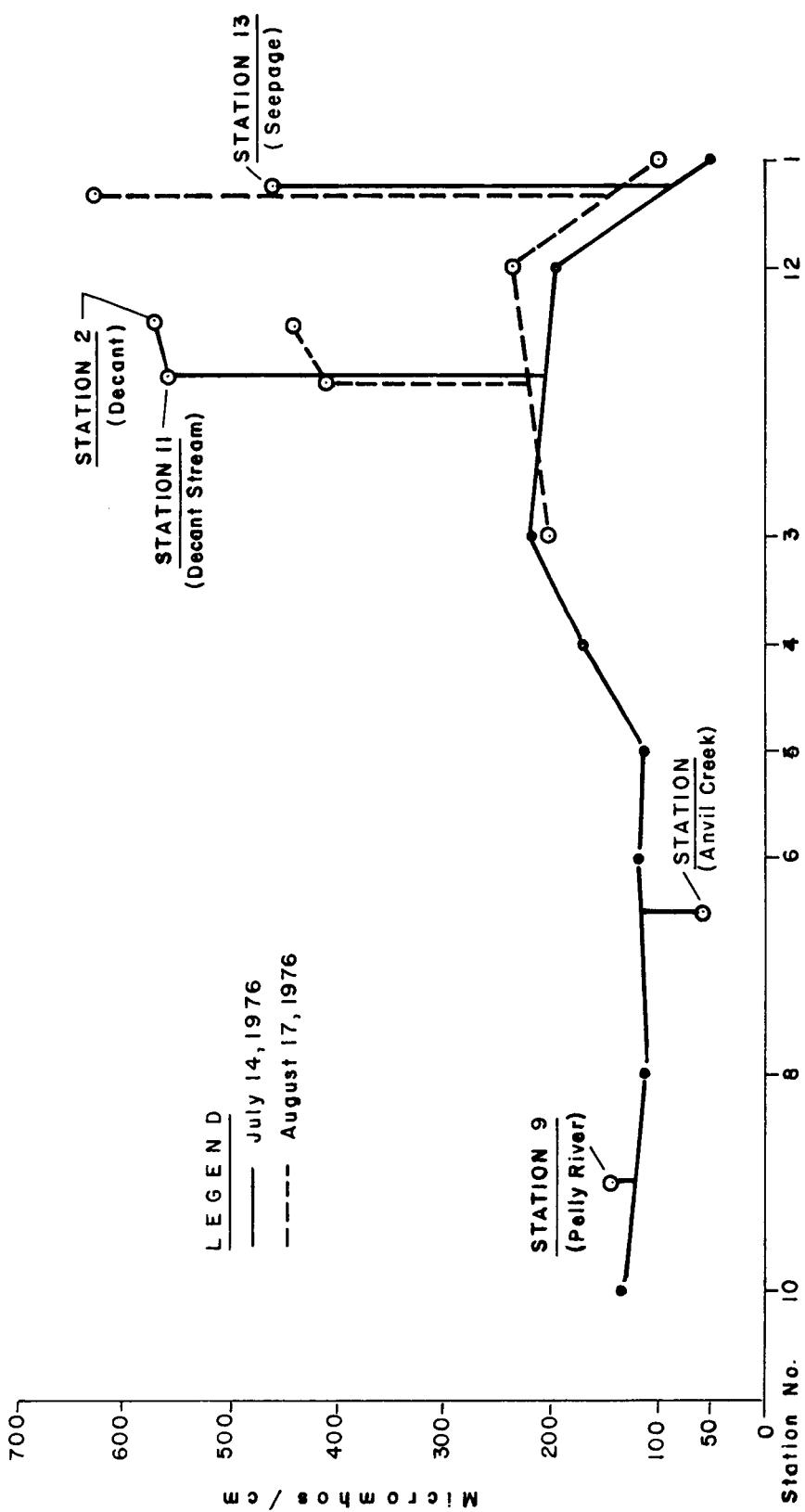


FIGURE 5 CONDUCTIVITY RESULTS, 1976

occasions and downstream water quality was subsequently affected. A listing of those elevated periods is provided in Table 4. The turbidity seems to have been reduced considerably upon completion of the Faro Creek diversion channel in May, 1975. The other elevated levels such as those recorded for September 29, 1975, may have been due to sudden heavy runoff which would have contributed eroded material to the stream.

3.1.6 Colour. True colour is caused by natural substances such as colloidal organic materials. (Apparent colour is due to suspended matter.) Colour generally increased with an increase in pH and with the eutrophication process. Industrial wastes may cause unnatural colours which do not relate to the standards for true colour or apparent colour (Environment Canada, 1976).

According to the Water Use License for Cyprus Anvil mine, the maximum acceptable colour value for effluents should not exceed 20 platinum colour (Pt-Co) units, and USEPA (1973) recommends no fluctuation in values of greater than 10%. Rose Creek colour data is presented in Appendix I. The literal interpretation of these values is in question due to the input of industrial non-natural effluent from the mine. Table 5 shows all values which exceed the limit set out in the Water Use License.

There were no recorded major events or spills at the mine at times which would have corresponded to these extraordinary colour values. Because true colour is related to natural organic substances, it is likely that these values were caused naturally or by a change in the effluent. Monitoring should be continued on a regular basis and the colour value should be maintained at less than 20 Pt-Co units.

3.1.7 Total Alkalinity. Alkalinity of less than 30 - 50 mg/litre (as CaCO₃) is considered low, and natural water rarely exceeds 400 - 500 mg/litre (as CaCO₃). The best range for aquatic life is in a pH of 7 to 8, with alkalinity of 100 mg/litre (Environment Canada, 1976). The alkalinity values for each station for Rose Creek are presented in Appendix I, and results of 100 mg/litre or greater, and 30 mg/litre or less are presented in Table 6. All values excluded from Table 6 were between 30 and 100 mg/litre CaCO₃, which is the acceptable range.

TABLE 4 EXCESSIVE TURBIDITY RESULTS (FTU)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974 March 27	-	-	150	86	58	-	-	-	-	-	-	-	-
September 16*	-	1400	600	320	-	-	-	-	-	-	-	-	-
October 16	-	28	-	29	-	-	-	-	-	-	-	-	-
October 30	-	-	140	-	-	-	-	-	-	-	-	-	-
1975 May 3	210	-	-	83	-	-	-	-	-	-	-	-	-
June 3	170	-	-	140	-	-	-	-	-	-	-	-	-
June 15	165	82	-	95	-	-	-	-	-	-	-	-	-
August 26	240	-	-	-	-	-	-	-	-	-	-	-	-
September 23*	26	-	-	18	-	-	19	-	24	-	21	-	27
1976 January 29	-	15	-	-	-	-	-	-	-	-	-	-	-
March 17	-	26	-	-	-	-	-	-	-	-	-	-	-
April 14	-	27	-	-	-	-	-	-	-	-	-	-	-
June 11	24	-	-	-	-	-	-	-	-	-	-	-	-
July 4	-	-	-	-	-	-	-	-	-	36	-	-	-
July 14*	-	145	-	-	-	-	-	-	42	-	18	-	-
September 22	-	-	-	-	-	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by D.I.N.A.

TABLE 5 EXCESSIVE COLOUR VALUES (Platinum Colour Units)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974 March 27	-	-	400	300	-	-	-	-	-	-	-	-	-
August 26	-	-	-	-	-	-	-	-	-	-	-	-	-
October 16	25	-	20	20	-	-	-	-	-	-	-	-	-
October 30	-	20	400	-	-	-	-	-	-	-	-	-	-
1975 May 3	160	-	-	-	-	-	-	-	-	-	-	-	-
June 3	90	-	-	80	-	-	-	-	-	-	-	-	-
June 15	200	100	110	150	-	-	-	-	-	-	-	-	100
August 26	50	-	-	-	-	-	29	191	-	-	-	-	-
September 23*	28	-	-	-	-	-	55	25	-	-	-	-	-
1976 April 14	-	31	-	-	-	-	-	-	-	-	-	-	-
June 11	45	-	-	28	23	29	128	55	24	30	-	-	25
July 14*	-	-	-	-	-	-	-	-	-	-	-	-	32
July 20	-	-	-	-	-	-	-	-	-	-	-	-	20
August 3	-	-	-	-	-	-	-	25	-	-	-	-	-
August 17*	-	-	-	-	-	-	-	64	-	-	-	-	-
September 22	-	30	-	-	-	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

TABLE 6 EXCESSIVE ALKALINITY VALUES (ppm or mg/L)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974 March 27	242	152	-	-	-	110	-	-	-	-	-	-	-
August 26	-	104	-	-	-	-	-	-	-	-	-	-	-
September 16*	-	100	-	-	-	-	-	-	-	-	-	-	-
October 16	-	125	-	-	105	-	-	-	-	-	-	-	-
October 29	100	-	-	-	-	-	-	-	-	-	-	-	-
October 30	-	-	-	-	102	-	-	-	-	-	-	-	-
1975 January 23	138	-	-	-	-	-	-	-	-	-	-	-	-
June 3	22.1	-	-	-	27.9	-	-	-	-	-	-	-	-
August 6	-	-	-	-	-	-	-	-	-	-	-	-	108
August 26	-	-	-	-	-	-	-	-	-	-	-	-	151
September 23*	-	-	-	-	-	-	-	-	-	-	-	-	173.6
1976 January 29	-	119	-	-	-	-	-	-	-	-	-	-	140
March 17	-	101	-	-	-	-	-	-	-	-	-	-	144
April 14	-	103	-	-	-	-	-	-	-	-	-	-	-
June 11	21.7	-	-	-	-	-	-	-	-	-	-	-	-
July 14*	-	-	-	-	-	-	-	-	-	-	-	-	149
July 20	-	-	-	-	-	-	-	-	-	-	-	-	145
August 17*	-	-	-	-	8.2	-	-	-	-	-	-	-	160
September 22	-	-	-	-	1.12	149	-	-	-	-	-	-	167
November 30	115	-	-	-	-	-	-	-	-	-	-	-	171

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

3.1.8 Total Hardness. Hard water is any water with a hardness value of greater than or equal to 120 mg/litre CaCO₃, moderate is 60 - 120 mg/litre CaCO₃, and soft water is less than 60 mg/litre CaCO₃ (USEPA, 1973). Soft water has a reduced capacity for complexation of such toxic substances as titanium, Cd, Pb, dichromates and ammonia (Environment Canada, 1976). Hardness is not a direct indication of water quality but is an indication of buffering capacity and productivity, harder water being a better buffer and more likely to be biologically productive (USEPA, 1973).

The results for hardness in Rose Creek, as presented in Appendix I, show a wide range of values from quite soft at 26.4 mg/litre CaCO₃ (at Station 1 - June 11, 1976) to very hard (257 mg/litre at Station 1 - March 27, 1974), but most values (more than 50%) were in the moderately hard range (60 to 100 mg/litre CaCO₃). There was no trend evident in these results.

3.1.9 Copper. The results for copper analysis in the water of Rose Creek are shown in Appendix I. Any results higher than ambient (as at Station 1) are noted in Table 7. The above-ambient levels at Stations 2 to 4 may be due to their proximity to the Canadian Industries Limited plant which produces CuCO₄, or due to the tailings pond from which some Cu might periodically be discharged. The increase in concentrations of copper in the seepage (Station 13) and decant after November, 1975, may be attributable to the CuSO₄ spill into the tailings pond between November 14 and 25, 1975.

All values which exceed the Water Use License level of 0.2 mg/litre (Table 1) are designated in Table 7 by an asterisk. Station 2 (the decant) was most consistently elevated until 1976, after which time the concentration of copper in the decant apparently was better controlled and maintained at a level acceptable to the Yukon Territorial Water Board.

3.1.10 Cadmium. Cadmium is a mineral often found associated with lead/zinc mines and chemical industries (Environment Canada, 1976). There is no known physiological mechanism for the excretion of cadmium from a body; therefore it accumulates and is known to be toxic at quite low levels

TABLE 7 EXCESSIVE COPPER CONCENTRATIONS (ppm)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974 March 27	0.003	0.38**	0.028	0.006	-	-	-	-	-	-	-	-	-
August 12	0.004	0.1	0.01	0.008	-	-	-	-	-	-	-	-	-
August 26	0.003	-	-	-	-	-	-	-	-	-	-	-	-
September 16*	0.01	0.03	-	-	-	-	-	-	-	-	-	-	-
September 16*	0.01	0.08	0.03	0.02	-	-	-	-	-	-	-	-	-
October 16	0.01	0.21**	0.5**	0.55**	-	-	-	-	-	-	-	-	-
October 29	0.003	-	-	-	-	-	-	-	-	-	-	-	-
October 30	-	0.32**	0.08	0.03	-	-	-	-	-	-	-	-	-
1975 January 23	0.02	-	-	-	-	-	-	-	-	-	-	-	-
May 3	0.03	-	-	-	0.05	-	-	-	-	-	-	-	-
June 3	0.043	-	-	-	-	-	-	-	-	-	-	-	-
June 15	0.032	0.41**	-	-	-	-	-	-	-	-	-	-	-
July 8	0.001	-	-	-	0.006	-	-	-	-	-	-	-	-
August 6	0.002	-	-	-	-	-	-	-	-	-	-	-	-
August 26	0.001	-	-	-	0.02	-	-	-	-	-	-	-	-
August 26*	0.02	-	-	-	-	-	-	-	-	-	-	-	-
1976 January 29	-	1.38**	-	-	-	-	-	-	-	-	-	-	-
March 17	-	-	-	-	-	-	-	-	-	-	-	-	-
April 14	-	0.04	-	-	-	-	-	-	-	-	-	-	-
June 11	0.005	-	-	-	-	-	-	-	-	-	-	-	-
July 14*	0.01	0.01	0.09	0.1	-	-	-	-	-	-	0.05	0.18	-
July 20	-	0.05	-	-	-	-	-	-	-	-	-	-	0.004
August 3	0.004	0.06	-	0.05	-	-	-	-	0.02	-	-	-	0.04
August 17*	0.01	0.04	-	-	-	-	-	-	-	-	0.04	-	-
September 22	0.002	0.1	-	-	-	-	-	-	-	-	-	-	-
November 30	0.002	-	0.006	-	-	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

** Values in excess of Yukon Territory Water Board recommended limit.

(USEPA, 1973). Recommended safe levels for reproduction by crustaceans and salmonid fish is 0.003 to 0.0004 mg/litre, depending on the hardness of the water (USEPA, 1973). Cadmium concentrations for Rose Creek sampling are presented in Appendix II, and all levels greater than the 0.0004 mg/litre limit are noted in Table 8. As may be seen from Table 8, only the seepage and the decant show any detectable cadmium and these levels are diluted to an acceptable concentration by the time the water reaches Station 3. The Yukon Territorial Water Board, in their license for Cyprus Anvil mine, have designated 0.02 mg/litre as a maximum acceptable level. No values recorded were in excess of this level.

3.1.11 Iron. Iron is often a naturally occurring mineral, although it is also frequently introduced to aquatic systems in acid mine drainage or from metal corrosion (Environment Canada, 1976; USEPA, 1973). Ferric salts form hydroxides which often settle out or are adsorbed onto various surfaces. These compounds may smother fish eggs or precipitate out onto the gills of fish, thereby blocking respiratory passageways. This precipitation of iron depends on the pH, pE, and hardness of the system. The recommended maximum safe concentration for iron is 0.05 mg/litre for minimal deleterious effects (USEPA, 1973). The data for iron concentrations in Rose Creek are presented in Appendix II and any excessive concentrations are presented in Table 9. The ambient concentration of Fe in Rose Creek was evidenced at Station 1 and was above the 0.05 mg/litre level, thus high iron values cannot necessarily be attributed to the Cyprus Anvil mine.

3.1.12 Vanadium. In 1974 the Environmental Protection Service carried out an analysis for vanadium. As all results were below the detection level, this analysis was discontinued.

3.1.13 Manganese. Manganese is an element commonly used in the metals industry but may also be found in ground water in association with iron. An application factor of 0.02 to the 96 hour LC50 of the most sensitive species is the accepted means for arriving at the maximum acceptable concentration for manganese in the water of the system in question (USEPA, 1973). With regard to public water supplies, a level of 0.05 mg/litre should not be exceeded (USEPA, 1973).

TABLE 8 EXCESSIVE CADMIUM CONCENTRATIONS (ppm)

Date	Stations											
	1	2	3	4	5	6	7	8	9	10	11	12
1974 September 16	D	D	D	D	D	D	D	D	D	-	-	-
1975 July 8	0.0002	-	-	-	-	-	-	-	-	-	-	d
August 6	0.0002	-	-	-	-	-	-	-	-	-	-	0.0017
August 26	0.0015	-	-	-	-	-	-	-	-	-	-	D
August 26*	D	-	-	D	D	D	D	D	D	D	D	-
September 23*	D	-	-	D	-	D	D	D	D	D	D	D
1976 March 17	-	d	-	-	-	-	-	-	-	-	-	-
April 14	-	0.0006	-	-	-	-	-	-	-	-	-	d
June 11	0.0002	-	-	-	-	-	-	-	-	-	-	0.0005
July 14*	D	D	D	D	D	D	D	D	D	D	D	D
July 20	-	0.0006	-	-	-	-	-	-	-	-	-	D
August 3	0.0006	0.0014	d	-	-	d	-	-	-	-	-	0.0004
August 17*	D	D	D	D	D	D	D	D	D	D	D	D
September 22	0.0002	0.0023	d	-	-	-	-	-	-	-	-	d
November 30	0.0002	-	d	-	-	-	-	-	-	-	-	d

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* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

D Less than detection limit of 0.01 ppb.

d Less than detection limit of 0.004 ppm.

TABLE 9 EXCESSIVE IRON CONCENTRATIONS (ppm)

	Date	Stations										
		1	2	3	4	5	6	7	8	9	10	11
1974	March 27	0.2	4.6	2.5	0.88	-	-	-	-	-	-	-
	August 12	0.39	0.25	0.4	0.34	-	-	-	-	-	-	-
	August 26	0.28	0.53	0.32	0.32	0.43	0.09	0.07	0.06	0.04	0.08	-
	September 16*	D	-	-	-	0.51	0.37	0.28	0.22	0.22	0.18	-
	October 16	E	2.8	1.3	2.3	1.5	-	-	-	-	-	-
	October 29	1.6	1.3	1.9	1.9	-	-	-	-	-	-	-
	October 30	0.5	-	-	-	-	-	-	-	-	-	-
1975	January 23	0.53	-	-	1.2	-	-	-	-	-	-	-
	May 3	2.6	-	-	1.5	-	-	-	-	-	-	-
	June 3	6.2	-	-	6.2	-	-	-	-	-	-	-
	June 15	16.0	36.0	4.9	5.0	-	-	-	-	-	-	-
	July 8	0.32	-	-	0.35	-	-	-	-	-	-	-
	August 6	0.14	-	-	-	-	-	-	-	-	-	-
	August 26	2.2	-	-	-	-	-	-	-	-	-	-
	September 23*	2.8	-	-	1.9	1.9	2.1	1.9	1.5	0.49	2.1	0.5
1976	January 29	-	1.0	-	-	-	-	-	-	-	-	-
	March 17	-	1.6	-	-	-	-	-	-	-	-	-
	April 14	-	1.9	-	-	-	-	-	-	-	-	-
	June 11	1.3	-	-	-	-	-	-	-	-	-	-
	July 14*	0.51	0.45	0.95	0.82	0.44	1.6	3.6	1.2	0.81	1.9	3.0
	July 20	-	0.55	-	-	-	-	-	-	-	-	-
	August 3	0.38	0.45	0.07	0.2	-	-	-	-	-	-	-
	August 7*	0.22	1.1	0.37	0.42	0.22	0.17	0.76	0.38	2.0	0.19	0.58
	September 22	0.24	1.3	0.26	0.34	-	-	-	-	-	-	-
	November 30	0.2	-	0.13	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

D Dissolved concentration.

E Extractable concentration.

The results for manganese in Rose Creek are presented in Appendix II and Table 10. The values in Table 10 are all those which exceed 0.05 mg/litre. All but Station 3 (November 11, 1976) and Station 13 values are less than 1.0 mg/litre and are therefore considered not harmful to aquatic life by standards recommended by the Working Group on Water Quality Objectives (1977). The values at Station 13 are elevated, probably because this station is the seepage from the tailings pond, but the values downstream are reduced to acceptable levels. There are no levels set for manganese in the Water Use License.

3.1.14 Molybdenum. Molybdenum is not usually considered a problematic metal. It is essential for normal growth of phytoplankton, although at high levels it may interfere with mammalian metabolism.

The Water Use License for Cyprus Anvil mine permits a concentration of molybdenum up to 0.4 mg/litre. The values for molybdenum in Rose Creek are shown in Appendix II and Table 11. Except for the three values shown in Table 11, all results were less than the limits of detection and the three "elevated" results obtained are all very low and present no hazard.

3.1.15 Lead. Lead has long been known as an environmental contaminant, especially in conjunction with automobile emissions and human health. Lead may be taken up by aquatic organisms, but is often made unavailable due to its strong affinity for adsorption to the sediments (Dinman, 1972). In solution, lead is chronically harmful to rainbow and brook trout at a concentration of 0.01 mg/litre in softer water, and at 0.03 mg/litre it has a detrimental effect on the reproduction of daphnia. It is recommended by USEPA (1973) that the concentration of lead in water not exceed 0.03 mg/litre at any time or place, for the safety of aquatic life.

The values for lead concentrations in Rose Creek are presented in Appendix II; Table 12 shows all results greater than the maximum recommended level of 0.03 mg/litre. The Water Board of the Yukon Territory requires that the concentration of lead in Rose Creek not exceed 0.20 mg/litre. This value is exceeded in almost every sample at Station 2 (the decant) and at Stations 4, 11, and 12 at various times.

TABLE 10 EXCESSIVE MANGANESE CONCENTRATIONS (ppm)

Date	Stations											
	1	2	3	4	5	6	7	8	9	10	11	12
1974 March 27	0.28	0.65	0.35	0.09	-	-	-	-	-	-	-	-
August 12	0.05	D	0.24	0.21	-	-	-	-	-	-	-	-
August 26	D	D	0.25	0.25	-	-	-	-	-	-	-	-
September 16*	0.06	D	0.12	0.68	0.43	0.15	D	D	D	0.08	-	-
October 16	0.14	D	0.21	0.76	0.44	0.16	D	D	D	0.08	-	-
October 29	0.16	D	0.82	0.8	-	-	-	-	-	-	-	-
October 30	0.13	-	D	1.80	0.88	-	-	-	-	-	-	-
1975 January 23	0.12	-	-	-	1.7	-	-	-	-	-	-	-
May 3	0.22	-	-	-	-	1.7	-	-	-	-	-	-
June 15	0.68	-	-	-	0.45	-	-	-	-	-	-	-
July 8	0.44	1.6	0.39	0.48	-	-	-	-	-	-	-	-
August 6	0.05	-	-	0.21	-	-	-	-	-	-	-	-
August 26	0.4	-	-	-	-	-	-	-	-	-	-	-
August 26*	-	-	-	-	-	-	-	-	-	-	-	-
1976 January 29	-	0.2	-	-	-	-	-	-	-	-	-	-
November 30	0.08	-	1.4	-	-	-	-	-	-	-	-	33.2
												6.1

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.
D Less than detection limit of 0.05 ppm.

TABLE 11 EXCESSIVE MOLYBDENUM CONCENTRATIONS (ppm)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1975 July 8	-	-	-	-	0.0015	-	-	-	-	-	-	-	-
August 6	-	-	-	-	-	-	-	-	-	-	-	-	0.012
August 26	-	-	-	-	-	-	-	-	-	-	-	-	0.011

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

TABLE 12 EXCESSIVE LEAD CONCENTRATIONS (ppm)

Date	Stations											
	1	2	3	4	5	6	7	8	9	10	11	12
1974 March 27	-	1.20	0.23	0.043	-	-	-	-	-	-	-	-
August 12	-	0.24	-	-	-	-	-	-	-	-	-	-
August 26	-	0.17	-	-	-	-	-	-	-	-	-	-
September 16*	0.04	0.49	0.08	0.07	0.04	-	-	-	-	-	-	-
October 16	-	0.32	0.15	0.15	-	-	-	-	-	-	-	-
October 30	-	0.37	0.75	0.13	-	-	-	-	-	-	-	-
1975 May 3	0.26	-	-	0.14	-	-	-	-	-	-	-	-
June 3	0.36	-	-	0.43	-	-	-	-	-	-	-	-
June 15	0.11	6.00	0.08	0.14	-	-	-	-	-	-	-	-
August 26	0.042	-	-	-	-	-	-	-	-	-	-	0.096
September 23*	-	-	-	-	0.03	-	-	-	-	-	0.15	-
1976 January 29	-	0.15	-	-	-	-	-	-	-	-	-	-
March 17	-	0.30	-	-	-	-	-	-	-	-	-	-
April 14	-	0.48	-	-	-	-	-	-	-	-	-	-
July 14*	-	0.39	0.18	0.20	-	0.07	-	-	-	-	0.27	0.35
July 20	-	0.45	-	-	-	-	-	-	-	-	-	-
August 3	-	0.05	-	-	-	-	-	-	-	-	-	-
August 17*	-	1.5	0.10	0.08	0.07	-	-	-	-	-	0.61	-
September 22	-	1.1	0.10	-	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

3.1.16 Zinc. The Yukon Territory Water Board specifies concentration of not greater than 0.5 mg/litre zinc in the water. All values in excess of this are presented in Table 13 and all other values may be found in Appendix II. Zinc concentrations were seldom elevated to hazardous levels except in the decant. The control sample at Station 1 on October 16, 1974, had a higher concentration of zinc than did the decant, so the elevated levels cannot necessarily be attributed to the Cyprus Anvil mine. This could be due to natural geochemical occurrences of zinc, which is quite possible, considering the nature of the rock in the area.

3.1.17 Nickel. Elemental nickel is insoluble, although many other nickel compounds are soluble. It is seldom found in an elemental form, but nickel compounds are found in many ores (Environment Canada, 1976). One form of nickel (gersdorffite - NiAsS) may be found with galena in varying amounts (Dow Chemical Co., 1970). From the results of this study, as presented in Appendix II for each station, the concentration of nickel has not been detected as a problem. One value (0.072 mg/litre at Station 13 on August 26, 1975) exceeded the Yukon Territorial Water Board's requirement of no concentration greater than 0.05 mg/litre.

3.1.18 Silver. Silver is an element which presents no threat to the aquatic life in Rose Creek. Results as shown in Appendix II are all less than the detectable limit of 0.03 mg/litre and therefore well below the standard (0.10 mg/litre) set by the Yukon Territorial Water Board.

3.1.19 Mercury. Mercury is well-known as a toxic substance. It is released in the smelting of copper, lead, and zinc ores, as well as in the burning of fossil fuels (USEPA, 1973). In the biological system, mercury is subject to biomagnification and its accumulation over time is proportional to the ambient concentrations (USEPA, 1973). The levels of mercury found in United States waters range from 0.1 mg/litre to 17 mg/litre. The U.S. Food and Drug Administration has recommended that concentrations of not greater than 0.5 mg/litre be allowed in fish flesh and, according to Mount (1975), this level could be induced in trout by a concentration of 0.05 mg/litre methyl mercury in the water.

TABLE 13 EXCESSIVE ZINC CONCENTRATIONS (ppm)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1974 September 16*	-	1.60	-	-	-	-	-	-	-	-	-	-	-
October 16	1.40	0.66	1.20	-	-	-	-	-	-	-	-	-	-
October 30	-	-	0.52	-	-	-	-	-	-	-	-	-	-
1975 May 3	0.50	-	7.0	-	-	-	-	-	-	-	-	-	-
June 15	-	-	-	-	-	-	-	-	-	-	-	-	-
1976 July 14*	-	-	0.50	-	-	-	-	-	-	-	-	-	-
August 17*	-	0.84	-	-	-	-	-	-	-	-	0.67	-	-
September 22	-	1.50	-	-	-	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

The Yukon Territory Water Board requires that the Cyprus Anvil mine not release any effluent with a concentration of mercury greater than 0.005 mg/litre. The results for mercury are presented in Appendix II and any values in excess of the 0.2 µg/litre detection limit are recorded in Table 14. Station 2 (decant from the tailings pond) and Station 13 (seepage) both exceed the EPA standards, although only on March 17, 1976, did the recorded concentration of mercury exceed the Yukon Territory Water Board standard of 0.005 mg/litre.

3.1.20 Arsenic. Arsenic, like mercury, is a cumulative poison. It may be found in nature in the form of arsenites or pyrites and occasionally in elemental form. The Yukon Territory Water Board issued a Water Use License allowing Cyprus Anvil mine to discharge concentrations up to but not exceeding 0.05 mg/litre of extractable arsenic into Rose Creek. All arsenic values are presented in Appendix II.

There are four values in excess of 0.05 mg/litre, all at Station 2 (the decant). They are:

TABLE 15 EXCESSIVE ARSENIC CONCENTRATIONS

Date	Concentration (mg/litre)
June 15, 1974	0.087
August 8, 1974	0.104
August 26, 1974	0.503
October 10, 1974	0.086

As elevated concentrations did not appear in the 1975 and 1976 data, it appears that the mine has improved the quality of its decant with regard to arsenic.

TABLE 14 EXCESSIVE MERCURY CONCENTRATIONS (ppb)

Date	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
1975 August 6	0.60	-	-	-	-	-	-	-	-	-	-	-	0.32
August 26	0.95	-	-	-	-	-	-	-	-	-	-	-	0.70
1976 March 17	-	8.50	-	-	-	-	-	-	-	-	-	-	-
September 22	-	0.40	-	-	-	-	-	-	-	-	-	-	-

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.

3.1.21 Cyanide. Cyanide is a substance of potential import to Rose Creek as it is used (in the form of sodium cyanide) in the flotation of galena, sphalerite, and pyrite. The waste material is deposited in the tailings pond. The amount of sodium cyanide in the tailings pond is kept at a minimum as required for the flotation process (Whitley, 1975). Once in the tailings pond, the sodium cyanide reacts with pyrite and is complexed so that there is usually little free cyanide. Metalocyanide complexes are increasingly toxic to fish and other aquatic organisms as the pH and/or oxygen concentration decreases. Treatment with chlorite, hypochlorite, or ozone can cause further chemical oxidation of the metalo-cyanide complexes and research is being conducted into the feasibility of ozonation for cyanide treatment at Cyprus Anvil mine.

The maximum acceptable concentration of cyanide recommended by the U.S. Environmental Protection Agency (1973) is 0.005 mg/litre, although the Yukon Territory Water Board has set an acceptable level of 0.05 mg/litre for the Cyprus Anvil tailings pond decant. The values for cyanide concentrations in Rose Creek are given in Appendix II and those in excess of the 0.005 mg/litre "safe" maximum concentration are presented in Table 16. Values which exceed the Yukon Territory Water Board limit of 0.05 mg/litre are designated with an asterisk.

All elevated concentrations of cyanide were recorded after February 13, 1976, when a spill of cyanide into the tailings pond was known to have occurred.

3.1.22 Selenium. Selenium was analysed on few occasions; concentrations were barely detectable and of no cause for concern.

3.1.23 Antimony. The Yukon Territory Water Board requires that the concentration of antimony in the mine effluent not exceed 0.10 mg/litre. On only one occasion was a higher concentration detected. On August 6, 1975, the concentration of antimony was recorded as being 0.11 mg/litre at Station 1 (the control station). There is little information about the sub-lethal effects of antimony.

TABLE 16 EXCESSIVE CYANIDE CONCENTRATIONS (ppm)

Date (1976)	Stations											
	1	2	3	4	5	6	7	8	9	10	11	12
March 17	-	0.035	-	-	-	-	-	-	-	-	-	0.47**
January 31	-	-	-	-	-	-	-	-	-	-	-	0.20
April 14	-	0.92**	-	-	-	-	-	-	-	-	-	-
June 11	-	-	-	-	-	-	-	-	-	-	-	1.13**
July 20	-	2.97**	-	-	-	-	-	-	-	-	-	1.80**
August 3	-	2.60**	0.23**	0.34**	-	-	-	-	-	-	-	-
August 17*	-	-	-	-	-	-	-	-	-	-	-	0.06**
September 22	-	0.72**	0.10**	0.225**	-	-	0.0072	-	-	-	-	0.52**
September 22 AM	-	0.053**	-	-	-	-	-	-	-	-	-	0.023
September 22 PM	-	0.057**	-	-	-	-	-	-	-	-	-	0.024
	-	0.018	-	-	-	-	-	-	-	-	-	0.045
	-	0.020	-	-	-	-	-	-	-	-	-	0.045

* Samples taken by Environmental Protection Service; all others taken by Indian and Northern Affairs.
** Values in excess of Yukon Territory Water Board limit.

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3.1.24 Barium. According to U.S. Environmental Protection Agency (1973), any water or acid-soluble barium compounds are toxic to living organisms, although barium salts precipitate out of solution quite readily. The U.S. Environmental Protection Agency recommended that a concentration of 1.00 mg/litre barium constitutes an environmental hazard and that 0.5 mg/litre represents a safe concentration for minimal deleterious effects (USEPA, 1973).

The Yukon Territory Water Board stipulated in the 1975 Water Use License that the Cyprus Anvil mine not discharge any concentration in excess of 1.00 mg/litre barium in its effluent. Most of the samples tested for barium were obscured by calcium interference and no results were recorded. Of all samples with valid results, none was in excess of the 1.00 mg/litre acceptable concentration.

3.2 Fish

3.2.1 Metals in Tissue. The results of tissue analysis for heavy metals done in 1975 for copper, zinc, and lead, are presented in Table 17. From these results, it is evident that liver tissue accumulates heavy metals in higher concentration than does the muscle tissue - an observation which is well documented (USEPA, 1974).

There was little available data concerning metal concentrations in fish tissue to compare with the Rose Creek results. Copper is a non-essential element to fish and may be concentrated up to 1000 times in tissue (USEPA, 1973), although the values detected here seem low.

Zinc is a substance of a known physiological function, affecting the activity of insulin (in humans). The concentrations of zinc recorded in the fish tissues sampled here are relatively high, especially the two liver samples from Station 10. With no standard for comparison, it is difficult to judge whether they are extraordinary.

The results of analysis for lead in the tissue of fish from Rose Creek are all below the detection limit. The average concentration of lead found in 17 species of fish from rural United States was 2.4 ppm Pb in summer and 1.8 ppm Pb in winter (Rolle & Jennett, 1973). In comparison with

this data, there is no problem with lead contamination in fish from Rose Creek. Lead tends to accumulate in organic sediments and may eventually be released into the water, thereby becoming available to the fish. Only analysis of the sediments would reveal the potential for this occurrence.

The mercury results for the Rose Creek survey carried out in 1976 (Table 18) are all well below 0.5 ppb, the maximum allowable concentration designated by the U.S. Environmental Protection Agency (1973).

3.2.2 Bioassay Results. A bioassay is a means of determining the biological toxicity of an effluent or a lethal agent (Environment Canada, 1976). The importance of this type of result is evidenced by the following:

"Protection of a species of fish requires protection of the population and a harvestable crop of quality fish suitable for various uses, such as food for man. Not only are fish important in their own right, but they also serve as sensitive indicators of water quality. A body of water unacceptable to fish is likely to be unacceptable for other desirable uses also." (Stephan & Mount, 1973)

The fish used in bioassays to determine the toxicity of the mill effluent of the Cyprus Anvil lead-zinc mine were rainbow trout (Salmo gairdneri), with the exception that coho salmon (Oncorhynchus kisutch) were used in 1974. The results of these bioassay tests are presented in Table 19.

On September 17, 1974, the 96 hour LC50 was found to be 24% at Station 3. This means that after dilution to 24%, within 96 hours the water killed 50% of the fish tested. On February 28, 1975, the decant (Station 2) was toxic; on January 8, 1976, the decant had a 96 hour LC50 of 81%. On all other dates tested, the results at Station 2 were non-toxic, with the exception of September 22, 1976, when the decant was only slightly toxic at 100% concentration (one fish dead after 72 hours, 2 fish dead after 96

TABLE 17 FISH TISSUE METALS ANALYSIS RESULTS - 1975 (ppm - mg/g)

Station	Species	Cu		Zn		Pb	
		Wet	Dry	Wet	Dry	Wet	Dry
10	2 Whitefish livers	6.5	29.0	327.0	120	0.2	0.1
10	2 Grayling livers	2.0	9.4	19.0	88	0.3	0.1
10	Whitefish tissue	0.3	2.0	2.9	16	0.2	0.1
10	Whitefish tissue	0.4	2.0	2.5	12	0.2	0.1
10	Grayling tissue	0.4	2.0	3.4	17	0.2	0.1
10	Grayling tissue	0.4	2.0	4.2	20	0.2	0.1
8	Grayling tissue	0.4	2.0	4.0	17	0.2	0.1
8	Not enough dried sample	-	-	-	-	-	-
8	Grayling liver	1.8	7.4	20.0	83	0.2	0.1

TABLE 18 FISH MERCURY ANALYSIS RESULTS - 1976

Station	Species	Wet Weight (mg/g)		
		Flesh Hg	Liver Hg	Eggs Hg
1	Grayling	0.08	0.23	-
1	Grayling	0.05	0.16	-
7	Sucker	0.09	0.45	-
7	Sucker	0.05	0.39	-
7	Whitefish	0.33	0.14	0.05
7	Whitefish	0.29	0.22	-
7	Grayling	0.10	-	-
7	Grayling	0.12	0.26	-
8	Grayling	0.11	0.16	-
8	Grayling	0.10	0.07	-

Note: 0.5 mg/g total body burden wet weight is EPA maximum acceptable concentration.

TABLE 19 FISH BIOASSAY RESULTS
(Results as 96 hour LC50 for Effluent and Concentration)

Date	Stations				
	1 (Decant)	2	Below Earth Plug	11	13
<u>1974</u>					
September 17	non-toxic	non-toxic	24%	-	-
<u>1975</u>					
February 28	-	toxic 100%	-	-	-
June 13	-	-	threshold 56%	-	non-toxic
September 23	-	-	-	-	non-toxic
<u>1976</u>					
January 8	-	81%	-	-	non-toxic*
March 29	-	non-toxic*	-	-	non-toxic*
August 27	-	non-toxic*	-	-	slightly toxic*
September 22	slightly toxic	-	-	slightly toxic	slightly toxic
September 27	non-toxic	-	-	-	-
October 5	-	-	-	-	5 samples were done: 3 slightly toxic 2 non- toxic
December 29	non-toxic	-	-	-	non-toxic

* Samples taken by the mine in compliance with Yukon Territory Water Use License.

hours). This was almost one month after a spill of CuSO₄ into the pond. The sample taken below the earth plug in the tailings dam had a threshold of toxicity of 56% of June 13, 1975, and was related to the tailings pond break described previously. Station 13 had non-toxic results on all dates tested, except August 27, 1976 (the day after the spill of CuSO₄), and September 22, 1976, both of which were "slightly toxic". Station 11 also had a slightly toxic bioassay result for September 22, 1976.

3.2.3 Electro-fishing Results. The results of attempts to fish all the stations produced very few fish from Rose Creek (Stations 1 to 6 and Station 8) (Table 20). Station 7 on Anvil Creek and Stations 9 and 10 on the Pelly River produced the greatest numbers of individuals and the most species. The lack of fish in Rose Creek by comparison could be due to a number of factors, the most likely being the effect of the continuous tailings pond discharge into the creek. The low number of fish in 1974 was possibly due to a high silt load from Faro Creek prior to completion of the diversion channels.

Some fishing was attempted in Faro Creek after the completion of the diversion channel (in May, 1975) by Fisheries and Marine Service personnel, using pull-seine nets. This endeavour proved fruitless as no fish were found above the culvert in Faro Creek despite an apparently good habitat. Upon further investigation, it was found that the culvert was impassable to fish. The small number of fish which may have attempted to move upstream was deemed insufficient to justify the cost of making the culvert passable.

The following fish have been found to inhabit the Pelly River system in the vicinity of the Cyprus Anvil mine:

Arctic Grayling	Least Cisco
Broad Whitefish	Longnose Sucker
Burbot	Pike
Chinook Salmon	Round Whitefish
Inconnu	Slimy Sculpin
Lake Trout	

All species are indigenous except the chinook salmon which is an anadromous species (Elson, 1974).

TABLE 20 FISH SPECIES COLLECTED IN ROSE CREEK BY ELECTRO-FISHING

Species	Stations									
	1	3	4	5	6	7	8	9	10	12
<u>1974</u>										
Arctic Grayling	5	4					3	-	1	
Slimy Sculpin	3	-					28	6	4	
<u>1975</u>										
Arctic Grayling	4		3	2	2		1	-	2	3
Round Whitefish	-		-	-	-		16	-	-	-
Humpback Whitefish	-		-	-	-		-	-	2	-
Longnose Sucker	-		-	-	-		1	2	1	-
Slimy Sculpin	1		-	-	-		3	3	-	-
Burbot	-		-	-	1		-	-	-	-
Chinook Salmon	-		-	-	1		1	1	-	-
<u>1976</u>										
Arctic Grayling	2					14	2	-	1	
Round Whitefish	-					3	-	-	-	
Longnose Sucker	-					2	-	-	1	
Slimy Sculpin	-					-	8	4	4	
Burbot	-					3	-	-	-	
Chinook Salmon	-					6	1	-	1	

3.3 Bottom Fauna

The results of the macro-invertebrate sampling are presented in Appendix III and the taxonomic list is given in Table 21.

Diversity is a calculated value representing the number of taxonomic groups present at a station; evenness is a value which represents how evenly the numbers of individuals are distributed among those taxonomic groups. A community with a high diversity value and a high evenness value is considered to be relatively stable and thereby resistant to environmental stresses. Any drastic change in these values may reflect a change in the community's environment. A decrease in diversity (indicating a reduction in number of species present) or a decrease in evenness (indicating a more erratic distribution of number of individuals amongst the species present) may detract from the ability of the community to survive through future environmental disturbances.

The results for Station 1 (Table 22) showed increased diversity in 1975 and 1976 over 1974 and consistently high evenness values. Station 3 showed decreased diversity from 1974 although the evenness value was relatively high. Station 4 showed low diversity during all three years, while evenness was high in 1974, low in 1975 and high again in 1976. The diversity at Station 5 increased slightly from 1974 to 1975 and again improved to 1976. Evenness values remained fairly consistent all three years at this station. Station 6 showed a decrease in diversity from 1974 to 1975 but a great improvement in 1976. The evenness values at this station followed a similar trend. At Station 7, the diversity and evenness both increased over the three-year period. Station 8 showed a decrease in both evenness and diversity from 1974 to 1975 and an increase in both values from 1975 to 1976. At Station 9, both diversity and evenness values were variable for the samples in 1974. In 1975, evenness was more consistent, although diversity values showed considerable range. By 1976, the diversity had increased as had the evenness values. Station 10 was not sampled in 1976, but for 1974 and 1975, the values for diversity and evenness were low. Station 12 was sampled only in 1976 and had relatively high but quite variable results for both evenness and diversity.

TABLE 21 INVERTEBRATE SPECIES LIST

		1974	1975	1976
	Phylum Arthropoda			
	Class Arachnida			
	Order Acarina			
	Family Halacaridae			
1.	<u>Parohalacarus</u> sp.			x
2.	Order Hydracarina		x	
	Superfamily Pionae			
	Family Hygrobaetidae			
3.	<u>Hygrobates</u> sp.			x
	Class Insecta			
	Order Coleoptera			
4.	Family Dytiscidae sp.	x		
	Order Diptera			
	Family Ceratopogonidae			
5.	<u>Culicoides</u> sp.			x
6.	prob. <u>Probezzia</u> sp.	x		
	Family Culicidae			
7.	<u>Culex</u> sp.	x		
8.	<u>Culicidae</u>			x
	Family Empididae			
9.	<u>Hemerodromia</u> sp.		x	
10.	<u>Roerderiodes</u> sp.		x	
	Family Rhagonidae			
11.	prob. <u>Atherix</u> sp.	x	x	
12.	<u>Clinocera stagnalis</u>			x
	Family Simuliidae			
13.	prob. <u>Simuliidae</u> sp.	x	x	x
	Family Syrphidae			
14.	prob. <u>Tubifera</u> sp.	x		
	Family Tenipedidae			
	Sub-family Diamesinae			
15.	<u>Diamesa</u> sp.			x
16.	<u>Diamesinae</u> sp.			x
17.	<u>Prodiamesae</u> sp.		x	x
18.	<u>Pseudodiamesae</u> sp.			x

TABLE 21 INVERTEBRATE SPECIES LIST (Continued)

		1974	1975	1976
19.	<u>Corynonerus</u> sp.	x	x	
20.	<u>Spaniotoma</u> sp.	x	x	
21.	<u>Brillia</u> sp.			x
22.	<u>Criptopus</u> sp.	?		x
23.	<u>Hydrobaenus</u> sp.			x
24.	<u>Heterotriassoclaudis</u> sp.			x
25.	<u>Psectrocladius</u> sp.			x
26.	<u>Hydrobaeninae</u> sp.			x
27.	<u>Tanypus</u> sp.			x
28.	<u>Pentaneurini</u> tribe			x
29.	<u>Pentaneura</u> sp.	x	x	
30.	<u>Procladius</u> sp.	x		
31.	<u>Constempellina</u> sp.			x
32.	<u>Polypedilium</u> sp.			x
33.	<u>Smittia</u> sp.			x
34.	<u>Stricto chironomous</u> sp.	x		
35.	<u>Tanytarsus</u> sp.	x		
36.	<u>Tendipedinae</u> sp. 1	x		
37.	<u>Tendipedinae</u> sp. 2	x		
38.	<u>Tendipedidae</u> sp. pupae	x	x	x
39.	<u>Eukiefferiella</u> sp.			x
40.	<u>prob. Anthocha</u> sp.	x		
41.	<u>Pedica</u> sp.			x
42.	<u>Tipula</u> sp.	x	x	
43.	Unknown Dipteran larva		x	
44.	Adult Dipteran (unidentified)	x		x
45.	<u>Chelifera</u> sp.			x
46.	<u>Pothastis</u> sp.			x
47.	<u>Wiedemannia</u> sp.			x
48.	<u>Suborder Brachyena</u>			
	<u>Brachyena</u> sp.			x
49.	<u>Order Hemiptera</u>			
	<u>Hemiptera</u> sp.			x

TABLE 21 INVERTEBRATE SPECIES LIST (Continued)

		1974	1975	1976
50.(a)	Order Ephemeroptera Family Baetidae		x	
50.	<u>Beatis</u> sp.			x
51.	<u>Centroptillum</u> sp.		x	x
52.	<u>Ephemerella</u> sp.		x	x
53.	<u>Pseudocleon</u> sp.		x	x
	Family Heptageniidae			
54.	<u>Cinygmulia</u> sp.		x	x
55.	<u>Epeorus</u> sp (Iron)	x	x	x
56.	<u>Heptogenia</u> sp.			x
57.	<u>Rithrogenia</u> sp.		x	x
	Family Siphlonuridae			
58.	<u>Siphlonurus</u> sp.		x	
	Order Hemiptera			
	Family Corixidae			
59.	<u>Corixidae</u> sp.	x		
60.	Family Gerridae			x
61.	Family Nabidae			x
	Order Homoptera			
	Family Aphididae			
62.	<u>Aphididae</u> sp.		x	
63.	Psyllidae			x
	Order Lepidoptera			
64.	pos. <u>Pyrausta</u> sp.		x	
	Order Plecoptera			
	Family Nemouridae			
	Sub-Family Capiiae			
65.	<u>Capnia</u> sp.	x		
	Sub-Family Leuctrinae			
66.	<u>Perlomyia</u> sp.		x	
	Sub-Family Nemourinae			
67.	<u>Nemoura</u> sp.	x	x	x
68.	<u>Nemoura</u> (Amphinemoura) sp.		x	x
69.	<u>Nemoura</u> (Zapada) sp.		x	x
	Family Perlodidae			
	Sub-Family Isogeniniae			
70.	<u>Isogenus</u> sp.	x	x	x

TABLE 21 INVERTEBRATE SPECIES LIST (Continued)

		1974	1975	1976
	Sub-Family Isoperlinae			
71.	<u>Arcynopteryx</u> sp.			x
72.	<u>Hastaperla</u> sp.		x	x
73.	<u>Isoperla</u> sp.	x	x	
74.	<u>Isoperla similis</u>		x	
75.	<u>Paraperla</u> sp.			x
	Sub-Family Perlodidinae			
76.	<u>Diura</u> sp.			x
77.	Perloididae - unidentified adult	x		
	Family Pteronaicidae			
78.	<u>Pteronarcella</u> sp.		x	
	Order Trichoptera			
	Family Brachycentridae			
79.	<u>Brachycentrus</u> sp.	x	x*	x
	Family Hydropsychidae			
80.	<u>Arctopsyche</u> sp.		x	x
81.	<u>Cheamatopsyche</u> sp.			x
	Family Hydroptilidae			
82.	<u>Hydroptilidae</u> sp.		x	
	Family Lepidostomatidae			
83.	<u>Lepidastoma</u> sp.	prob.	x	x
	Family Limnophilidae			
84.	<u>Closteia</u> sp.		x	
85.	<u>Ecclysmomyia</u> sp.		x	x
86.	<u>Dicosmoecus</u> sp.			x
87.	<u>Drusinus</u> sp.	x	x	
88.	Ross' Limnophilid genus sp.		x	
89.	Family Psychomyiidae		?	
90.	<u>Psychomyiidae</u> sp.			x
	Family Rhyacophilidae			
91.	<u>Rhyacophila</u> sp.	?	x*	x
92.	Phylum Nematomorpha	x		
93.	Nematoda			x

TABLE 21 INVERTEBRATE SPECIES LIST (Continued)

		1974	1975	1976
	Phylum Annelida			
	Class Hirudinae			
	Order Arhynchobdellida			
	Family Hirudidae			
94.	<u>Pisicola salmonstica</u>			x
95.	Class Oligochaeta		x	
	Order Prosopora			
	Family Lumbricillidae			
96.	<u>Stylodrilus</u> sp.			x
97.	<u>Enchytraeidae</u> sp.			x

x present in that year

* 2 spp.

TABLE 22 INVERTEBRATE SPECIES DIVERSITY AND EVENNESS

Station	1974		1975		1976		
	Diversity	Evenness	Diversity	Evenness	Diversity	Evenness	
1	A	0.4849	0.8054	0.5561	0.9237	0.6026	0.6315
	B	0.5188	0.7422	0.6994	0.7329	0.8493	0.7870
	C	0.2479	0.8235	0.6639	0.6957	0.9107	0.7743
3	A	0.6507	0.6248	0.4231	0.8868	0.8451	0.9592
	B	-	-	0.3815	0.7996	0.6257	0.6557
	C	0.5840	0.5840	0.5426	0.7763	0.2765	0.9185
4	A	0.5796	0.7449	0.1671	0.2275	0.7400	0.8756
	B	0.4771	1.0000	0.2268	0.2915	0.3010	1.0000
	C	0.3447	0.5725	0.0333	0.1106	-	-
5	A	0.3768	0.7897	0.3489	0.7313	0.6481	0.7176
	B	-	-	0.2932	0.4870	0.8233	0.7435
	C	-	-	0.4990	0.8288	0.3010	1.0000
6	A	0.3010	1.0000	0.2053	0.2937	0.7481	0.6932
	B	0.6489	0.9283	0.1733	0.1919	0.9652	0.7844
	C	0.4917	0.8167	0.4130	0.5307	0.8219	0.6988
7	A	0.3981	0.8344	0.6790	0.6520	0.8778	0.7464
	B	0.5360	0.7668	0.6330	0.6634	0.9434	0.7835
	C	0.5043	0.6481	0.6053	0.6053	1.0576	0.7999
8	A	0.4076	0.6770	0.2966	0.2588	0.4510	0.4994
	B	0.4196	0.8738	0.0817	0.0905	0.8920	0.8920
	C	0.4916	0.7033	0.2054	0.2274	0.7848	0.8690
9	A	0.7242	0.9306	0.7510	0.8887	0.7072	0.8368
	B	0.3634	0.2188	0.3010	1.0000	0.8759	0.8759
	C	0.6963	0.7710	0.8959	0.8959	0.6282	0.8073
10	A	0.1203	0.2521	0.3157	0.3736	-	-
	B	0.2339	0.4902	0.5750	0.4673	-	-
	C	0.3768	0.7897	0.5873	0.5640	-	-
12	A	-	-	-	-	0.5324	0.4933
	B	-	-	-	-	0.9211	0.8845
	C	-	-	-	-	0.9543	1.0000

All of the stations seemed to show improvement in 1976 as far as the statistical tests are concerned. This could possibly be attributed to the completion of the Faro Creek diversion channel and resultant decrease in sediment load of Rose Creek.

The ranking of the three most dominant taxonomic groups encountered during the study are shown in Figure 6. This figure clearly indicated a shift in dominance as one progresses downstream from the mine. Station 1, the upstream control station, showed the family Plecoptera to be dominant in 1974 and 1976, but Tendipedidae dominated in 1975. The reason for this anomaly was unclear. The family Tendipedidae dominated Stations 2, 3, and 4 for all three years, and Stations 5 an 6 in 1974. This tends to indicate that the water quality was impaired at least 16 km further downstream in 1974 than in 1975 and 1976. The improvement was probably due to the completion of the Faro Creek diversion ditch which would have reduced the sediment load of the creek, and the lack of decant in 1975. During the construction of a new tailings impoundment, Station 7 had a majority of Plecoptera and Ephemeroptera (in 1974) as well as a number of Tendipedidae. The Ephemeropterans were considerably more common at Stations 7, 8, 9, and 10 than at the upstream stations. This seems to indicate recovery of water quality and improved health of the aquatic community.

It is interesting to note that this recovery does not become apparent until 16 km downstream of the mine. The mine has apparently had a deleterious affect on the biological organisms of this stream. The periodic non-compliance with various aspects of the Water Use License has seemingly led to the deterioration of Rose Creek.

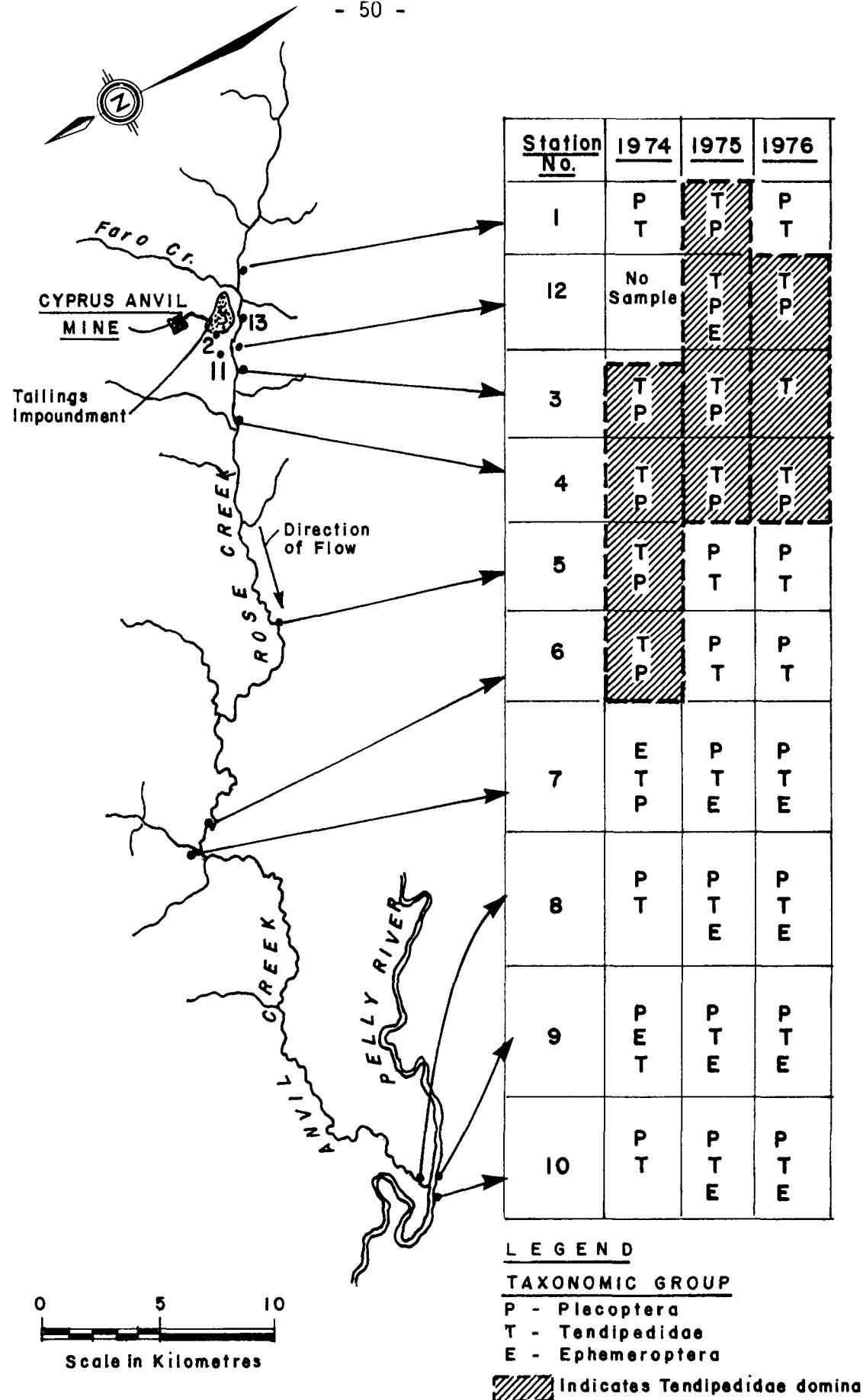


FIGURE 6

INVERTEBRATE TAXONOMIC GROUP DOMINANCE IN CYPRUS ANVIL MINE STUDY AREA

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APPENDIX I

WATER CHEMISTRY DATA

Station 1
Station 2 (Decant)
Stations 3 and 3(a)
Station 4
Station 5
Station 6
Station 7
Station 8
Station 9
Station 10
Station 11
Station 12
Station 13

* Results collected during the Environmental Protection Service survey work; all other results were obtained by Indian and Northern Affairs.

f Data obtained in the field.

L Less than.

Units - Conductivity - $\mu\text{mhos}/\text{cm}$
- Turbidity - FTU
- True Colour - Pt - colour units
- Total Alkalinity
- Total Hardness mg/L (CaCO_3)
- NFR - mg/L

APPENDIX I WATER CHEMISTRY DATA.....STATION 1

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APPENDIX I WATER CHEMISTRY DATA.....STATION 2 (decant)

Date	Temp. °C.	pH Field	pH Lab	D0 (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
<u>1974</u>										
March 27	17.3	-	11.3	-	1370	1.6	L5	152.0	161.0	-
June 15	17.9	-	7.9	-	353	82.0	100	53.3	106.0	90.0
August 12	21.2	-	10.0	-	1140	3.1	L5	75.5	18.0	-
August 26	27.1	-	7.9	-	1010	4.2	5	63.0	38.7	10.0
September 16*	6.2	9.7	9.5	10.15	390	1400.0	5	100.0	D-25.0	12.0
October 16	20.8	-	10.0	-	1130	28.0	10	125.0	E-28.0	-
October 30	16.4	-	9.3	-	930	14.0	20	73.7	35.3	-
									23.0	16.0
<u>1976</u>										
January 29	21.8	-	10.2	-	617	15.0	5	119.0	24.3	8.5
March 17	23.4	-	8.1	0	867	26.0	8	101.0	77.0	-
April 14	20.9	-	7.2	-	519	27.0	13	103.0	108.0	-
July 14*	f-16.0	-	8.1	-	570	7.2	8	98.0	87.0	15.0
July 20	20.8	-	7.8	-	726	7.0	5	91.5	101.0	5.5
August 3	20.0	-	7.4	-	740	8.4	20	66.0	108.0	3.3
August 17*	f-16.0	7.2	7.6	0	440	10.0	11	80.0	-	15.0
September 22	21.0	-	7.2	-	487	145.0	30	70.3	131.0	10.3

APPENDIX I WATER CHEMISTRY DATA.....STATIONS 3 and 3(a)

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
<u>1974</u>										
May 27	17.4	-	7.3	-	90	150.0	400	31.2	47.6	1032.0
June 15	17.6	-	7.4	-	123	-	110	40.3	53.7	412.0
August 12	20.7	-	7.6	-	209	2.9	13	50.0	69.0	-
August 26	26.2	-	8.0	22.0	227	1.7	15	56.9	74.2	-
September 16*	f-4.5	6.5	7.9	7.85	190	600.0	10	84.0	D-84.0	23.0
October 16	20.2	-	7.7	-	535	30.0	20	104.0	E-73.0	-
October 30	16.1	-	7.5	-	503	140.0	400	92.0	107.0	-
								92.0	121.0	-
<u>1976</u>										
July 14*	f-10.0	-	7.6	3.3	215	4.3	31	57.3	67.0	25.0
August 3	19.9	-	7.3	-	280	1.8	15	73.7	101.0	1.3
August 17*	f-12.0	7.5	-	7.5	200	1.1	17	8.2	-	40.0
September 22	22.1	-	7.9	-	400	1.7	7	1.12	139.0	1.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 4

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
<u>1974</u>										
March	27	17.6	-	7.4	-	107	86.0	300	37.0	51.6
June	15	17.9	-	7.4	-	112	97.0	150	40.2	53.7
August	12	20.9	-	7.9	-	258	3.1	15	70.0	102.0
August	26	26.1	-	7.4	-	233	1.1	12	55.6	76.8
September	16*	f-4.5	7.95	7.7	7.65	192	320.0	10	99.0	D-110.0
October	16	20.3	-	7.8	-	521	29.0	20	105.0	E- 79.0
October	30	16.0	-	8.0	-	503	13.0	15	102.0	128.0
									123.0	41.0
<u>1975</u>										
May	3	24.0	-	7.2	-	621	83.0	14	81.0	146.0
June	3	22.9	-	7.7	-	93	140.0	80	27.9	37.3
July	8	21.8	-	8.2	-	221	1.6	0.3	59.5	89.0
August	26*	f-5.6	7.6	7.6	8.3	255	0.65	3	84.0	111.0
September	23*	f-3.3	7.4	7.7	10.0	205	18.0	11	73.1	63.0
<u>1976</u>										
July	14*	f-10.0	-	7.6	7.1	170	3.5	28	52.8	64.0
August	3	20.0	7.6	7.7	-	289	0.98	10	78.5	96.5
August	17*	f-12.0	-	-	-	-	-	-	-	2.3
September	22	f-15.0	8.0	7.6	7.9	-	1.1	17	85.0	L10.0
		22.0	7.1	7.9	-	763	1.2	10	149.0	203.0
		f- 7.0	-	-	-	-	-	-	-	11.0

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APPENDIX I WATER CHEMISTRY DATA..... STATION 5

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1974 September 16*	f-1.2	7.9	7.3	10.05	172	58.0	5	91.0	D-120.0 E- 77.0	6.5
1975 August 26*	f-5.1	7.6	7.8	9.6	240	0.55	1	88.0	110.0 86.0	L3.0 63.0
September 23*	f-2.9	7.4	7.4	10.0	190	11.0	10	73.4	-	59
1976 July 14*	f-8.1	-	7.6	9.0	110	1.7	23*	60.3	69.0	-
August 17*	f-10.0	-	7.8	913	-	1.0	12	92.0	-	L10.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 6

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity (ppm)	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1974 September 16*	f-2.8	8.2	7.8	11.03	156	12.0	5	110.0	D-130.0 E-82.0	L3.0
1975 August 26* September 23*	f-5.3 f-2.8	7.8 7.4	8.1 7.9	10.45 11.4	230 190	0.44 19.0	1 16	97.0 82.2	114.0 100.0	L3.0 58.0
1976 July 14* August 17*	f-8.2 f-8.5	-	7.9 8.0	9.8 9.9	115 -	1.9 0.6	29 12	70.3 99.0	7.8 -	13.0 10.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 7

Date	Temp. °C.	Field pH	Lab pH	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1974 September 16*	f-1.0	7.65	7.7	11.93	91.	6.0	10	54.0	D-62.0 E-57.0	5.5
1975 August 26*	f-4.2	7.5	7.7	10.95	120	11.0	29	51.0	65.0	8.0
September 23*	f-0.7	7.2	7.6	11.4	110	11.0	55	41.6	68.0	5.0
1976 July 14*	f-6.0	-	7.3	9.1	55	42.0	128	34.7	47.0	-
August 17*	f-6.0	-	7.7	10.8	-	6.0	64	48.0	-	58.0

APPENDIX I WATER CHEMISTRY DATA..... STATION 8

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Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1974 September 16*	f-4.0	8.1	7.9	11.9	150	5.0	5	100.0	D-120.0 E- 76.0	5.8
1975 August 26*	f-5.6 f-2.9	7.7 7.4	8.0 8.0	10.5 11.1	210 185	1.5 24.0	191 25	92.0 7.92	30.0 93.0	6.0 10.0
1976 July 14*	f-9.0 19.9	7	7.7 7.8	95.0 -	110 223	9.0 36.0	55 25	62.5 84.9	67.0 103.0	50.0 29.5
August 4	f-9.5	-	8.0	10.0	-	1.7	18	90.0	-	15.0
August 17*	f-9.5	-	8.0	10.0	-	1.7	18	90.0	-	15.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 9

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1974 September 16*	f-8.3	8.1	8.0	11.15	150	4.0	5	100.0	D-140.0 E- 88.0	5.3
1975 August 26* September 23*	f-7.1 f-5.0	7.7 8.0	8.1 10.3	9.2 205	215 205	2.5 6.0	2 10	92.0 87.3	8.3 130.0	6.0 16.0
1976 July 14* August 17*	f-14.0 f-13.3	-	8.1	9.0 9.0	140	8.9 0.9	24 13	76.4 94.0	97.0 -	35.0 10.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 10

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1974 September 16*	f-4.5	8.1	8.0	11.15	150	4.0	5	100.0	D-120.0 E- 77.0	5.3
1975 August 26* September 23*	f-5.8 f-3.2	7.9 7.5	8.1 8.0	10.4 11.0	205 180	1.4 21.0	5 25	90.0 80.2	707.0 88.0	10.0 5.1
1976 July 14* August 17*	f-13.0 f-12.0	-	7.9 8.1	9.0 9.4	130 -	18.0 1.4	30 10	23.9 98.0	93.0 -	96.0 10.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 11

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1975 August 26*	26*	f-6.1	8.2	8.3	10.0	340	5.7	11	135.0	193.0
September 23*	f-5.0	7.9	8.2	10.5	290	5.0	7	116.7	150.0	4.0 11.0
1976 July 14*	f-16.0	-	7.8	0.5	560	9.5	12	96.5	100.0	55.0
August 17*	f-15.0	7.2	7.7	3.1	410	8.0	26	89.0	-	18.0

APPENDIX I

WATER CHEMISTRY DATA

STATION 12

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
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1975 August 26*	f-6.2	7.6	7.6	6.3	370	0.7	4	92.0	127.0	13.0
September 23*	f-4.7	7.5	7.6	9.9	290	27.0	11	75.1	82.0	100.0
1976 July 14*	f-10.0	-	7.7	7.3	190	2.0	32	60.8	69.0	16.0
17*	f-11.0	7.7	7.7	6.5	235	0.4	18	95.0	-	L10.0

APPENDIX I WATER CHEMISTRY DATA.....STATION 13

Date	Temp. °C.	pH Field	pH Lab	DO (ppm)	Conduc- tivity	Turb- idity	True Colour	Total Alka- linity	Total Hard- ness	NFR
1975										
August 6	22.2 f-10.0	-	7.6	-	894	2.8	5	108.0	215.0	-
August 26	21.6 f-10.0	-	7.7	-	94010	1.7	5	151.0	239.0	-
August 26*	21.5 f-6.2	8.2 7.5	7.3	-	266	230.0 0.053	100 1	81.7 87.0	100.0 279.0	2532.0 5.0
September 23*	f-7.5	7.5	3.4	910	1.0	2	173.6	200.0	5.0	
1976										
January 29	21.8 23.8 f-3.0	7.1 -	7.8 -	-	670	0.82	7	140.0	134.0	4.8
March 17	21.6 f-6.0	7.1 -	11.5 7.6	-	790	2.0	-	-	-	-
June 11	21.3 f-7.0	-	7.7 -	1.2	460	1.3	4	-	77.0	9.8
July 20	6.5 14*	6.5 f-13.0	7.7 -	870	1.5	20	145.0	149.0 191.0	6.0 9.8	
August 3	19.9 f-13.0	7.7	7.7	-	136	1.3	15	60.0	69.1	1.0
August 17*	9.0 22.0	7.3 7.7	8.0 7.8	3.9 -	625	1.2	14	160.0*	-	L10.0
September 22	f-7.5 22.9	7.7	8.0	-	194	0.66	-	90.3	96.0	1.3
September 22	f-9.5	7.5	8.0	-	948	1.4	10	167.0	194.0	10.8
November 30	22.5 f-5.0	7.5	8.0	-	914	0.90	5	171.0	251.0	2.8

APPENDIX II

METAL DATA

Station 1
Station 2 (Decant)
Station 3
Station 4
Station 5
Station 6
Station 7
Station 8
Station 9
Station 10
Station 11
Station 12
Station 13

* Results collected during the Environmental Protection Service survey work; all other results were obtained by Indian and Northern Affairs.

L Less than.

All metal data given in ppm (mg/L)

D Dissolved Concentration

E Extractable Concentration

APPENDIX II METAL DATA - STATION 1

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		Cu		Cd		Fe		Va		Mn
	D	E	D	E	D	E	D	E	D	E
<u>1974</u>										
March	27	-	0.003	-	-	0.20	-	-	-	0.28
June	15	-	0.032	-	-	16.0	-	-	-	0.44
Aug.	12	-	0.004	-	-	0.39	-	-	-	0.05
Aug.	26	-	0.003	-	-	0.28	-	-	-	0.04
Sept.	16*	L0.01	0.01	L0.01	0.2	2.8	L0.2	0.6	0.14	
Oct.	16	-	0.010	-	-	1.60	-	-	-	0.16
Oct.	29	-	0.003	-	-	0.50	-	-	-	0.13
<u>1975</u>										
Jan.	23	-	0.02	-	-	-	0.53	-	-	0.12
May	3	-	0.03	-	-	-	2.6	-	-	0.22
June	3	-	0.043	-	-	-	6.2	-	-	0.68
July	8	-	0.001	-	L0.0002	-	0.32	-	-	0.04
Aug.	6	-	0.002	-	0.0002	-	0.026	-	-	0.06
Aug.	6	-	0.001	-	-	0.0002	-	-	-	0.40
Aug.	26	-	0.024	-	0.0015	-	0.14	-	-	0.40
Aug.	26*	-	L0.02	-	L0.01	-	2.2	-	-	-
Sept.	23*	-	-	L0.01	-	-	2.8	-	-	-
<u>1976</u>										
June	11	-	0.005	-	L0.0002	-	1.3	-	-	-
July	14*	-	L0.01	-	L0.01	-	0.51	-	-	-
Aug.	3*	-	0.004	-	0.0006	-	0.38	-	-	-
Aug.	17	-	L0.01	-	L0.01	-	0.22	-	-	-
Sept.	22	-	0.002	-	0.0002	-	0.24	-	-	-
Nov.	30	-	0.002	-	0.0002	-	0.2	-	-	0.08

(continued)

APPENDIX II METAL DATA - STATION 1 (continued)

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		Mo	D	E	Pb	D	E	Zn	D	E	Ni	D	E	Ag	D	E
1974																
March	27	-	-	-	-	0.010	-	0.11	-	-	-	-	-	-	-	-
June	15	-	-	-	-	0.11	-	0.09	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	0.017	-	0.07	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	0.008	-	0.05	-	-	-	-	-	-	-	-
Sept.	16*	10.3	10.3	10.02	10.04	0.03	0.105	-	-	-	-	-	-	-	-	-
Oct.	16	-	-	-	10.001	-	1.40	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	0.026	-	0.10	-	-	-	-	-	-	-	-	-
1975																
Jan.	23	-	-	-	-	0.014	-	0.14	-	-	-	-	-	-	-	-
May	3	-	-	-	-	0.26	-	0.50	-	-	-	-	-	-	-	-
June	3	-	-	-	-	0.36	-	0.13	-	-	-	-	-	-	-	-
July	8	-	-	10.0005	-	0.004	-	0.017	-	10.001	-	-	-	-	-	-
Aug.	6	-	-	0.002	-	0.011	-	0.05	-	0.001	-	-	-	-	-	-
Aug.	6	-	-	0.004	-	0.001	-	0.013	-	0.001	-	-	-	-	-	0.005
Aug.	26	-	-	10.001	-	0.042	-	0.09	-	0.040	-	-	-	-	-	0.030
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.005
Sept.	23*	-	10.3	-	10.02	-	0.04	-	10.1	-	10.03	-	-	-	-	-
1976																
June	11	-	-	-	-	0.08	-	0.05	-	10.05	-	-	-	-	-	0.005
July	14*	-	10.1	-	10.02	-	0.04	-	10.05	-	-	-	-	-	-	10.03
Aug.	3*	-	-	-	-	0.017	-	0.07	-	-	-	-	-	-	-	0.005
Aug.	17	-	10.1	-	10.02	-	0.05	-	10.05	-	-	-	-	-	-	10.03
Sept.	22	-	-	-	-	0.005	-	0.05	-	-	-	-	-	-	-	0.005
Nov.	30	-	-	-	-	0.005	-	0.08	-	-	-	-	-	-	-	10.005

(continued)

APPENDIX II METAL DATA - STATION 1 (continued)

		Hg	D	E	As	D	E	CN	E	Se	E	Sb	D	Mg	D	Ba	E	S04	D
1974																			
March	27	-	-	10.005	-	-	-	-	-	-	-	-	-	-	-	-	26.4		
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.6		
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.3		
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.3		
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.4		
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.2		
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1975																			
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.0	
May	3	-	-	-	-	10.0097	-	-	-	-	-	-	-	-	-	-	27.0		
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6		
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.3		
Aug.	6	-	-	0.05	-	-	10.005	-	0.0003	-	-	-	-	-	-	-	0.15		
Aug.	6	-	-	0.60	-	10.0005	0.005	0.0001	-	0.0006	0.11	-	20.7	-	-	0.09	9.1		
Aug.	26	-	-	0.95	-	-	-	0.0006	-	-	-	-	22.5	-	-	L0.0002	92.0		
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	10.03	21.0	4.55	0.30	10.9		
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	17.0	4.0	-	-	-		
1976																			
June	11	-	-	10.2	-	0.0021	0.0022	-	-	10.3	13.0	9.2	0.8	-	-	3.1			
July	14*	-	-	-	-	-	0.0009	0.0008	-	-	22.4	4.2	-	-	-	7.8			
Aug.	3*	-	-	-	-	10.02	10.03	-	-	10.3	22.0	4.3	-	-	-	9.5			
Aug.	17	-	-	-	-	0.0005	0.0005	-	-	-	28.0	-	-	-	-	14.5			
Sept.	22	-	-	0.05	-	0.0083	0.001	-	-	-	37.8	-	-	-	-	-	-		
Nov.	30	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-		

APPENDIX II METAL DATA - STATION 2 (Decant)

		Cu	E	D	Cd	E	D	Fe	E	D	Va	E	D	Mn	E
		D	E	D	E	D	E	D	E	D	D	E	D	D	E
1974															
March	27	-	0.38	-	-	-	-	4.60	-	-	-	-	-	0.65	
June	15	-	0.41	-	-	-	-	36.00	-	-	-	-	-	1.60	
Aug.	12	-	0.19	-	-	-	-	0.25	-	-	-	-	-	0.01	
Aug.	26	-	0.003	-	-	-	-	0.53	-	-	-	-	-	0.02	
Sept.	16*	0.03	0.08	10.01	10.03	10.01	10.03	10.30	10.02	10.03	10.03	10.03	10.03	0.04	
Oct.	16	-	-	-	-	-	-	1.30	-	-	-	-	-	0.03	
Oct.	29	-	0.32	-	-	-	-	-	-	-	-	-	-	-	
Oct.	30	-	0.21	-	-	-	-	0.92	-	-	-	-	-	0.04	
...
1976															
Jan.	29*	-	1.38	-	-	0.0002	-	1.00	-	-	-	-	-	0.20	
March	17	-	-	0.04	-	0.0006	-	1.6	-	-	-	-	-	-	
April	14*	-	-	-	-	-	-	1.9	-	-	-	-	-	-	
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14*	-	0.01	-	-	10.01	-	0.45	-	-	-	-	-	-	
July	20	-	0.05	-	-	0.0006	-	0.55	-	-	-	-	-	-	
Aug.	3*	-	0.06	-	-	0.0014	-	0.45	-	-	-	-	-	-	
Aug.	17*	-	0.04	-	-	10.01	-	1.1	-	-	-	-	-	-	
Sept.	22	-	0.10	-	-	0.0023	-	1.3	-	-	-	-	-	-	
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	

(continued)

APPENDIX II METAL DATA - STATION 2 (Decant) (continued)

		Mo		Pb		Zn		Ni		Ag	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	1.20	-	0.42	-	-	-
June	15	-	-	-	-	6.00	-	7.00	-	-	-
Aug.	12	-	-	-	-	0.24	-	0.02	-	-	-
Aug.	26	-	-	-	-	0.17	-	0.02	-	-	-
Sept.	16*	10.3	10.3	0.07	0.49	0.02	-	1.60	-	-	-
Oct..	16	-	-	-	0.32	-	-	0.66	-	-	-
Oct..	29	-	-	-	-	-	-	-	-	-	-
Oct..	30	-	-	-	-	0.37	-	0.06	-	-	-
1976											
Jan.	29*	-	-	-	-	0.15	-	-	-	-	-
March	17	-	-	-	-	0.30	-	0.13	-	-	-
April	14*	-	-	-	-	0.48	-	0.36	-	-	-
June	11	-	-	-	-	-	-	-	-	0.005	L0.005
July	14*	-	-	-	-	0.39	-	0.21	-	-	-
July	20	-	-	-	-	0.45	-	0.20	-	-	-
Aug.	3*	-	-	-	-	0.05	-	0.34	-	-	-
Aug.	17*	-	-	-	-	1.5	-	0.84	-	-	-
Sept.	22	-	-	-	-	1.1	-	1.5	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 2 (Decant) (continued)

		Hg	E	D	As	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	E	SO4	D
1974																				
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	185.0	
June	15	-	-	-	0.087	-	-	-	-	-	-	-	-	-	-	-	-	-	103.0	
Aug.	12	-	-	-	0.104	-	-	-	-	-	-	-	-	-	-	-	-	-	284.0	
Aug.	26	-	-	-	0.053	-	-	-	-	-	-	-	-	-	-	-	-	-	200.0	
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct..	16	-	-	-	0.086	-	-	-	-	-	-	-	-	-	-	-	-	-	170.0	
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	30	-	-	-	0.17	-	-	-	-	-	-	-	-	-	-	-	-	-	190.0	
.....																				
1976																				
Jan.	29*	-	-	-	-	0.005	-	-	-	-	-	-	-	-	-	-	-	-	210.0	
March	17	-	8.5	-	-	0.035	-	-	-	-	18.3	-	-	-	-	-	-	-	185.0	
April	14*	-	0.13	-	-	0.92	-	-	-	-	-	-	-	-	-	-	-	-	145.0	
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	20	-	0.11	-	0.0018	2.97	-	-	-	-	26.0	5.4	-	-	-	-	-	-	200.0	
Aug.	3*	-	-	-	0.0009	2.6	-	-	-	-	29.6	-	-	-	-	-	-	-	215.0	
Aug.	17*	-	-	-	L0.02	-	-	-	-	-	31.8	-	-	-	-	-	-	-	-	
Sept.	22	-	0.40	-	0.002	0.72	-	-	-	-	L0.03	33.0	6.9	-	-	-	-	-	-	
Nov.	30	-	-	-	-	-	-	-	-	-	40.7	-	-	-	-	-	-	-	-	

APPENDIX II METAL DATA - STATION 3

		Cu	E	Cd		Fe		Va	E	Mn	E
	D			D	E	D	E	D	E	D	E
1974											
March	27	-	0.028	-	-	-	2.50	-	-	-	0.35
June	15	-	0.020	-	-	-	4.90	-	-	-	0.39
Aug.	12	-	0.010	-	-	-	0.40	-	-	-	0.24
Aug.	26	-	0.003	-	-	-	0.32	-	-	-	0.25
Sept.	16*	10.01	0.03	10.01	-	0.34	2.30	10.02	-	0.12	0.21
Oct.	16	-	0.500	-	-	-	1.90	-	-	-	0.82
Oct.	29	-	-	-	-	-	-	-	-	-	-
Oct.	30	-	0.08	-	-	-	13.0	-	-	-	1.80
...
1976											
June	11	-	-	-	-	10.01	-	-	-	-	-
July	14	-	0.09	-	-	0.0002	-	0.95	-	-	-
Aug.	3	-	0.002	-	-	10.01	-	0.07	-	-	-
Aug.	17	-	10.01	-	-	-	-	0.37	-	-	-
Sept.	22	-	-	-	-	0.0002	-	0.26	-	-	-
Nov.	30	-	0.006	-	-	0.0002	-	0.13	-	-	1.4

(continued)

APPENDIX II METAL DATA - STATION 3 (continued)

		Mo		Pb		Zn		Ni		Ag	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	0.23	-	0.08	-	-	-
June	15	-	-	-	-	0.080	-	0.066	-	-	-
Aug.	12	-	-	-	-	0.027	-	0.05	-	-	-
Aug.	26	-	-	-	-	0.020	-	0.04	-	-	-
Sept.	16*	L0.03	L0.03	0.2	0.08	0.04	0.265	-	-	-	-
Oct.	16	-	-	-	-	0.15	-	1.20	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-
Oct.	30	-	-	-	-	0.75	-	0.52	-	-	-
1976											
June	11	-	-	-	-	0.18	-	L0.07	-	L0.05	-
July	14	-	-	L0.1	-	L0.001	-	0.04	-	-	L0.03
Aug.	3	-	-	-	-	0.10	-	0.18	-	L0.05	-
Aug.	17	-	-	L0.1	-	-	-	0.10	-	-	L0.03
Sept.	22	-	-	-	-	-	-	0.14	-	-	L0.05
Nov.	30	-	-	-	-	0.010	-	0.02	-	-	L0.005

(continued)

APPENDIX II METAL DATA - STATION 3 (continued)

		Hg	D	E	As	D	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	E	SO ₄	D
1974																					
March	27	-	-	-	-	-	-	0.009	-	-	-	-	-	-	-	-	-	-	12.5		
June	15	-	-	-	-	-	-	0.007	-	-	-	-	-	-	-	-	-	-	17.4		
Aug.	12	-	-	-	-	-	-	0.007	-	-	-	-	-	-	-	-	-	-	47.5		
Aug.	26	-	-	-	-	-	-	0.017	-	-	-	-	-	-	-	-	-	-	52.4		
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Oct.	16	-	-	-	-	-	-	0.004	-	-	-	-	-	-	-	-	-	-	10.5		
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5		
Oct.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5		
.....
1976																					
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14	-	10.2	-	-	-	-	0.0008	0.23	-	10.03	-	20.0	-	4.2	-	-	-	-	62.0	
Aug.	3	-	-	-	-	10.02	10.03	-	-	10.3	-	29.7	6.5	-	-	-	-	-	-		
Aug.	17	-	10.05	-	-	10.0015	0.10	-	-	31.0	-	31.0	6.2	-	-	-	-	-	-		
Sept.	22	-	-	10.05	-	0.0012	-	-	-	42.9	-	-	50.5	-	-	-	-	-	85.0		
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110.0		

APPENDIX II METAL DATA - STATION 4

- 78 -

		Cu	E	D	Cd	E	D	Fe	E	D	Va	E	D	Mn	E
1974															
March	27	-	0.006	-	-	-	-	0.88	-	-	-	-	-	0.09	-
June	15	-	0.019	-	-	-	-	5.0	-	-	-	-	-	0.48	-
Aug.	12	-	0.008	-	-	-	-	0.34	-	-	-	-	-	0.21	-
Aug.	26	-	0.003	-	-	-	-	0.32	-	-	-	-	-	0.25	-
Sept.	16*	10.01	0.02	10.01	-	0.23	-	1.5	10.02	-	0.68	-	-	0.76	-
Oct.	16	-	0.55	-	-	-	-	1.90	-	-	-	-	-	0.80	-
Oct.	29	-	0.03	-	-	-	-	1.20	-	-	-	-	-	0.88	-
1975															
Jan.	23	-	-	0.05	-	-	-	-	-	-	-	-	-	-	1.7
May	3	-	-	0.028	-	-	-	-	-	-	-	-	-	0.45	-
June	3	-	-	0.006	-	10.0002	-	-	-	-	-	-	-	0.21	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	10.02	-	10.01	-	1.9	-	-	-	-	-	-	-
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1976															
June	11	-	-	-	-	-	10.01	-	-	-	-	-	-	-	-
July	14*	-	0.10	-	-	-	10.0002	-	-	-	0.82	-	-	-	-
Aug.	3*	-	0.05	-	-	-	10.01	-	-	-	0.20	-	-	-	-
Aug.	17	-	10.01	-	-	-	10.01	-	-	-	0.42	-	-	-	-
Sept.	22	-	0.002	-	-	-	10.0002	-	-	-	0.34	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 4 (continued)

- 79 -

		Mo	E	Pb	D	Zn	D	Ni	D	Ag	E
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	0.043	-	0.035	-	-	-
June	15	-	-	-	-	0.14	-	0.062	-	-	-
Aug.	12	-	-	-	-	0.020	-	0.11	-	-	-
Aug.	26	-	-	-	-	0.021	-	0.04	-	-	-
Sept.	16*	10.3	10.3	10.02	0.07	0.04	0.175	-	-	-	-
Oct.	16	-	-	-	-	0.15	-	-	-	-	-
Oct.	29	-	-	-	-	0.13	-	0.09	-	-	-
1975											
Jan.	23	-	-	-	-	0.14	-	0.10	-	-	-
May	3	-	-	-	-	0.43	-	0.18	-	-	-
June	3	-	-	-	-	0.01	-	0.013	-	10.001	-
July	8	-	0.0015	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	10.3	-	10.02	-	0.03	-	10.1	-	10.03
1976											
June	11	-	10.1	-	-	0.20	-	0.5	-	10.05	-
July	14*	-	-	-	-	0.003	-	0.027	-	-	L0.03
Aug.	3*	-	-	-	-	0.08	-	0.13	-	-	0.005
Aug.	17	-	10.1	-	-	0.003	-	0.05	-	10.05	-
Sept.	22	-	-	-	-	-	-	-	-	-	L0.03
Nov.	30	-	-	-	-	-	-	-	-	-	L0.005

(continued)

APPENDIX II METAL DATA - STATION 4 (continued)

		Hg	D	E	As	D	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	E	SO4	D
1974																					
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.0	
June	15	-	-	-	-	-	-	0.006	-	-	-	-	-	-	-	-	-	-	-	17.2	
Aug.	12	-	-	-	-	-	-	0.008	-	-	-	-	-	-	-	-	-	-	-	51.9	
Aug.	26	-	-	-	-	-	-	0.050	-	-	-	-	-	-	-	-	-	-	-	54.0	
Sept.	16*	-	-	-	-	-	-	0.0155	-	-	-	-	-	-	-	-	-	-	-	131.0	
Oct.	16	-	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	156.0	
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1975																					
Jan.	23	-	-	-	-	-	-	0.0081	-	-	-	-	-	-	-	-	-	-	-	240.0	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.8	
June	3	-	-	-	-	-	-	-	-	0.0006	-	-	-	-	-	-	-	-	-	56.0	
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1976																					
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14*	-	-	L0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	3*	-	-	-	-	-	-	0.0010	0.34	-	-	-	-	-	-	-	-	-	-	65.5	
Aug.	17	-	-	-	-	-	-	L0.02	L0.03	-	-	-	-	-	-	-	-	-	-	-	
Sept.	22	-	-	0.05	-	-	-	0.0022	0.225	-	-	-	-	-	-	-	-	-	-	210.0	
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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APPENDIX III METAL DATA - STATION 5

- 81 -

	Cu		Cd		Fe		V _a		Mn	
	D	E	D	E	D	E	D	E	D	E
1974										
March 27	-	-	-	-	-	-	-	-	-	-
June 15	-	-	-	-	-	-	-	-	-	-
Aug. 12	-	-	-	-	-	-	-	-	-	-
Aug. 26	-	-	-	-	-	-	-	-	-	-
Sept. 16*	10.01	10.01	10.01	10.01	0.43	0.51	10.2	0.43	0.44	-
Oct. 16	-	-	-	-	-	-	-	-	-	-
Oct. 29	-	-	-	-	-	-	-	-	-	-
...
1975										
Jan. 23	-	-	-	-	-	-	-	-	-	-
May 3	-	-	-	-	-	-	-	-	-	-
June 3	-	-	-	-	-	-	-	-	-	-
July 8	-	-	-	-	-	-	-	-	-	-
Aug. 6	-	-	-	-	-	-	-	-	-	-
Aug. 6	-	-	-	-	-	-	-	-	-	-
Aug. 26	-	-	-	-	-	-	-	-	-	-
Aug. 26*	-	-	10.02	-	-	-	-	-	-	-
Sept. 23*	-	-	-	-	-	-	1.9	-	-	-
...
1976										
June 11	-	-	0.01	-	-	10.01	-	-	0.44	-
July 14*	-	-	-	-	-	-	-	-	-	-
Aug. 3*	-	-	-	-	10.01	-	-	-	0.22	-
Aug. 17	-	-	-	-	-	-	-	-	-	-
Sept. 22	-	-	-	-	-	-	-	-	-	-
Nov. 30	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 5 (continued)

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		Mo	Pb	Zn	Ni	Ag
		D	E	D	E	D
1974						
March	27	-	-	-	-	-
June	15	-	-	-	-	-
Aug.	12	-	-	-	-	-
Aug.	26	-	-	-	-	-
Sept.	16*	10.3	0.3	0.02	0.04	0.060
Oct.	16	-	-	-	-	-
Oct.	29	-	-	-	-	-
...
1975						
Jan.	23	-	-	-	-	-
May	3	-	-	-	-	-
June	3	-	-	-	-	-
July	8	-	-	-	-	-
Aug.	6	-	-	-	-	-
Aug.	6	-	-	-	-	-
Aug.	26	-	-	-	-	-
Aug.	26*	-	-	-	-	-
Sept.	23*	-	10.3	-	0.02	0.03
...
1976						
June	11	-	-	-	-	-
July	14*	-	10.1	-	0.02	0.04
Aug.	3*	-	-	-	-	-
Aug.	17	-	10.1	-	0.07	0.09
Sept.	22	-	-	-	-	-
Nov.	30	-	-	-	-	-
...

(continued)

APPENDIX II METAL DATA - STATION 5 (continued)

		Hg	D	E	As	D	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	D	S04
1974																				
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
...	
1975																				
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	L0.03	32.0	7.3	-	-	
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	L0.03	25.0	5.8	-	-	
...	
1976																				
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	L0.3	2.0	4.6	-	-	
July	14*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	3*	-	-	-	-	-	-	-	-	-	-	-	-	-	L0.3	33.0	6.9	-	-	
Aug.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

APPENDIX II METAL DATA - STATION 6

- 84 -

		Cu	E	Cd		Fe		Va	Mn	
	D	D	E	D	E	D	E	D	E	
1974										
March	27	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-
Sept.	16*	10.01	10.01	10.01	10.01	0.09	0.37	10.2	0.15	0.16
Oct.	16	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-
1975										
Jan.	23	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	10.02	-	10.01	-	-	-	-
Sept.	23*	-	-	-	-	-	-	2.1	-	-
1976										
June	11	-	-	-	-	10.01	-	-	-	-
July	14*	-	-	10.1	-	-	-	1.6	-	-
Aug.	3*	-	-	-	-	10.1	-	-	-	-
Aug.	17	-	-	-	-	10.01	-	0.17	-	-
Sept.	22	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 6 (continued)

- 85 -

		Mo	D	E	Pb	D	E	Zn	D	E	Ni	D	E	Ag	D	E
1974																
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	16*	10.3	-	10.3	-	10.02	-	10.02	-	0.015	0.03	-	-	-	-	-
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
...
1975																
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	-	10.3	-	0.03	-	0.03	-	0.03	-	0.03	-	0.03	-	0.03
...
1976																
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	14*	-	-	10.1	-	-	-	0.07	-	-	-	0.04	-	-	-	-
Aug.	3*	-	-	-	-	-	-	-	-	-	-	0.02	-	-	-	-
Aug.	17	-	-	-	-	-	-	-	-	-	-	0.03	-	-	-	-
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 6 (continued)

APPENDIX II METAL DATA - STATION 7

- 87 -

		Cu	E	Cd	D	E	Fe	D	E	Va	D	E	Mn	D	E
		D	E	D	E	D	E	D	E	D	E	D	E	D	E
1974															
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	16*	0.01	0.01	0.01	0.01	0.01	0.01	0.07	0.28	0.28	0.2	0.03	0.03	0.03	0.03
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1975															
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	0.02	-	0.01	-	-	-	-	-
Sept.	23*	-	-	-	-	-	-	-	-	0.01	-	1.9	-	-	-
1976															
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	14*	-	-	0.02	-	-	-	-	-	-	-	3.6	-	-	-
Aug.	3*	-	-	-	0.01	-	-	-	-	-	-	0.76	-	-	-
Aug.	17	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 7 (continued)

- 88 -

		Mo	E	D	Pb	E	D	Zn	E	D	Ni	E	D	Ag	E
1974															
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	16*	10.3	10.3	10.02	10.02	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-
...
1975															
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	10.3	-	10.02	-	10.01	-	10.1	-	10.03	-	-	-	-
...
1976															
June	11	-	-	-	10.02	-	0.2	-	10.5	-	-	-	-	-	10.03
July	14*	-	10.1	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	3*	-	-	10.1	-	10.02	-	10.01	-	10.5	-	-	-	-	10.03
Aug.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 7 (continued)

		Hg	E	D	As	E	CN	E	Se	E	Sb	D	Ca	D	Mg	E	Ba	E	SO ₄	D
1974																				
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1975																				
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1976																				
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14*	L0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

APPENDIX II METAL DATA - STATION 8

- 90 -

		Cu		Cd		Fe		V _a		Mn	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Sept.	16*	L0.01	L0.01	L0.01	L0.01	0.06	0.22	L0.2	L0.2	0.07	0.09
Oct.	16	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-
1975											
Jan.	23	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	L0.02	-	L0.01	-	-	-	-	-
Sept.	23*	-	-	-	-	L0.01	-	1.5	-	-	-
1976											
June	11	-	-	-	-	L0.01	-	-	-	-	-
July	14*	-	-	L0.01	-	-	-	-	-	-	-
Aug.	3*	-	-	0.02	-	0.002	-	-	-	1.2	-
Aug.	17	-	-	L0.01	-	L0.01	-	-	-	0.62	-
Sept.	22	-	-	-	-	-	-	-	-	0.38	-
Nov.	30	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 8 (continued)

- 91 -

		Mo		Pb		Zn		Ni		Ag	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Sept.	16*	L0.03	L0.03	L0.02	L0.02	0.02	0.03	-	-	-	-
Oct.	16	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-
...
1975											
Jan.	23	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	L0.03	-	L0.02	-	L0.02	-	L0.1	-	L0.03
...
1976											
June	11	-	-	-	-	L0.02	-	0.02	-	L0.05	-
July	14*	-	-	L0.1	-	-	-	-	-	-	L0.03
Aug.	3*	-	-	-	-	-	-	-	-	-	-
Aug.	17	-	-	L0.1	-	0.008	-	0.03	-	-	L0.005
Sept.	22	-	-	-	-	L0.002	-	0.02	-	L0.05	-
Nov.	30	-	-	-	-	-	-	-	-	-	L0.03e

(continued)

APPENDIX II METAL DATA - STATION 8 (continued)

		Hg	E	D	As	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	E	SO ₄	D
1974																				
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1975																				
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1976																				
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14*	-	L0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

APPENDIX II METAL DATA - STATION 9

		Cu	D	E	Cd	D	E	Fe	D	E	Va	D	E	Mn	D	E
1974	March 27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	June 15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Sept. 16*	L0.1	L0.1	L0.1	-	-	-	0.04	-	-	0.22	L0.2	-	L0.03	L0.03	-
	Oct. 16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Oct. 29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1975	Jan. 23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	May 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	June 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	July 8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 26*	-	-	-	-	-	-	L0.02	-	-	L0.01	-	-	-	-	-
	Sept. 23*	-	-	-	-	-	-	-	-	-	-	0.49	-	-	-	-
1976	June 11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	July 14*	-	-	-	-	-	-	L0.01	-	-	-	-	-	-	-	-
	Aug. 3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Aug. 17	-	-	-	-	-	-	-	-	-	-	L0.01	-	-	-	-
	Sept. 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nov. 30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 9 (continued)

		Mo		Pb		Zn		Ni		Ag	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Sept.	16*	L0.3	L0.3	L0.02	L0.02	L0.01	L0.02	-	-	-	-
Oct.	16	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-
•	•	•	•	•	•	•	•	•	•	•	•
1975											
Jan.	23	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	L0.3	-	L0.02	-	L0.01	-	L0.1	-	L0.03
•	•	•	•	•	•	•	•	•	•	•	•
1976											
June	11	-	-	-	-	-	-	-	-	-	-
July	14*	-	L0.1	-	L0.02	-	L0.01	-	L0.05	-	L0.03
Aug.	3*	-	-	-	-	-	-	-	-	-	-
Aug.	17	-	L0.1	-	L0.02	-	L0.01	-	L0.05	-	L0.03
Sept.	22	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 9 (continued)

APPENDIX II METAL DATA - STATION 10

- 96 -

		Cu	D	E	Cd	D	E	Fe	D	E	Va	D	E	Mn	D	E
1974																
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	16*	10.01	10.01	10.01	10.01	10.01	10.01	0.08	0.08	0.18	10.2	10.2	10.08	10.08	0.08	0.08
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
...
1975																
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	10.02	10.02	10.01	10.01	10.01	10.01	10.01	10.01	10.01
Sept.	23*	-	-	-	-	-	-	-	-	-	2.1	-	-	-	-	-
...
1976																
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	14*	-	-	-	-	-	-	10.01	10.01	-	-	-	-	-	-	-
Aug.	3*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	17	-	-	-	-	-	-	10.01	10.01	-	-	-	-	-	-	-
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 10 (continued)

- 97 -

		Mo	E	D	Pb	E	D	Zn	E	D	Ni	E	D	Ag	E
1974															
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	16*	10.3	10.3	10.02	10.02	10.01	10.01	0.05	-	-	-	-	-	-	-
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1975															
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	-	10.3	-	10.02	-	0.02	-	10.1	-	10.03	-	-	-
1976															
June	11	-	-	-	-	10.02	-	-	-	-	-	-	-	-	-
July	14*	-	-	10.1	-	-	0.2	-	-	-	-	-	-	-	10.03
Aug.	3*	-	-	-	-	-	-	10.01	-	-	-	-	-	-	-
Aug.	17	-	-	10.1	-	10.02	-	-	-	-	-	-	-	-	10.03
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 10 (continued)

- 98 -

APPENDIX II METAL DATA - STATION 11

- 99 -

		Cu		Cd		Fe		V _a		Mn	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Sept.	16*	-	-	-	-	-	-	-	-	-	-
Oct.	16	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-
1975											
Jan.	23	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	0.02	-	0.01	-	0.50	-	-	-
Sept.	23*	-	-	-	-	-	-	-	-	-	-
1976											
June	11	-	-	0.05	-	0.01	-	-	-	-	-
July	14*	-	-	-	-	-	-	3.0	-	-	-
Aug.	3*	-	-	0.04	-	0.01	-	0.58	-	-	-
Aug.	17	-	-	-	-	-	-	-	-	-	-
Sept.	22	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 11 (continued)

APPENDIX II METAL DATA - STATION 11 (continued)

		Hg	E	D	As	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	E	S04	D
1974																				
March	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	16*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Oct.	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1975																				
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1976																				
June	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	14*	-	0.043	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	3*	-	-	-	10.03	-	10.03	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nov.	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

APPENDIX II METAL DATA - STATION 12

- 102 -

		Cu		Cd		Fe		V _a		Mn	
		D	E	D	E	D	E	D	E	D	E
1974											
March	27	-	-	-	-	-	-	-	-	-	-
June	15	-	-	-	-	-	-	-	-	-	-
Aug.	12	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Sept.	16*	-	-	-	-	-	-	-	-	-	-
Oct.	16	-	-	-	-	-	-	-	-	-	-
Oct.	29	-	-	-	-	-	-	-	-	-	-
1975											
Jan.	23	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	-	-	-	-	-	-
Aug.	26	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	10.02	-	10.01	-	2.9	-	-	-
Sept.	23*	-	-	-	-	-	-	-	-	-	-
1976											
June	11	-	-	-	-	10.01	-	-	-	-	-
July	14*	-	-	0.18	-	-	-	0.52	-	-	-
Aug.	3*	-	-	-	10.01	-	-	-	-	-	-
Aug.	17	-	-	-	-	10.01	-	0.32	-	-	-
Sept.	22	-	-	-	-	-	-	-	-	-	-
Nov.	30	-	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 12 (continued)

APPENDIX II METAL DATA - STATION 12 (continued)

- 104 -

APPENDIX II METAL DATA - STATION 13

- 105 -

		Cu	D	E	Cd	D	E	Fe	D	E	Va	D	E	Mn	D	E
1975																
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	6	-	-	-	-	Lo.002	-	-	-	0.30	-	-	-	-	-	3.0
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aug.	26*	-	-	-	-	Lo.002	-	-	-	0.17	-	-	-	-	-	3.4
Aug.	26*	-	-	-	0.08	0.0017	-	-	-	12.0	-	-	-	-	-	1.2
Aug.	26	-	-	Lo.02	-	Lo.01	-	-	-	-	-	-	-	-	-	-
Sept.	23*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1976																
Jan.	29	-	-	0.004	-	-	Lo.0002	-	-	-	-	-	-	-	-	33.2
March	17	-	0.003	-	-	-	-	-	-	-	-	-	-	-	-	-
March	31	-	-	0.004	-	-	0.0005	-	-	-	-	-	-	-	-	-
June	11	-	0.004	-	-	-	Lo.01	-	-	-	-	-	-	-	-	-
July	14	-	0.01	-	-	-	Lo.0002	-	-	-	-	-	-	-	-	-
July	20	-	0.004	-	-	-	0.0004	-	-	-	-	-	-	-	-	-
Aug.	3	-	0.04	-	-	-	Lo.01	-	-	-	-	-	-	-	-	-
Aug.	17	-	Lo.01	-	-	-	Lo.0002	-	-	-	-	-	-	-	-	-
Sept.	22	-	0.02	-	0.002	-	Lo.0002	-	-	-	0.20	-	-	-	-	-
Sept.	22	-	-	0.001	-	-	Lo.0002	-	-	-	0.51	-	-	-	-	-
Nov.	30	-	-	-	-	-	Lo.0002	-	-	-	0.51	-	-	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 13 (continued)

- 106 -

		Mo	Pb	Zn	Ni	Ag
		D	E	D	E	D
1975						
Jan.	23	-	-	-	-	-
May	3	-	-	-	-	-
June	3	-	-	-	-	-
July	8	-	-	-	-	-
Aug.	6	0.012	0.005	-	0.015	-
Aug.	6	-	-	-	-	-
Aug.	26	0.011	0.002	0.003	0.015	0.015
Aug.	26*	0.001	0.096	0.19	0.072	0.005
Aug.	26	-	-	-	-	-
Sept.	23*	-	-	-	-	-
1976						
Jan.	29	-	0.002	-	-	-
March	17	-	0.005	-	-	-
March	31	-	-	0.015	-	-
June	11	-	0.009	-	-	-
July	14	L0.10	L0.02	0.02	-	-
July	20	-	0.004	0.09	L0.05	-
Aug.	3	-	0.002	0.02	-	-
Aug.	17	-	L0.02	0.04	-	-
Sept.	22	-	0.002	0.18	L0.05	-
Sept.	22	-	0.002	0.04	-	-
Nov.	30	-	0.001	0.006	-	-
			0.009	-	-	-

(continued)

APPENDIX II METAL DATA - STATION 13 (continued)

		Hg	D	E	As	D	E	CN	T	Se	E	Sb	D	Ca	D	Mg	E	Ba	D	SO4
1975																				
Jan.	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
May	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
June	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
July	8	-	-	-	0.32	-	-	-	-	-	-	64.4	-	-	-	0.29	300.0	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.46	315.0	-	-	
Aug.	26	-	-	-	0.70	-	-	-	-	-	-	-	-	-	-	0.69	55.5	-	-	
Aug.	26*	-	-	-	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Aug.	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sept.	3*	-	-	-	-	-	-	-	-	-	-	L0.03	80.0	17.0	-	-	-	-	-	
1976																				
Jan.	29	-	-	-	0.05	0.0029	-	-	0.47	-	-	-	-	41.5	-	-	-	-	210.0	
March	17	-	-	-	-	-	0.20	-	-	-	-	-	-	40.3	-	-	-	-	175.0	
March	31	-	-	-	-	0.0024	-	1.13	-	-	-	-	-	-	-	-	-	-	235.0	
June	11	-	-	-	L0.20	-	-	-	L0.3	-	66.0	-	10.0	-	-	-	-	-	-	
July	14	-	-	-	L0.05	0.0036	-	1.80	-	-	58.7	-	-	-	-	-	-	-	290.0	
July	20	-	-	-	-	0.0005	-	L0.0005	-	-	21.2	-	3.9	-	-	-	-	7.3	-	
Aug.	3	-	-	-	L0.02	-	-	-	L0.3	-	97.0	-	11.0	-	-	-	-	-	-	
Aug.	17	-	-	-	0.20	-	-	-	-	-	28.0	-	-	-	-	-	-	-	9.8	
Sept.	22	-	-	-	L0.05	0.0006	-	-	-	-	-	-	-	-	-	-	-	-	260.0	
Sept.	22	-	-	-	L0.05	0.0046	-	0.52	-	-	-	-	-	-	-	-	-	-	295.0	
Nov.	30	-	-	-	L0.05	0.0020	-	-	-	-	-	-	-	-	-	-	-	-	-	

APPENDIX III

INVERTEBRATE DATA

APPENDIX III INVERTEBRATE DATA.....

.....STATION 1

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <u>Porohalacaru</u> sp	-	-	-	-	-	-	-	-	-
2. <u>Hydrocarina</u>	-	-	-	-	-	-	-	-	-
3. <u>Hygrobataes</u> sp	-	-	-	-	-	-	-	-	-
4. <u>Dytiscidae</u>	-	-	-	-	-	-	-	-	-
5. <u>Culicoides</u> sp	-	-	-	-	-	-	-	-	-
6. <u>Probezia</u> sp	-	-	-	-	-	-	-	-	-
7. <u>Culex</u> sp	-	-	-	-	-	-	-	-	-
8. <u>Culicidae</u>	-	-	-	-	-	-	-	-	-
9. <u>Hemerodromia</u> sp	-	-	-	-	-	-	-	-	-
10. <u>Roerderoides</u>	-	-	-	-	-	-	-	-	-
11. <u>Atherix</u>	-	-	-	-	-	-	-	-	-
12. <u>Clinocera stagnalis</u>	-	-	-	-	-	-	-	-	-
13. <u>Simuliidae</u>	-	-	-	-	-	-	-	-	-
14. <u>Tubifera</u> sp	-	-	-	-	-	-	-	-	-
15. <u>Diamesa</u> sp	-	-	-	-	-	-	-	-	-
16. <u>Diamesinae</u> sp	-	-	-	-	-	-	-	-	-
17. <u>Prodiamesa</u> sp	-	-	-	-	-	-	-	-	-
18. <u>Pseudodiamesa</u> sp	-	-	-	-	-	-	-	-	-
19. <u>Corynoneura</u> sp	-	-	-	-	-	-	-	-	-
20. <u>Spaniotoma</u> sp	-	-	-	-	-	-	-	-	-
21. <u>Brillia</u> sp	-	-	-	-	-	-	-	-	-
22. <u>Cricotopus</u> sp	-	-	-	-	-	-	-	-	-
23. <u>Hydrobaenus</u> sp	-	-	-	-	-	-	-	-	-
24. <u>Heterotrirossocladius</u> sp	-	-	-	-	-	-	-	-	-
25. <u>Psectrocladius</u> sp	-	-	-	-	-	-	-	-	-
26. <u>Tanypus</u> sp	-	-	-	-	-	-	-	-	-
27. <u>Pentaneurini</u> sp	-	-	-	-	-	-	-	-	-
28. <u>Pentanura</u> sp	-	-	-	-	-	-	-	-	-
29. <u>Procladius</u> sp	-	-	-	-	-	-	-	-	-
30. <u>Constempsellina</u> sp	-	-	-	-	-	-	-	-	-
31. <u>Polypedilium</u> sp	-	-	-	-	-	-	-	-	-
32. <u>Smittia</u> sp	-	-	-	-	-	-	-	-	-
33. <u>Strictochironomous</u> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 1 (continued)

- 110 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferellidae</i> sp	-	-	-	-	-	-	1	2	-
38. <i>Antocnidae</i> sp	-	2	-	-	-	-	-	-	-
39. <i>Pedicia</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	1	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Cheliferidae</i> sp	-	-	-	-	-	-	2	-	-
44. <i>Pothastidae</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemaniidae</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyenidae</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. <i>Baetidae</i>	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilidae</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Epimerellidae</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleoniidae</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulidae</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epororidae</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptageniidae</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogenidae</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonuridae</i> sp	-	-	-	-	-	-	-	-	-
58. <i>Corixidae</i>	-	-	-	-	-	-	-	-	-
59. <i>Gerridae</i> (fam)	-	-	-	-	-	-	-	-	-
60. <i>Nabidae</i>	-	-	-	-	-	-	-	-	-
61. <i>Aphidiidae</i>	-	-	-	-	-	-	1	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyraustidae</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capniidae</i> sp	2	-	-	-	-	-	-	-	-
65. <i>Peritomiyidae</i>	-	-	-	-	-	-	3	6	-
66. <i>Nemouridae</i> sp	-	-	-	-	-	-	1	-	-
67. <i>Nemouridae</i> (sp A)	-	-	-	-	-	-	7	9	4

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 1 (continued)

- 111 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	7	10	30	25	23	22
69. <i>Isogenus</i> sp	-	-	-	-	-	-	-	-	-
70. <i>Arcyopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	-	2	1	11	-	-	-
72. <i>Isoperla</i> sp	-	-	-	-	-	-	-	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	2	-	-
76. <i>Perlidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	-	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsyche</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydropsyidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Clostetia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. <i>Rossi</i> Limnophilid genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	2	2	-	-	-	-
90. <i>Nematomorpha</i>	3	3	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	8	1	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	14	9	2	50	54	103	36	51	50
Station Total	28			207			136		
Diversity	.4849	.5188	.2479	.5561	.6994	.6639	.6026	.8493	.9107
Evenness	.8054	.7422	.8235	.9237	.7329	.6957	.6315	.7870	.7743

APPENDIX III INVERTEBRATE DATA

STATION 3

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <i>Porohalacaru</i> sp	-	-	-	-	-	-	-	-	-
2. <i>Hydrocarina</i>	1	-	-	-	-	-	-	-	-
3. <i>Hygrobataes</i> sp	-	-	-	-	-	-	-	-	-
4. <i>Dytiscidae</i>	-	-	-	-	-	-	-	-	-
5. <i>Culicoides</i> sp	-	-	-	1	-	-	-	-	-
6. <i>Probezia</i> sp	-	-	-	-	-	-	-	-	-
7. <i>Culex</i> sp	-	-	-	-	-	-	-	-	-
8. <i>Cuticidae</i>	-	-	-	-	-	-	-	-	-
9. <i>Hemerodromia</i> sp	-	-	-	-	-	-	-	-	-
10. <i>Roerderoides</i>	-	-	-	-	-	-	-	-	-
11. <i>Atherix</i>	-	-	-	-	-	-	-	-	-
12. <i>Clinocera stagnalis</i>	-	-	-	-	-	-	-	-	-
13. <i>Simuliidae</i>	-	-	-	-	-	-	-	-	-
14. <i>Tubifera</i> sp	-	-	-	-	-	-	-	-	-
15. <i>Diamesa</i> sp	-	-	-	-	-	-	-	-	-
16. <i>Diamesinae</i> sp	-	-	-	-	-	-	-	-	-
17. <i>Prodiamesa</i> sp	-	-	-	-	-	-	-	-	-
18. <i>Pseudodiamesa</i> sp	-	-	-	-	-	-	-	-	-
19. <i>Corynoneura</i> sp	-	-	-	-	-	-	-	-	-
20. <i>Spaniotoma</i> sp	5	-	-	1	4	-	-	-	-
21. <i>Brillia</i> sp	-	-	-	-	-	-	-	-	-
22. <i>Cricotopus</i> sp	-	-	-	-	-	-	-	-	-
23. <i>Hydrobaenus</i> sp	-	-	-	-	-	-	-	-	-
24. <i>Heterotrissocladius</i> sp	-	-	-	-	-	-	-	-	-
25. <i>Psectrocladius</i> sp	-	-	-	-	-	-	-	-	-
26. <i>Tanypus</i> sp	-	-	-	-	-	-	-	-	-
27. <i>Pentaneurini</i> sp	-	-	-	-	-	-	-	-	-
28. <i>Pentanura</i> sp	-	-	-	32	12	24	-	-	-
29. <i>procadius</i> sp	-	-	-	-	-	-	-	-	-
30. <i>Constempellina</i> sp	-	-	-	-	-	-	-	-	-
31. <i>Polypedilium</i> sp	-	-	-	-	-	-	-	-	-
32. <i>Smittia</i> sp	-	-	-	-	-	-	-	-	-
33. <i>Strictochironomus</i> sp	18	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 3 (continued)

- 113 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	1	-	4	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferellia</i> sp	-	2	-	-	-	-	-	-	-
38. <i>Antocnra</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedica</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	1	-	1	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	1	-	-	-	-	-
42. adult Dipteran	-	-	-	-	1	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Pothastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. Corixidae	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphididae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	-	-	-
65. <i>Peritomyia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	6	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 3 (continued)

- 114 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (Zapada)	-	-	-	-	-	-	-	-	-
69. <i>Isogenus</i> sp	-	-	1	-	-	-	-	-	-
70. <i>Arcymopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	-	-	-	-	-	-	-
72. <i>Isoperla</i> sp	3	-	2	-	-	1	-	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perlidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	-	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsycche</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Clostetia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. <i>Ross</i> Limnophilid genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. Nematomorpha	-	-	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	1	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	1	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	42	1	37	64	19	65	6	10	2
Station Total	80	-	-	148	-	-	18	-	-
Diversity	.6507	-	.5840	.4231	.3815	.5426	.8451	.6257	.2765
Evenness	.6248	-	.5840	.8868	.7996	.7763	.9592	.6557	.9185

APPENDIX III INVERTEBRATE DATA.....

.....STATION 4

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <u>Porohalacaru</u> sp	-	-	-	-	-	-	-	-	-
2. <u>Hydrocarina</u>	-	-	-	-	-	-	-	-	-
3. <u>Hygrobataes</u> sp	-	-	-	-	-	-	-	-	-
4. <u>Dytiscidae</u>	-	-	-	-	-	-	-	-	-
5. <u>Culicoides</u> sp	-	-	-	-	-	-	-	-	-
6. <u>Probezia</u> sp	-	-	-	-	-	-	-	-	-
7. <u>Culex</u> sp	-	-	-	-	-	-	-	-	-
8. <u>Culicidae</u>	-	-	-	-	-	-	-	-	-
9. <u>Hemerodromia</u> sp	-	-	-	-	-	-	-	-	-
10. <u>Roerderoides</u>	-	-	-	-	-	-	-	-	-
11. <u>Atherix</u>	-	-	-	-	-	-	-	-	-
12. <u>Clinocera stagnalis</u>	-	-	-	1	-	-	-	-	-
13. <u>Simuliidae</u>	-	-	-	-	-	-	-	-	-
14. <u>Tubifera</u> sp	-	-	-	-	-	-	-	-	-
15. <u>Diamesa</u> sp	-	-	-	-	-	-	5	-	-
16. <u>Diamesinae</u> sp	-	-	-	-	-	-	1	-	-
17. <u>Prodiaimesa</u> sp	-	-	-	-	-	-	1	-	-
18. <u>Pseudodiamesa</u> sp	-	-	-	-	-	-	7	-	-
19. <u>Corynoneura</u> sp	-	-	-	-	-	-	-	-	-
20. <u>Spaniotoma</u> sp	1	-	-	-	-	-	13	-	-
21. <u>Spaniotoma</u> sp	2	-	-	-	-	-	20	-	-
22. <u>Brillia</u> sp	-	-	-	-	-	-	-	-	-
23. <u>Crichtopus</u> sp	-	-	-	-	-	-	-	-	-
24. <u>Hydrobaenus</u> sp	-	-	-	-	-	-	-	-	-
25. <u>Heterotrirosscladius</u> sp	-	-	-	-	-	-	-	-	-
26. <u>Psectrocladius</u> sp	-	-	-	-	-	-	-	-	-
27. <u>Tanypus</u> sp	-	-	-	-	-	-	-	-	-
28. <u>Pentanura</u> sp	-	-	-	-	-	-	-	-	-
29. <u>Proctadius</u> sp	-	-	-	-	-	-	-	-	-
30. <u>Constempettina</u> sp	-	-	-	-	-	-	-	-	-
31. <u>Polydeltium</u> sp	-	-	-	-	-	-	-	-	-
32. <u>Smittia</u> sp	-	-	-	-	-	-	-	-	-
33. <u>Strictochironomous</u> sp	-	-	-	-	-	-	1	2	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 4 (continued)

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	2	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	3	1	1	-	-	-
37. <i>Eukiefferellia</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocna</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedica</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	1	-	-	-	-	-
44. <i>Pothastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. <i>Corixidae</i>	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphididae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	-	-	-
65. <i>Peritomyia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	2	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 4 (continued)

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	-	-	-	-	-	-
69. <i>Isogenus</i> sp	-	-	-	-	-	-	-	-	-
70. <i>Arcymopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	1	-	-	-	-	-	-	-	-
72. <i>Isoperla</i> sp	-	-	-	-	-	-	-	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perlidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	-	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsyché</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydropsyche</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Closteia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. Ross Limnophilid genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. Nematomorpha	1	-	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Styliodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	10	2	35	80	65	68	16	2	0
Station Total	47			213			18		
Diversity	.5796	.4771	.3447	.1671	.2268	.0333	.7400	.3010	0
Evenness	.7449	.1000	.5725	.2275	.2915	.1106	.8756	.1000	0

APPENDIX III INVERTEBRATE DATA.....

.....STATION 5

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <i>Porohalacaru</i> sp	-	-	-	-	-	-	-	-	-
2. <i>Hydrocarina</i> sp	-	-	-	-	-	-	-	-	-
3. <i>Hygrobetaes</i> sp	-	-	-	-	-	-	-	-	-
4. <i>Dytiscidae</i>	-	-	-	-	-	-	-	-	-
5. <i>Culicoides</i> sp	-	-	-	-	-	-	-	-	-
6. <i>Probezia</i> sp	-	-	-	-	-	-	-	-	-
7. <i>Culex</i> sp	-	-	-	-	-	-	-	-	-
8. <i>Cuticidae</i>	-	-	-	-	-	-	-	-	-
9. <i>Hemerodromia</i> sp	-	-	-	-	-	-	-	-	-
10. <i>Roerderoides</i>	-	-	-	-	-	-	-	-	-
11. <i>Atherix</i>	-	-	-	-	-	-	-	-	-
12. <i>Clinocera stagnalis</i>	-	-	-	-	-	-	-	-	-
13. <i>Simuliidae</i>	-	-	-	-	-	-	-	-	-
14. <i>Tubifera</i> sp	-	-	-	-	-	-	-	-	-
15. <i>Diamesa</i> sp	-	-	-	7	4	-	-	-	-
16. <i>Diamesinae</i> sp	-	-	-	-	2	-	-	-	-
17. <i>Prodiamesa</i> sp	-	-	-	8	-	-	-	-	-
18. <i>Pseudodiamesa</i> sp	-	-	-	6	1	2	-	-	-
19. <i>Corynoneura</i> sp	-	-	-	4	-	-	-	-	-
20. <i>Spaniotoma</i> sp	-	-	-	-	-	-	-	-	-
21. <i>Brillia</i> sp	-	-	-	-	-	-	-	-	-
22. <i>Crioptopus</i> sp	-	-	-	-	-	-	-	-	-
23. <i>Hydrobaenus</i> sp	-	-	-	-	-	-	-	-	-
24. <i>Heterotrisocadius</i> sp	-	-	-	-	-	-	2	-	-
25. <i>Psectrocladius</i> sp	-	-	-	-	-	-	-	-	-
26. <i>Tanypus</i> sp	-	-	-	-	-	-	-	-	-
27. <i>Pentaneurini</i> sp	-	-	-	-	-	-	-	-	-
28. <i>Pentanura</i> sp	-	-	-	-	4	5	2	-	-
29. <i>Procladius</i> sp	-	-	-	-	-	-	-	-	-
30. <i>Constempetina</i> sp	-	-	-	-	1	-	-	-	-
31. <i>Polyedrium</i> sp	-	-	-	-	-	-	-	-	-
32. <i>Smittia</i> sp	-	-	-	-	-	-	-	-	-
33. <i>Strictochironomous</i> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 5 (continued)

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferellidae</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocnidae</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedicia</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Potthastidae</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemaniidae</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. <i>Baetidae</i>	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulidae</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. <i>Corixidae</i>	-	-	-	-	-	-	-	-	-
59. <i>Gerridae</i> (fam)	-	-	-	-	-	-	-	-	-
60. <i>Nabidae</i>	-	-	-	-	-	-	-	-	-
61. <i>Aphidiidae</i>	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	-	-	-
65. <i>Peritomia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 5 (continued)

- 120 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (Zapada)	-	-	-	-	-	-	-	-	-
69. <i>Tsogenus</i> sp	-	-	-	-	-	-	-	-	-
70. <i>Arcyopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	1	-	-	-	-	-	-	-	-
72. <i>Isoperla</i> sp	-	-	-	-	-	-	-	-	-
73. <i>Isoperla similis</i>	-	-	-	1	-	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perloidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	1	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsyche</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	1	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Closteia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	1	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	1	-	-
87. <i>Rossi Limnophilid</i> genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. <i>Nematamorpha</i>	-	-	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	2	1	-
Column Total	6	1	0	15	41	9	27	10	4
Station Total	7			65			41		
Diversity	.3768	0	-	.3489	.2932	.4990	.6481	.8233	.3010
Evenness	.7897	0	-	.7313	.4870	.8288	.7176	.7435	.1000

APPENDIX III INVERTEBRATE DATA

STATION 6

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <i>Porohalacaru</i> sp	-	-	-	-	-	-	1	-	-
2. <i>Hydrocarina</i>	-	-	-	-	-	-	-	-	-
3. <i>Hygrobataes</i> sp	-	-	-	-	-	-	-	-	-
4. <i>Dytiscidae</i>	-	-	-	-	-	-	-	-	-
5. <i>Culicoides</i> sp	1	-	-	-	-	-	-	-	-
6. <i>Probezia</i> sp	-	-	-	-	-	-	-	-	-
7. <i>Culex</i> sp	-	-	-	-	-	-	1	1	1
8. <i>Cuticidae</i>	-	-	-	-	-	-	-	-	-
9. <i>Hemerodromia</i> sp	-	-	-	-	-	-	-	-	-
10. <i>Roerderoides</i>	-	-	-	-	-	-	18	14	35
11. <i>Atherix</i>	-	-	-	-	-	-	-	-	-
12. <i>Clinocera stagnalis</i>	-	-	-	-	-	-	-	-	-
13. <i>Simuliidae</i>	-	-	-	-	-	-	-	-	-
14. <i>Tubifera</i> sp	-	-	-	-	-	-	-	-	-
15. <i>Diamesa</i> sp	-	-	-	-	-	-	-	-	-
16. <i>Diamesinae</i> sp	-	-	-	-	-	-	-	-	-
17. <i>Prodiamesa</i> sp	-	-	-	-	-	-	-	-	-
18. <i>Pseudodiamesa</i> sp	-	-	-	-	-	-	-	-	-
19. <i>Corynoneura</i> sp	-	-	-	-	-	-	-	-	-
20. <i>Spaniotoma</i> sp	1	-	-	3	-	-	-	-	-
21. <i>Brillia</i> sp	-	-	-	1	1	4	-	-	-
22. <i>Crichtopus</i> sp	-	-	-	-	-	-	-	-	-
23. <i>Hydrobaenus</i> sp	-	-	-	-	-	-	-	-	-
24. <i>Heterotrissocladius</i> sp	-	-	-	-	-	-	-	-	-
25. <i>Psectrocladius</i> sp	-	-	-	-	-	-	-	-	-
26. <i>Tanypus</i> sp	-	-	-	-	-	-	-	-	-
27. <i>Pentaneurini</i> sp	-	-	-	-	-	-	-	-	-
28. <i>Pentanura</i> sp	-	-	-	-	-	-	5	3	7
29. <i>Proctadius</i> sp	-	-	-	-	-	-	-	-	-
30. <i>Constempetina</i> sp	-	-	-	-	-	-	-	-	-
31. <i>Polyedilium</i> sp	-	-	-	-	-	-	-	-	-
32. <i>Smittia</i> sp	-	-	-	-	-	-	-	-	-
33. <i>Strictochironomous</i> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 6 (continued)

- 122 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferellia</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocnna</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedica</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Potthastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilliam</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. <i>Corixidae</i>	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphididae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	-	-	-
65. <i>Peritomyia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 6 (continued)

- 123 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	6	3	-	-	16	4
69. <i>Isogenus</i> sp	-	-	-	-	-	-	22	-	-
70. <i>Arcymopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	1	-	-	-	-	-	-
72. <i>Isoperla</i> sp	-	-	-	-	-	-	-	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	2	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	1	-	-	-	-	-	-	-	-
76. <i>Perトイidae</i>	-	-	-	-	3	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	1	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsyche</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Closteia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectlisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. Ross' <i>Limnophilid</i> genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	1	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. <i>Nematomorpha</i>	-	-	-	-	-	-	-	-	-
91. <i>Nematode</i>	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Otigachaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	3	5	16	140	234	89	51	75	69
Station Total	-	-	-	463	-	-	195	-	-
Diversity	•3010	•6489	•4917	•2053	•1733	•4130	•7481	•9652	•8211
Evenness	1.0000	.9283	.8167	.2937	.1919	.5307	.6932	.7844	.6988

APPENDIX III INVERTEBRATE DATA.....

.....STATION 7

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <u>Porohalacaru</u> sp	-	-	-	-	-	-	-	-	-
2. <u>Hydrocarina</u> sp	1	-	-	-	-	-	-	-	-
3. <u>Hygrobataes</u> sp	-	-	-	-	-	-	-	-	-
4. <u>Dytiscidae</u>	-	-	-	-	-	-	-	-	-
5. <u>Culicoides</u> sp	-	-	-	-	-	-	-	-	-
6. <u>Probezia</u> sp	-	-	-	-	-	-	-	-	-
7. <u>Culex</u> sp	-	-	-	-	-	-	-	-	-
8. <u>Cuticidae</u>	-	-	-	-	-	-	-	-	-
9. <u>Hemerodromia</u> sp	-	-	-	1	2	-	1	1	8
10. <u>Roederoides</u>	-	-	-	-	-	-	-	-	-
11. <u>Atherix</u>	-	-	-	-	-	-	-	-	-
12. <u>Clinocera stagnalis</u>	-	75	-	-	-	-	-	-	-
13. <u>Simuliidae</u>	2	1	75	131	74	69	7	8	2
14. <u>Tubifera</u> sp	-	-	-	-	-	-	-	-	-
15. <u>Diamesa</u> sp	-	-	-	-	-	-	38	32	33
16. <u>Diamesinae</u> sp	-	-	-	-	-	-	2	-	-
17. <u>Prodiamesa</u> sp	-	-	-	-	-	-	-	-	-
18. <u>Pseudodiamesa</u> sp	-	-	-	-	-	-	9	9	22
19. <u>Corynoneura</u> sp	-	-	-	2	2	-	-	-	-
20. <u>Spaniotoma</u> sp	6	1	1	-	-	-	-	-	-
21. <u>Brittilia</u> sp	-	-	-	-	-	-	-	-	-
22. <u>Cricotopus</u> sp	-	-	-	-	-	-	-	-	-
23. <u>Hydrobaenus</u> sp	-	-	-	-	-	-	-	-	-
24. <u>Heterotrissoncladius</u> sp	-	-	-	-	-	-	-	-	-
25. <u>Psectrocladius</u> sp	-	-	-	-	-	-	-	-	-
26. <u>Tanypus</u> sp	-	-	-	-	-	-	-	-	-
27. <u>Pentaneurini</u> sp	-	-	-	-	-	-	-	-	-
28. <u>Pentanura</u> sp	-	-	-	-	-	-	-	-	-
29. <u>Procladius</u> sp	-	-	-	-	-	-	-	-	-
30. <u>Constempellina</u> sp	-	-	-	-	-	-	-	-	-
31. <u>Polypedilium</u> sp	-	-	-	-	-	-	-	-	-
32. <u>Smittia</u> sp	-	-	-	-	-	-	-	-	-
33. <u>Strictochironomous</u> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 7 (continued)

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Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferella</i> sp	-	-	-	-	-	1	-	-	-
38. <i>Antocnia</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedica</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	1	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Potthastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	2	2	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	1	-	1	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	1	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	4	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	1	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	9	6	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. Corixidae	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphidiidae	-	-	-	-	-	-	1	-	-
62. Psyllidae (adult)	-	-	-	-	-	1	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	7	6	-
65. <i>Peritomia</i>	-	-	-	-	-	-	-	18	-
66. <i>Nemoura</i> sp	-	-	-	-	-	5	-	48	20
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	10	7	14	(continued)

APPENDIX III INVERTEBRATE DATA - STATION 7 (continued)

- 126 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	-	7	-	-	-	-
69. <i>Isogenus</i> sp	-	-	-	-	-	-	-	-	-
70. <i>Arcyopteryx</i> sp	-	-	-	-	-	-	4	-	1
71. <i>Hastaperla</i> sp	4	2	-	19	-	4	-	-	-
72. <i>Isoperla</i> sp	-	-	-	1	-	-	-	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	1	-	2	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perloidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	4	-	-	-	1	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsychie</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Closteia</i> sp	-	-	-	-	-	-	-	1	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	62	37	3
87. Ross Limnophilid genus 'C' sp	-	-	-	-	-	-	-	-	-
88. Psychomyiidae	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. Nematomorpha	-	-	-	-	-	-	-	-	-
91. Nematode	1	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	13	4	230	267	147	133	89	117	122
Station Total	247			547			328		
Diversity	.3981	.5360	.5043	.6790	.6330	.6053	.8778	.9434	1.0526
Evenness	.8344	.7668	.6481	.6520	.6634	.6053	.7464	.7835	.7999

APPENDIX III INVERTEBRATE DATA

STATION 8

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <i>Porohalacaru</i> sp	-	-	-	-	-	-	-	-	-
2. <i>Hydrocarina</i>	-	-	-	-	-	-	-	-	-
3. <i>Hygrobataes</i> sp	-	-	-	-	-	-	-	-	-
4. <i>Dytiscidae</i>	-	-	-	-	-	-	-	-	-
5. <i>Culicoides</i> sp	-	-	-	-	-	-	-	-	-
6. <i>Probezia</i> sp	-	-	-	-	-	-	-	-	-
7. <i>Culex</i> sp	-	-	-	-	-	-	-	-	-
8. <i>Cutticidae</i>	-	-	-	-	-	-	-	-	-
9. <i>Hemerodromia</i> sp	-	-	-	-	-	-	-	-	-
10. <i>Roerderoides</i>	-	-	-	-	-	-	-	-	-
11. <i>Atherix</i>	-	-	-	-	-	-	-	-	-
12. <i>Clinocera stagnalis</i>	-	-	-	-	-	-	-	-	-
13. <i>Simuliidae</i>	-	-	-	-	-	-	-	-	-
14. <i>Tubifera</i> sp	-	-	-	-	-	-	-	-	-
15. <i>Diamesa</i> sp	-	-	-	-	-	-	-	-	-
16. <i>Diamesinae</i> sp	-	-	-	-	-	-	-	-	-
17. <i>Prodiamesa</i> sp	-	-	-	-	-	-	-	-	-
18. <i>Pseudodiamesa</i> sp	-	-	-	-	-	-	-	-	-
19. <i>Corynoneura</i> sp	-	-	-	-	-	-	-	-	-
20. <i>Spaniotoma</i> sp	-	-	-	-	-	-	-	-	-
21. <i>Brillia</i> sp	-	-	-	-	-	-	-	-	-
22. <i>Crichtopus</i> sp	-	-	-	-	-	-	-	-	-
23. <i>Hydrobaenus</i> sp	-	-	-	-	-	-	-	-	-
24. <i>Heterotrirossocladius</i> sp	-	-	-	-	-	-	-	-	-
25. <i>Psectrocladius</i> sp	-	-	-	-	-	-	-	-	-
26. <i>Tanypus</i> sp	-	-	-	-	-	-	-	-	-
27. <i>Pentaneurini</i> sp	-	-	-	-	-	-	-	-	-
28. <i>Pentanura</i> sp	-	-	-	-	-	-	-	-	-
29. <i>procadius</i> sp	-	-	-	-	-	-	-	-	-
30. <i>Constempellina</i> sp	-	-	-	-	-	-	-	-	-
31. <i>Polypedium</i> sp	-	-	-	-	-	-	-	-	-
32. <i>Smitia</i> sp	-	-	-	-	-	-	-	-	-
33. <i>Strictochironomous</i> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 8 (continued)

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferella</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocna</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedica</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Cheiifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Pothastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i> sp	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. Corixidae	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphidiidae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	-	-	-
65. <i>Peritomyia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 8 (continued)

- 129 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	1	1	-	-	5	-
69. <i>Isogenus</i> sp	-	-	-	3	-	-	1	5	-
70. <i>Arcymopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	-	2	1	-	24	62	2
72. <i>Isoperla</i> sp	15	71	20	1	1	3	-	-	-
73. <i>Isoperla similis</i>	-	-	-	1	6	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perloidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	1	2	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	1	2	-	-	-	-
79. <i>Arctopsycche</i> sp	-	-	-	-	-	-	9	4	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Closteia</i> sp	-	-	-	1	-	-	-	3	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	1	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	8	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. Ross' Limnophilid genus 'C' sp	-	-	-	-	-	-	-	-	-
88. Psychomyiidae	-	-	-	-	-	-	-	1	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. Nematomorpha	-	-	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	27	121	57	277	348	273	29	84	14
Station Total	-----205-----			-----898-----			-----127-----		
Diversity	.4076	.4196	.4916	.2966	.0817	.2054	.4510	.8920	.2848
Evenness	.6770	.8238	.7033	.2588	.0905	.2274	.4994	.8920	.8690

APPENDIX III INVERTEBRATE DATA.....

.....STATION 9

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <u>Porohalacaru</u> sp	-	-	-	-	-	-	-	-	-
2. <u>Hydrocarina</u> sp	-	-	-	-	-	-	-	-	-
3. <u>Hygrobetaes</u> sp	-	-	-	-	-	-	-	-	-
4. <u>Dytiscidae</u>	1	-	-	-	-	-	-	-	-
5. <u>Culicooides</u> sp	-	-	-	-	-	-	-	-	-
6. <u>Probezia</u> sp	-	-	-	-	-	-	-	-	-
7. <u>Culex</u> sp	-	-	1	-	-	-	-	-	-
8. <u>Culicidae</u>	-	-	-	-	-	-	-	-	-
9. <u>Hemerodromia</u> sp	-	-	-	-	-	-	-	-	-
10. <u>Roerderoides</u>	-	-	-	-	-	-	-	-	-
11. <u>Atherix</u>	-	-	-	-	-	-	-	-	-
12. <u>Clinocera</u> <u>stagnalis</u>	-	-	1	-	-	-	-	-	-
13. <u>Simuliidae</u>	-	-	-	-	-	-	-	-	-
14. <u>Tubifera</u> sp	-	-	-	-	-	-	-	-	-
15. <u>Diamesa</u> sp	-	-	-	-	-	-	3	-	-
16. <u>Diamesinae</u> sp	-	-	-	-	-	-	3	-	-
17. <u>Prodiamesa</u> sp	-	-	-	-	-	-	-	-	-
18. <u>Pseudodiamesa</u> sp	-	-	-	-	-	-	-	-	-
19. <u>Corynoneura</u> sp	-	-	-	-	-	-	2	-	-
20. <u>Spaniotoma</u> sp	-	-	1	-	-	-	4	-	-
21. <u>Brillia</u> sp	-	-	-	-	-	-	-	-	-
22. <u>Cryptopus</u> sp	-	-	-	-	-	-	-	6	-
23. <u>Hydrobaenus</u> sp	-	-	-	-	-	-	-	7	-
24. <u>Heterotrissocadius</u> sp	-	-	-	-	-	-	-	-	-
25. <u>Psectrocladius</u> sp	-	-	-	-	-	-	-	-	-
26. <u>Tanypus</u> sp	-	-	-	-	-	-	-	-	-
27. <u>Pentaneurini</u> sp	-	-	-	-	-	-	1	-	-
28. <u>Pentanura</u> sp	-	-	-	-	-	-	-	-	-
29. <u>Procladius</u> sp	-	-	-	-	-	-	-	-	-
30. <u>Constempsellina</u> sp	-	-	-	-	-	-	1	-	-
31. <u>Polypedilium</u> sp	-	-	-	-	-	-	-	-	-
32. <u>Smittia</u> sp	-	-	-	-	-	-	-	-	-
33. <u>Strictochironomous</u> sp	-	-	-	-	-	-	-	-	27

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 9 (continued)

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Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferella</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocnia</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedicia</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Potthastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemannia</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachylena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptillam</i> sp	95	-	-	-	-	-	4	10	6
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	1	8	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	10	4
53. <i>Cinygmuta</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	2	1	3
58. Corixidae	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	1	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphididae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	3	9	11
65. <i>Peritomyia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	5	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	3	-	1

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 9 (continued)

- 132 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	-	-	-	-	-	-
69. <i>Isogenus</i> sp	-	-	-	-	-	-	3	-	-
70. <i>Arcymopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	-	-	-	-	-	-	-
72. <i>Isoperla</i> sp	-	-	-	-	-	-	9	23	24
73. <i>Isoperla similis</i>	-	1	-	-	-	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perloidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	-	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsyche</i> sp	-	-	-	-	-	-	-	2	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	5	-	-
81. <i>Hydropsyche</i> larva	-	-	-	-	-	-	7	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Clostetia</i> sp	-	-	-	-	-	-	1	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. <i>Rossi</i> Limnophilid genus 'C' sp	-	-	-	-	-	-	1	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. <i>Nematomorpha</i>	-	-	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonistica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	6	12	249	13	2	25	41	73	49
Station Total	267			40			163		
Diversity	.7242	.3634	.6963	.7510	.3110	.8959	.7072	.8759	.6282
Evenness	.9306	.2188	.7710	.8887	1.0000	.8959	.8868	.8759	.8073

APPENDIX III INVERTEBRATE DATA.....

.....STATION 10

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <i>Porohalacaru</i> sp	-	-	-	-	-	-	-	-	-
2. <i>Hydrocarina</i> sp	-	-	-	-	-	-	-	-	-
3. <i>Hygrobataes</i> sp	-	-	-	-	-	-	-	-	-
4. <i>Dytiscidae</i>	-	-	-	-	-	-	-	-	-
5. <i>Culicoides</i> sp	-	-	-	-	-	-	-	-	-
6. <i>Probezia</i> sp	-	-	-	-	-	-	-	-	-
7. <i>Culex</i> sp	-	-	-	-	-	-	-	-	-
8. <i>Cuticidae</i>	-	-	-	-	-	-	-	-	-
9. <i>Hemerodromia</i> sp	-	-	-	-	-	-	-	-	-
10. <i>Roerderoides</i>	-	-	-	-	-	-	-	-	-
11. <i>Atherix</i>	-	-	-	-	-	-	-	-	-
12. <i>Clinocera stagnalis</i>	-	-	-	-	-	-	-	-	-
13. <i>Simuliidae</i>	-	-	-	-	-	-	-	-	-
14. <i>Tubifera</i> sp	-	-	-	-	-	-	-	-	-
15. <i>Diamesa</i> sp	-	-	-	-	-	-	-	-	-
16. <i>Diamesinae</i> sp	-	-	-	-	-	-	-	-	-
17. <i>Prodiamesa</i> sp	-	-	-	-	-	-	-	-	-
18. <i>Pseudodiamesa</i> sp	-	-	-	-	-	-	-	-	-
19. <i>Corynoneura</i> sp	-	-	-	-	-	-	-	-	-
20. <i>Spaniotoma</i> sp	-	-	-	-	-	-	-	-	-
21. <i>Brillia</i> sp	-	-	-	-	-	-	-	-	-
22. <i>Crichtopus</i> sp	-	-	-	-	-	-	-	-	-
23. <i>Hydrobaenus</i> sp	-	-	-	-	-	-	-	-	-
24. <i>Heterotrissocladius</i> sp	-	-	-	-	-	-	-	-	-
25. <i>Psectrocladius</i> sp	-	-	-	-	-	-	-	-	-
26. <i>Tanypus</i> sp	-	-	-	-	-	-	-	-	-
27. <i>Pentaneurini</i> sp	-	-	-	-	-	-	-	-	-
28. <i>Pantanura</i> sp	-	-	-	-	-	-	-	-	-
29. <i>Procladius</i> sp	-	-	-	-	-	-	-	-	-
30. <i>Constempetina</i> sp	-	-	-	-	-	-	-	-	-
31. <i>Polypedilum</i> sp	-	-	-	-	-	-	-	-	-
32. <i>Smittia</i> sp	-	-	-	-	-	-	-	-	-
33. <i>Strictochironomous</i> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 10 (continued)

- 134 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferellidae</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocnina</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedicia</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	1	1	-	-	-	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Pothastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Epeorus</i> sp	-	-	-	-	-	-	-	-	-
55. Heptagenia	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. Corixidae	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphididae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	30	-	-	-	-	-	-	-	-
65. <i>Peritomyia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 10 (continued)

- 135 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (<i>Zapada</i>)	-	-	-	-	-	-	-	-	-
69. <i>Isogenus</i> sp	-	-	-	-	-	-	-	-	-
70. <i>Arcyopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	-	-	-	-	-	-	-
72. <i>Isoperla</i> sp	-	-	-	6	-	-	2	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	-	2	3	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perloidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcella</i> sp	-	-	-	-	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsycche</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	1	-	-
83. <i>Closteia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	1	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	3	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. Ross' Limnophilid genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophila</i> sp	-	-	-	-	-	-	-	-	-
90. Nematomorpha	-	-	-	-	-	-	1	-	1
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonistica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	1	-	1
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	32	27	36	91	287	106			
Station Total			95				484		
Diversity	.1203	.2339	.3768	.3157	.5750	.5873			
Evenness	.2521	.4902	.7897	.3736	.4673	.5640			

APPENDIX III INVERTEBRATE DATA

.....STATION 12

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
1. <u>Porohalacaru</u> sp	-	-	-	-	-	-	-	-	-
2. <u>Hydrocarina</u> sp	-	-	-	-	-	-	-	-	-
3. <u>Hygrobetaes</u> sp	-	-	-	-	-	-	-	-	-
4. <u>Dytiscidae</u>	-	-	-	-	-	-	-	-	-
5. <u>Culicoides</u> sp	-	-	-	-	-	-	-	-	-
6. <u>Probezia</u> sp	-	-	-	-	-	-	-	-	-
7. <u>Culicidae</u>	-	-	-	-	-	-	-	-	-
8. <u>Culicidae</u>	-	-	-	-	-	-	-	-	-
9. <u>Hemerodromia</u> sp	-	-	-	-	-	-	-	-	-
10. <u>Roerderoides</u>	-	-	-	-	-	-	-	-	-
11. <u>Atherix</u>	-	-	-	-	-	-	-	-	-
12. <u>Clinocera stagnalis</u>	-	-	-	-	-	-	-	-	-
13. <u>Simuliidae</u>	-	-	-	-	-	-	-	-	-
14. <u>Tubifera</u> sp	-	-	-	-	-	-	-	-	-
15. <u>Diamesa</u> sp	-	-	-	-	-	-	-	-	-
16. <u>Diamesinae</u> sp	-	-	-	-	-	-	-	-	-
17. <u>Prodiamesa</u> sp	-	-	-	-	-	-	-	-	-
18. <u>Pseudodiamesa</u> sp	-	-	-	-	-	-	-	-	-
19. <u>Corynoneura</u> sp	-	-	-	-	-	-	-	-	-
20. <u>Spaniotoma</u> sp	-	-	-	-	-	-	-	-	-
21. <u>Brillia</u> sp	-	-	-	-	-	-	-	-	-
22. <u>Crioptopus</u> sp	-	-	-	-	-	-	-	-	-
23. <u>Hydrobaenus</u> sp	-	-	-	-	-	-	-	-	-
24. <u>Heterotrisocadius</u> sp	-	-	-	-	-	-	-	-	-
25. <u>Psectrocladius</u> sp	-	-	-	-	-	-	-	-	-
26. <u>Tanypus</u> sp	-	-	-	-	-	-	-	-	-
27. <u>Pentaneurini</u> sp	-	-	-	-	-	-	-	-	-
28. <u>Pentanura</u> sp	-	-	-	-	-	-	-	-	-
29. <u>Proctadius</u> sp	-	-	-	-	-	-	-	-	-
30. <u>Constempellina</u> sp	-	-	-	-	-	-	-	-	-
31. <u>Polypedatum</u> sp	-	-	-	-	-	-	-	-	-
32. <u>Smittia</u> sp	-	-	-	-	-	-	-	-	-
33. <u>Strictochironomous</u> sp	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 12 (continued)

- 137 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
34. <i>Tanytarsus</i> sp	-	-	-	-	-	-	-	-	-
35. <i>Tendipedidae</i>	-	-	-	-	-	-	-	-	-
36. <i>Tendipedinae</i> sp	-	-	-	-	-	-	-	-	-
37. <i>Eukiefferellia</i> sp	-	-	-	-	-	-	-	-	-
38. <i>Antocnra</i> sp	-	-	-	-	-	-	-	-	-
39. <i>Pedica</i> sp	-	-	-	-	-	-	-	-	-
40. <i>Tipula</i> sp	-	-	-	-	-	-	-	-	-
41. Unknown Dipteran larva	-	-	-	-	-	-	-	-	-
42. adult Dipteran	-	-	-	-	-	-	-	-	-
43. <i>Chelifera</i> sp	-	-	-	-	-	-	-	-	-
44. <i>Pothastia</i> sp	-	-	-	-	-	-	-	-	-
45. <i>Weidemania</i> sp	-	-	-	-	-	-	-	-	-
46. <i>Brachyena</i> sp	-	-	-	-	-	-	-	-	-
47. Hemiptera	-	-	-	-	-	-	-	-	-
48. Baetidae	-	-	-	-	-	-	-	-	-
49. <i>Baetis</i> sp	-	-	-	-	-	-	-	-	-
50. <i>Centroptilum</i> sp	-	-	-	-	-	-	-	-	-
51. <i>Ephemerella</i> sp	-	-	-	-	-	-	-	-	-
52. <i>Pseudocleon</i> sp	-	-	-	-	-	-	-	-	-
53. <i>Cinygmulia</i> sp	-	-	-	-	-	-	-	-	-
54. <i>Eporus</i> sp	-	-	-	-	-	-	-	-	-
55. <i>Heptagenia</i>	-	-	-	-	-	-	-	-	-
56. <i>Rhithrogena</i> sp	-	-	-	-	-	-	-	-	-
57. <i>Siphlonurus</i> sp	-	-	-	-	-	-	-	-	-
58. Corixidae	-	-	-	-	-	-	-	-	-
59. Gerridae (fam)	-	-	-	-	-	-	-	-	-
60. Nabidae	-	-	-	-	-	-	-	-	-
61. Aphididae	-	-	-	-	-	-	-	-	-
62. Psyllidae (adult)	-	-	-	-	-	-	-	-	-
63. <i>Pyrausta</i> sp	-	-	-	-	-	-	-	-	-
64. <i>Capnia</i> sp	-	-	-	-	-	-	-	-	-
65. <i>Peritomia</i>	-	-	-	-	-	-	-	-	-
66. <i>Nemoura</i> sp	-	-	-	-	-	-	-	-	-
67. <i>Nemoura</i> (sp A)	-	-	-	-	-	-	-	-	-

(continued)

APPENDIX III INVERTEBRATE DATA - STATION 12 (continued)

- 138 -

Species No.	1974			1975			1976		
	a	b	c	a	b	c	a	b	c
68. <i>Nemoura</i> (Zapada)	-	-	-	-	-	-	3	8	-
69. <i>Isogenus</i> sp	-	-	-	-	-	-	-	-	-
70. <i>Arcymopteryx</i> sp	-	-	-	-	-	-	-	-	-
71. <i>Hastaperla</i> sp	-	-	-	-	-	-	-	-	-
72. <i>Isoperla</i> sp	-	-	-	-	-	-	-	-	-
73. <i>Isoperla similis</i>	-	-	-	-	-	-	-	-	-
74. <i>Pcyaperla</i> sp	-	-	-	-	-	-	-	-	-
75. <i>Diura</i> sp	-	-	-	-	-	-	-	-	-
76. <i>Perloidae</i>	-	-	-	-	-	-	-	-	-
77. <i>Pteronarcelta</i> sp	-	-	-	-	-	-	-	-	-
78. <i>Brachyantrus</i> sp	-	-	-	-	-	-	-	-	-
79. <i>Arctopsyche</i> sp	-	-	-	-	-	-	-	-	-
80. <i>Cheumatopsyche</i> sp	-	-	-	-	-	-	-	-	-
81. <i>Hydroptilidae</i> (larva)	-	-	-	-	-	-	-	-	-
82. <i>Lepidostoma</i> sp	-	-	-	-	-	-	-	-	-
83. <i>Closteia</i> sp	-	-	-	-	-	-	-	-	-
84. <i>Ectisomyia</i> sp	-	-	-	-	-	-	-	-	-
85. <i>Dicosmoecus</i> sp	-	-	-	-	-	-	-	-	-
86. <i>Drusinus</i> sp	-	-	-	-	-	-	-	-	-
87. <i>Ross Limnophilid</i> genus 'C' sp	-	-	-	-	-	-	-	-	-
88. <i>Psychomyiidae</i>	-	-	-	-	-	-	-	-	-
89. <i>Ryacophilidae</i>	-	-	-	-	-	-	-	-	-
90. <i>Nematamorpha</i>	-	-	-	-	-	-	-	-	-
91. Nematode	-	-	-	-	-	-	-	-	-
92. <i>Picicola salmonstica</i>	-	-	-	-	-	-	-	-	-
93. <i>Oligochaeta</i>	-	-	-	-	-	-	-	-	-
94. <i>Stylodrilus</i> sp	-	-	-	-	-	-	-	-	-
95. <i>Enchytraeidae</i> sp	-	-	-	-	-	-	-	-	-
Column Total	1	-	-	-	-	-	70	55	80
Station Total	1	-	-	-	-	-	133	-	-
Diversity	.5324	.9211	.9543						
Evenness	.4933	.8845	1.0000						