

PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENVIRONMENT

ELK RIVER STUDY
HYDROLOGY OVERVIEW

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ABSTRACT

A hydrology overview study of the Elk River basin has been completed using all available hydrologic information from government agencies and private mining companies. All measured and observed discharges that were listed in company reports and others obtained separately are presented in the study report in a standard format. A regionalization procedure using historical data was utilized to produce graphical relationships between various individual climatological and streamflow characteristics and associated physiographic variables. The graphs were used to define two uniform hydrologic subregions in the Elk River basin. All data and active hydrometeorological stations were examined and an expansion of the climatological, snow course and hydrometric networks was recommended. Published historical information was used without regard to refinement or adjustments for common time study periods. Peak flow frequency analyses were done for some stations. The results of this study present a fairly reliable description of climatological and streamflow conditions in the Elk River and immediately surrounding watersheds. As such, this information is useful for operation, environmental impact assessment, planning and preliminary design of water related activities and projects. However, the graphical relationships presented in this report should not be used for design purposes which would require site investigation and possible additional data collection.

PREFACE

The Elk River basin in southeastern British Columbia has been the subject of many hydrology studies, primarily by different consulting firms for various mining companies. This work resulted in some unnecessary duplication of effort and an unorganized data base. The apparent need for a standard information base for water management prompted the Kootenay Region of the Water Management Branch to request the Hydrology Section to review all pertinent studies and active monitoring networks at individual mine sites. The desirable information in such a data base would be specific streamflow design characteristics or procedures that would be applicable on a regional basis throughout the Elk River basin.

A preliminary review revealed that the estimated data in the various mining stage reports were based on different criteria and methods. Hence the compilation or consolidation of this information could not be used to realistically produce the desired design discharges with any degree of confidence. Some mining company hydrometric discharges were published but much of the referenced data were not presented.

The general limitations of mining report hydrologic data and its unsuitability to establish regional design information was described to the Kootenay Regional Water Manager. Further report assessment and discussion with Regional personnel led to a refinement in definition of scope for the study and a definition of three objectives.

The first study objective was to extract all measured and observed discharges that were listed in the company reports and to obtain all other available discharge data from the mining companies and publish them in the study report in a standard format.

The second study objective was to define regional hydrologic relationships to estimate various streamflow characteristics. Published long-term historical data formed the basis of the regionalizations but suitable mining company discharge data were also incorporated. The results provide an assessment, planning or preliminary design rather than a final design data base.

The third study objective was to review the operating hydrometeorologic network and to recommend network station changes (additions) that would allow better definition of the regional relationships and provide a data base for current operations and future design of mining projects in the Elk River basin.

TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
2. STUDY REGION	2
2.1 Elk River Basin	2
2.2 Precipitation Weather Patterns	4
3. HYDROMETEOROLOGIC DATA	4
3.1 Climatological Data	4
3.2 Snow Course Data	7
3.3 Hydrometric Data	7
4. HYDROLOGIC REGIONALIZATION	10
4.1 Climatological Regionalization	10
4.2 Snowpack Regionalization	10
4.3 Runoff Regionalization	15
4.4 Peak Flow Regionalization	15
4.5 Low Flow Regionalization	18
5. HYDROLOGIC ESTIMATES FOR SMALL DRAINAGE AREAS	26
5.1 Design Information Limitations	26
5.2 Volume Runoff Design	26
5.3 Peak Flow Design	27
5.4 Low Flow Design	28
6. HYDROMETEOROLOGIC NETWORK RECOMMENDATIONS	28
6.1 Climatological and Snow Course Networks	28
6.2 Hydrometric Network	30
7. CONCLUSIONS	32

LIST OF APPENDICES

A	MINING COMPANY HYDROMETRIC STATIONS	A1
B	BYRON CREEK COLLIERIES LIMITED HYDROMETRIC DATA Byron Creek Mine Expansion Project	B1
C	CROWS NEST RESOURCES LIMITED HYDROMETRIC DATA Line Creek Project	C1
D	ELCO MINING LIMITED HYDROMETRIC DATA Elk River Project	D1
E	FORDING COAL LIMITED HYDROMETRIC DATA Eagle Mountain Project	E1
F	KAISER COAL OF CANADA LIMITED HYDROMETRIC DATA Hosmer-Wheeler Coal Project	F1
G	WESTAR MINING LIMITED HYDROMETRIC DATA Greenhills Mining Project	G1
H	WESTAR MINING LIMITED HYDROMETRIC DATA Natal-Harmer Ridge Mining Project	H1

LIST OF TABLES

1	Climatological Data	6
2	Snow Course Data	8
3	Hydrometric Data	9
4	Recommended Climatological Network Changes	29
5	Recommended Snow Course Network Changes	29
6	Recommended Hydrometric Network Changes	31

LIST OF FIGURES

1	Elk River Basin	3
2	Hydrometeorologic Stations	5
3	Climatological Regionalization Mean Annual Temperature	11
4	Climatological Regionalization Mean Annual Precipitation	12
5	Climatological Regionalization Maximum 24-hour Precipitation	13
6	Climatological Regionalization Mean Annual Maximum Snow Water Equivalent	14
7	Runoff Regionalization Mean Annual Unit Runoff	16
8	Peak Flow Regionalization Mean Annual Peak Flow	17
9	Peak Flow Regionalization 10-year Peak Flow	19
10	Peak Flow Regionalization 25-year Peak Flow	20
11	Peak Flow Regionalization 50-year Peak Flow	21
12	Peak Flow Regionalization 100-year Peak Flow	22
13	Peak Flow Regionalization 200-year Peak Flow	23
14	Peak Flow Regionalization Maximum Ratios of Instantaneous to Daily Discharges	24
15	Low Flow Regionalization Mean Annual Minimum Daily Flows	25
16	Mining Site Locations	A3
17	Middle Elk River Mining Company Hydrometric Sites	A4
18	Fording Coal Limited Hydrometric Sites	A5
19	Westar Mining Limited - Greenhills Hydrometric Sites	A6

1. INTRODUCTION

The Elk River basin, like the rest of southeastern British Columbia, has been monitored by a number of hydrometeorologic stations for various hydrologic purposes. The current government climatological and hydrometric networks in the basin evolved primarily as a result of site-specific study or water use requirements rather than of a comprehensive network planning program. In addition, coal mining companies have been maintaining hydrometric stations for various project planning and assessment purposes. Hence, a substantial hydrologic data base accumulated but experience with its use revealed a need for evaluation and consolidation of available data and a review of the hydrometeorologic network.

The Elk River basin has been the subject of many hydrology studies which resulted in some unnecessary duplication of effort both due to uncoordinated studies and the use of an unorganized or incomplete hydrologic data base. This study attempts to evaluate this data base and the hydrologic information published in the numerous reports and to present all available unpublished hydrometric data in a standard format. The second study objective was to organize and regionalize all available hydrologic data in order to supply information for hydrologic impact assessment and preliminary design purposes. The third objective was to recommend a hydrometeorologic network plan for current water management and future development plans.

Section 2 describes the study region and the dominant weather patterns which generate the regional precipitation.

Section 3 outlines the regional hydrometeorological stations and provides compilation of historical data summaries.

Section 4 describes regionalization procedures whereby historical climatological and streamflow characteristics are graphically related to physiographic characteristics. Analysis of all the regionalized information led to the clear definition of two hydrologically homogeneous subregions. These defined areas are not strictly zones in the sense of uniform physiographic regions (the whole basin is physically uniform) but are identified as unique hydrologic subregions caused by specific regional air mass movements and climatological responses. For ease of reference the two regions of uniform hydrologic characteristics will be referred to as subregions.

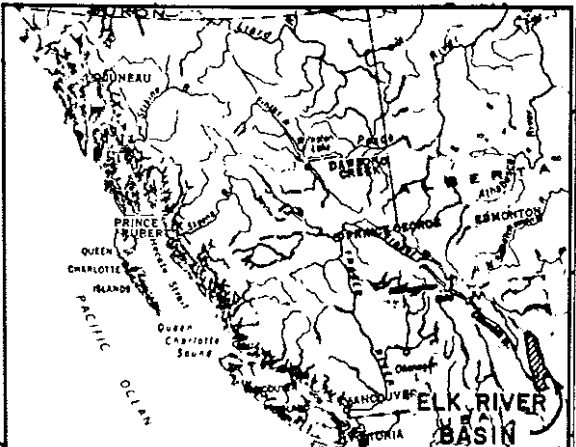
Section 5 evaluates and recommends a series of design procedures for estimating runoff for small drainage areas to be used in the interim until an adequate data base is achieved and regional design curves are established.

Section 6 outlines a climatological and hydrometric network review in which all active stations are examined for types of data collected, locations, and spatial and altitudinal distribution within each hydrologic subregion. Recommendations are made with respect to station additions, deletions and types of instrumentation to complete the current hydrometeorologic network so that all present and future water management needs are met in the Elk River basin.

2. STUDY REGION

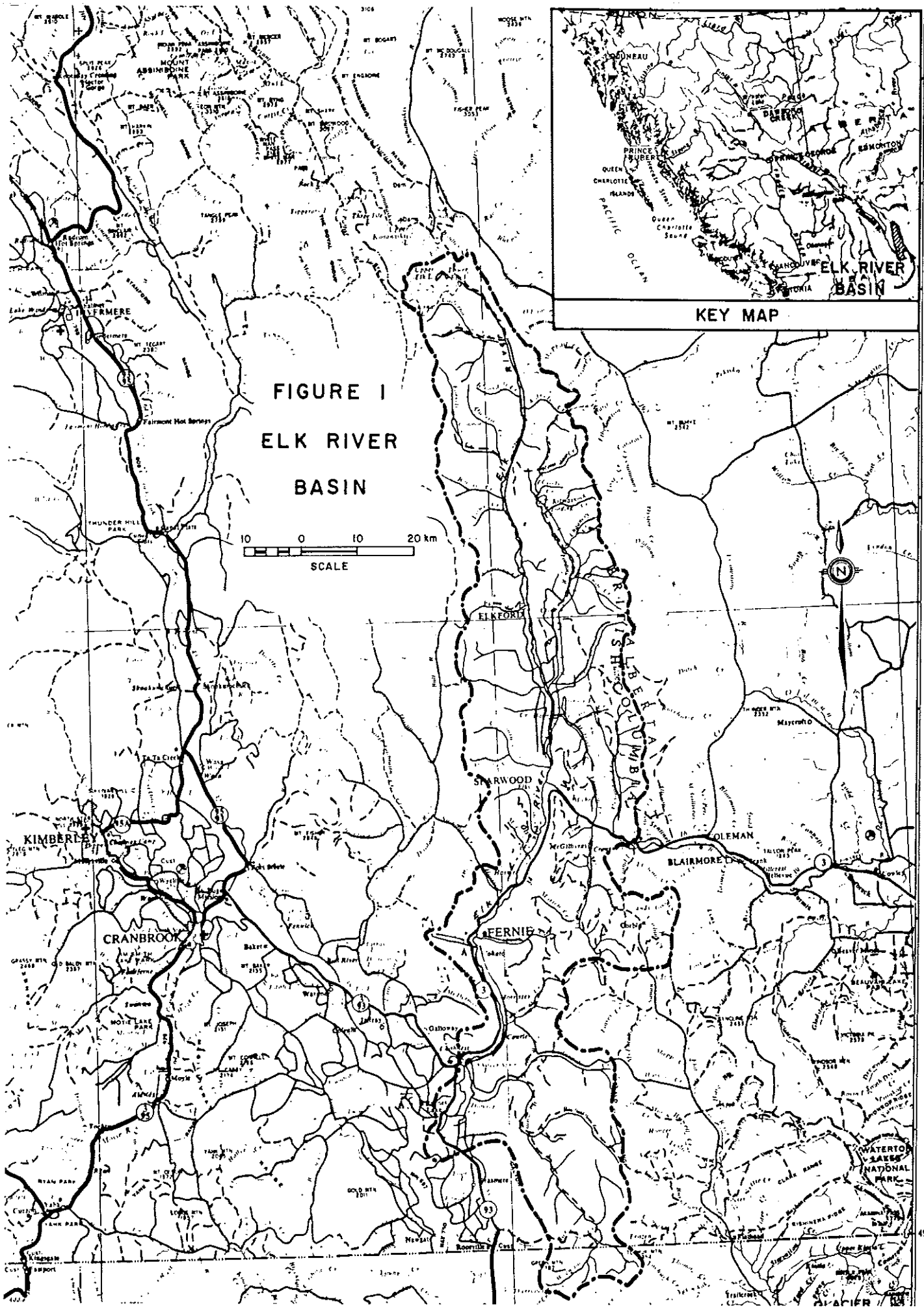
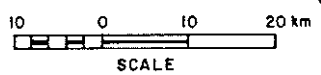
2.1 Elk River Basin

The study area consists of the Elk River watershed which is located in the southeastern corner of British Columbia adjacent to Alberta as shown in Figure 1. The long narrow north-south oriented basin lies in the extremely rugged terrain of the Front and Border Ranges of the Rocky



KEY MAP

FIGURE 1
ELK RIVER
BASIN



1:50,000 (1:50,000)

Mountains with peaks up to 3,300 metres in the north and 2,200 metres in the south. The Elk River bisects the basin forming a valley one to six kilometres wide which falls from an elevation of 1,700 metres at its northern source to 800 metres at its mouth.

2.2 Precipitation Weather Patterns

The Elk River basin experiences a humid continental climate characterized predominantly by Pacific frontal storms. The majority of precipitation occurs from orographic lifting of stable moist maritime air masses producing low intensity but long duration storms. The majority of these large-scale frontal storms flow easterly but a significant number originate from the south and southeast. Synoptic scale storms are often associated with cold low pressure systems to produce heavy rainfall in the late spring and early summer. In mid to late summer local convective storms provide significant precipitation from southerly continental systems.

3. HYDROMETEOROLOGIC DATA

All federal and provincial networks as well as those operated by mining companies were reviewed within the Elk River watershed and immediately adjacent watersheds. Active stations were identified and plotted on a regional map (Figure 2).

3.1 Climatological Data

Climatological data summaries (Table 1) were extracted from "Canadian Climate Normals 1951-1980" published by Atmospheric Environment Service, Environment Canada. Long-term average climatological data summaries were unavailable for provincial stations or other sources. However, some short-term data were also included in the regionalizations of this study.

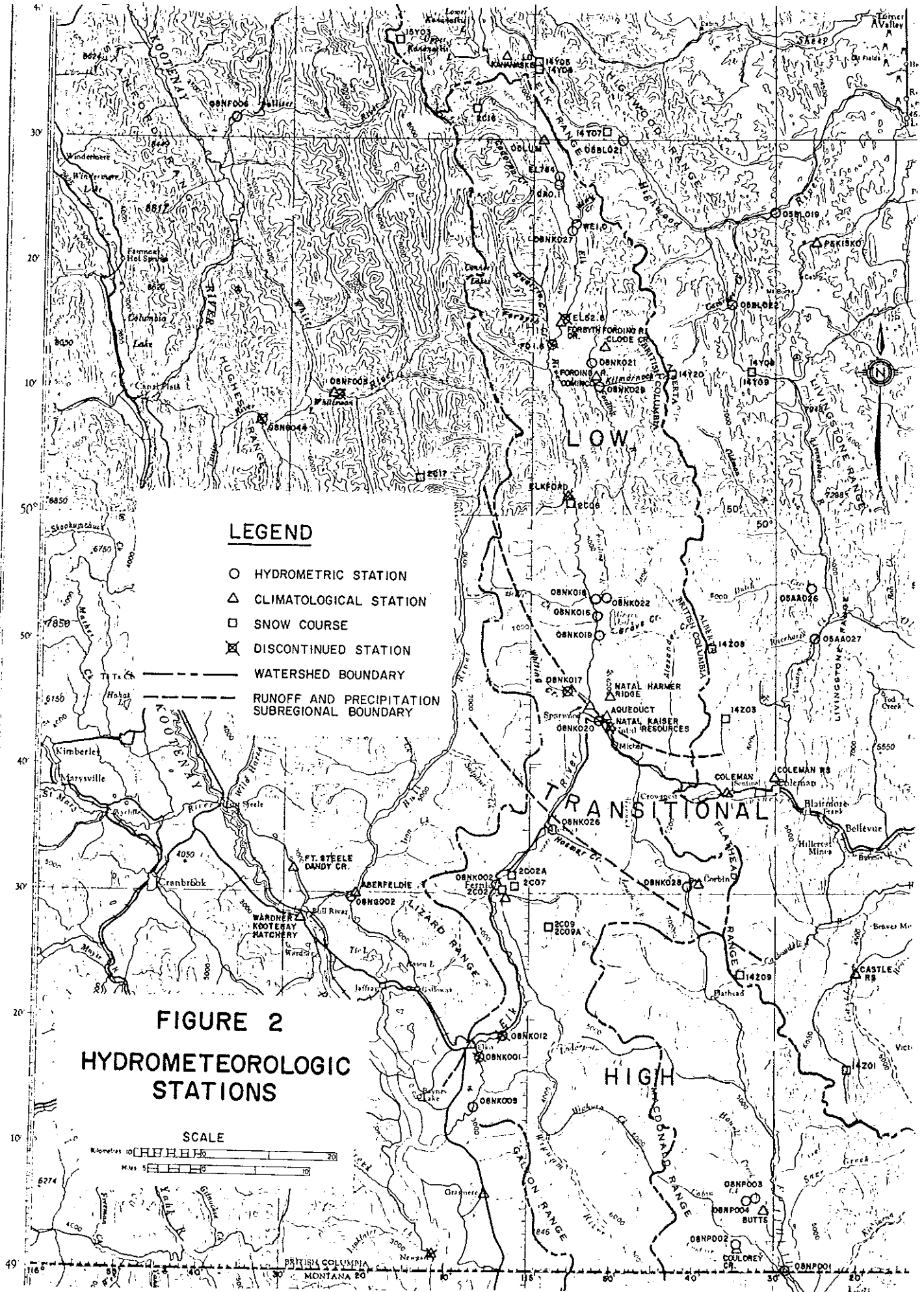


TABLE 1
CLIMATOLOGICAL DATA

Climatological Station		Station Elevation (m)	Period of Record	Type of Record*	Mean Annual		Record Length ⁺ (yrs)	Maximum 24-hour Precipitation		Record Length (yrs)
Number	Name				Temp. (°C)	Prec. (mm)		(mm)	Rain Snow	
Atmospheric Environment Stations:										
1150060	Aberfeldie	805	1950-82	3	6.2	571.1	30	99.6	R	28
3051430	Castle RS	1364	1958-76	2	3.0	852.0	30	94.0	R	14
3051720	Coleman	1341	1912-82	2	3.2	569.0	30	81.3	S	64
3051725	Coleman RS	1341	1958-71	2			30	53.6	R	12
1151915	Corbin	1572	1977-83	2	1.7	983.8	5/3	49.5	R	7
1152653	Elkford	1280	1972-78	2	3.0	648.5	5/6			
1152670	Elko	939	1923-83	3	6.1	604.5	30	58.7	S	48
1152850	Fernie	1003	1913-83	2	4.7	1127.6	30	106.2	R	63
1152898	Fording River Clode Creek	1920	1976-82	2	-0.7	851.6	5/4	62.2	S	8
1152899	Fording River Cominco	1702	1970-82	2	1.5	725.7	30	63.5	S	9
1153034	Ft. Steele Dandy Creek	856	1978-82	2						
1153034	Ft. Steele Steeples Ranch	835	1968-78	2	5.4	450.2	30	43.2	R	12
1153282	Grasmere	869	1962-82	2	7.0	493.7	30	45.2	R	18
1155402	Natal Harmer Ridge	1890	1971-82	2	0.3	840.8	30	53.3	R	10
1155403	Natal Kaiser Resources	1128	1969-82	2	4.1	637.1	30	86.4	R	10
1155490	Newgate	709	1914-60	2	6.5	434.4	30	48.3	S	46
3055120	Pekisko	1439	1905-82	2	1.8	696.1	30			
1157630	Sparwood	1137	1980-83	3	3.8	568.4	2	65.0	S	4
1158692	Wardner Kootenay Hatchery	762	1971-82	2	5.8	421.3	30	32.5	S	7
1158917	Whiteswan Lake	1138	1959-61	2	3.3	447.8	1	28.7	R	3
Ministry of Environment Stations:										
115505	Aqueduct 48	1440	1977-79	1	3.3	-	3	-	-	-
165201	Butts	1350	1979	3	2.0	-	1	-	-	-
115536	Forsyth Creek	1490	1977-79	3	2.0	-	3	-	-	-

- * 1, temperature
2, temperature, precipitation
3, temperature, precipitation, rate of rainfall

+ 30-year means are based on the latest A.E.S. published normals, 1951-80; shorter records may have been adjusted to the 30-year period.

3.2 Snow Course Data

Snow course data summaries (Table 2) were extracted from computer listings, "B.C. Snow Survey Annual Summary, Surface Water Section, Water Management Branch, 1984", and "Snow Course Historical Data Summary, Technical Services Division, Alberta Environment, 1983-84" as well as other snow survey bulletins.

3.3 Hydrometric Data

Hydrometric data summaries (Table 3) were extracted from "Historical Streamflow Summary 1982" published by Water Survey Canada, Environment Canada. Short-term records were updated to include 1983. Annual data published by Elco Mining Limited and Kaiser Resources Limited were also included in data analysis. All published and unpublished discharges, obtained directly from mining companies, are listed in the Appendices. It is recommended that these Appendices be updated every five years to maintain an up-to-date form of data publication for those data that would otherwise not be published.

TABLE 2
SNOW COURSE DATA

Snow Course Station		Name	Station Elevation (m)	Source of Data*	Period of Record	Mean March 1 Water Equivalent (mm)	Record Length (yrs)	Mean April 1 Water Equivalent (mm)	Record Length (yrs)
Number									
Alta.	B.C.								
British Columbia:									
	2C02	Fernie	1070	1	1937-84	197	45	191	46
	2C07	Fernie East	1250	1	1951-84	351	34	381	33
	2C02A	Fernie (NE)	1070	1	1974-84	217	11	239	11
	2C09	Morrissey Ridge	1860	1	1961-84	633	21	724	22
	2C09A	Morrissey Ridge 2	1800	1	1984	373	1	533	1
	2C16	Mount Joffre	1750	1	1969-84	319	14	388	16
	2C17	Thunder Creek	2010	1	1969-84	238	15	287	16
	2C06	Upper Elk River	1340	1	1948-84	168	36	158	36
Alberta:									
14Z03	AL01	Allison Pass	1980	1	1963-84	-	-	503	20
14Y04		Highwood Summit (Open)	2210	2	1963-79	302	8	349	11
14Y05	AL02	Highwood Summit (Bush)	2210	1	1963-84	352	8	387	15
14Y20		Lost Creek	2130	4	1984	272	1	328	1
14Y07		Mist Creek	1755	3	1965-84	-	-	206	8
14Z08		Race Horse Creek	1920	3	1983-84	447	2	-	-
15Y03		Three Isle Lake	2160	3	1981-84	488	3	572	4
14Z01		West Castle Bush	1525	3	1963-84	366	4	474	18
14Y08		Wilkinson Summit (Open)	1980	2, 3	1964-84	134	4	189	20
14Y09	AL03	Wilkinson Summit (Bush)	1980	1	1963-84	180	4	219	21

* Source of data:

- 1, B.C. Snow Survey Annual Summary, Surface Water Section, Water Management Branch, 1984
- 2, Snow Course Historical Data Summary, Technical Services Division, Alberta Environment, 1980
- 3, Water Supply Review and Snow Survey Summary, Technical Services Division, Alberta Environment, 1983-84
- 4, Water Supply Review and Snow Survey Summary, Technical Services Division, Alberta Environment, April 1985

TABLE 3
HYDROMETRIC DATA

Hydrometric Station		Drainage Area (km ²)	Median Basin Elevation (m)	Period of Record	Mean Annual						Ratio of Maximum Instantaneous to Daily Discharge
					Discharge		Extreme Discharge				
					Unit Runoff (mm)	Record Length (yrs)	Minimum Daily (m ³ /s)	Record Length (yrs)	Maximum Daily (L/s/km ²)	Record Length (yrs)	
Number	Name										
<u>Water Survey of Canada Stations:</u>											
08NK027	Elk R. below Weary Cr.	328	2180	1982-83	584	2	0.615	2	122	2	
08NK016	Elk R. near Natal	1870	2000	1950-83	467	28	3.91	30	96.3	32	1.04
08NK002	Elk R. at Fernie	3110	1800	1919-83	502	14	8.02	16	96.1	16	1.04
08NK012	Elk R. at Stanley Park	3520	1770	1944-69	571	25	8.03	26	112	25	1.08
08NK001	Elk R. at Elko	3550	1760	1914-44	510	22	8.63	25	103	26	-
08NK005	Elk R. at Phillips Bridge	4450		1924-83	548	52	5.66	58	110	59	1.08
08NK025	Fording R. above Clode Cr.	96.3		1975	674	1	0.255	1	167	1	-
08NK021	Fording R. below Clode Cr.	104	2130	1971-83	565	10	0.178	11	174	12	1.17
08NK018	Fording R. at the Mouth	619	2020	1970-83	441	13	1.32	14	108	14	1.08
08NK029	Kilmarnock Cr. near the Mouth			1983							
08NK022	Line Cr. at the Mouth	138	1960	1971-83	527	11	0.359	12	130	13	1.20
08NK019	Grave Cr. at the Mouth	83.9	1790	1970-83	447	13	0.226	14	88.1	14	1.04
08NK017	Whiting Cr. near Natal			1963-66			0.010	4			-
08NK020	Michel Cr. below Natal	637	1820	1970-83	571	13	1.19	14	157	14	-
08NK013	Aqueduct Cr. near Natal	1.19		1947-52			0.003	5			-
08NK028	Michel Cr. above Corbin			1983							-
08NF006	Palliser R. in Lot SL49	653		1973-83	730	11	1.94	11	156	11	1.14
08NF003	White R. near Canal Flats	987		1941-48	394	1	4.25	1	86.8	8	1.07
08NG044	Lussier Cr. near Canal Flats	246		1941-48	813	3	2.00	7	99.6	8	-
08NG002	Bull R. near Wardner	1530	1720	1914-83	693	55	4.13	56	140	64	1.14
08NP001	Flathead R. at Flathead	1110	1750	1929-83	766	30			190	55	1.29
08NP003	Howel Cr. above Cabin Cr.	145		1977-83	621	6	0.326	6	128	6	1.14
08NP004	Cabin Cr. near the Mouth	93.2		1977-83	673	6	0.238	6	174	6	1.38
08NP002	Couldrey Cr. in Lot 9380	118		1974-83	682	10	0.302	10	153	10	1.16
08NK026	Hosmer Cr. above Diversions	6.40		1981-83					148	3	-
05AA026	Dutch Cr. near the Mouth	143		1966-83	322	17	0.477	17	103	18	1.17
05AA027	Racehorse Cr. near the Mouth	217		1966-83	384	13	0.238	13	137	18	1.75
05BL021	Highwood R. below Picklejar Cr.	132		1965-83	596	18	0.700	18	187	18	1.20
05BL019	Highwood R. at Diebel's Ranch	776		1950-83	350	32	1.41	32	108	33	1.53
05BL022	Cataract Cr. near Forestry Road	166		1966-83	368	12	0.150	12	131	18	1.46
<u>Mining Company Stations:</u>											
EL76.4	Elk R.	143	2190	1977-83	578	7	0.19	7	116	7	1.13
EL52.5	Elk R.	497	2170	1977-82	511	6	1.05	6	105	6	1.12
CA0.1	Cadorna Cr.	131	2310	1977-83	780	7	0.46	7	143	7	1.14
WE1.0	Weary Cr.	20.4	2165	1977-83	460	7	0.04	7	142	7	1.07
F01.6	Forsyth Cr.	178	2290	1977-80	283 ^e	4	0.06	4	79.8	4	1.07
WS1	Fording R.	391					0.79 ^e		117 ^e		
WS18	Elk R.	961					2.0 ^e		83.6 ^e		

^e, estimate

4. HYDROLOGIC REGIONALIZATION

4.1 Climatological Regionalization

Climatological regionalization was based on regional plots of mean annual temperature and precipitation versus station elevation as shown in Figures 3 and 4. Data summaries are listed in Table 1. The temperature plot revealed a single well-defined zone for the Elk River basin. Kootenay River valley stations near the mouth of Elk River were grouped in the lower elevation part of the plot but with more scatter. The mean annual precipitation plot revealed two climatological subregions shown in Figure 2, a high precipitation subregion in the south, a lower precipitation subregion in the north and a transitional area in between.

In Figure 5 a plot of maximum 24-hour precipitation also identified the same subregions. The high precipitation subregion is indicated by Fernie and extends through the MacDonald and Clark Ranges from the southeast. This location is not conclusive from this data alone but is substantiated in the following runoff regionalization section in which the Flathead and Wigwam Rivers confirm a high runoff subregion. Corbin precipitation indicates intermediate or transitional conditions which would extend through the Michel Creek watershed. This transition is relatively narrow extending northwest-southeast approximately between Hosmer and Sparwood. North of Sparwood the plot indicates that the Elk River watershed lies in a uniform lower precipitation area.

4.2 Snow Pack Regionalization

Snow pack regionalization was based on a regional plot of mean annual maximum snow water equivalent versus station elevation as shown in Figure 6. Snow water equivalent means were based on the larger values of March 1st or April 1st data for the period of record as listed in Table 2.

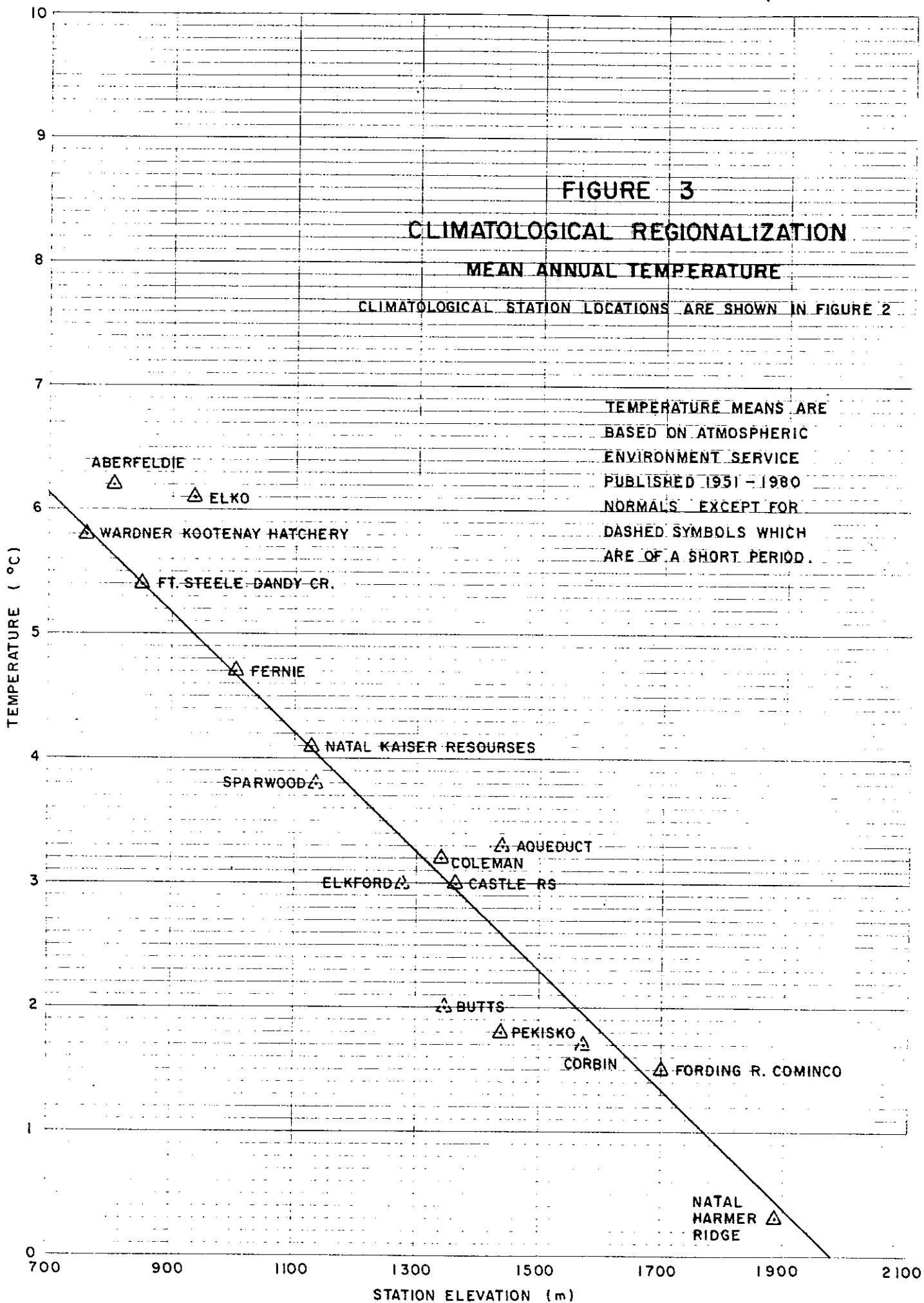
FIGURE 3

CLIMATOLOGICAL REGIONALIZATION

MEAN ANNUAL TEMPERATURE

CLIMATOLOGICAL STATION LOCATIONS ARE SHOWN IN FIGURE 2

TEMPERATURE MEANS ARE BASED ON ATMOSPHERIC ENVIRONMENT SERVICE PUBLISHED 1951-1980 NORMALS EXCEPT FOR DASHED SYMBOLS WHICH ARE OF A SHORT PERIOD.



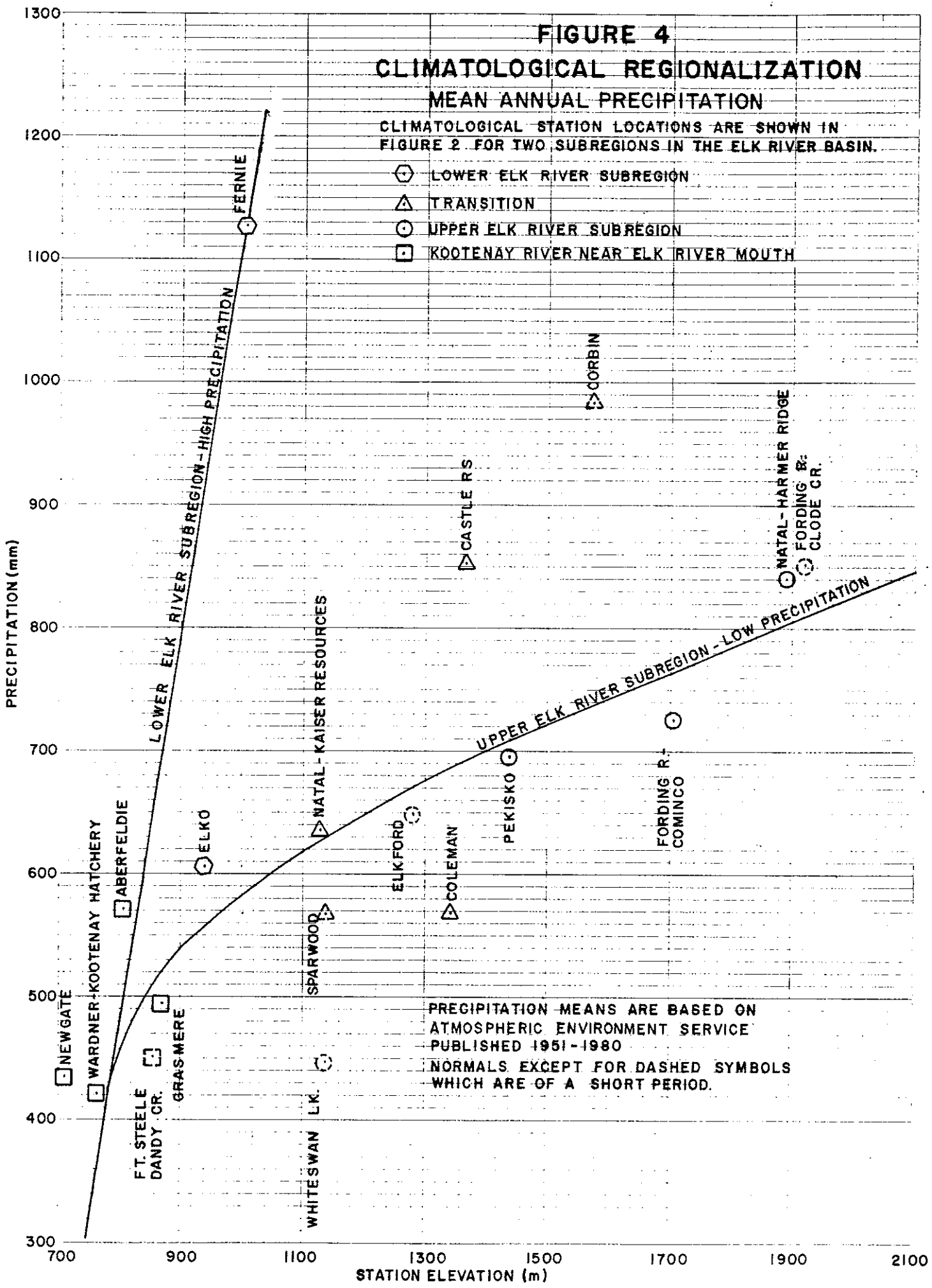
0704

177 033 100 100 100 100

FIGURE 4 CLIMATOLOGICAL REGIONALIZATION MEAN ANNUAL PRECIPITATION

CLIMATOLOGICAL STATION LOCATIONS ARE SHOWN IN
FIGURE 2 FOR TWO SUBREGIONS IN THE ELK RIVER BASIN.

- LOWER ELK RIVER SUBREGION
- △ TRANSITION
- UPPER ELK RIVER SUBREGION
- KOOTENAY RIVER NEAR ELK RIVER MOUTH



PRECIPITATION MEANS ARE BASED ON
ATMOSPHERIC ENVIRONMENT SERVICE
PUBLISHED 1951-1980
NORMALS EXCEPT FOR DASHED SYMBOLS
WHICH ARE OF A SHORT PERIOD.

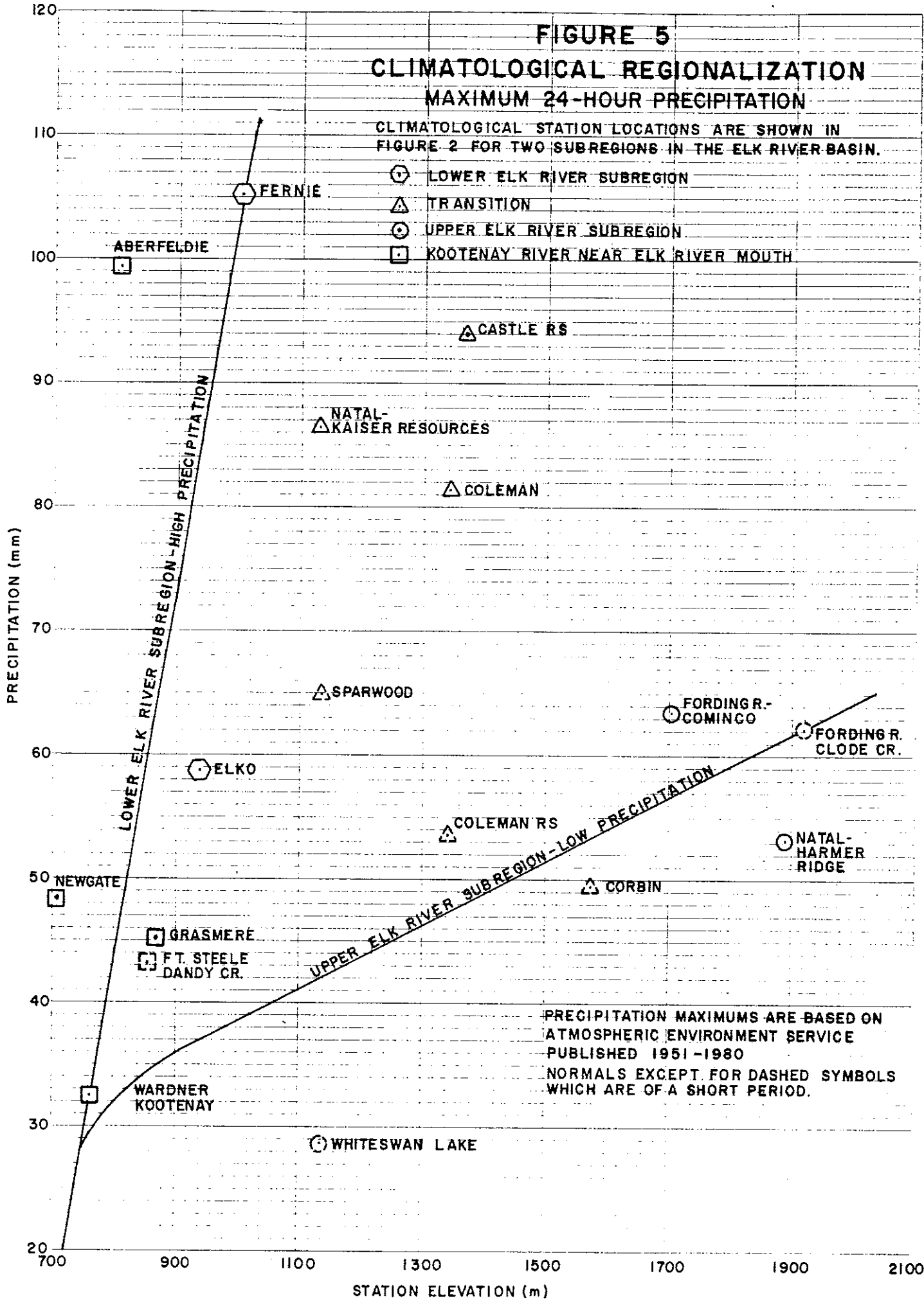
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FIGURE 5 CLIMATOLOGICAL REGIONALIZATION MAXIMUM 24-HOUR PRECIPITATION

CLIMATOLOGICAL STATION LOCATIONS ARE SHOWN IN
FIGURE 2 FOR TWO SUBREGIONS IN THE ELK RIVER BASIN.

- LOWER ELK RIVER SUBREGION
- △ TRANSITION
- ⊙ UPPER ELK RIVER SUBREGION
- KOOTENAY RIVER NEAR ELK RIVER MOUTH



PRECIPITATION MAXIMUMS ARE BASED ON
ATMOSPHERIC ENVIRONMENT SERVICE
PUBLISHED 1951-1980
NORMALS EXCEPT FOR DASHED SYMBOLS
WHICH ARE OF A SHORT PERIOD.

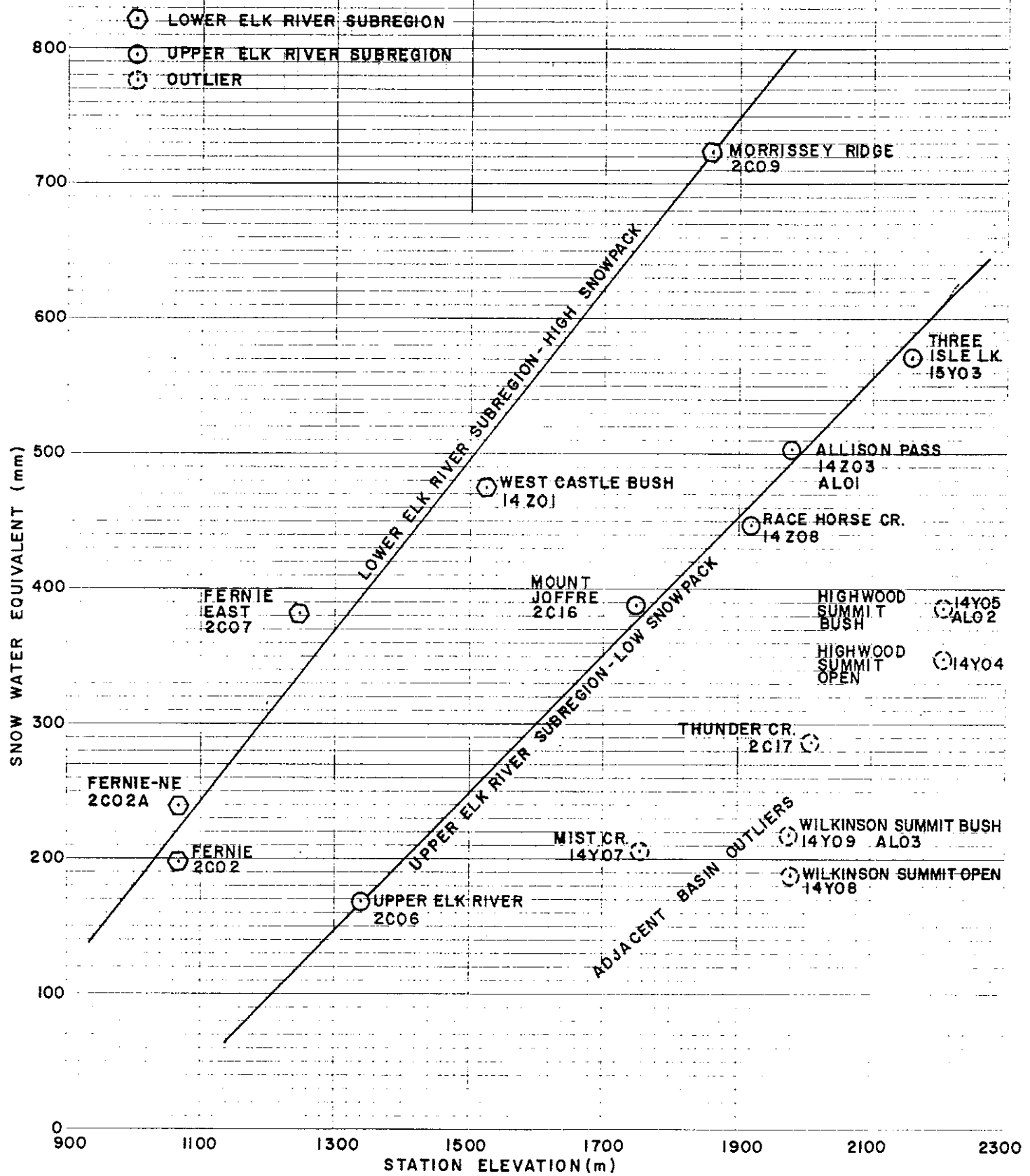
FIGURE 6

CLIMATOLOGICAL REGIONALIZATION

MEAN ANNUAL MAXIMUM SNOW WATER EQUIVALENT

SNOW WATER EQUIVALENT MEANS ARE BASED ON THE LARGER VALUES OF MARCH OR APRIL DATA FOR THE PERIOD OF RECORD AS LISTED IN TABLE 2.

SNOW COURSE STATION LOCATIONS ARE SHOWN IN FIGURE 2 FOR TWO SUBREGIONS IN THE ELK RIVER BASIN.



46-10703

19-2 IN TO THE PUBL. MARCH 1954

The plot once again confirmed the presence of the two subregions in the Elk River basin.

4.3 Runoff Regionalization

Runoff regionalization was based on a regional plot of mean annual unit runoff versus median basin elevation (Figure 7). This confirmed the presence of the hydrologic subregions defined in the previous sections. The watershed points are fairly well segregated in the plot and define runoff-elevation curves or bands* for the subregions but with slightly more scatter than the precipitation plots.

4.4 Peak Flow Regionalization

Peak flow regionalization was based on a regional plot of mean annual unit peak flows versus drainage area (Figure 8). Although the two subregions could be inferred from the plot sufficient evidence was not shown to clearly define envelope curves for each subregion. For example, the lower runoff-upper Elk River basin could be defined by a curve (straight line on a log-log plot) running through Elk River near Natal (08NK016) and Fording River below Clode Creek (08NK021) with Fording River at the Mouth (08NK018) plotting almost on the line. The slope of this line is -0.22 which is identical to peak flow envelope curves for the northeastern half of the province defined in other regional hydrologic studies. However, a band which encompasses all Elk River stations was drawn with a slope of -0.18 to define the regional mean annual peak daily flow in the Elk River basin.

* The regional runoff and streamflow plots are presented with bands drawn to encompass the plotted points in each subregion rather than with regression type curves as were used in the climatological regionalizations. This method is a new approach to aid in assessing future runoff calculations by consultants in which an acceptable estimate would lie in the appropriate band. The climatological curves were intended for descriptive purposes only therefore visually defined regression lines or curves were appropriate.

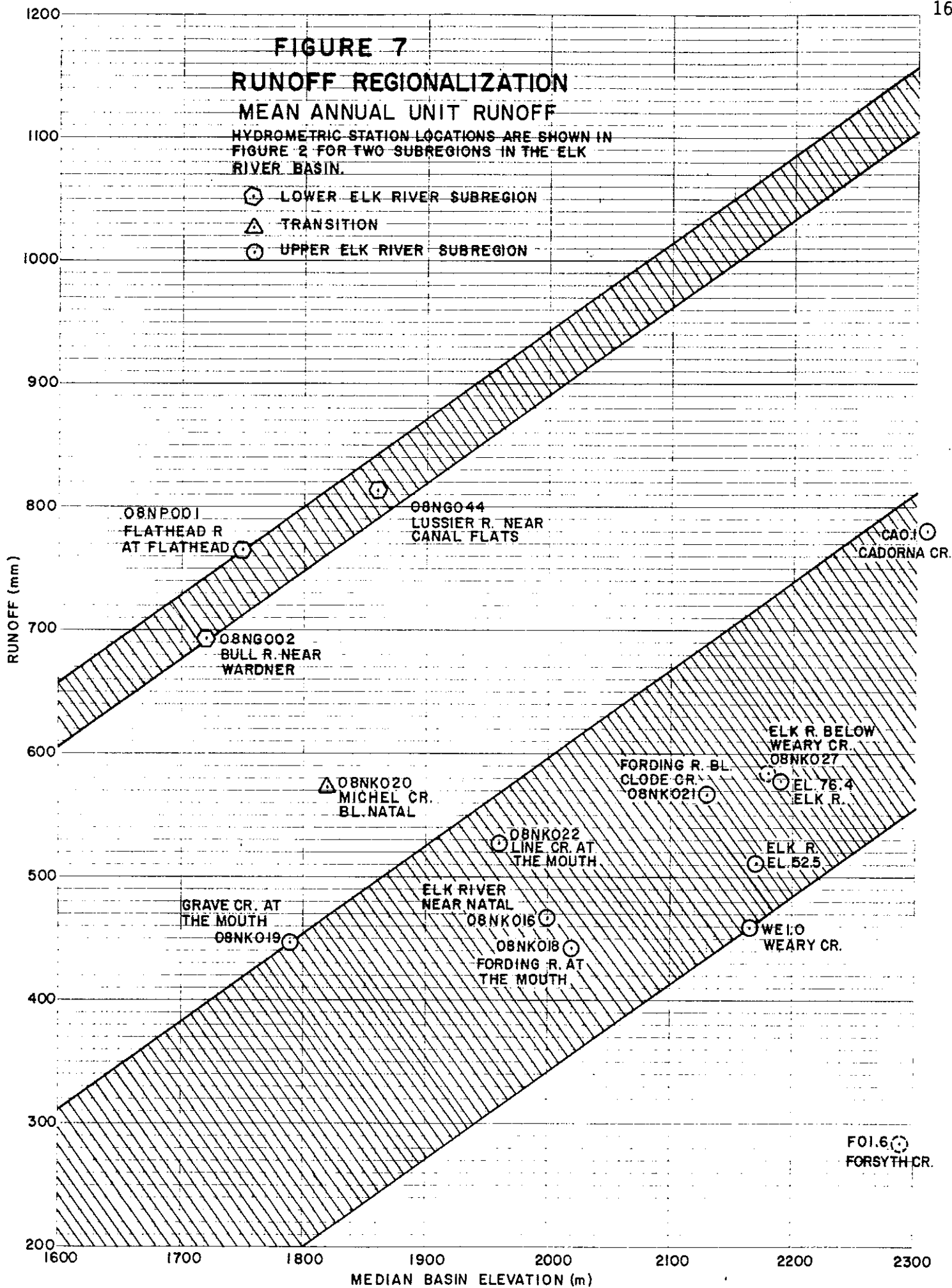
FIGURE 7

RUNOFF REGIONALIZATION

MEAN ANNUAL UNIT RUNOFF

HYDROMETRIC STATION LOCATIONS ARE SHOWN IN FIGURE 2 FOR TWO SUBREGIONS IN THE ELK RIVER BASIN.

- LOWER ELK RIVER SUBREGION
- △ TRANSITION
- UPPER ELK RIVER SUBREGION



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PLAN TO THE INSTITUTE OF WATER RESOURCES

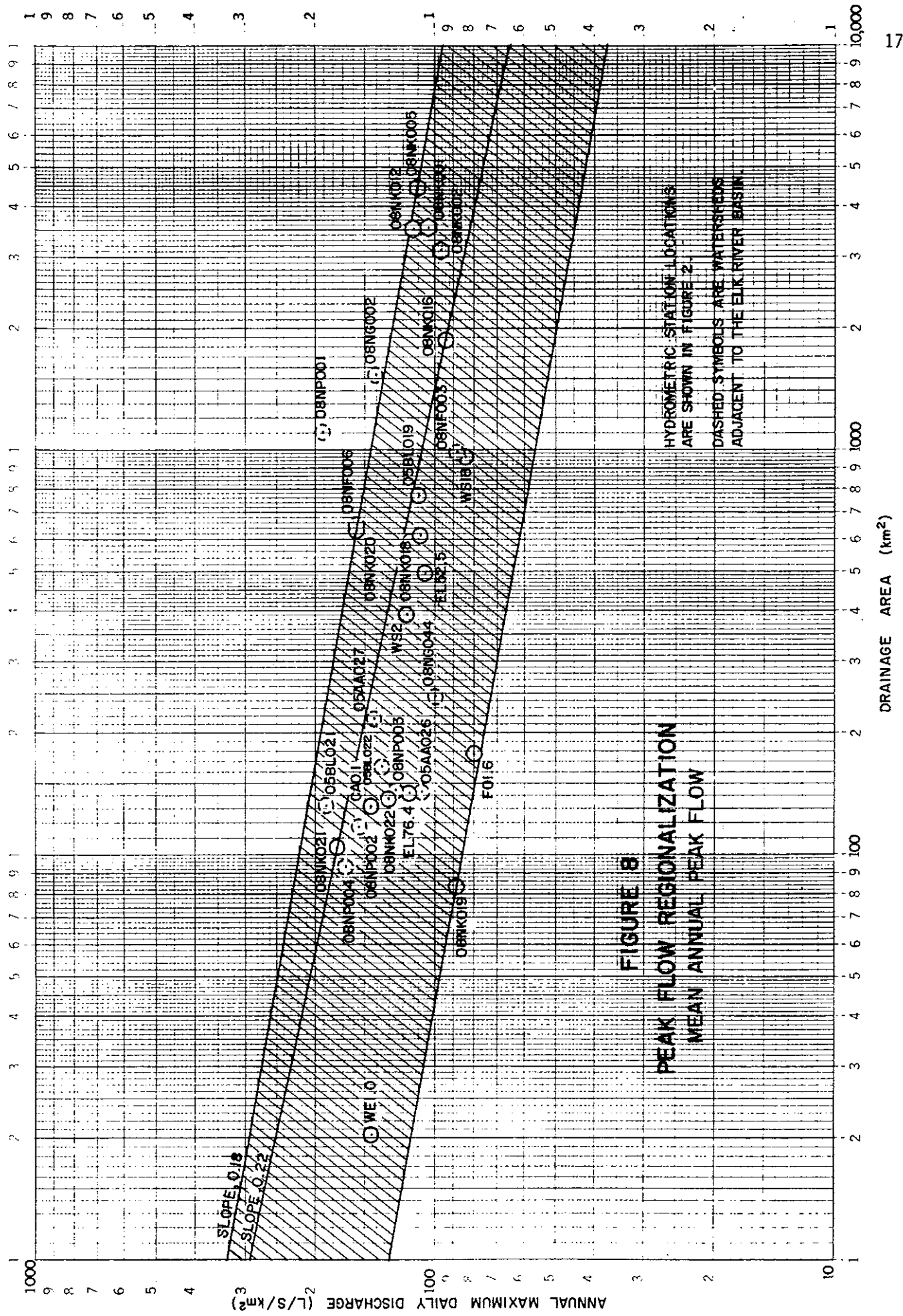


FIGURE 8
PEAK FLOW REGIONALIZATION
MEAN ANNUAL PEAK FLOW

HYDROMETRIC STATION LOCATIONS ARE SHOWN IN FIGURE 2.
 DASHED SYMBOLS ARE WATERSHEDS ADJACENT TO THE ELK RIVER BASIN.

DRAINAGE AREA (km²)

To provide some information for other frequency floods, certain long-term stations that helped to define the location of the upper and lower bounds of the band were selected for frequency analysis. The results were plotted to define bands for standard design recurrence intervals of 10, 25, 50, 100 and 200-years in Figures 9 to 13.

The peak flow regionalization procedure is based on annual maximum daily discharges so that data from manual gauge hydrometric stations can be utilized. For the purpose of making instantaneous flow estimates, ratios of instantaneous to daily discharge were computed for annual peaks for all recorder stations where the required data were available. In each record the highest two or three peaks were examined for the maximum ratio which was then plotted against drainage area (Figure 14). A single envelope curve was drawn through the highest plotted ratios within the Elk River basin to define a regional instantaneous to daily peak flow relationship. Other neighbouring watershed stations used in the study were treated as outliers.

4.5 Low Flow Regionalization

Low flow regionalization was based on a regional plot of mean annual minimum daily flows versus drainage area (Figure 15). This plot resulted in a single hydrologic zone of low flow. Forsyth Creek (FO 1.6) of the Elko Mining network plots low in the relationship but is based on only three years of record and may also represent an anomaly as indicated in Figure 7.

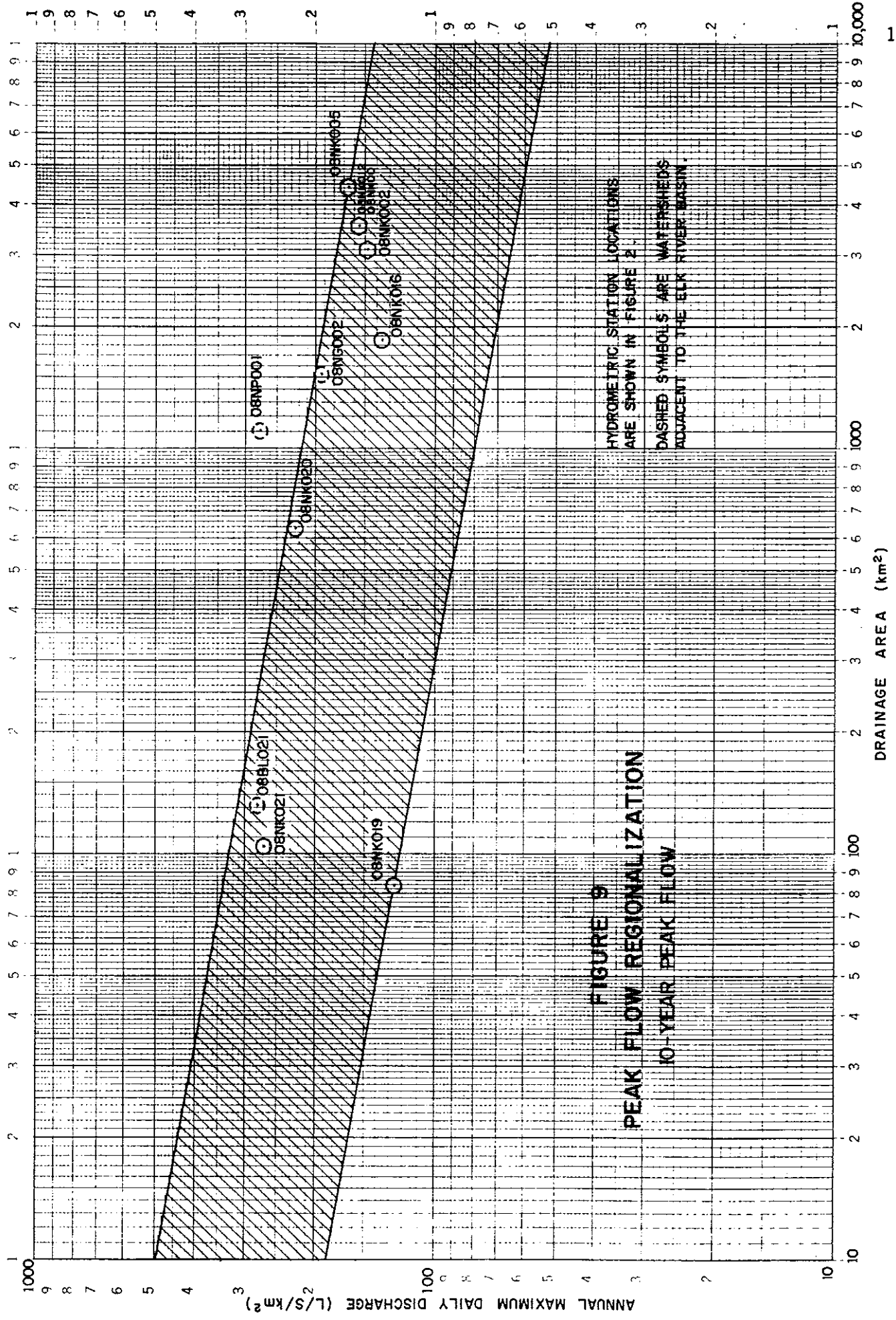


FIGURE 9
PEAK FLOW REGIONALIZATION
10-YEAR PEAK FLOW

HYDROMETRIC STATION LOCATIONS
 ARE SHOWN IN FIGURE 2.
 DASHED SYMBOLS ARE WATERSHEDS
 ADJACENT TO THE ELK RIVER BASIN.

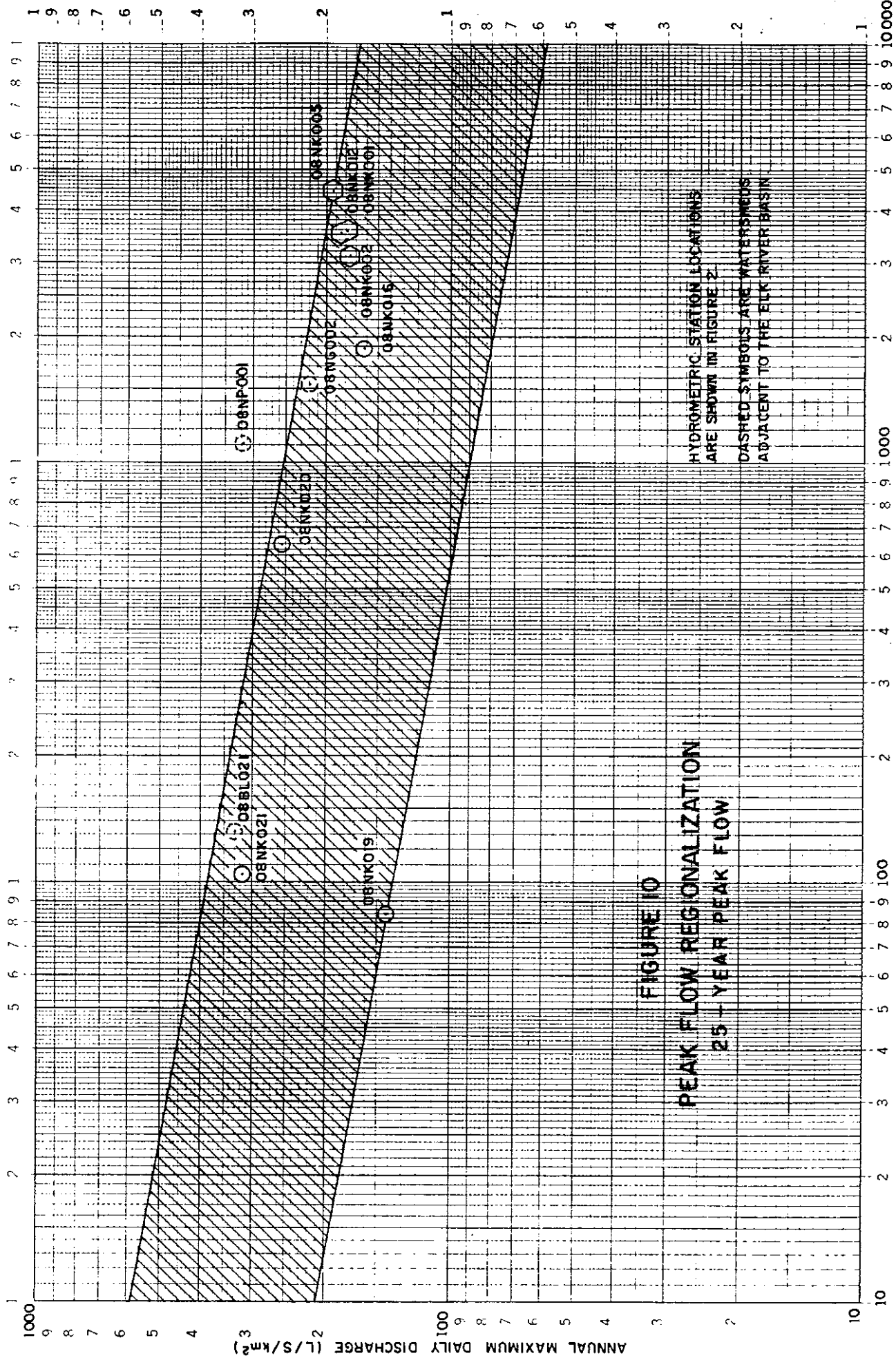


FIGURE 10
PEAK FLOW REGIONALIZATION
25 - YEAR PEAK FLOW

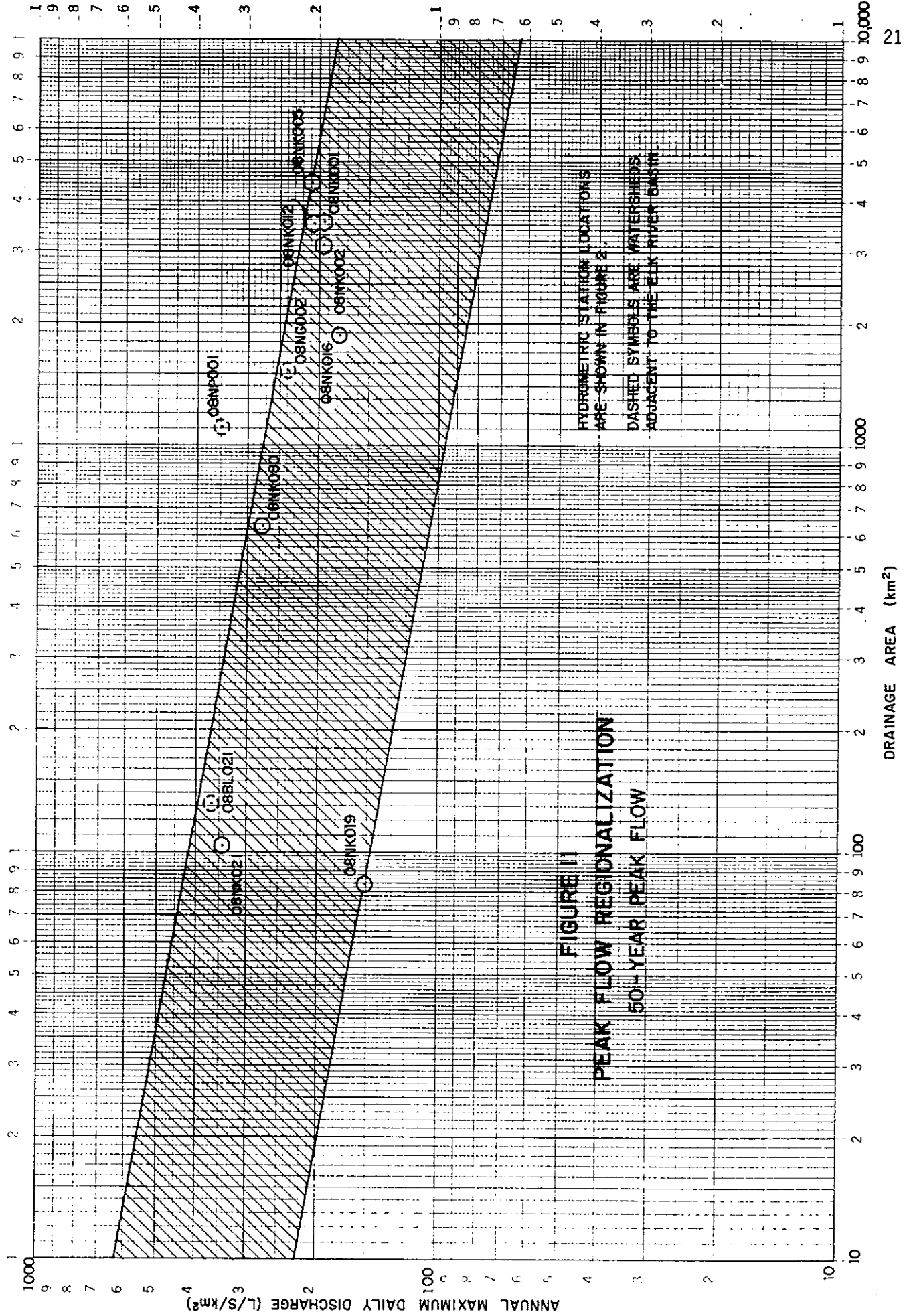


FIGURE II
PEAK FLOW REGIONALIZATION
50-YEAR PEAK FLOW

HYDROMETRIC STATION LOCATIONS
 ARE SHOWN IN FIGURE 2.
 DASHED SYMBOLS ARE WATERSHEDS
 ADJACENT TO THE ELK RIVER BASIN.

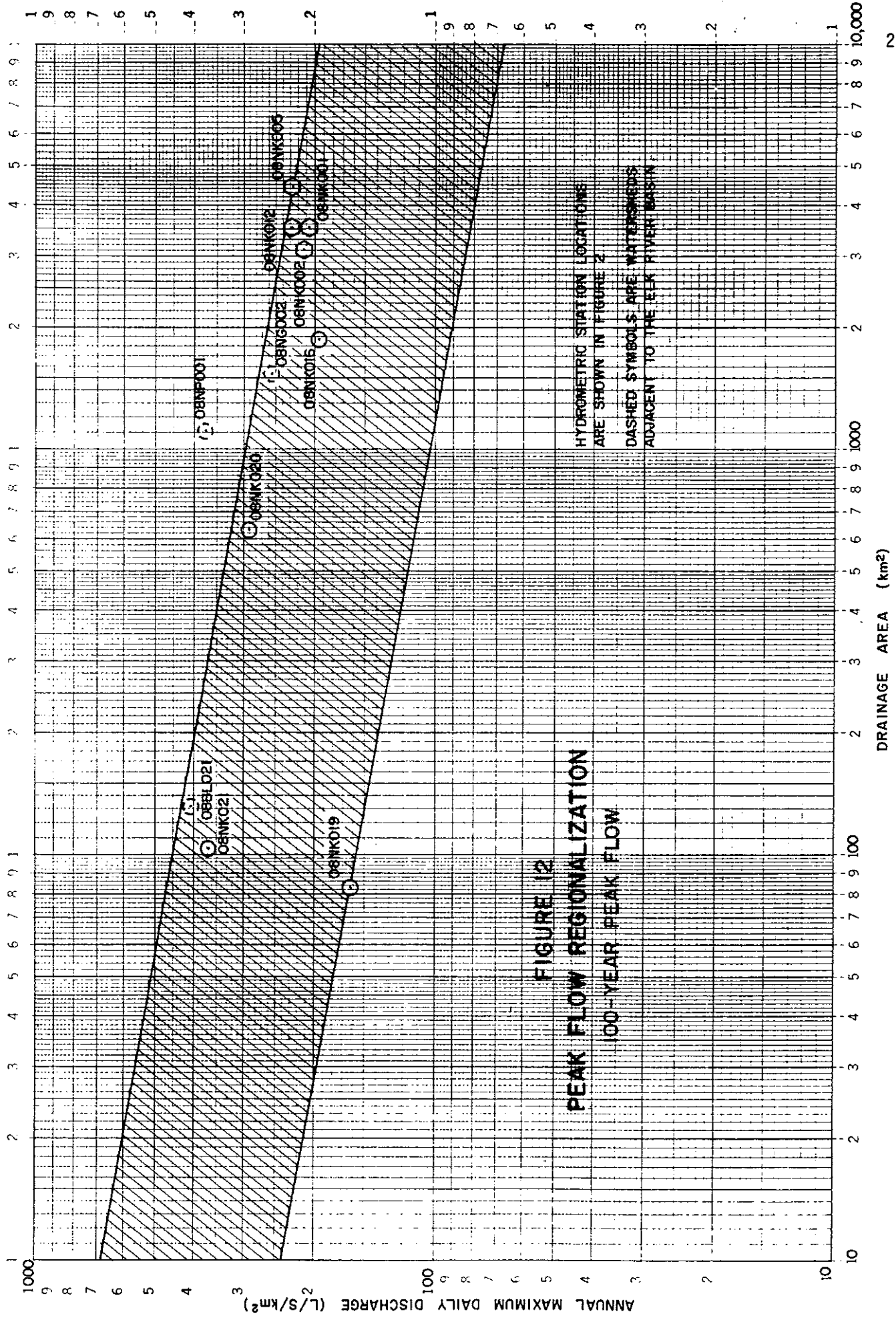
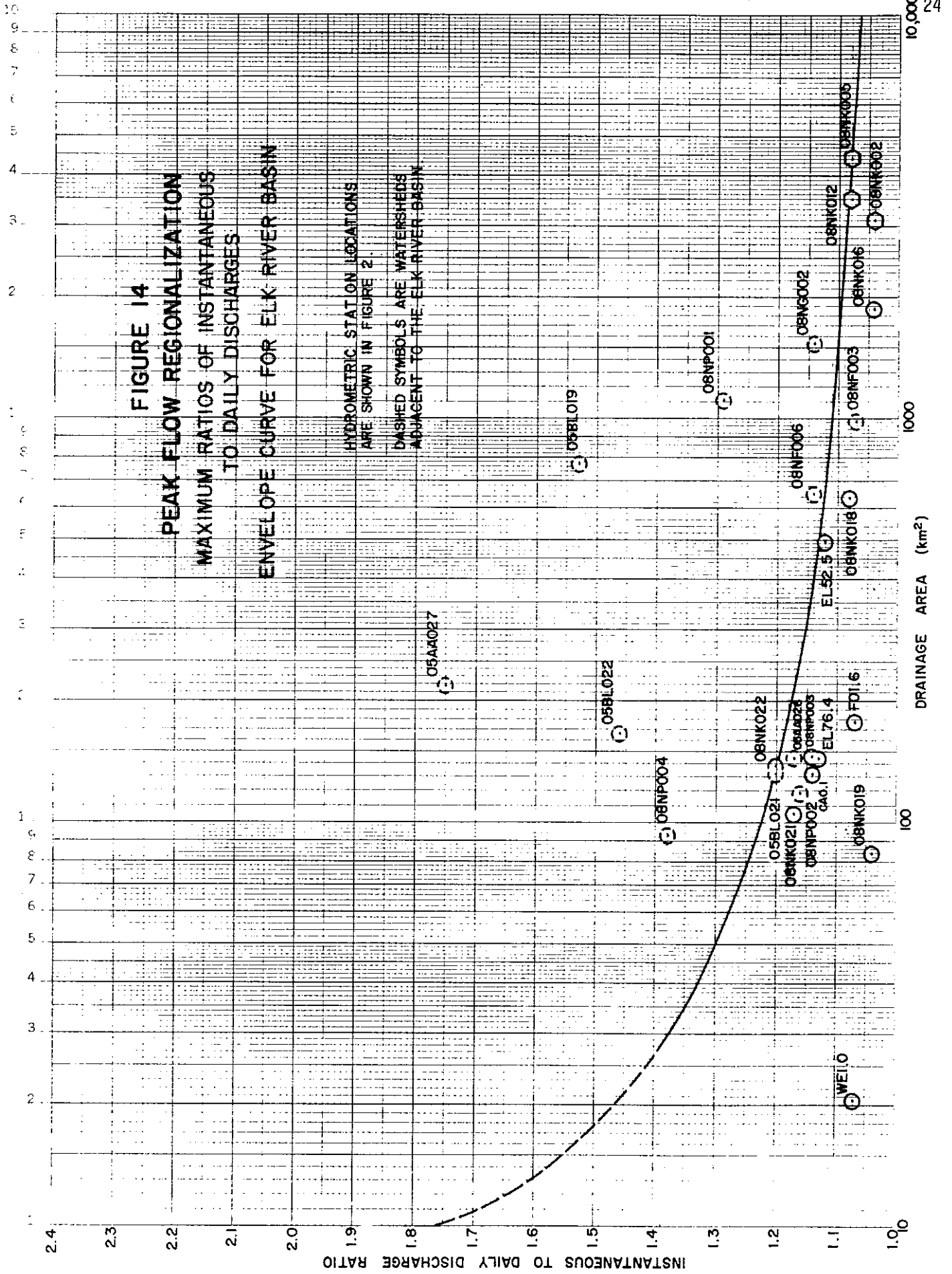
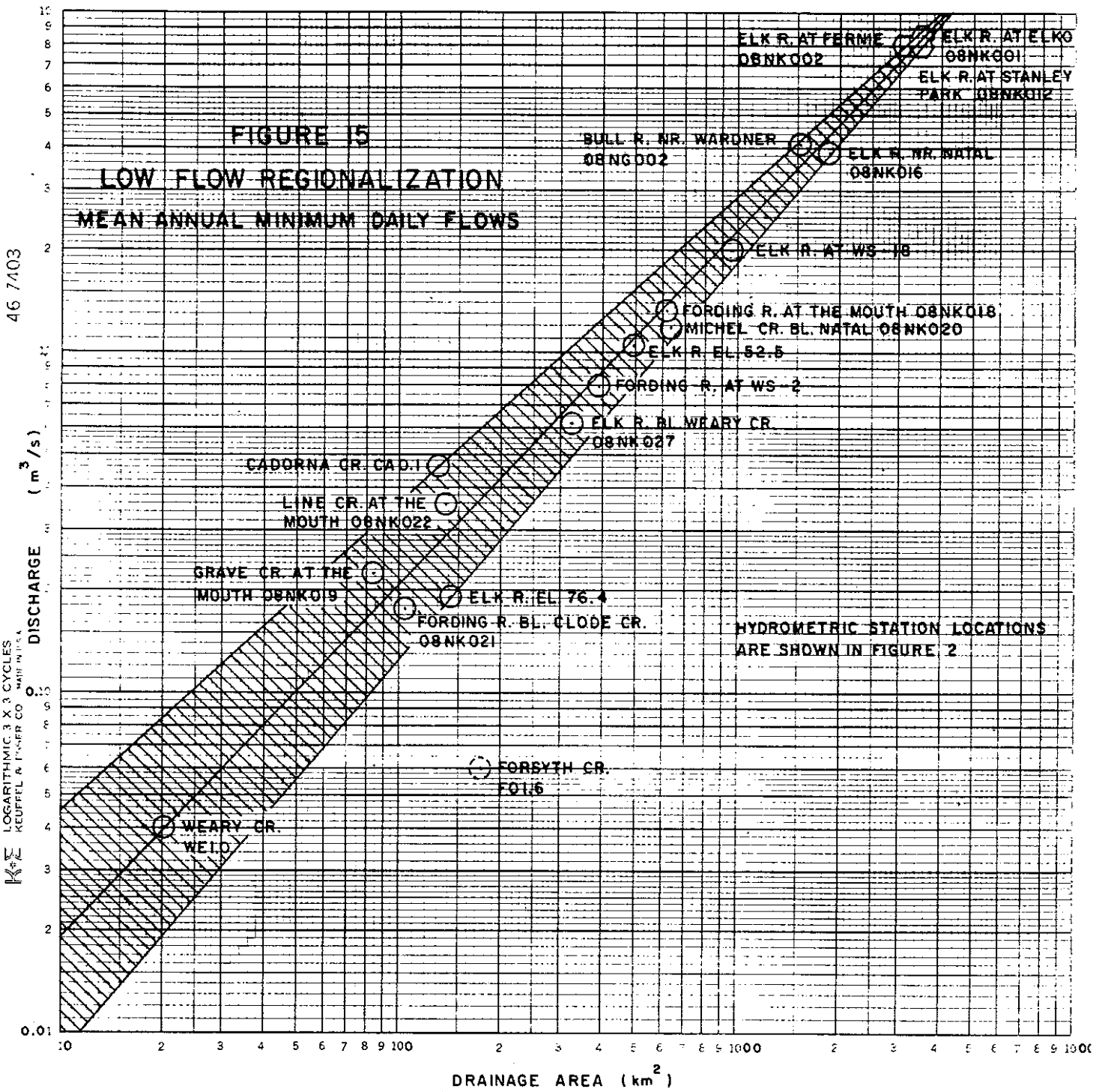


FIGURE 12
 PEAK FLOW REGIONALIZATION
 100-YEAR PEAK FLOW





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5. HYDROLOGIC ESTIMATES FOR SMALL DRAINAGE AREAS

5.1 Design Information Limitations

Hydrologic design estimates for small ungauged drainage areas (<100 km²) are generally more difficult to make than for large areas. This is not so much a limitation of hydrologic knowledge as it is the general paucity of small-stream hydrometric data. Nevertheless, design discharges were required for various planned mining projects in the study area and many hydrology studies were conducted by different consulting firms engaged by the mining companies. The net result was an unnecessary duplication of effort with uncoordinated studies which used an unorganized or incomplete data base.

Notwithstanding the partial intent of this report to present a hydrologic base for preliminary water management planning and assessment of proposed projects, the following recommendations are made for estimating design flow characteristics. This design approach is not intended as a standard reference of project design or step-by-step design manual approach but rather as a general guide to help the engineer solve a design problem. Until an adequate data base is achieved and regional design curves are established the best hydrologic design approach would be a stepwise procedure increasing in complexity with an increase in the amount of available information.

5.2 Volume Runoff Design

Seasonal or annual runoff design estimates in ungauged areas for storage sites or high runoff-season diversions should follow a regional analysis approach as introduced in Section 4.3. Since unit runoff is the basis of this method it is similarly applicable to large and small basins.

Figure 7 should be replotted with updated information and all unit runoff data adjusted to a common long-term period using suitable long-term index stations for each subregion. The problem stream site should be positioned in the appropriate subregion giving a similar weight to the degree of proximity of any plotted gauged site.

5.3 Peak Flow Design

Peak flow design estimates in small ungauged areas should be based on various methods depending on available data and its proximity. In the case of no nearby hydrometric data the flood estimating procedure should be based on precipitation intensity data (intensity-duration-frequency curves). For example, the rational formula could be used with either regional precipitation maps/estimates or the closest rainfall recorder station adjusted for the problem site. The estimate should be checked using regional plots similar to those of Figures 8 to 14 or their projections. In the case where the problem site is near a hydrometric station it can be compared with the plotted position of the latter in the regional plots. Since regional plots are usually based on daily data due to the paucity of recorder installations, instantaneous peaks can be derived from a plot such as Figure 14. If the nearby hydrometric station has a recorder with identifiable storm hydrographs a unit hydrograph approach based on a basin characteristic transfer formula should be used.

If a storm hydrograph shape or volume design is required the method used will again depend on the proximity of hydrometric data. The case with no nearby station will require standard volume hydrograph formulae based on basin physiographic characteristics. When using a unit hydrograph approach both peaks and hydrograph shapes are calculated in the one procedure.

5.4 Low Flow Design

There are no reliable methods for estimating low flows from small ungauged areas. The most practical and accurate procedure incorporates a series of miscellaneous streamflow measurements at the problem site during the low flow base period. This data is then used to derive short duration or monthly flow data based on frequency information of a nearby long-term representative hydrometric station/s. The next best method would be to use a regional plot of stations such as in Figure 15 (not necessarily using daily values) weighting the problem site point by any nearby gauged points. In the absence of neighbouring information a regional curve value is used for an approximate design value.

6. HYDROMETEOROLOGIC NETWORK RECOMMENDATIONS

6.1 Climatological and Snow Course Networks

A climatological/snow course data base is required in this resource development region for project design and operation as well as associated environmental assessment. The climatological/snow course regionalization of this study revealed deficiencies in the types of information collected and in the geographical coverage in the hydrologic subregions both in horizontal extent and vertical distribution. The Elk River basin network is comprised of seven active climatological stations operated by the federal Atmospheric Environment Service (AES) and three by the provincial Waste Management Branch. A number of climatological sites are also maintained by several mining companies. There are six active snow courses operated by the provincial Water Management Branch (WMB).

Listed in Tables 4 and 5 are recommended climatological and snow course changes and proposed stations along with reasons for each recommendation. These additions will complete the current network which

TABLE 4
RECOMMENDED CLIMATOLOGICAL NETWORK CHANGES

Station	Agency*	Change	Reason
Aqueduct	WMB	discontinue	nearby Sparwood and Natal-Harmer Ridge provide adequate coverage
Elkford	AES	continue only one of these stations	only station in this area; near new mine site
Greenhills	WML		
Odlum	WMB	add precipitation storage	only climate station in upper Elk River reach; near new mine site
Forsyth Creek	WMB	continue one station: add precipitation storage	complements precipitation recorder
Fording Clode Creek	AES	-or alternatively- add precipitation recorder	only recorder in this area; near operating and expanding mine site
Line Creek	CNRL	continue one or more stations	only stations in this area; near hydrometric stations; near operating and expanding mine site

* AES, Atmospheric Environment Service
CNRL, Crows Nest Resources Limited
WMB, Waste Management Branch
WML, Westar Mining Limited

TABLE 5
RECOMMENDED SNOW COURSE NETWORK CHANGES

Station	Agency	Change	Reason
Corbin	Water Management Branch	establish	only station in transitional subregion near precipitation station
Fording River Clode Creek		establish	only station in this area; near precipitation and hydrometric stations
Fernie 2C02		discontinue	scheduled replacement by 2C02A

should then meet hydrologic zone sampling and other regional planning and operational requirements.

The recommendations for new stations did not specify the agency to be responsible for construction and maintenance. However, it should be emphasized that any company or agency that collects climatological/snow course data must adhere to the standards set by the AES/WMB for the data to be universally applicable.

6.2 Hydrometric Network

A hydrometric data base is required in this resource development region for project design and operation as well as associated environmental impact assessment. Hydrometric data uses include peak flow designs, water supply assessment and evaluation of other potential low flow concerns as well as for operational water management and waste management services. The current hydrometric network in the Elk River basin evolved primarily as a result of site-specific study and/or water use requirements rather than of a comprehensive network planning program. The network is comprised of 11 active hydrometric stations operated by Water Survey of Canada (WSC), three* by Elko Mining Limited (EML) and a number of gauging sites maintained by Fording Coal Limited (FCL) and Crows Nest Resources Limited (CNRL). Mining company hydrometric stations and miscellaneous measurement sites are shown in Appendix A.

The network appears adequate in large-stream stations but inadequate in small-stream gauges considering the diversity of the Elk River basin with its hydrologic subregions. Listed in Table 6 are recommended changes and proposed hydrometric stations along with reasons for each recommendation.

* The last three stations operated by EML have been discontinued on October 24, 1984 ("Elk River Project, 1984 Hydrology Summary" by Hydrocon Engineering (Continental) Ltd., April 1985).

TABLE 6
RECOMMENDED HYDROMETRIC NETWORK CHANGES

Station	Agency*	Change	Reason
Elk River EL 76.4	EML	discontinue	nearby WSC 08NK027 meets subregional requirements
Cadorna Creek CA 0.1	EML	reestablish with recorder	only measured western tributary of upper Elk River; near proposed mine site
Weary Creek WE 1.0	EML	reestablish with recorder	only measured eastern tributary of upper Elk River; near proposed mine site
Michel Creek 08NK020	WSC	add recorder	only large-stream tributary measured in the eastern transitional area; near operating and expanding mine site
Michel Creek 08NK028	WSC	add recorder	only small-stream tributary measured in the eastern transitional area; near operating and expanding mine site
Whiting Creek 08NK017	WSC	reestablish with recorder	only tributary measured in the western transitional area; near operating and expanding mine site
Brownie Creek Blackrill Creek Blackstone Creek	FCL	continue one station with recorder	only small-stream tributary measured in the area; near operating and expanding mine site
West Line Creek No Name Creek	CNRL	continue one station with recorder	only small-stream tributary measured in the area; near operating and expanding mine site

* CNRL, Crows Nest Resources Limited
EML, Elco Mining Limited
FCL, Fording Coal Limited
WSC, Water Survey of Canada

It should be noted that all sites should monitor natural flow conditions and any significant upstream water use (current and/or planned) should be carefully considered on all parts of an annual hydrograph before any station is reestablished. Alternative sites will have to be found for those which are unsuitable. Recorders are preferable over manual gauges for flood hydrograph data collection purposes. It should also be noted, as for the climatological/snow course station establishment, that any company or agency that collects hydrometric data must adhere to the standards set by WSC for the data to be universally applicable.

7. CONCLUSIONS

A hydrology overview study of the Elk River basin has been completed using all available hydrologic information from both government agencies and private mining companies. All measured and observed discharges that were listed in company reports and others obtained separately are presented in a standard format as Appendices to this report. It is recommended that these Appendices be updated every five years.

A regionalization procedure using historical data was utilized to produce graphical relationships between climatological and streamflow characteristics and physiographic variables. This information was used to define two uniform hydrologic subregions in the Elk River basin. All historical data and active hydrometeorologic station locations were reviewed and climatological, snow course and hydrometric network additions were recommended to compile a data bank for hydrologic aspects of current water management and future development plans.

This study was conducted under a general perspective of quantitative analysis, more for descriptive purposes than for rigorous hydrologic design. Published historical information was used without regard to refinement or

adjustments for common time periods. Hence the graphical relationships presented in this report should not be used without other information for design purposes.

The results of this study do however present a fairly reliable description of climatologic and streamflow conditions in the Elk River and immediately surrounding watersheds. As such, this information is useful for operation, environmental impact assessment, planning and preliminary design of water related activities and projects.

APPENDIX A

MINING COMPANY
HYDROMETRIC STATIONS

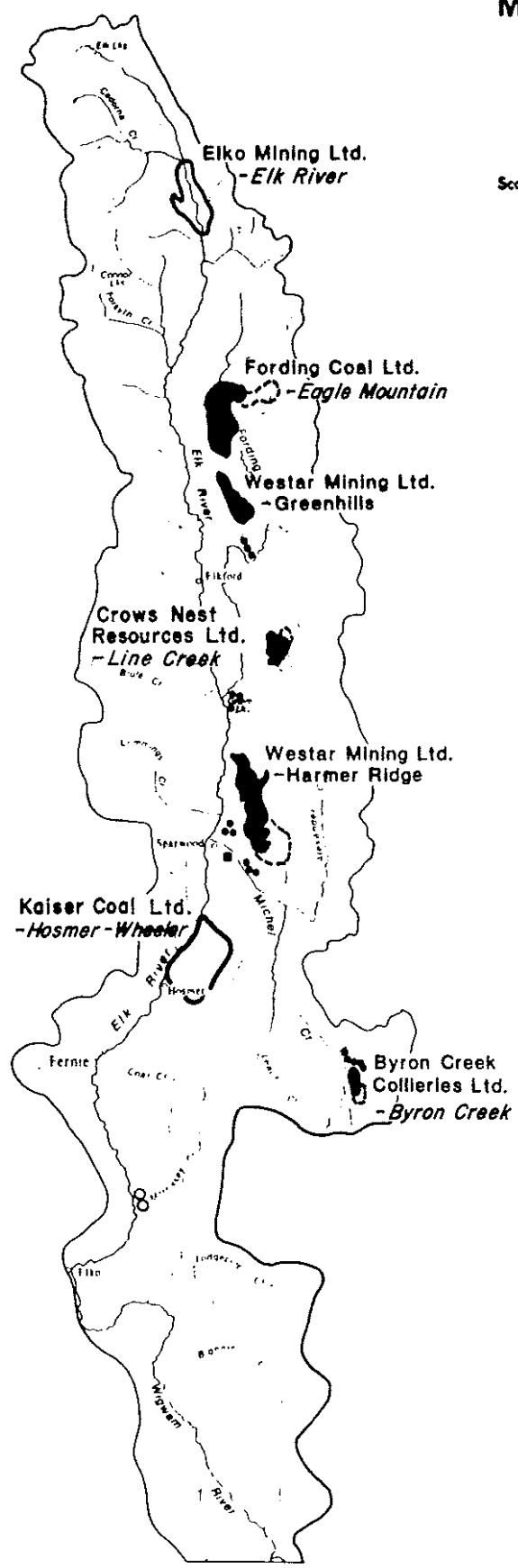
APPENDIX AMINING COMPANY HYDROMETRIC STATIONS

Hydrometric data have been collected by numerous mining companies over the past ten years in the Elk River basin. Many of the actual observed and measured discharge data have been presented in various mining proposed project reports. Mining site locations are shown on a small-scale map in Figure 16. Actual mining company hydrometric station and measurement site locations are shown on various scale maps in Figures 17 to 19. Elko Mining Limited hydrometric station locations are shown in Figure 2.

Streamflow measurements which have been collected and listed in mining company reports have been extracted and presented in Appendices 2 to 6. Other unpublished data were obtained directly from Westar Mining Limited and are shown in Appendices 7 and 8. A standard form of hydrometric data reporting was devised that follows Water Survey of Canada publication standards but with certain deviations to accommodate the nature of mining company data. An annual daily discharge table was adapted to present daily miscellaneous measurements and observations. Since these discharges are of a discontinuous nature with many gaps in the records no monthly or annual summary discharge data are presented. However, all other relevant station information such as station name and number, year, type of gauge, location, drainage area, type of flow (natural or regulated), source of information and comments are given. For certain dates two flows are recorded, one for the daily mean discharge and one for a discharge derived from a crest gauge observation for that date. The latter discharge is the maximum observed instantaneous discharge between that date and the previously recorded date. To reduce report volume an annual page was used for a station if three or more daily measurements were available such as in Appendices 2 and 3. The only exception to the above data format was Appendix 4 in which Elko Mining Limited annual daily discharge tables were photocopied directly from the company reports since they were already published in an acceptable format.

FIGURE 16

MINING SITE LOCATIONS



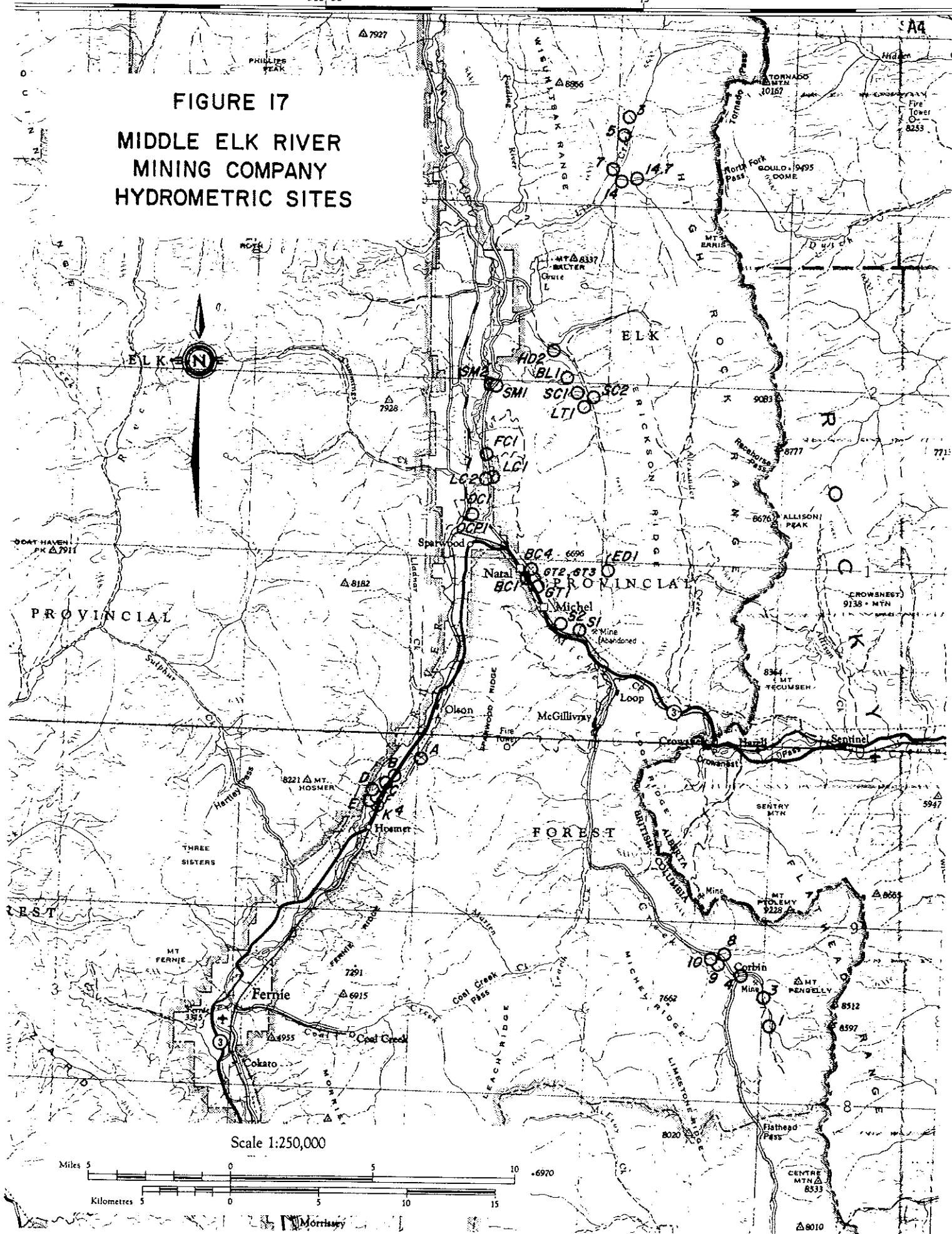
Scale in Kilometres 10 0 10 20

Existing & Proposed Mining Developments

- Existing Mines
 - Surface
 - Underground
- Proposed Mines
 - Surface
- Proposed Expansions
 -
- Plant Sites & Facilities
 - Existing
 - Proposed



FIGURE 17
MIDDLE ELK RIVER
MINING COMPANY
HYDROMETRIC SITES



Scale 1:250,000



Morrissey

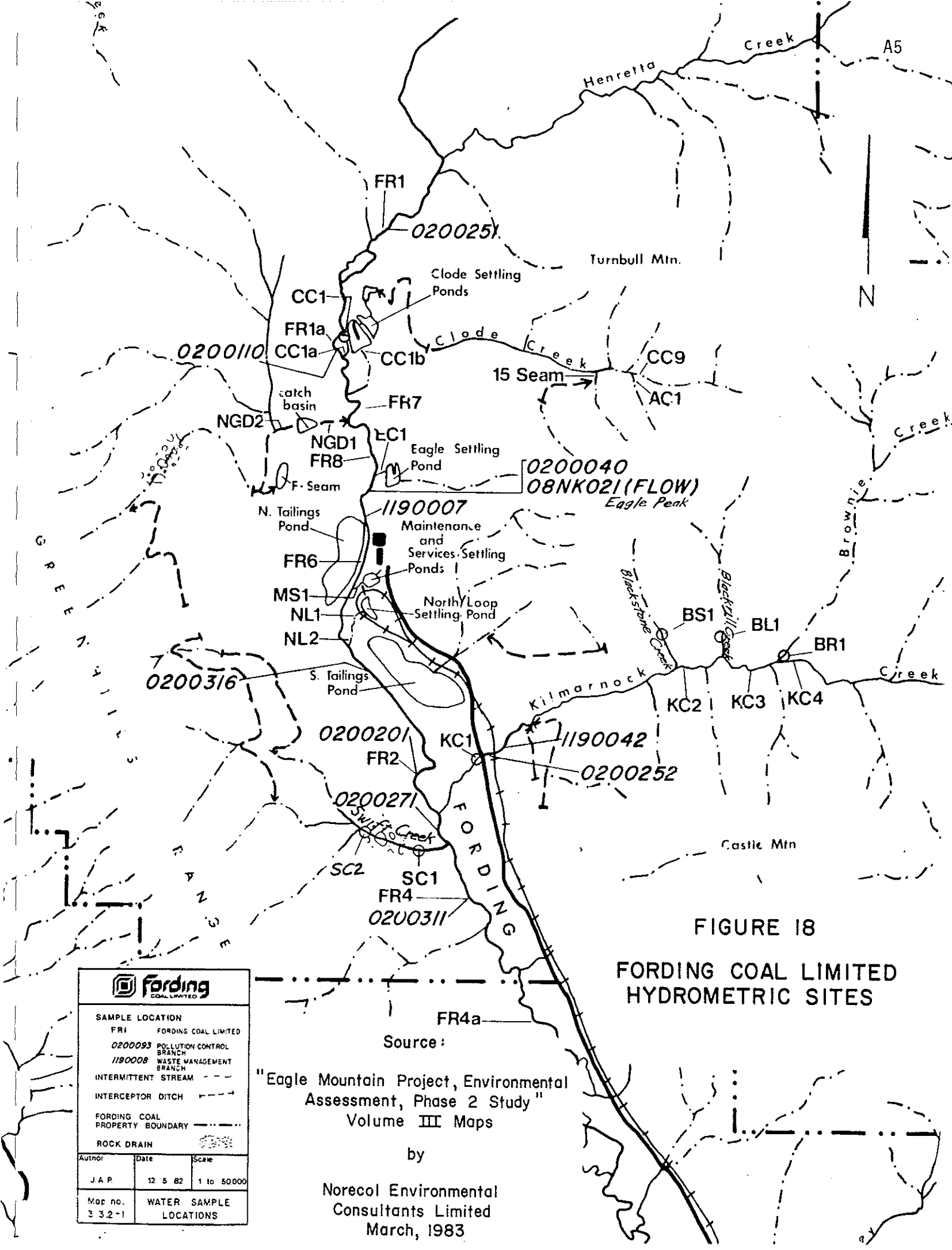


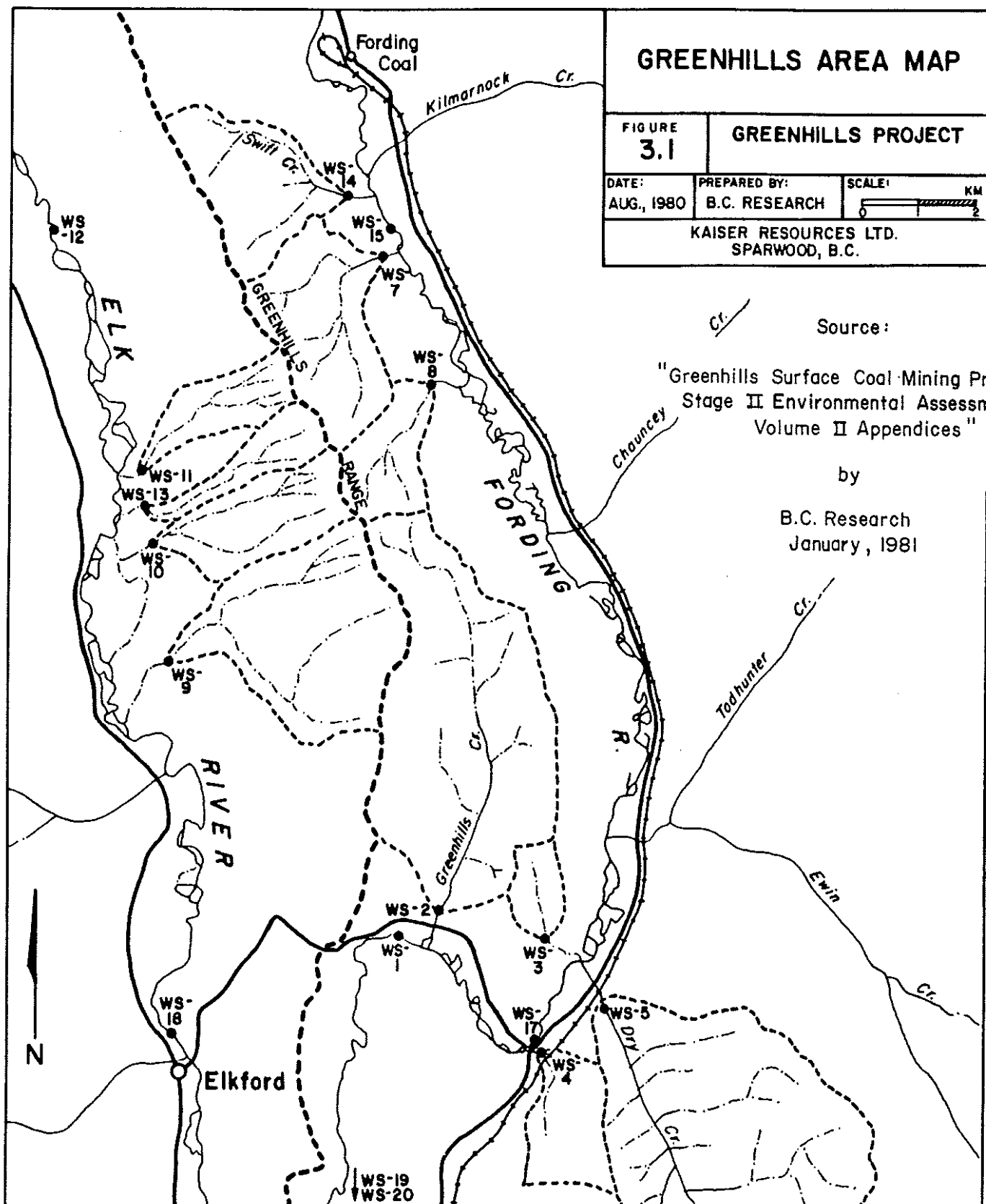
FIGURE 18

FORDING COAL LIMITED
HYDROMETRIC SITES

SAMPLE LOCATION		
FRI FORDING COAL LIMITED		
0200093 POLLUTION CONTROL BRANCH		
1190008 WASTE MANAGEMENT BRANCH		
INTERMITTENT STREAM		
INTERCEPTOR DITCH		
FORDING COAL PROPERTY BOUNDARY		
ROCK DRAIN		
Author:	Date:	Scale:
J.A.P.	12.5.82	1 to 50000
Map no.	WATER SAMPLE LOCATIONS	
3.3.2-1		

Source: "Eagle Mountain Project, Environmental Assessment, Phase 2 Study" Volume III Maps
by Norecol Environmental Consultants Limited March, 1983

WESTAR MINING LIMITED
GREENHILLS HYDROMETRIC SITES



The planning nature of this report precludes a detailed evaluation of mining company hydrometric data. Nevertheless any comments or notes that were given in the mining company reports were sited as to type of gauge used (e.g. recorder, staff gauge, weir) or other relevant information. Regulation upstream of gauged stream sites was examined by a review of Water Management Branch water license information and affected measurements were identified. However, there was no attempt to define the accuracy of hydrometric data and these data should therefore be used for planning purposes only. If the data were to be considered for design purposes it should be examined carefully both for field conditions and office computation procedures. Actual gauge sites would have to be examined and stage-discharge curves evaluated and a rating index defined to evaluate the accuracy of the streamflow data.

APPENDIX B

BYRON CREEK COLLIERIES LIMITED
HYDROMETRIC DATA

Byron Creek Mine Expansion Project

APPENDIX BBYRON CREEK COLLIERIES LIMITEDHYDROMETRIC DATAByron Creek Mine Expansion Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	DATE	DISCHARGE (m ³ /s)	REMARKS
1	Corbin Creek	12.6	49° 29' 20" 114° 38' 40"	Oct., 1981	0.012	natural flow
3	Corbin Creek	17.6	49° 30' 22" 114° 39' 00"	Oct., 1981 Aug./Sept., 1982	0.016 0.060-0.080	regulated since 1975.10.06
4	Corbin Creek	30	49° 30' 58" 114° 40' 06"	Oct., 1981 Aug./Sept., 1982	0.041 0.140-0.200	regulated since 1949.09.10
8	Andy Good Creek	33.1	49° 31' 39" 114° 41' 14"	Aug./Sept., 1981	0.500-0.700	regulated since 1979.11.29
9	Michel Creek	67.1	49° 31' 24" 114° 41' 19"	Oct., 1981	0.141	regulated since 1970.12.29
10	Michel Creek	100.2	49° 31' 24" 114° 41' 26"	Aug./Sept., 1981	0.700-0.900	regulated since 1970.12.29

Source: "Byron Creek Collieries Limited Expansion, Detailed Project Assessment," Volume 1, "Biophysical Environment Impact Assessment," February, 1983.

Note: See Figure 17 for hydrometric site locations.

APPENDIX C

CROWS NEST RESOURCES LIMITED

HYDROMETRIC DATA

Line Creek Project

APPENDIX CCROWS NEST RESOURCES LIMITEDHYDROMETRIC DATALine Creek Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	DATE	DISCHARGE (m ³ /s)	REMARKS
L14	South Line Creek	43.8	49° 55' 01" 114° 46' 09"	July 14, 1975 September, 1975 July 28, 1976	2.25 0.331 0.60	natural flow
L14.7	Line Creek tributary	6.7	49° 54' 58" 114° 45' 31"	July 14, 1975 September, 1975	0.12 0.014	natural flow
L7	West Line Creek	11.4	49° 55' 18" 114° 46' 14"	June 6, 1974 July 14, 1975 September, 1975 July 28, 1976	0.456 0.192 0.068 0.06	natural flow
L5	Line Creek tributary	0.8	49° 56' 24" 114° 45' 42"	July, 1975	0.01	natural flow
L3	No Name Creek	7.3	49° 56' 46" 114° 45' 27"	July 12, 1975 September, 1975	0.351 0.059	natural flow

Source: "Stage 2 Environmental Study of the Line Creek Project," Volume II, Table 5.2.1.1-1/2, Volume III, Table V, for Crows Nest Industries Ltd., Fernie, B.C., by B.C. Research, Vancouver, B.C. August, 1977.

Note: See Figure 17 for hydrometric site locations.

DAILY DISCHARGE

Station Name West Line Creek Station No. L7
 Daily Discharge in Cubic Metres per Second for the Year 19 75

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.235							2
3						0.309							3
4						0.396							4
5						0.389							5
6						0.433							6
7						0.337							7
8													8
9						0.283							9
10													10
11													11
12						0.269							12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23													23
24													24
25													25
26													26
27													27
28													28
29						0.082							29
30						0.099							30
31						0.119							31
	Type of Gauge: <u>staff</u> Location: <u>49° 55' 18" N; 114° 46' 14" W</u> Drainage Area: <u>11.4 km²</u>												
	Comments: <u>natural flow</u>												
	Source: "Stage 2 Environmental Study of the Line Creek Project," Volume 11 and 111, Table 5.2.1.1-2, for Crows Nest Industries, Fernie, B.C., by B.C. Research, Vancouver, B.C., August, 1977.												

APPENDIX D

ELCO MINING LIMITED

HYDROMETRIC DATA

Elk River Project

APPENDIX DELCO MINING LIMITEDHYDROMETRIC DATAElk River Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	PERIOD OF RECORD	REMARKS	PAGE
EL76.4	Elk River	143	50° 26' 48" 114° 57' 00"	1977-83	natural flow	D3
EL52.5	Elk River	497	50° 15' 18" 114° 56' 22"	1977-82	natural flow	D10
CA0.1	Cadorna Creek	131	50° 26' 11" 114° 56' 42"	1977-83	natural flow	D16
WE1.0	Weary Creek	20.4	50° 23' 14" 114° 54' 57"	1977-83	natural flow	D23
FO1.6	Forsyth Creek	178	50° 13' 52" 114° 58' 02"	1977-80	natural flow	D30

Source: "Elk River Project Hydrology Summary, 1977-81, 1982, 1983," for Elco Mining Ltd. by Hydrocon Engineering (Continental) Ltd., Calgary, Alberta. December 3, 1982, May 11, 1983, May 15, 1984.

Note: See Figure 2 for hydrometric site locations.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River (EL 76.4)

Drainage Area: 142.9 km²

Year: 1977

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.33	2.9	3.1	3.5	3.9	3.6	1.7	0.67	0.59
2			0.29	0.37	3.0	4.2	3.7	4.1	2.8	1.6	0.68	0.58
3				0.41	3.1	4.8*	3.8	4.4	2.7	1.6	0.67	0.57
4				0.48	3.3*	4.4	3.3	4.2	2.7	1.5	0.74	0.57
5		0.31B*		0.53	3.1	4.0	2.9	3.7	2.7	1.5	0.97	0.56
6				0.60	2.9	4.1*	2.7	3.8	2.8	1.4	0.48	0.56
7				0.66	2.9	5.0	2.6	4.1	2.8	1.4	0.46	0.55
8				0.74	3.1	7.73*	2.6	4.2	2.8	1.3	1.00	0.54
9				0.84	3.4*	9.6	2.6	4.3	2.7	1.3	0.94	0.54
10				0.90	3.8	8.4	2.7	4.1	2.6	1.3	0.86	0.53
11	0.44B*			1.00	3.9E	6.0	2.8	3.9	2.5	1.2	0.51	0.53
12				1.10	4.1E	4.8	2.9	3.9	2.5	1.2	0.36	0.52
13				1.20	3.9	4.9	2.6	5.7	2.5	1.1	0.33	0.51
14				1.30	3.6	5.0	2.6	6.8	2.5	1.1	0.35	0.50*
15				1.40	4.2	5.0	2.7	5.8	2.4	1.00	0.68BE	0.58
16			0.31*	1.50	4.35*	5.2	3.5	5.0	2.4	1.00	0.68BE	0.68
17				1.60	4.0	5.7	3.6	4.5	2.3	0.90	0.67BE	0.61
18				1.80	3.6	5.4	4.2	4.6	2.3	0.89*	0.66BE	0.45
19				1.90	3.3	5.4	4.7	4.6	2.3	0.88	0.66BE	0.34BE
20				2.00	3.0	5.3	3.7	4.5	2.2	0.85	0.65BE	0.48BE
21				2.10	2.9	5.3	3.3	4.5	2.2	0.80	0.65BE	0.62BE
22			0.27	2.30	2.9	5.1	3.4	4.4	2.1	0.90BE	0.64BE	0.76BE
23				2.40	3.1	5.1	4.0	4.5	2.1	0.80	0.63BE	0.90BE
24				2.40	3.2	5.0	4.4	4.7	2.0	0.94BE	0.63BE	1.04BE
25				2.50*	3.3	4.6	4.5	4.7	2.0	1.10	0.62BE	1.04B
26				2.50	3.5	5.2	4.2	4.9	1.9	0.97	0.62BE	0.56B
27				2.60	3.6	5.4	4.5	4.2	1.9	0.94BE	0.61BE	0.44B
28				2.60	3.5	4.5	4.6	4.4	1.8	0.96BE	0.60BE	0.31B
29			0.24*	2.70	3.3	4.1	4.8	4.4	1.8	0.81	0.60BE	0.39B
30				2.80	3.1	3.8	4.2	4.5	1.8	0.74	0.59BE	0.38B
31				-	3.1	-	4.1	4.5	-	0.70	----	0.26B
Total				45.60	104.95	156.13	111.00	140.00	71.70	34.38	19.21	17.49
Mean 10 ⁶ x M ³				1.5	3.4	5.2	3.6	4.5	2.4	1.10	0.64	0.56
Maximum				3.94	9.06	13.49	9.60	12.08	6.19	2.40	1.659	1.499
Minimum				2.8	4.35	9.6	4.8	6.8	3.6	1.70	1.00	1.04
				0.33	2.9	3.1	2.6	3.7	1.8	0.70	0.33	0.26
Monthly Runoff (mm)				27.6	63.4	94.4	67.2	84.5	43.3	9.174	11.60	10.496
Metered Flow (m ³ /s)				2.5	3.3	4.8				0.887	0.682	0.50

- NOTES: 1. Discharges listed prior to installation of continuously recording equipment on October 18, 1977 were determined by daily staff gauge readings.
2. Flows were also metered on May 10 - 3.7; May 16 - 4.4; June 6 - 4.1; June 8 - 7.7; June 10 - 9.6 m³/s.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River (EL 76.4)

Drainage Area: 142.9 km²

Year: 1978

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.24	0.19	0.21BE	0.28	3.72	4.98	10.98	5.42	2.65	3.08	0.90BE	1.11BE
2	0.14 BE	0.21	0.20BE	0.31	3.89	4.82	9.80	7.01	3.04	2.79	0.94BE	1.04BE
3	0.14 BE	0.23	0.20BE	0.32	3.51	5.91	8.79	4.66	3.21	2.59	0.88BE	1.04BE
4	0.28	0.26	0.20	0.34	3.32	8.79	8.32	4.57	3.38	2.37	0.87B	0.95BE
5	0.36	0.28	0.23	0.35	3.43	12.85	8.60	4.86	3.68	2.20	0.80BE	0.89BE
6	0.41	0.30	0.27	0.36	2.68	16.32*	8.61	5.29	3.78	2.05	0.80BE	0.91BE
7	0.39	0.28	0.29	0.38BE	2.59	16.00	9.33	5.17	3.67	1.86	0.91BE	0.89BE
8	0.41	0.24	0.28	0.41	2.94	14.87	12.10	5.30	3.82	1.76	1.06BE	0.98BE
9	0.40	0.37BE	0.27BE	0.43BE	3.41	15.55	12.69	5.33	3.83	1.62	1.20BE	1.04B
10	0.38BE	0.28	0.27BE	0.43BE	3.87	15.61	11.10	5.34	3.47	1.57	1.34BE	1.00B
11	0.38BE	0.20BE	0.26	0.45	3.92	12.55	9.96	5.11	3.30	1.57	1.49BE	0.95B
12	0.38	0.22BE	0.23	0.45BE	3.64	10.33	8.26	4.65	3.22	1.52	1.63BE	0.85BE
13	0.35	0.24BE	0.23	0.47BE	3.47	9.21	7.03	4.33	2.93	1.40	1.77BE	0.85BE*
14	0.33	0.25BE	0.25BE	0.46	4.21	9.22	6.87	4.11	2.72	1.32	1.92BE	0.66B
15	0.32	0.25*	0.26BE	0.46BE	5.06	9.18	7.49	3.78	2.89	1.24	1.67B	0.53B
16	0.30	0.23	0.27BE	0.46	5.45*	8.35	8.00	3.61	3.01	1.20	1.67B	0.50B
17	0.27	0.23BE	0.25	0.47	5.44	7.19	8.81	3.66	2.71	1.15*	1.41BE	0.53BE
18	0.25	0.23	0.21	0.48	5.36	7.22	8.82	3.33	2.47	1.10	1.51BE	0.58B
19	0.24	0.23	0.19BE	0.54*	5.59	8.20	7.70	3.10	2.26*	1.08	1.61BE	0.54BE
20	0.24	0.25	0.20BE	0.59	6.54	8.26	6.61	3.02	2.09	1.05	1.71BE	0.59BE
21	0.23	0.24	0.20BE	0.59	8.38	7.73	6.02	2.97	1.96	1.07	1.81BE	0.53BE
22	0.23	0.23BE	0.21BE	0.59	9.48	8.86	5.74	2.74*	2.09	1.04	1.82B	0.50BE
23	0.24	0.23	0.20	0.60	9.08	10.38	5.97	2.65	2.52	1.02	1.87B	0.46B
24	0.25	0.23BE	0.19BE	0.68	7.66	10.65	6.54	2.67	2.44	1.09	1.85B	0.39B
25	0.24	0.23BE	0.22BE	0.99	6.48	10.45	6.94	2.68	2.33	1.10B	1.67B	0.33BE
26	0.19	0.22BE	0.20	1.41	5.43	10.15	6.77*	2.63	2.40	0.99B	1.54B	0.29BE
27	0.19	0.22BE	0.21	1.71	4.69	9.64	6.62	2.52	2.65	0.93B	1.49B	0.26BE
28	0.22	0.21BE	0.22	2.37	4.34	9.65	6.70	2.40	3.31	0.94B	1.44B	0.23BE
29	0.21	----	0.25	3.12	4.21	10.43	6.33	2.34	3.60	0.82B	1.34BE	0.19BE
30	0.19	----	0.28	3.39	4.62	11.46	6.13	2.32	3.32	0.91B	1.30BE	0.16BE
31	0.19	----	0.29	----	5.52	----	5.74	2.37	----	1.02BE	----	0.12BE
Total	8.59	6.78	7.24	23.89	151.93	304.81	249.37	119.94	88.75	45.45	42.22	19.89
Mean 10 ⁶ x M ³	0.27 0.723	0.24 0.581	0.23 0.616	0.79 2.048	4.90 13.124	10.16 26.335	8.04 21.534	3.86 10.34	2.95 7.646	1.46 3.910	1.40 3.629	0.64 1.714
Maximum	0.41	0.37	0.29	3.39	9.48	16.32	12.69	7.01	3.83	3.08	1.92	1.11
Minimum	0.14	0.19	0.19	0.28	2.59	4.82	5.74	2.32	1.96	0.82	0.80	0.12
Monthly Runoff (mm)	5.05	4.06	4.31	14.33	91.84	184.29	150.70	72.35	53.51	27.37	25.39	11.99
Metered Flow (m ³ /s)		0.267		0.50	5.29	16.95	7.03	2.57	2.28	1.16		0.80

NOTES: Maximum Instantaneous Discharge 17.0 m³/s on June 6.B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River (EL 76.4)

Drainage Area: 142.9 km²

Year: 1979

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.10B	0.09B	0.65BE	0.38BE	1.50	5.90	7.08	4.92	4.03	1.23	0.57	0.68B
2	0.11B	0.08B	0.60BE	0.30BE	1.46	6.70	6.12	4.93	3.62	1.13	0.60	0.58B
3	0.12B	0.08B	0.55BE	0.30BE	1.57	8.50	5.02	5.28	3.30	1.04	0.39	0.52B
4	0.12B	0.09B	0.54BE	0.30BE	1.90	10.09	4.35	5.46	3.02	0.95	0.38	0.53B
5	0.12B	0.10B	0.48B	0.30BE	2.99	10.93*	4.25	4.98	2.57	0.91	0.34	0.51B
6	0.10B	0.10B	0.44B	0.30BE	2.96	11.32	4.88	4.90	2.22	0.88	0.57BE	0.51B
7	0.08B	0.12B	0.42B	0.30BE	2.15	9.31	6.72	4.73	2.08	0.96	0.40BE	0.51BE
8	0.09B	0.11BE	0.30BE	0.30BE	1.88	7.45*	7.16	4.32	2.14	1.16	0.40B	0.53BE
9	0.11B	0.14B	0.35BE	0.30BE	1.91	6.35	6.75	4.08	2.37	1.16	0.37B	0.84B
10	0.15B	0.15B	0.35BE	0.30BE	2.32	5.98*	6.31	3.88	2.30	1.09	0.34BE	0.51BE
11	0.23B	0.16B	0.35BE	0.31B*	2.68	6.60	6.08	4.27	2.03	1.12	0.33BE	0.51BE
12	0.29B	0.19BE	0.35B	0.29	3.14	7.89	5.57	4.23	1.79	1.22	0.33	0.51BE
13	0.28B	0.18BE	0.30BE	0.28	3.21	9.27	5.05	3.95	1.63*	1.24	0.36	0.72B
14	0.26B	0.19BE	0.30BE	0.27	3.20	8.78	4.60	3.83*	1.54	1.25	0.48BE	0.53B
15	0.23B	0.20BE	0.25BE	0.28	4.03	6.97	4.27	3.60	1.55	1.25	0.47BE	0.49BE
16	0.17B	0.20BE	0.17B	0.26	6.93*	6.12	4.01	3.63	1.72	1.20	0.52BE	0.49B
17	0.14B	0.20B	0.11B	0.28	6.40	5.53	4.08*	3.82	1.97	1.13	0.55	0.46B
18	0.13B	0.22B	0.11BE	0.28	5.83	5.40	4.58	4.00	2.01	1.05	0.45	0.41B
19	0.14B	0.24B	0.10BE	0.27	5.40	5.83	5.25	3.97	2.01	0.96	0.50BE	0.35B
20	0.15B	0.26B	0.08B	0.26	4.98	6.68	5.92	3.63	1.98	0.90	0.50BE	0.32B
21	0.17B	0.32B*	0.08BE	0.28	5.12	6.94	6.49	3.45	1.96	0.82	0.50BE	0.32B
22	0.16B	0.33BE	0.12B	0.30	6.01	6.51	6.62	3.30	1.94	0.74	0.50BE	0.32B
23	0.18B	0.36B	0.16B	0.27	6.63	6.30	6.65	3.40	1.81	0.68	0.50BE	0.32BE
24	0.18B	0.42B	0.09B	0.30	8.90	6.18	6.25	3.67	1.74	0.65	0.53B	0.32BE
25	0.17B	0.49B	0.08BE	0.33	10.93	6.29	5.80	3.58	1.68	0.65	0.52B	0.32B
26	0.16B	0.59B	0.10BE	0.38	11.70	5.73	4.67	3.45	1.64	0.64*	0.58B	0.32B
27	0.14B	0.65B	0.20BE	0.43	14.79	5.95	4.47	3.44	1.63	0.61	0.60B	0.30BE
28	0.13B	0.76B	0.20BE	0.54	11.36	6.32	4.62	3.47	1.66	0.60	0.65BE	0.29BE
29	0.12B		0.26B	0.67	8.20	6.71	4.77	3.51	1.53	0.56	0.60BE	0.30B
30	0.10BE		0.24B	1.19	6.72	7.11	4.87	3.65	1.38	0.52	0.55BE	0.30B
31	0.10BE		0.53B		6.06*		4.95	4.05		0.49		0.31B
Total	4.73	6.93	8.86	10.55	162.86	215.64	168.19	125.38	62.85	28.84	14.38	13.93
Mean 10 ⁶ x M ³	0.153	0.248	0.286	0.352	5.254	7.188	5.425	4.045	2.095	0.930	0.479	0.449
Maximum	0.409	0.599	0.766	0.912	4.071	18.631	14.532	10.833	5.430	2.491	1.242	1.204
Minimum	0.029	0.076	0.065	0.119	14.79	11.32	7.16	5.46	4.03	1.25	0.65	0.84
	0.08	0.08	0.08	0.26	1.46	5.40	4.01	3.30	1.38	0.49	0.33	0.29
Monthly Runoff (mm)	2.8	4.1	5.3	6.3	98.4	130.3	101.6	75.8	38.0	17.4	8.6	8.4
Metered Flow (m ³ /s)		0.33		0.306	7.5	10.829	4.084	3.926	1.651	0.634		

NOTES: 1. Flows also measured on May 31 (6.032); June 8 (7.325); June 10 (5.954).

2. Maximum Instantaneous Discharge 15.28 m³/s May 27.

B - Ice Conditions

E - Estimated

** - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River EL 76.4

Drainage Area: 142.9 km²

Year: 1980

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.31B	0.04B	0.15B	0.17BE	10.63	7.85	4.81	4.05	1.54	2.51	0.82	0.96 E
2	0.30B	0.06B	0.06BE	0.17BE	11.74	8.06	4.69	4.06	1.46	2.41	0.75	0.96 E
3	0.30E	0.09B	0.06BE	0.17BE	12.93	8.86	5.06	4.24	1.40	2.23	0.74	0.95 E
4	0.30E	0.09B	0.06BE	0.17BE	12.30	9.14	5.37	3.69	1.33	2.11	0.71	0.94 E
5	0.30B	0.09B	0.06BE	0.18BE	12.08	9.47	5.23	3.21	1.26	2.05	0.68	0.93 E
6	0.30B	0.09B	0.07BE	0.18B	12.05	9.37	4.81	3.24	1.22	2.01	0.67	0.92 E
7	0.29B	0.08B	0.09BE	0.17BE	11.03	8.29	4.40	2.99	1.33	2.09	0.71	0.91 E
8	0.29B	0.08B	0.10BE	0.16BE	9.43	7.78	4.32	2.78	1.56	2.29	0.74	0.90 E
9	0.29B	0.07B	0.12B	0.14	8.42	8.06	4.73	2.86	1.69	2.31	0.71	0.89 E
10	0.29B	0.06B	0.15B	0.14	6.96	9.59	5.30	3.06	1.62	2.09	0.64BE	0.88 E
11	0.29B	0.05B	0.16B	0.19BE	6.96	11.31*	5.26	3.64	1.61	1.83	0.56BE	0.87*E
12	0.28B	0.05B	0.17B	0.20BE	6.93	11.56	4.68	4.20	1.80	1.64	1.03BE	0.86 E
13	0.29B	0.05BE	0.18B	0.20BE	6.52	10.80	4.19	4.21	2.15	1.53	0.89BE	0.85 E
14	0.29B	0.05B	0.19B	0.21BE	6.46*	11.13	4.17	3.86	2.11	1.45	0.90BE	0.85 E
15	0.29B	0.05B	0.21B	0.25B	6.78	11.83	4.48	3.72	2.03	1.38	0.80BE	0.84 E
16	0.29B	0.06B	0.19BE	0.26BE	7.13	12.05	4.77	3.69	2.07	1.30	0.83BE	0.83 E
17	0.29B	0.06B	0.22BE	0.30BE	7.34	13.13	4.57	3.73	2.04*	1.23	1.04BE	0.82 E
18	0.29B	0.06B	0.24B	0.33BE	7.87	12.71	4.16	3.79	2.06	1.18	0.99B*	0.81 E
19	0.26*B	0.07B	0.29BE	0.38	8.48	11.28	3.99	3.51	2.07	1.12	0.94B	0.80 E
20	0.15B	0.07B	0.29BE	0.43	8.44	10.78	3.86	3.25	2.15	1.07	0.85B	0.79 E
21	0.12B	0.07BE	0.29BE*	0.54	9.21	10.23	3.85	3.10	2.14	1.09	1.06B	0.78 E
22	0.10B	0.08BE	0.38BE	1.06	10.52	9.65	4.26	2.76	1.99	1.12	1.05E	0.78 E
23	0.12B	0.08BE	0.32BE	1.66	11.31	9.21	5.00*	2.54	1.81	0.99	1.04E	0.77 E
24	0.11B	0.08BE	0.31BE	2.38	11.95	8.46	5.44	2.47	1.66	0.92	1.03E	0.76 E
25	0.08B	0.10B	0.28BE	3.51	11.11	7.55	4.82	2.38	1.54	0.87	1.02E	0.75 E
26	0.05B	0.10B	0.25BE	4.60	21.67E	7.09	4.56	2.18	1.44	0.91	1.01E	0.74 E
27	0.04B	0.20B	0.20BE	6.02	16.46E	6.45	4.66	2.16	1.37	0.83	1.00E	0.73 E
28	0.03B	0.23B	0.19BE	7.44	12.47	5.79	4.83	2.08	1.23	0.80	0.99E	0.72 E
29	0.02B	0.18B	0.18BE	8.35	10.67	5.34	4.86	1.83	1.30	0.78	0.98E	0.71 E
30	0.02B		0.17BE	9.73	9.64	5.15	4.66	1.74	2.01	0.75	0.97E	0.70 E
31	0.02B		0.17BE		8.51		4.14	1.62		0.71		0.69 E
Total	6.40	2.39	5.70	49.67	317.00	277.97	143.93	96.61	50.98	45.60	26.15	25.68
Mean 10 ⁶ x M ³	0.21	0.08	0.18	1.65	10.23	9.26	4.64	3.11	1.69	1.47	0.87	0.82
Maximum	0.553	0.206	0.492	4.291	27.389	24.001	12.428	8.330	4.380	3.937	2.255	2.196
Minimum	0.02	0.04	0.06	0.14	6.46	5.15	3.86	1.62	1.22	0.71	0.56	0.69
Monthly Runoff (mm)	3.8	1.4	3.4	30.0	191.6	167.9	86.9	58.3	30.7	27.6	15.8	15.4
Metered Flow (m ³ /s)	0.295		0.391		6.271	11.591	5.153		1.975		0.994	

NOTES: 1. Maximum Instantaneous Discharge 24.4 m³/s on May 26.

B - Ice Conditions

E - Estimated

* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River EL 76.4

Drainage Area: 142.9 km²

Year: 1981

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.688E	0.518E	0.428E	0.45	6.53	13.0	10.37	6.64	3.20	1.09	0.72	
2	0.678E	0.518E	0.428E	0.47	6.82	11.4*	11.26	6.16	3.09	1.22	0.71	
3	0.678E	0.508E	0.428E	0.46	6.02	11.7*	9.94	5.86	2.78	1.24	0.698	
4	0.668E	0.508E	0.428E	0.54	5.03	11.6*	10.65	5.76	2.51	1.17	0.678	
5	0.658E	0.508E	0.488E	0.48	4.72	10.2*	13.45	5.55	2.33	1.10	0.678	
6	0.648E	0.498E	0.418E	0.45	4.45	9.45*	15.20	5.52	2.20	1.06	0.678	
7	0.638E	0.498E	0.418E	0.54	3.97	8.72*	14.65	5.72	2.17	1.04	0.678	
8	0.628E	0.498E	0.408E	0.53	3.99	7.79*	12.62	6.24	2.22	1.02	0.59	
9	0.618E	0.488E	0.408E	0.47	3.94E	6.97*	8.96	6.57	2.55	1.05	0.558	
10	0.608E	0.488E	0.408E	0.46	3.90E	6.03*	7.16	6.32	2.78	1.04	0.558	
11	0.598E	0.488E	0.408E	0.46	3.92E	5.61	6.26	6.36	3.16	1.01	0.58*	
12	0.588E	0.488E	0.398E	0.45	3.78E	5.32	5.81	6.57	3.06	0.99	0.68	
13	0.578E	0.478E	0.398E	0.48	3.68E	7.92	6.28	6.58*	3.01	0.96	0.67	
14	*0.568E	0.478E	0.398E	0.47	3.92*	11.35	7.95	6.48	2.75	0.94	0.61	
15	0.568E	0.478E	0.388E	0.46	5.20	9.99	8.07	6.24	2.50	0.91	0.62	
16	0.568E	0.468E	0.388E	0.48	5.58	9.98	7.13	6.23	2.41*	0.88	0.61	
17	0.558E	0.468E	0.388E	0.50	5.38	9.61	6.66	6.56	2.50	0.85	0.57	
18	0.558E	0.468E	0.388E	0.56	5.72	8.70	6.7	6.39	2.60	0.83	0.56	
19	0.558E	0.458E	*0.378E	0.64	6.65	7.60	7.27	5.89	2.75	0.82	0.53	
20	0.548E	0.458E	0.398E	0.74	7.73	6.90	8.0	5.69	2.73	0.80	0.56	
21	0.548E	0.458E	0.388E	0.89	9.10E	6.49	8.58	5.44	2.34	0.808	0.57	
22	0.548E	0.458E	0.418E	1.16	10.6E	6.32	8.59	4.78	2.09	0.838	0.54	
23	0.548E	0.448E	0.438E	1.78	11.7E	6.39	8.54	4.41	1.82	0.858	0.51	
24	0.538E	0.448E	0.438E	2.96	13.2E	5.98	8.02	4.34	1.65	0.76	0.50	
25	0.538E	0.448E	0.448E	2.89	15.8E	5.65	7.88	4.39	1.53	0.73		
26	0.538E	0.438E	0.448E	2.73	18.2E	6.03	7.46	4.68	1.48	0.82		
27	0.528E	0.438E	0.458E	2.55	18.3E	7.87	7.03	5.08	1.38	0.82		
28	0.528E	0.438E	0.468E	2.49	16.4E	8.67	7.58	4.83	1.29	0.80		
29	0.528E		0.45	2.79	14.3E	7.59	8.4	4.14	1.22	0.79		
30	0.518E		0.45	3.78	13.6E	7.60	8.43	3.87	1.26	0.77		
31	0.518E		0.45		13.8E		7.49	3.56		0.76		
Total	17.83	13.11	12.75	34.11	255.93	248.43	272.39	172.85	69.36	28.75		
Mean 10 ⁶ x m ³	0.57	0.46	0.41	1.14	8.26	8.28	8.79	5.58	2.31	0.92		
Maximum	1.527	1.113	1.098	2.955	22.11	21.46	23.534	14.93	5.992	2.484		
Minimum	0.68	0.51	0.46	3.78	18.3	13.0	15.20	6.64	3.20	1.24		
	0.51	0.43	0.37	0.45	3.68	5.32	5.81	3.56	1.22	0.73		
Monthly Runoff (mm)	10.7	7.8	7.7	20.7	154.7	150.2	164.7	104.5	41.93	17.38		
Metered Flow (m ³ /s)	0.561		0.371		3.775	11.37		6.811	2.426		0.556	

NOTES: 1. Flow also metered June 2 - 11.37; June 3 - 11.84; June 4 - 11.83;
June 5 - 10.16; June 6 - 9.39; June 7 - 8.71; June 8 - 7.83;
June 9 - 7.21; June 10 - 5.95 m³/s.

B - Ice Conditions
E - Estimated
* - Dates metered

2. Maximum Instantaneous Discharge 18.8 m³/s (E) on May 27.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: ELK RIVER (EL 76.4)

Drainage Area: 142.9 km²

Year: 1982

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	·	·	·		.505B	5.98	11.3	5.78	2.70	1.58	.890	·
2	·	·	·		.580	6.72	10.1	5.73	2.55	1.50	.850B	·
3	·	·	·		.900	7.87	9.80	5.48	2.90	1.47	.760B	·
4	·	·	·		1.01 B	9.15	9.95	4.50	3.85	1.38	.700	·
5	·	·	·		1.01	10.1	8.35	3.83	5.85	1.31	.715	·
6	·	·	·		1.27 B	10.7	6.45	3.55	4.90	1.26	.700	·
7	·	·	·		1.29	9.50	5.79	3.82	4.20	1.22	0.710	·
8	·	·	·		1.29	8.00	5.55	3.98	4.20	1.18	·	·
9	·	·	·		.495B	1.22 B	7.08	5.55	4.18	4.20	1.12	·
10	·	·	·		.435	1.22 B	6.98	5.80	4.15	4.50	1.09	·
11	·	·	·		.398	1.28 B	8.45	6.25	4.80	3.87	1.07	·
12	·	·	·		.360	1.63	11.1	6.53	4.68	3.12	1.03	·
13	·	·	·		.348	1.92	13.9	6.08	4.02	2.73	1.00	·
14	·	·	·		.315	2.58	16.8	5.85	4.05	2.42	.995	·
15	·	·	·		.308B	3.59	18.9	6.22	3.80	2.19	.980	·
16	·	·	·		.305B	4.64	20.4*	5.08	3.23	2.05	.990	·
17	·	·	·		.295B	6.07	20.3	4.22	2.97	1.90	1.03	·
18	·	·	·		.280B	6.96	17.9	3.85	3.08	1.80	1.09	·
19	·	·	·		.255B	7.19	16.7	3.95	3.18	1.75	1.07	·
20	·	·	·		.250B	7.36	16.9	5.10	3.27	1.75	1.05B	·
21	·	·	·		.240B	7.71	16.8	6.45	3.35	1.73	1.02B	·
22	·	·	·		.248B	8.55	16.9	6.40	3.73	1.69	1.00	·
23	·	·	·		.286*B	9.39	16.2	5.55	3.45*	1.65	1.12	·
24	·	·	·		.328	9.45	14.5	4.61	3.28	1.60	1.10	0.596*B
25	·	·	·		.330B	10.6	13.4	4.22	3.35	1.57	1.06	·
26	·	·	·		.352B	11.0	13.8	4.27	4.05	2.02	1.03	·
27	·	·	·		.385B	9.29	13.6	4.42	3.63	2.03	1.01	·
28	·	·	·		.400	7.69*	13.2	4.63	3.85	1.91	.960	·
29	·	·	·		.405	6.53	11.9	4.96	3.82	1.82	.970	·
30	·	·	·		.425B	5.96	10.7	5.25	3.37	1.69	.945B	·
31	·	·	·		-	5.67	-	5.73	3.07	-	.920B	·
Total				7.443	145.35	379.73	188.26	121.03	81.14	34.55		
Mean 10 ⁶ x m ³				.338	4.69	12.7	6.07	3.90	2.70	1.11		
Maximum				.495	11.0	20.8	11.3	5.78	5.85	1.58		
Minimum				.240	.505	5.98	3.85	2.97	1.69	.920		
Monthly Runoff (mm)	6E	5E	5E	6.4E	87.9	230.0	114.0	73.2	49.1	20.9	12E	10E
Metered Flow (m ³ /s)				.286	7.69	20.8	-	3.45	-	-	0.596	

NOTES: 1. Maximum Instantaneous Discharge 20.9 m³/s on June 16.

2. Estimated Annual Runoff 620 mm.

B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: ELK RIVER (EL 76.4)

Drainage Area: 142.9 km²

Year: 1983

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1			0.37	0.28	1.63	11.50	5.30	4.75	3.25	1.26	0.69	
2			0.37	0.29	1.66	10.30	5.20	4.95	3.30	1.20	0.69	
3			0.33	0.29	1.76	10.30	5.60	5.50	2.85	1.16		
4			0.32	0.28	1.85	9.80	5.20	5.40	2.55	1.18		
5			0.64	0.36	1.83	9.00	5.12	5.00	23.7	1.15		
6			0.49	0.28	2.12	8.30	5.70	5.05	2.12	1.40		
7			0.31	0.32	2.72	8.20	6.50	5.20	2.03	1.05		
8			0.29	0.32	2.90	8.90	6.70	5.20	1.87	1.03		
9			0.30	0.32	2.78	9.10	6.70	5.10	1.75	0.97		
10			0.31	0.34	2.54	8.50	5.80	5.05	1.63	0.93		
11			0.31	0.35	2.64	7.80	5.05	5.00	1.53	0.91		
12			0.30	0.32	2.79	6.60	5.40	5.30	1.45	0.88		
13			0.30	0.38	3.03	5.82	10.00	5.15	1.35	0.85		
14			0.30	0.37	3.32	5.22	13.20	4.70	1.30	0.84		
15			0.30	0.33	3.50	5.30	11.30	4.55	1.27	0.86		
16			0.30	0.33	3.60	5.60	7.90	4.40	1.27	0.86		
17			0.28	0.34	3.82	5.60	6.20	4.25	1.32	0.84		
18			0.40	0.39	4.03	5.70	5.30	4.07	1.28	0.83		
19			0.76	0.44	3.94	5.4	5.00	3.70	1.23	0.83		
20			0.49	0.50	4.09	4.8	5.60	3.43	1.16	0.79		
21			0.44	0.58	4.47	4.15	5.80	3.50	1.10	0.77		
22			0.48	0.99	4.90	3.93	5.40	3.38	1.05	0.79		
23			0.39	1.48	5.60	4.23	4.95	3.38	1.03	0.80		
24			0.28	1.96	6.32	6.00	4.95	3.35	1.02	0.74		
25			0.32	2.05	7.65	7.20	6.00	3.38	0.97	0.80		
26			0.34	2.32	9.30*	6.18	6.50	3.27	0.98	0.73		
27		0.59	0.40	1.96	10.50	5.30	5.50	2.97	1.23	0.72		
28		0.53	0.29	1.78	12.00	5.10	4.60	2.92	1.45	0.75		
29		-	0.28	1.65	13.40	5.20	4.35	2.92	1.37	0.77		
30		-	0.27	1.67	14.70	5.40	4.30	2.90	1.28	0.71		
31		-	0.27	-	13.00	-	4.45	3.10	-	0.69		
Total	-	-	11.23	23.27	158.39	204.41	189.57	127.9	48.36	27.77	-	-
Mean 10 ⁶ x m ³	-	-	0.36	0.776	5.11	6.814	6.115	4.126	1.612	0.896	-	-
Maximum	-	-	0.970	2.01	13.69	17.66	16.38	11.05	4.18	2.40	-	-
Minimum	-	-	0.27	0.28	1.63	3.93	4.30	2.90	0.97	0.69	-	-
Monthly Runoff (mm)	9E	8E	6.79	14.1	95.8	123.0	115.0	77.3	29.2	16.8	14E	12E
Metered Flow (m ³ /s)	-	-	-	0.330	9.96	5.37	-	4.99	-	0.675	-	-

NOTES: 1. Maximum Instantaneous Discharge 16.3 m³/s on May 30, 1984

2. Estimated Annual Runoff 521 mm.

B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River (EL 52.5)

Drainage Area: 497.2 km²

Year: 1977

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				1.2	9.4	10.7	10.4	2.2	1.9	2.3	3.16	2.19BE
2				1.3	9.8	19.5	11.1	2.2	2.3	2.3	3.20	2.19BE
3				1.3	10.1	17.4	11.1	3.8	2.3	2.4	3.08	2.19BE
4				1.4	10.3	15.5	9.2	2.2	2.3	2.5	2.82	2.19BE
5				1.4	10.1	14.5	8.8	2.2	2.3	2.5	2.59	2.20BE
6		1.24*		1.5	9.6	16.6*	8.4	2.0	2.0	2.6	2.66	2.20BE
7				1.5	9.1	21.4	7.8	3.0	2.3	2.6	2.72	2.20BE
8				1.6	9.8*	28.8	7.4	3.1	2.1	2.7	2.45	2.20BE
9				1.6	10.6	32.4	4.5	3.0	1.8	2.8	2.15	2.21BE
10				1.7	16.0	32.6	1.6	2.6	1.7	2.8	2.39	2.21BE
11				1.7	21.8	21.4	1.6	2.2	1.5	2.9	2.67	2.21BE
12				1.8	19.8	15.4	1.6	2.5	1.5	2.9	2.72	2.21BE
13				1.8	17.0	17.8	1.7	3.3	1.4	3.0	2.75	2.21BE*
14				1.9	13.4	19.0	1.8	4.0	1.2	3.1	2.76*	2.19BE
15			1.21*	1.9	20.4	17.8	1.8	4.8	1.3	3.1	2.65	2.16BE
16				2.0	12.2	20.3	1.9	3.6	1.3	3.2	2.59	2.14BE
17				2.0	12.8*	19.2	2.1	3.2	1.4	3.2	2.42	2.12BE
18				2.1	11.2	19.5	2.6	3.0	1.5	3.3*	2.27	2.11BE
19				2.1	9.5	19.2	3.2	3.0	1.5	3.30	1.65	2.09BE
20				2.2	8.8	19.5	2.9	2.9	1.6	3.25	1.47	2.07BE
21				2.2	9.0	19.4	2.2	2.9	1.7	3.14	1.56	2.06BE
22				2.3*	9.2	17.8*	2.2	3.2	1.7	3.13	1.98	2.04BE
23				3.8	9.6	18.4	2.2	3.3	1.8	3.08	2.13	2.02BE
24				5.2	12.0	16.0	2.3	3.4	1.8	3.10	2.13	2.00BE
25				6.3	13.6	15.3	2.5	3.5	1.9	3.40	2.14	1.99BE
26				7.0	14.4	15.3	2.6	3.5	2.0	3.53	2.18	1.97BE
27				7.6	14.6	15.2	2.6	3.5	2.0	3.39	2.18BE	1.95BE
28				8.1	13.6	14.6	2.3	3.5	2.1	3.24	2.18BE	1.94BE
29				8.6	11.7	12.8	2.3	3.5	2.1	3.23	2.18BE	1.92BE
30				9.1*	10.6	11.8	2.4	3.5	2.2	3.22	2.18BE	1.90BE
31			1.16*	-	10.0	-	2.3	3.6	-	3.17		1.89BE
Total				94.2	380.0	555.1	127.4	96.2	54.5	92.38	72.01	65.17
Mean				3.14	12.3	18.5	4.1	3.1	1.8	2.98	2.40	2.10
10 ⁶ x M ³				8.14	32.83	47.96	11.01	8.31	4.71	7.982	6.222	5.630
Maximum				9.1	21.8	32.6	11.1	4.8	2.3	3.53	3.20	2.21
Minimum				1.2	8.8	10.7	1.6	2.0	1.2	2.3	1.47	1.89
Monthly Runoff (mm)				16.4	66.0	96.5	22.1	16.7	9.5	16.0	12.5	11.3
Metered Flow (m ³ /s)				2.3	9.8	16.6				3.315	2.70	2.206

NOTES: 1. Discharges listed prior to installation of continuously recording equipment on October 18, 1977 were determined by daily staff gauge readings.

B - Ice Conditions
E - Estimated
* - Dates Metered

2. Stilling well froze on November 26, 1977 and the station remained out of commission until February 14, 1978.

3. Flows were also metered on April 30 - 9.1; May 17 - 12.8; June 22 - 17.8 m³/s.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River 52.5

Drainage Area: 497.2 km²

Year: 1978

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.87BE	1.34BE	1.18BE	2.32	12.58	17.90	30.45	14.68	5.60	8.17	3.18	2.50
2	1.85BE	1.32BE	1.18BE	2.24	14.47	17.18	27.80	13.92	6.08	7.58	3.18	2.23
3	1.83BE	1.30BE	1.18BE	2.19	14.17	19.42	25.73	12.55	6.55	7.00	3.23	2.08
4	1.82BE	1.29BE	1.19BE	2.21	12.72	28.60	24.35	11.68	6.87	6.50	3.53	2.22
5	1.80BE	1.27BE	1.19BE	2.29	11.18	49.58	23.67	11.57	7.38	6.12	3.23	2.10
6	1.78BE	1.25BE	1.19BE	2.28	10.06	57.41	23.47	12.01	7.90	5.77	3.17	2.07
7	1.77BE	1.24BE	1.20BE	2.28	9.62	52.48*	25.83	11.85	7.88	5.52	3.32	2.04
8	1.75BE	1.22BE	1.20BE	2.40	8.91	48.57	31.28	11.65	8.01	5.33	4.52	1.77
9	1.73BE	1.20BE	1.20BE	2.38	9.83	49.90	32.90	11.67	8.38	5.15	4.45	1.87
10	1.71BE	1.18BE	1.21BE	2.46	11.85	44.93	30.23	11.62	8.28	5.00	3.25	2.10
11	1.70BE	1.17BE	1.21BE	2.76	12.88	36.63	28.45	11.38	8.22	5.07	2.77	2.13
12	1.68BE	1.15BE	1.21BE	2.86	12.78	30.73	23.80	10.74	8.18	5.33	2.93	2.10
13	1.66BE	1.14BE	1.22BE	2.78	12.38	28.53	20.35	10.11	7.72	5.10	2.88	1.83*
14	1.65BE	1.13BE*	1.22BE	2.68	13.58	29.89	19.50	9.67	7.25	4.55	2.80	1.80
15	1.63BE	1.13BE	1.22BE	2.59	16.12	28.20	19.99	9.08	7.19	4.40	2.80	1.92
16	1.61BE	1.13BE	1.23BE	2.61	17.63	24.80	20.49	8.65	7.38	4.30	2.92	1.92
17	1.59BE	1.14BE	1.23BE	2.63	18.37*	21.58	21.72	8.68	7.05	4.23	3.12	1.78
18	1.58BE	1.14BE	1.23BE	2.61	18.37	23.43	22.38	8.20	6.52	4.17*	2.62	1.85
19	1.56BE	1.14BE	1.22	2.74*	19.32	25.67	21.15	7.75	6.08	4.12	2.32	1.78
20	1.54BE	1.15BE	1.19	3.01	22.80	24.47	19.05	7.57	5.70*	4.02	2.60	1.70
21	1.53BE	1.15BE	1.19	3.20	28.54	24.65	17.73	7.50	5.40	4.00	2.66	1.67
22	1.51BE	1.15BE	1.16	3.31	33.99	27.65	16.92	7.25	5.35	3.93	2.58	1.62
23	1.49BE	1.16BE	1.14	3.27	33.35	30.63	16.78	6.92*	5.85	3.68	2.83	1.60
24	1.47BE	1.16BE	1.17	3.29	28.62	30.62	17.22	6.70	5.88	3.72	2.88	1.58
25	1.46BE	1.16BE	1.20	3.54	23.53	29.85	17.41	6.48	5.60	3.85	2.90	1.48
26	1.44BE	1.17BE	1.36	4.31	19.67	28.78	17.06	6.27	5.75	3.72	2.80	1.77
27	1.42BE	1.17BE	1.62	5.60	17.65	27.97	16.85*	6.03	6.28	3.62	2.75	1.35
28	1.41BE	1.17BE	1.77	7.30	15.87	28.23	17.08	5.78	7.78	3.57	2.75	2.52
29	1.39BE		2.00	10.09	15.22	30.10	16.58	5.60	8.93	3.58	2.67	4.10
30	1.37BE		2.30	11.53	15.50	31.97	16.03	5.52	8.70	3.48	2.55	4.57
31	1.36BE		2.42		18.23		15.37	5.43		3.30		4.63
Total	49.96	33.32	41.43	105.76	529.79	928.55	652.15	284.51	209.74	147.88	90.19	66.68
Mean 10 ⁶ x M ³	1.61 4.317	1.19 2.879	1.34 3.579	3.53 9.138	17.09 45.774	30.95 80.227	21.04 56.346	9.18 24.582	6.99 18.122	4.77 12.777	3.01 7.792	2.15 5.761
Maximum	1.87	1.34	2.42	11.09	33.99	57.41	32.90	14.68	8.93	8.17	4.52	4.63
Minimum	1.36	1.13	1.14	2.19	8.91	17.18	15.37	5.43	5.35	3.30	2.32	1.35
Monthly Runoff (mm)	8.6	5.7	7.1	18.3	92.0	161.3	113.3	49.4	36.4	25.6	15.6	11.5
Metered Flow (m ³ /s)		1.13		2.72	18.38	51.22	17.00	6.96	5.84	4.17		1.70

NOTES: 1. Maximum Instantaneous Discharge 59.1 m³/s on June 6.

B - Ice Conditions

E - Estimated

* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River (EL 52.5)

Drainage Area: 497.2 km²

Year: 1979

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.53	2.47	1.00	1.24	6.89	22.15	20.47	9.92	8.48	3.46	2.04	1.18
2	3.79	3.07	1.05	1.32	6.33	24.98*	18.40	9.91	8.06	3.41	1.85	1.31
3	3.65	3.28	1.05	1.24	6.57	32.63	15.63	10.08	7.43	3.28	1.82	1.40
4	3.60	2.77	1.32	1.30	6.89	37.68	13.77	10.97	7.12	3.16	1.89	1.54
5	3.55	2.37	1.60	1.30	9.50	40.20	13.60	10.06	6.65	3.08	1.89	1.53
6	3.60	2.06	1.19	1.38	10.30	43.12*	15.22	10.49	6.09	2.95	1.78	1.57
7	3.60	1.79	1.08	1.52	8.74	35.48	18.00	9.37	5.72	2.90	1.58	1.57
8	3.60	1.65	1.08	1.59	7.61	28.47	18.95	8.72	5.50	3.04	1.58	1.51
9	3.60	1.60	0.97	1.66	7.16	24.13*	18.02	8.29	5.66	3.16	1.58	2.00
10	3.60	1.48	0.93	1.58	7.66	22.88	16.92	7.90	5.88	3.17	1.58	2.00
11	3.65	1.35	0.95	1.52*	8.08	25.52*	16.39	7.74	5.53	3.09	1.59	1.53
12	3.53	1.27	0.96	1.48	9.24	28.60	15.78	8.49	5.13	3.04	1.58	1.40
13	3.22	1.25	1.02	1.49	10.10	32.23	13.83	8.23	4.77	3.11	1.60	1.54
14	3.48	1.20	1.00	1.55	10.95	29.27	12.72	7.88	4.53*	3.14	1.59	1.47B
15	4.52	2.12	1.00	1.61	12.83	23.40	11.75	7.68*	4.40	3.14	1.40	1.37B
16	4.70	1.77	1.09	1.65	19.16	20.20	11.08	7.58	4.37	3.17	1.34	1.37B
17	4.65	1.40	1.10	1.84	20.27*	18.75	10.08	7.78	4.59	2.88	1.60	1.50
18	4.65	1.25	1.07	2.08	19.13	18.45	11.32*	8.00	4.73	2.75	1.66	1.73
19	4.40	1.16	1.06	2.07	18.02	20.38	12.53	8.13	4.72	2.60	1.66	1.80
20	3.77	1.15	1.08	1.95	16.75	22.45	13.45	7.93	4.66	2.57	1.41	1.83
21	2.74	1.23	1.03	1.90	17.14	22.52	14.29	7.73	4.58	2.48	1.10	1.84
22	2.35	1.16*	1.09	1.90	19.40	21.20	14.52	7.53	4.58	2.40	1.01	1.84
23	2.08	1.48	1.15	1.90	22.87	20.62	14.40	7.42	4.50	2.33	1.10	1.83
24	1.79	1.14	1.19	1.95	31.83	20.49	13.83	7.98	4.30	2.30	1.33	1.72
25	2.25	0.97	1.17	2.10	38.65	19.74	12.83	8.30	4.16	2.30	1.39	1.68
26	1.86	1.05	1.15	2.51	41.13	18.83	11.20	8.18	4.07	2.30	1.42	1.64
27	1.65	1.01	1.12	3.18	50.85	19.35	10.28	8.04	3.95	2.29*	1.42	1.59
28	1.52	0.99	1.52	4.32	43.28	19.65	10.03	7.86	3.92	2.35	1.32	1.35
29	1.59		1.13	5.23	32.95	20.05	10.19	7.59	3.92	2.30	1.16	1.38
30	2.79		1.20	6.17	27.10	20.50	10.17	7.63	3.76	2.20	1.02	1.43
31	2.97		1.17		23.23		9.88	8.20		2.12		1.46
Total	101.28	45.49	34.52	62.53	570.61	753.92	429.63	261.61	155.76	87.47	45.29	48.91
Mean	3.27	1.62	1.11	2.08	18.41	25.13	13.86	8.44	5.19	2.822	1.510	1.578
10 ⁶ x M ³	8.75	3.93	2.98	5.40	49.30	65.14	37.12	22.60	13.46	7.557	3.913	4.226
Maximum	4.70	3.28	1.60	6.17	50.85	43.12	20.47	10.97	8.48	3.46	2.04	2.00
Minimum	1.52	0.97	0.93	1.24	6.33	18.45	9.88	7.42	3.76	2.12	1.01	1.18
Monthly Runoff (mm)	17.5	7.9	5.9	10.8	99.1	131.0	74.6	45.4	27.1	15.1	7.8	8.4
Metered Flow (m ³ /s)		1.26		1.524	19.70	24.475	11.484	7.571	4.533	2.204		

NOTES: 1. Flows also measured on June 6 (44.348 m³/s), June 9 (20.419 m³/s), and June 11 (24.348 m³/s)
 2. Maximum Instantaneous Discharge 52.1 m³/s on May 27.

B - Ice Conditions
 E - Estimated
 * - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Elk River 52.5

Drainage Area: 497.2 km²

Year: 1980

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.49	1.28BE	1.27	1.07	33.13	31.25	15.74	8.93	4.70	7.08	2.55	1.72
2	1.55	1.28BE	1.26	1.08	35.95	32.02	15.20	8.88	4.41	7.29	2.61	1.51
3	1.55	1.18	1.14	1.07	38.03	33.65	15.58	9.46	4.33	6.91	2.60	1.36
4	1.49	1.20	1.08BE	1.07	37.98	33.92	16.02	9.10	4.16	6.48	2.55	1.27
5	1.49BE	1.24	1.08BE	1.07	36.83	32.90	15.34	8.26	3.93	6.12	2.54	1.29
6	1.49BE	1.26	1.08BE	1.11	38.41	32.48	14.35	8.53	3.76	6.16	2.50	1.54BE
7	1.49BE	1.25	1.05	1.17	35.92	29.73	13.21	8.30	3.71	5.96	2.58	1.92BE
8	1.49BE	1.23	1.02	1.14	30.90	27.78	12.64	8.08	3.93	5.65	2.65	2.03
9	1.49BE	1.22	1.04	1.13	28.06	29.21	13.08	8.55	4.13	5.65	2.61	2.03
10	1.50	1.22	1.08	1.13	25.93	35.09	14.18	9.28	4.11	5.41	2.53	2.10
11	1.40	1.22	1.10	1.16	23.82	38.43	14.08	10.55	4.04	5.01	2.39	2.16
12	1.28	1.22	1.10	1.19	22.87	37.23	12.93	13.58	4.13	4.61	2.04	2.14
13	1.28	1.20BE	1.10	1.30	22.32*	34.25	11.88	13.86	4.52	4.37	1.68	1.98
14	1.34	1.20BE	1.08	1.54	22.25	35.17	11.60	12.30	4.81	4.19	1.49	1.90
15	1.38	1.20BE	1.06	1.92	22.83	37.18	11.80	10.82	5.00	3.98	1.41	2.01
16	1.37	1.15	1.03	2.22	24.07	37.42	12.16	10.20	5.13	3.71	1.36	2.28
17	1.36BE	1.12	1.03	2.58	25.75	41.23	11.84	9.53	5.15	3.60	1.51	2.40
18	1.43BE*	1.13	1.07	3.20	27.18	39.33	11.18	9.45	5.31*	3.53	1.87*	2.06
19	1.52BE	1.15	1.09	4.14	29.38	34.34	10.87	9.13	5.36	3.44	2.10	1.49
20	1.45	1.15	1.07*	5.19	30.65	31.97	10.28	8.43	5.48	3.35	2.11	1.45
21	1.42BE	1.13	1.08	5.68	33.45	29.90	9.85	8.05	5.66	3.39	2.23	1.66
22	1.44BE	1.10	1.09	5.79	37.53	28.21	10.16*	7.56	5.52	3.34	2.17	1.84
23	1.40	1.09BE	1.12	7.87	37.99	26.21	11.66	7.01	5.22	3.20	1.71	1.62
24	1.38	1.07BE	1.12	10.88	38.83	24.42	11.60	6.65	4.89	3.11	1.52	1.47
25	1.28BE	1.05	1.11	14.50	36.60	22.09	11.08	6.41	4.61	3.02	1.61	1.69
26	1.28BE	1.01	1.09	17.25	54.98	20.96	10.53	6.09	4.35	2.94	1.83	2.06
27	1.28BE	1.07	1.08	20.48	54.58	19.67	10.56	5.80	4.16	2.91	2.06	3.32
28	1.28BE	1.15	1.09	23.61	43.62	18.14	10.60	5.70	3.97	2.80	2.19	4.06
29	1.28BE	1.22	1.08	27.28	39.35	17.08	10.46	5.46	3.94	2.74	2.15	3.81
30	1.28BE		1.09	29.36	37.00	16.58	10.51	5.13	5.47	2.66	2.05	3.59
31	1.28BE		1.05		33.55	-----	9.81	4.93		2.55		3.43
Total	43.44	33.99	33.83	198.18	1039.74	907.84	380.78	264.01	137.88	135.16	63.21	65.19
Mean 10 ⁶ x M ³	1.40	1.17	1.09	6.61	33.54	30.26	12.28	8.51	4.59	4.36	2.10	2.10
Maximum	3.75	2.94	2.92	17.12	89.83	78.44	32.89E	22.79	11.90	11.68	5.44	5.62
Minimum	1.55	1.28	1.27	29.36	54.98	41.23	16.02	13.86	5.66	7.29	2.65	4.06
	1.28	1.01	1.03	1.07	22.25	16.58	9.81	4.93	3.71	2.55	1.36	1.27
Monthly Runoff (mm)	7.5	5.9	5.8	34.4	180.6	157.8	66.2	45.8	23.9	23.5	10.9	11.3
Metered Flow (m ³ /s)	1.38		1.07		22.15		10.24		3.07		1.91	

NOTES: 1. Maximum Instantaneous Discharge 61.5 m³/s on May 26.

B - Ice Conditions

E - Estimated

* - Dates Metered

STREAM GAUGING DATA

Station: ELK RIVER 52.5

Drainage Area: 497.2 km²

Year: 1981

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.68	1.88	1.52	1.83	13.27	49.4	38.0	19.9	9.24	4.10	2.86	1.30
2	2.21	1.79	1.48	1.77	17.72	44.6	39.2	18.7	8.98	4.47	2.83	1.59
3	2.12	1.60	1.61	1.70	16.03	44.6*	35.1	17.9	8.58	4.92	2.78	1.76
4	2.01	1.53	1.60	1.62	14.40	44.3*	37.4	20.6	8.06	4.71	2.74	1.76
5	2.28	1.67	1.59	1.56	13.64	38.8*	41.7	21.0	7.63	4.65	2.65	1.85
6	2.49	1.46	1.58	1.59	13.48	36.2*	43.2	15.9	7.26	4.20	2.46	1.93
7	2.56	1.45	1.36	1.44	12.20	35.2*	40.7	16.0	6.86	4.09	2.37	1.95
8	2.61	1.50	1.42	1.47	12.61	31.5*	34.7	16.8	6.70	4.03	2.38	1.95
9	2.65	1.72	1.44	1.46	13.51	26.7*	28.2	17.0	6.82	4.10	2.36	1.95
10	2.63	3.44	1.44	1.43	13.88	24.6*	24.1	16.4	7.37	4.10	2.26	1.95
11	2.37	3.53	1.54	1.38	13.30	22.9	22.0	16.0	7.73	4.03	2.26*	1.95
12	2.06	2.36	1.61	1.35	12.42	21.7	21.0	16.1	7.51	3.93	2.39	1.78
13	1.85	1.76	1.66	1.32	11.85*	24.7	22.1	17.8	7.37	3.77	2.40	1.45BE
14	1.84	1.67	1.62	1.26	12.42	31.3	22.4	18.8	7.09	3.64	2.40	1.25BE
15	1.80*	1.71	1.73	1.29	16.08	33.6	25.3	18.9	6.63	3.59	2.40	1.41
16	1.94	1.70	1.81	1.51	17.07	33.7	23.2	18.1	6.41*	3.45	2.40	1.63
17	2.15	1.72	1.86	1.79	18.57	34.4	22.0	18.3	6.26	3.40	2.40	1.65
18	1.71	1.73	1.80	2.08	18.55	32.7	21.8	17.6	6.32	3.42	2.36	1.55
19	1.90	1.72	1.60*	2.46	20.43	29.2	22.6	16.6	6.64	3.39	2.35	1.57
20	2.06	1.71	1.51	3.23	25.17	27.0	24.2	15.1	6.84	3.36	2.26	1.70
21	2.02	1.69	1.44	4.20	32.60	25.8	25.0	14.5	6.58	3.13	2.22	1.71
22	2.07	1.65	1.74	4.88	39.98	24.0	24.8	13.6	6.29	3.00	2.22	1.59
23	2.10	1.61	1.72	5.77	45.60	24.3	24.4	12.6	5.69	2.97	2.22	1.40B
24	2.17	1.60	1.72	8.32	51.96	23.4	23.2	11.7	5.33	2.99	2.14	1.36
25	2.18	1.61	1.70	9.49	58.97	22.2	23.9	11.4	5.20	3.00	1.55	1.46
26	2.10	1.40	1.72	8.41	67.69	24.8	23.7	11.4	5.13	3.13	1.35	1.50
27	1.99	1.49	1.71	7.79	69.16	30.5	22.0	11.8	4.90	3.20	1.68	1.50
28	1.93	1.49	1.72	7.62	61.73	32.2	22.1	11.8	4.60	3.20	1.38	1.55
29	1.96		1.77	7.73	53.29	29.4	23.0	11.1	4.46	3.19	1.15	1.50B
30	1.97		1.86	8.25	49.56	30.9	23.0	10.5	4.34	3.11	1.17	1.50B
31	1.95		1.86		50.29		21.6	9.86		2.96		1.48
Total	66.36	50.19	50.74	106.00	887.43	934.6	845.0	483.8	198.92	113.23	65.33	50.48
Mean 10 ⁶ x m ³	2.14	1.79	1.64	3.53	28.6	31.2	27.3	15.6	6.63	3.65	2.21	1.62
Maximum	5.732	4.330	4.393	9.150	76.683	80.75	73.0	41.80	17.19	9.78	5.73	4.36
Minimum	2.68	3.53	1.86	9.49	69.16	49.4	43.2	21.0	9.24	4.92	2.86	1.95
	1.71	1.45	1.36	1.26	11.85	21.7	21.0	9.86	4.34	2.96	1.15	1.25
Monthly Runoff (mm)	11.5	8.7	8.8	18.4	154.2	162.4	146.8	84.1	34.6	19.7	11.5	8.8
Metered Flow (m ³ /s)	1.70		1.35		11.76			17.99	6.26		2.20	

NOTES: 1. Flows also metered June 3 - 45.54; June 4 - 46.15; June 4 - 42.70;
 June 5 - 38.36; June 6 - 35.93; June 7 - 35.82; June 8 - 31.42;
 June 9 - 26.61; June 10 - 24.15 m³/s.

B - Ice Conditions
 E - Estimated
 * - Dates metered

2. Maximum Instantaneous Discharge 71.9 m³/s on May 27.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: ELK RIVER (EL 52.5)

Drainage Area: 497.2 km²

Year: 1982

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1.45	1.32	1.13	0.87	5.25	21.8	32.1	13.9				
2	1.44	1.27	1.14	0.87	6.69	23.8	29.5	13.6				
3	1.44	1.278E	1.14	0.86	8.16	26.8	28.5	14.4				
4	1.43	1.258E	1.15	0.82	8.05	29.5	28.5	13.9				
5	1.418	1.288E	1.15	0.83	7.49	32.8	25.6	11.8				
6	1.458	1.308E	1.14	0.83	7.65	34.0	23.2	10.5				
7	1.568	1.308E	1.12	0.83	7.95	31.8	20.3	10.0				
8	1.608	1.328E	1.03	0.97	8.24	28.2	19.3	10.0				
9	1.52	1.358E	1.06	0.97	7.63	25.2	18.7	10.1				
10	1.51	1.388E	1.08	0.83	7.15	24.5	18.6	10.3				
11	1.53	1.408E	1.08	0.92	7.63	27.8	19.1	10.7				
12	1.53	1.408E	1.06	1.12	9.05	33.9	19.3	11.5				
13	1.54	1.408E	1.06	1.25	9.93	39.2	18.7	10.6				
14	1.53	1.408E	1.04	1.28	11.5	44.3	17.9	11.2				
15	1.42	1.408E	1.04	1.22	14.0	47.4	18.2	11.5				
16	1.45	1.408E	1.04	1.12	16.8	49.0	16.4	10.3				
17	1.48	1.38	1.04	1.04	20.9	48.0	14.2	9.38				
18	1.51	1.33	0.96	1.04	23.8	45.0E	13.0	8.82				
19	1.55	1.32	0.90	0.86	24.9	42.0*	12.7	8.70				
20	1.60	1.30	0.89	0.95	24.7	43.3	14.3	8.38				
21	1.48	1.40	0.90	1.10	25.0	43.7	16.9	8.40				
22	1.47	1.34	0.80	1.43	27.6	43.4	16.7	8.70				
23	1.46	1.20	0.92	2.08*	29.8	42.0	15.5	8.70				
24	1.45	1.20	0.94	2.66	30.6	38.2	13.7	8.40*				
25	1.52	1.15	0.90	2.54	33.7	36.7	12.6	-				
26	1.48	1.12	0.85	2.61	36.8	36.1	12.2	-				
27	1.47	1.13	0.96	3.11	33.2*	36.3	12.1	-				
28	1.35	1.13	1.00	3.98	29.2	36.5	12.2	-				
29	1.33	-	0.97	4.48	25.0	33.7	12.7	-				
30	1.33	-	0.95	4.48	22.4	31.2	13.1	-				
31	1.32	-	0.88	-	21.3	-	13.6	-				
Total	44.27	36.61	31.32	47.95	553.17	1076.1	559.4	253.68				
Mean 10 ⁶ x m ³	1.43	1.31	1.01	1.60	17.8	35.9	18.1	10.6				
Maximum	3.825	3.163	2.706	4.143	47.794	92.975	48.332	14.4				
Minimum	1.60	1.40	1.15	4.48	36.86	49.0	32.1	8.30				
Monthly Runoff (mm)	7.7	6.4	5.4	8.3	96.1	187.0	97.2	54.2E				
Metered Flow (m ³ /s)				2.08	33.2	42.0		8.30				

NOTES: 1. Maximum Instantaneous Discharge 49.0 m³/s on June 16.

2. Station Discontinued Aug. 24, 1982.

B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Cadorna Creek CA 0.1

Drainage Area: 130.8 km²

Year: 1977

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.60	2.6	4.0	4.3	3.7	4.3	2.1	1.07	0.91BE
2				0.61	2.8	8.3*	4.7	3.5	3.9	2.1	1.09	0.91BE
3				0.63	3.0	7.4	4.3	3.9	3.8	2.0	1.02	0.91BE
4				0.65	3.2*	5.5	4.0	3.9	3.9	2.0	0.96	0.90BE
5				0.69	3.0	5.3	3.6	3.5	3.5	1.9	0.90	0.90BE
6				0.71	2.8	6.9*	3.1	3.5	5.0	1.9	1.08	0.90BE
7				0.74	2.7	9.0	3.0	5.9	3.3	1.8	1.12	0.89BE
8				0.77	2.9	12.4	3.0	5.1	3.4	1.8	0.88	0.89BE
9				0.79	3.7	12.8	3.0	5.0	3.5	1.7	0.84	0.89BE
10				0.81	4.3*	10.8	3.0	4.3	3.2	1.7	0.95	0.88BE
11				0.85	4.9	8.0	3.2	3.9	2.9	1.7	1.06	0.88BE
12				0.90	5.1	6.8	3.3	3.7	2.8	1.6	1.10	0.88BE
13				0.93	4.5	7.1	3.4	5.5	2.9	1.5	1.10	0.87BE
14				0.98	3.7	7.8	3.5	2.6	2.9	1.5	1.09	0.87BE
15				1.0	3.8	7.8	3.5	7.0	2.9	1.5	1.06*	0.86BE
16				1.1	3.7*	7.7	3.6	5.6	2.8	1.4	1.09	0.85B
17				1.1	3.4	7.3	4.1	4.9	2.8	1.4	0.98	0.81B
18				1.1	3.3	7.6	4.9	4.8	2.7	1.3	0.95	0.79B
19				1.2	3.1	7.9	5.7	4.7	2.7	1.3	0.95BE	0.79B
20				1.2	2.9	7.7	4.4	4.6	2.7	1.21*	0.95BE	0.80BE
21				1.3	3.0	7.4	4.1	4.5	2.6	1.17	0.95BE	0.77BE
22				1.4	3.2	7.2	3.9	5.5	2.5	1.17	0.94BE	0.78BE
23				1.5	3.5	7.1	4.2	5.5	2.5	1.18	0.94BE	0.76B
24				1.6	4.6	6.9	4.1	5.6	2.5	1.21	0.94BE	0.77BE
25				1.7*	5.2	6.8	4.1	6.0	2.4	1.18	0.93BE	0.79BE
26				1.8	5.4	6.8	4.1	6.9	2.4	1.18	0.93BE	0.80BE
27				1.9	5.5	7.0	4.0	7.1	2.3	1.11	0.93BE	0.82BE
28				2.1	5.1	6.5	4.1	7.4	2.3	1.09	0.92BE	0.83BE
29			0.56*	2.3	4.4	5.8	4.2	7.5	2.2	1.08	0.92BE	0.84BE
30				2.4	3.5	5.0	4.0	7.5	2.2	1.07	0.92BE	0.79B
31				-	3.5	-	3.8	7.6	-	1.06		0.74BE
Total				35.4	116.0	225.0	120.0	161.0	89.8	46.02	45.82	26.07
Mean 10 ⁶ x M ³				1.2	3.7	7.5	3.9	5.2	3.0	1.48	1.52	0.84
Maximum				2.4	5.5	12.8	5.7	7.6	7.76	3.96	3.99	2.250
Minimum				0.60	2.6	4.0	3.0	2.6	2.2	1.06	0.84	0.74
Monthly Runoff (mm)										9.03	19.41	17.20
Metered Flow (m ³ /s)			0.56	1.7	3.1	8.3				1.22	0.96	0.86

- NOTES: 1. Discharges were determined by daily staff gauge readings prior to the installation of continuous recording equipment on October 20, 1977.
2. Flows also metered on May 10 - 4.3; May 16 - 3.7; June 6 - 6.9 m³/s.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Cadorna Creek

Drainage Area: 130 km²

Year: 1978

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.73BE	0.53BE	0.45BE	0.51	3.39	5.10				3.10	1.06	0.62
2	0.73BE	0.53BE	0.45BE	0.51	3.53	5.53				2.89	1.03	0.61B
3	0.72BE	0.52BE	0.44BE	0.50	3.52	8.80				2.70	0.97	0.63B
4	0.72BE	0.51BE	0.44BE	0.49	3.30	14.16				2.53	0.96	0.60B
5	0.71BE	0.51BE	0.44BE	0.49	3.02	17.55				2.42	0.88	0.59B
6	0.70BE	0.50BE	0.43	0.49	2.80	18.95				2.34	0.84	0.57B
7	0.70BE	0.49BE	0.41	0.48	2.63	18.27*				2.25	1.27	0.56BE
8	0.69BE	0.49BE	0.39	0.49	2.58	17.70				2.18	1.32	0.56BE
9	0.69BE	0.48BE	0.39	0.50	3.19	18.66				2.07	1.02	0.60B
10	0.68BE	0.48BE	0.38	0.52	3.38	18.20				2.06	0.70BE	0.57B
11	0.67BE	0.47BE	0.38	0.56	3.38	16.35				2.10	0.67BE	0.57*
12	0.66BE	0.47BE	0.37	0.59	3.36	14.00				2.00	0.66	0.55BE
13	0.65BE	0.46BE	0.37	0.58	3.26	13.30				1.83	0.65	0.55BE
14	0.65BE	0.46BE	0.36	0.58	3.61	14.33				1.77	0.65	0.56B
15	0.64BE	0.45BE	0.38B	0.58	3.87	14.25				1.75	0.68	0.56B
16	0.63BE	0.44*	0.38B	0.58	4.03*	13.00				1.63	0.72	0.54B
17	0.63BE	0.44B	0.38B	0.58	4.21	11.05				1.61*	0.83	0.52B
18	0.62BE	0.44	0.38B	0.57	4.63	13.45				1.62	0.86BE	0.52B
19	0.61BE	0.41	0.38B	0.57*	6.00	13.55				1.55	0.83BE	0.53B
20	0.61BE	0.41	0.39B	0.60	8.45	13.05				2.30	1.45	0.80BE
21	0.60BE	0.41	0.39B	0.62	10.85	13.85				2.22	1.45	0.77BE
22	0.60BE	0.41	0.39B	0.65	12.18	15.50				2.48	1.34	0.74BE
23	0.59BE	0.41	0.39B	0.64	12.30	15.75				2.40	1.30	0.74
24	0.58BE	0.41	0.39B	0.62	11.33	15.40				2.28	1.32	0.73
25	0.58BE	0.41	0.39B	0.68	9.23	15.55				2.29	1.27	0.71
26	0.57BE	0.40B	0.51B	0.88	7.25	15.25				2.50	1.20	0.69
27	0.57BE	0.41B	0.43	1.15	5.80	15.30				3.48	1.18	0.67
28	0.56BE	0.42B	0.40	1.65	4.80	15.66				3.57	1.14	0.65
29	0.55BE		0.46	2.45	4.61	Vandalism				3.56	1.11	0.65
30	0.55BE		0.52	2.85	5.40	ism. No further record.				3.47	1.08	0.63
31	0.54BE		0.51	---	5.21					----	1.04	----
Total	19.73	12.77	12.77	22.96	165.10	401.51			30.55	55.28	24.38	17.70
Mean 10 ⁶ x M ³	0.63	0.45	0.41	0.76	5.32	14.33			2.77	1.78	0.81	0.57
Maximum	1.687	1.089	1.098	1.969	14.249	37.143			2.633	4.768	2.099	1.527
Minimum	0.73	0.53	0.51	2.85	12.30	18.95			3.57	3.10	1.32	0.73
	0.54	0.40	0.36	0.48	2.58	5.10			2.22	1.04	0.63	0.50
Monthly Runoff (mm)	12.89	8.32	8.39	15.05	108.93	283.96			20.12	36.45	16.05	11.67
Metered Flow (m ³ /s)		0.44		0.53	3.98	18.27	7.34	2.91	2.30	1.58		0.51

NOTES: Maximum Instantaneous Discharge 21.6 m³/s on June 6

B - Ice Conditions

E - Estimated

* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Cadorna Creek (CA 0.1)

Drainage Area: 130.8 km²

Year: 1979

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.63BE	0.52B	0.56B	0.39BE	1.25	7.40	8.33	3.81	3.06	1.41	0.85	0.45
2	0.66BE	0.52BE	0.57B	0.39BE	1.21	9.14	6.70	3.82	2.99	1.38	0.88	0.45
3	0.69B	0.51BE	0.57B	0.38B	1.17	13.35*	5.61	4.00	2.84	1.33	0.92	0.47
4	0.72B	0.51B	0.57B	0.38B	1.34	15.30	5.28	4.05	2.75	1.28	0.92	0.46
5	0.75B	0.51B	0.57B	0.38B	1.70	16.25	6.19	3.78	2.61	1.24	0.88	0.46
6	0.78B	0.52B	0.56B	0.46B	1.63	16.70	7.53	3.65	2.45	1.20	0.68	0.46
7	0.77B	0.52B	0.51B	0.50B	1.39	12.68*	7.98	3.53	2.33	1.21	0.69	0.45
8	0.75B	0.53B	0.48B	0.56B	1.20	9.79	7.80	3.42	2.28	1.25	0.72	0.47
9	0.73B	0.53B	0.48B	0.43	1.19	9.01	7.15	3.26	2.33	1.25	0.75	0.49BE
10	0.70B	0.54B	0.47B	0.43	1.32	7.89*	6.63	3.18	2.33	1.22	0.76	0.48BE
11	0.67B	0.54B	0.47B	0.43*E	1.49	13.28	6.37	3.23	2.25	1.18	0.78	0.47
12	0.58B	0.54B	0.47B	0.42	1.67	15.53	5.87	3.32	2.14	1.18	0.76	0.44
13	0.52B	0.53B	0.47B	0.42	1.78	16.15	6.09	3.32	2.04*	1.18	0.76	0.45
14	0.51BE	0.53BE	0.47B	0.42	1.94	14.99	5.62	3.32*	1.98	1.18	0.70	0.45BE
15	0.51BE	0.61BE	0.47B	0.42	2.60	11.22	5.13	3.29	1.92	1.18	0.68	0.45BE
16	0.50B	0.68BE	0.47B	0.42	4.85	9.09	4.92	3.15	1.90	1.18	0.67	0.45BE
17	0.50B	0.67B	0.45B	0.42	4.71*	7.25	5.38	3.11	1.91	1.18	0.70	0.43
18	0.49B	0.66B	0.43B	0.43	4.45	8.43	5.32	3.07	1.90	1.17	0.72	0.42
19	0.48B	0.63B	0.43B	0.43	4.11	10.20	5.73*	3.05	1.87	1.14	0.67	0.42
20	0.48B	0.63B	0.43B	0.43	3.77	10.94	6.11	2.99	1.84	1.11	0.63BE	0.43
21	0.48B	0.61B*	0.43B	0.42	4.15	10.71	6.18	2.98	1.81	1.08	0.59BE	0.43
22	0.52BE	0.54BE	0.43B	0.42	5.23	10.13	6.17	2.94	1.79	1.06	0.59BE	0.42
23	0.54B	0.54BE	0.41B	0.41	6.77	9.74	6.15	2.92	1.76	1.04	0.56	0.42
24	0.52B	0.55B	0.39B	0.41	9.47	9.75	5.63	2.94	1.71	1.04	0.55	0.42
25	0.52BE	0.56B	0.38B	0.42	11.24	8.53	5.02	2.95	1.64	1.06	0.54	0.43
26	0.53B	0.55B	0.38B	0.46	12.53	8.32	4.22	2.97	1.58	1.08*	0.53	0.42
27	0.52B	0.54B	0.38B	0.53	16.20	8.62	3.92	2.93	1.53	1.09	0.52BE	0.43BE
28	0.52B	0.55B	0.38BE	0.68	14.63	8.85	3.91	2.88	1.56	1.09	0.52BE	0.45
29	0.52BE		0.38B	0.88	9.88	8.73	4.02	2.85	1.52	1.05	0.50BE	0.43
30	0.52BE		0.38B	1.09	7.63*	8.92	3.92	2.88	1.47	1.02	0.47	0.40
31	0.52BE		0.38B		7.18		3.80	3.01		0.98		0.39
Total	18.13	15.67	14.22	14.26	149.68	326.97	178.68	100.60	62.09	36.04	20.47	13.69
Mean 10 ⁶ x M ³	0.585	0.560	0.459	0.475	4.828	10.899	5.764	3.245	2.070	1.163	0.682	0.442
Maximum	1.566	1.354	1.229	1.232	12.932	28.250	15.438	8.692	5.365	3.114	1.769	1.183
Minimum	0.48	0.51	0.38	0.38	1.17	7.25	3.80	2.85	1.47	0.98	0.47	0.39
Monthly Runoff (mm)	11.9	10.3	9.3	9.4	98.8	215.9	118.0	66.4	41.0	23.8	13.5	9.0
Metered Flow (m ³ /s)		0.59		0.534	4.50	13.293	5.530	3.277	2.058	1.092		

NOTES: Flows also measured on May 30 (7.576); June 7 (12.242); June 10 (10.288).
Maximum Instantaneous Discharge 17.5 m³/s on June 6.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED
STREAM GAUGING DATA

Station: Cadonna Creek CA 1.0

Drainage Area: 130.8 km²

Year: 1980

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.39	0.38BE	0.40	0.43BE	10.09	14.18	9.33	3.95	2.28	2.79	1.09	0.92BE
2	0.39	0.38	0.41	0.42	11.50	14.75	9.36	3.96	2.17	2.76	1.10	0.92BE
3	0.39	0.36	0.42BE	0.43BE	12.65	15.03	9.45	4.11	2.08	2.60	1.10	0.92BE
4	0.39	0.35	0.42BE	0.43BE	12.78	15.07	9.43	3.96	1.97	2.47	1.10	0.92BE
5	0.36BE	0.35	0.42BE	0.43	12.65	14.78	8.96	3.83	1.84	2.36	1.09	0.92BE
6	0.36BE	0.35	0.42BE	0.43	14.38	14.58	8.33	3.90	1.79	2.25	1.08	0.92BE
7	0.36BE	0.35	0.42BE	0.43	13.65	13.78	7.66	3.84	1.74	2.17	1.08	0.92BE
8	0.36BE	0.35	0.42	0.43	12.47	13.21	7.53	3.78	1.77	2.08	1.09	0.92BE
9	0.36BE	0.35	0.42	0.43	9.77	13.97	7.78	4.03	1.75	1.94	1.10	0.92BE
10	0.36BE	0.34	0.43	0.44	8.57	16.45	8.11	4.09	1.69	1.77	1.09	0.88
11	0.36BE	0.34	0.43	0.45	7.83	18.42*	7.71	4.66	1.66	1.65	0.98	0.79
12	0.36BE	0.34	0.42	0.46	7.70	18.21	6.93	5.83	1.71	1.51	0.85	0.80
13	0.32	0.35BE	0.42	0.48	7.83	17.40	6.11	5.37	1.88	1.43	0.78	0.80
14	0.32	0.35BE	0.42	0.53	8.20*	17.71	5.83	4.51	1.89	1.37	0.79	0.78
15	0.32	0.35BE	0.42	0.59	8.72	18.40	5.91	4.17	2.03	1.33	0.81	0.81
16	0.31	0.35BE	0.42	0.62	9.63	19.16	5.98	3.90	2.07	1.34	0.84	0.87
17	0.32	0.35	0.42	0.70	10.57	21.06	5.56	3.77	2.04*	1.28	0.93	0.85
18	0.35BE	0.35	0.41	0.89	12.04	20.40	4.98	3.82	1.89	1.21	0.99*	0.86BE
19	0.35BE*	0.35	0.40	1.19	13.48	18.18	4.78	3.78	1.81	1.18	1.03	0.86BE
20	0.35BE	0.36	0.43E	1.42	13.92	17.30	4.60	3.65	1.91	1.17	1.04	0.77
21	0.35	0.36	0.39*	1.51	15.77	16.53	4.53	3.48	2.05	1.16	1.03	0.76
22	0.35	0.36	0.40	1.52	17.45	15.83	4.65	3.35	2.00	1.15	1.04	0.74
23	0.35	0.37BE	0.42	1.93	17.13	15.10	5.27*	3.24	1.85	1.10	1.03BE	0.75BE
24	0.38	0.37BE	0.42	2.64	16.65	14.48	5.28	3.13	1.70	1.09	0.99	0.75BE
25	0.38BE	0.36	0.42	3.14	15.77	13.03	4.66	3.01	1.61	1.09	0.98	0.74
26	0.38BE	0.36	0.42	3.63	21.71	12.45	4.50	2.89	1.50	1.07	0.97	0.81
27	0.38BE	0.36	0.42	4.15	21.77	11.90	4.32	2.79	1.46	1.07	0.98	1.08
28	0.38BE	0.38	0.42	4.58	18.38	11.01	4.25	2.72	1.45	1.07	0.98	1.13
29	0.38BE	0.39	0.42	5.13	16.63	10.31	4.20	2.60	1.51	1.08	0.96	1.10
30	0.38BE		0.43	7.58	15.67	9.83	4.08	2.49	1.43	1.11	0.93	1.06
31	0.38BE		0.43BE		14.68	-----	3.96	2.40		1.10		1.01
Total	11.17	10.36	12.96	47.45	410.04	462.51	191.03	115.01	54.53	48.75	29.85	27.28
Mean 10 ⁶ x M ³	0.36	0.36	0.42	1.58	13.23	15.41	6.16	3.71	1.81	1.57	0.99	0.88
Maximum	0.965	0.895	1.120	4.100	35.427	39.943	16.499	9.937	4.692	4.205	2.566	2.357
Minimum	0.39	0.39	0.43	7.58	21.77	21.06	9.45	5.83	2.28	2.79	1.10	1.13
	0.31	0.34	0.39	0.42	7.70	9.83	3.96	2.40	1.43	1.07	0.78	0.74
Monthly Runoff (mm)	7.3	6.8	8.5	31.3	270.8	305.4	126.1	75.9	35.9	32.1	19.6	18.0
Metered Flow (m ³ /s)	0.311		0.377		8.215	18.811	5.51		2.079		1.029	

NOTES: 1. Flow also metered May 14 - 8.066

2. Maximum Instantaneous Discharge 24.10 m³/s on May 26.

B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Cadorna Creek CA 1.0

Drainage Area: 130.8 km²

Year: 1981

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.96BE	0.62	0.51	0.51	3.91	15.79	20.58	9.39	3.87	1.77	1.40	0.90
2	0.94BE	0.61	0.49	0.52	4.59	14.53*	20.10	8.77	3.75	1.92	1.39	0.93
3	0.97BE	0.60	0.48	0.52	3.89	16.82*	18.23	8.71	3.60	1.93	1.30	0.95
4	0.99BE	0.59BE	0.47	0.50	3.52	16.75*	20.63	7.90	3.37	1.82	1.21	0.95
5	0.92	0.60BE	0.46	0.51	3.29	14.52*	23.03	7.43	3.20	1.80	1.16	0.95
6	0.89	0.59	0.46	0.50	3.13	13.33*	22.37	7.40	3.13	1.80	1.13	0.95
7	0.89	0.57	0.47BE	0.50BE	3.00	13.35*	19.33	7.43	3.00	1.80	1.13	0.94
8	0.88	0.57	0.47	0.49	3.02	10.88*	15.50	7.83	2.84	1.79	1.19	0.91
9	0.87	0.55	0.47BE	0.49	3.21	9.82*	11.70	7.93	2.91	1.78	1.13	0.90
10	0.84	0.55	0.47BE	0.49	3.26	8.53*	9.64	7.69	2.89	1.77	1.11	0.90
11	0.81	0.55	0.46	0.48	3.17	7.98	8.84	7.56	2.82	1.72	1.11*	0.90
12	0.79	0.54	0.45	0.48	3.05	7.61	9.07	7.50	2.76	1.70	1.10	0.86B
13	0.78	0.54	0.45	0.47	3.01	8.84	9.68	7.91*	2.57	1.64	1.10	0.84BE
14	0.75*	0.54BE	0.46	0.47	3.18*	11.93	11.23	8.00	2.41	1.61	1.08	0.84BE
15	0.70	0.53	0.47	0.48	3.90	12.72	10.77	7.58	2.30	1.60	1.05	0.83
16	0.69BE	0.52	0.48	0.50	4.53	12.97	10.03	7.10	2.21*	1.60	1.06	0.81B
17	0.68BE	0.52	0.50	0.53	4.30	13.26	9.61	7.33	2.20	1.60	0.97	0.80B
18	0.69BE	0.52	0.49	0.57	4.38	12.23	10.22	6.92	2.20	1.59	0.93	0.80B
19	0.67	0.51	0.55*	0.64	5.36	10.56	10.70	6.58	2.20	1.58	0.85	0.80
20	0.66	0.51	0.50	0.80	7.61	9.47	11.37	6.30	2.21	1.58	0.85	0.80
21	0.65	0.50	0.52BE	0.99	10.44	8.61	11.83	5.92	2.20	1.45	0.85	0.80B
22	0.65	0.51	0.52	1.06	13.63	8.46	11.83	5.23	2.23	1.50	0.85	0.80B
23	0.64	0.51	0.50	1.24	15.06	8.13	11.67	5.30	2.12	1.51	0.88	0.80B
24	0.64	0.52	0.50	1.67	16.35	7.66	10.90	5.10	2.09	1.53	0.85	0.80
25	0.64	0.52	0.50	1.70	18.78	7.93	11.27	4.61	2.00	1.53	0.75B	0.80
26	0.62	0.52BE	0.50	1.60	21.69	9.74	11.03	4.56	1.97	1.50	0.75	0.80
27	0.62	0.51BE	0.50	1.61	22.47	12.95	10.20	4.58	1.86	1.50	0.80	0.80B
28	0.63	0.51BE	0.50	1.68	19.45	13.70	10.40	4.46	1.81	1.47	0.83B	0.80BE
29	0.63		0.50	1.83	16.98	12.30	10.77	4.25	1.80	1.42	0.85	0.80BE
30	0.63		0.51	2.34	16.13	14.13	10.77	4.10	1.77	1.40	0.87	0.80BE
31	0.62		0.51		16.35		10.77	3.98		1.40		0.80BE
Total	23.34	15.23	15.12	26.17	264.64	345.5	403.37	205.35	76.29	50.61	30.59	26.36
Mean 10 ⁶ x M ³	0.75	0.54	0.49	0.87	8.54	11.52	13.01	6.62	2.54	1.63	1.02	0.85
Maximum	2.009	1.306	1.312	2.261	22.874	29.85	34.85	17.74	6.59	4.37	2.64	2.28
Minimum	0.99	0.62	0.55	2.34	22.47	16.82	23.03	9.39	3.87	1.93	1.40	0.95
	0.62	0.50	0.45	0.47	3.00	7.61	8.84	3.98	1.77	1.40	0.75	0.80
Monthly Runoff (mm)	15.4	10.0	10.0	17.3	174.8	228.2	266.44	135.6	50.4	33.4	20.2	17.4
Metered Flow (m ³ /s)	0.753		0.645		3.070						1.09	

NOTES: 1. Flow also metered: June 2-14.17; June 3 - 16.89; June 4 - 16.53;
June 5 - 14.45; June 6 - 13.23; June 7 - 13.71; June 8 - 11.11;
June 9 - 9.92; and June 10 - 8.38 m³/s.

B - Ice Conditions
E - Estimated
* - Dates metered

2. Maximum Instantaneous Discharge 23.47 m³/s on May 27.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: CADORNA CREEK (C.A 0.1)

Drainage Area: 130.8 km²

Year: 1982

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.75B ^E	.59	.59	.59	.98	6.59	11.2	4.42	3.13	2.32	1.63	1.03
2	.70	.59	.59	.59	1.22	7.28	10.2	4.37	2.99	2.24	1.37	1.02
3	.70	.59B	.58	.58	1.39	8.39	10.5	4.76	2.94	2.21	1.41	1.02
4	.66	.59B	.58	.54	1.40	10.2	10.1	4.48	3.38	2.18	1.54	1.01
5	.66B	.59B	.59	.54	1.42	11.3	8.20	4.01	4.32	2.04	1.68	1.01
6	.67B	.59B	.60	.56	1.44	11.0	6.99	3.76	4.19	2.00	1.61	-
7	.68B	.58B	.60	.62	1.50	9.42	6.49	3.62	3.83	2.02	1.43	-
8	.69B	.56B	.60	.65	1.58	7.55	6.13	3.58	3.63	1.99	1.28	-
9	.70	.57B	.59	.59	1.48	6.49	5.99	3.60	3.46	1.91	1.19	-
10	.70	.58B	.58	.58	1.42	6.62	6.18	3.67	3.67	1.87	1.18	-
11	.70	.59B	.57	.58	1.52	8.95	6.53	3.82	3.57	1.83	1.22	-
12	.69	.59	.58	.54	1.75	11.8	6.36	3.90	3.32	1.81	1.33	-
13	.69	.57	.57	.56	1.96	14.4	5.93	3.85	3.10	1.80	1.38	-
14	.67	.58	.56	.58	2.46	17.0	5.88	4.31	2.86	1.78	1.36	-
15	.65B	.58	.57	.58	3.15	19.4	5.77	4.28	2.69	1.78	1.38	-
16	.66B	.56	.57	.55	4.18	19.5	4.97	3.93	2.60	1.78	1.42	-
17	.68B	.56	.57	.54	5.62	17.8	4.28	3.64	2.57	1.78	1.50	-
18	.70	.57	.60	.55	6.60	16.4	4.03	3.50	2.54	1.79	1.51	-
19	.68B	.58	.59	.62	6.92	16.0*	4.25	3.41	2.56	1.76	1.52	-
20	.65B	.57	.57	.61	6.85	16.7	5.09	3.33	2.57	1.68	1.51	-
21	.63B	.55	.58	.59	7.31	17.0	5.60	3.31	2.53	1.68	1.36	-
22	.62B	.58	.59	.58	8.19	17.0	5.41	3.34	2.45	1.70	1.21B	-
23	.61B	.59	.57	.66*	9.25	15.8	4.85	3.34*	2.42	1.80	1.09*	-
24	.60B	.59	.57	.75	9.55	13.6	4.36	3.23	2.31	1.80	1.08	-
25	.61	.59	.61	.74	10.03	12.9	4.07	3.20	2.22	1.79	1.03B	-
26	.59	.58	.59	.73	12.4	12.5	4.01	3.46	2.49	1.79	1.07	-
27	.60	.58	.59	.76	10.4	12.6	4.00	3.54	2.59	1.78	1.11	-
28	.60	.59	.58	.87	8.19*	12.4	4.02	3.61	2.59	1.72	1.11	-
29	.60	-	.59	.91	6.95	11.1	4.17	3.57	2.49	1.73	1.10	-
30	.60	-	.59	.91	6.28	10.7	4.32	3.37	2.40	1.58	1.11	-
31	.59	-	.59	-	6.41	-	4.45	3.23	-	1.61	-	-
Total	20.34	16.23	18.10	19.05	150.07	378.39	184.33	115.44	88.41	57.55	39.72	-
Mean 10 ⁶ x m ³	0.66 1.757	0.58 1.402	0.58 1.564	0.64 1.646	4.84 12.966	12.6 32.693	5.95 15.926	3.72 9.974	2.95 7.639	1.85 4.972	1.32 3.432	0.96E 2.57E
Maximum	0.75	0.59	0.61	0.91	12.4	19.5	11.2	4.76	4.32	2.32	1.68	-
Minimum	0.59	0.55	0.56	0.54	0.98	6.49	4.00	3.20	2.22	1.58	1.03	-
Monthly Runoff (mm)	13.4	10.7	12.0	12.6	99.1	250.0	122.0	76.3	58.4	38.0	26.2	19.7E
Metered Flow (m ³ /s)	-	-	-	0.667	8.07	16.0	-	3.33	-	-	1.09	-

NOTES: 1. Maximum Instantaneous Discharge 20.1 m³/s on June 15.

2. Estimated annual runoff 738 mm.

B - Ice Conditions

E - Estimated

* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: CADORNA CREEK (CA-0.1)

Drainage Area: 130.8 km²

Year: 1983

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	—	0.78	0.70	0.66	1.8	14.7	7.3	4.7	2.5	1.6	1.2	—
2	—	0.76	0.70	0.66	1.8	12.9	7.1	4.8	2.6	1.6	1.2	—
3	—	0.76	0.70	0.65	1.9	12.3	6.9	4.9	2.6	1.6	1.3	—
4	—	0.75	0.70	0.65	2.0	13.4	7.1	4.8	2.6	1.6	1.6	—
5	—	0.89	0.70	0.64	2.0	13.2	7.3	4.6	2.6	1.6	1.6	—
6	—	0.79	0.70	0.63	2.3	12.1	7.3	4.5	2.5	1.5	1.5	—
7	—	0.74	0.70	0.63	2.6	12.3	7.4	4.5	2.4	1.4	1.4	—
8	—	0.74	0.70	0.63	2.8	12.8	7.5	4.4	2.4	1.4	1.4	—
9	—	0.74	0.70	0.63	2.9	12.8	7.4	4.4	2.3	1.4	1.4	—
10	—	0.74	0.70	0.63	2.8	12.3	6.6	4.3	2.2	1.4	1.4	—
11	—	0.74	0.70*	0.63	2.8	11.2	5.9	4.3	2.1	1.4	1.3	—
12	—	0.74	0.69	0.64	3.0	9.6	6.7	4.3	2.0	1.4	1.3	—
13	0.89	0.74	0.69	0.64	3.3	8.2	10.7	4.3	2.0	1.4	1.3	—
14	0.88	0.74	0.69	0.65	3.5	7.7*	14.3	4.1	1.9	1.4	1.3	—
15	1.16	0.74	0.69	0.65	3.7	7.8	14.0	4.0	1.9	1.4	1.2	—
16	1.16	0.74	0.69	0.66	3.9	8.0	10.6	3.8	1.9	1.4	1.2	—
17	0.88	0.70	0.69	0.69	4.1	8.1	8.1	3.7	1.9	1.3	1.2	—
18	0.88	0.70	0.69	0.76	4.2	8.4	7.1	3.6	1.8	1.3	1.2	—
19	0.90	0.70	1.12	0.87	4.3	7.6	6.6	3.4*	1.8	1.3	1.2	—
20	1.30	0.70	0.69	1.0	4.5	6.6	6.5	3.0	1.7	1.3	1.2	—
21	0.94	0.70	0.69	1.3	5.1	5.9	6.6	2.9	1.7	1.3	1.1	—
22	0.83	0.70	0.70	1.5	5.8	5.5	6.3	2.8	1.6	1.3	1.0	—
23	0.83	0.70	0.68	1.7	6.5	6.6	5.9	2.7	1.6	1.3	0.98	—
24	0.82	0.70	0.68	2.0	7.6	9.4	5.7	2.7	1.6	1.2	1.0	—
25	0.82	0.70	0.68	2.3	9.3	9.6	6.0	2.8	1.6	1.2	1.1	—
26	0.91	0.70	0.67	2.1	11.5*	7.6	6.5	2.9	1.6	1.2	1.1	—
27	0.81	0.70	0.67	2.0	13.7	6.7	6.0	2.8	1.6	1.2*	1.2	—
28	0.80	0.70	0.67	1.8	15.1	6.4	5.5	2.7	1.7	1.2	1.1	—
29	1.13	-	0.67	1.8	16.7	6.6	5.1	2.6	1.7	1.2	1.1	—
30	1.34	-	0.67	1.8	18.6	7.1	4.8	2.6	1.7	1.2	0.95B	—
31	0.83	-	0.67	-	16.8	-	4.7	2.5	1.2	-	-	—
Total	-	20.53	21.79	31.90	186.9	283.4	225.5	114.4	60.1	42.2	37.03	-
Mean 10 ⁶ x m ³	-	0.733	0.70	1.06	6.03	9.45	7.27	3.69	2.80	1.36	1.23	-
Maximum	-	1.77	1.88	2.76	16.2	24.5	19.5	9.88	5.19	3.65	3.20	-
Minimum	-	0.89	1.12	2.3	18.6	14.7	14.3	4.7	2.6	1.6	1.6	-
Minimum	-	0.70	0.67	0.63	1.8	5.5	4.7	2.5	1.6	1.2	0.95	-
Monthly Runoff (mm)		13.6	14.4	21.1	123	187	149	75.6	39.7	27.9	24.5	18.4E
Metered Flow (m ³ /s)	16.6E	-	0.572	-	12.1	7.88	-	3.49	-	1.19	-	-

NOTES: 1. Maximum Instantaneous Discharge 19.3 m³/s on May 30.

2. Estimated annual runoff 711 mm.

B - Ice Conditions

E - Estimated

* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Weary Creek (WE 1.0)

Drainage Area: 20.4 km²

Year: 1977

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.07	0.36	0.59	0.27	0.18	0.20	0.19	0.04	0.06BE
2				0.07	0.48	0.89	0.25	0.15	0.23	0.18	0.05	0.06BE
3				0.07	0.44*	0.58	0.23	0.16	0.23	0.18	0.04	0.06BE
4				0.07	0.41	0.46	0.22	0.17	0.20	0.18	0.04	0.06BE
5				0.07	0.33	0.46	0.21	0.17	0.22	0.17	0.06	0.06BE
6				0.07	0.44	0.65	0.21	0.19	0.22	0.17	0.05	0.06BE
7				0.07	0.27	0.89*	0.20	0.37	0.22	0.16	0.05	0.05BE
8				0.08	0.30	0.97	0.20	0.26	0.21	0.16	0.06B	0.05BE
9				0.08	0.85*	0.89	0.19*	0.23	0.20	0.15	0.08	0.05BE
10				0.08	0.88	0.60	0.20	0.21	0.19	0.15	0.09	0.05BE
11				0.08	1.1	0.45	0.19	0.18	0.18	0.15	0.08	0.05BE
12				0.08	0.79	0.43	0.19	0.18	0.18	0.14	0.07	0.05BE
13				0.08	0.62	0.44	0.20	0.50	0.18	0.14	0.07	0.05BE
14				0.08	0.50	0.44	0.19	0.51	0.17	0.13	0.07	0.05BE
15				0.08	0.47*	0.45	0.19	0.41	0.17	0.13	0.07*	0.05BE*
16				0.08	0.39	0.60*	0.19	0.35	0.18	0.12	0.08BE	0.05B
17				0.08	0.38	0.48	0.20	0.57	0.18	0.12	0.08BE	0.04B
18				0.09	0.36*	0.36	0.18	0.26	0.19	0.12*	0.08BE	0.04B
19				0.09	0.33	0.36	0.19	0.24	0.19	0.12	0.08BE	0.03B
20				0.09	0.31	0.48	0.18	0.27	0.20	0.10	0.08BE	0.03BE
21				0.09	0.32	0.46	0.17	0.25	0.20	0.08	0.08BE	0.03BE
22				0.09*	0.33	0.45	0.17	0.30	0.20	0.07	0.08BE	0.03BE
23				0.11	0.38	0.44	0.17	0.30	0.20	0.07	0.07BE	0.03BE
24				0.29	0.71	0.42	0.16	0.29	0.19	0.07	0.07BE	0.03BE
25				0.48	0.60	0.43	0.18	0.30	0.19	0.07	0.07BE	0.03BE
26				0.38	0.56	0.36	0.17	0.25	0.19	0.05	0.07BE	0.03BE
27				0.36	0.54	0.31	0.17	0.29	0.19	0.05	0.07BE	0.03BE
28				0.35	0.46	0.31	0.17	0.21	0.19	0.05	0.07BE	0.03BE
29				0.35	0.40	0.27	0.16	0.20	0.19	0.05	0.07	0.03BE
30				0.35	0.34	0.19	0.17	0.20	0.18	0.04	0.06BE	0.03BE
31				-	0.36	-	0.18	0.21	-	0.04	---	0.03BE
Total				4.4	15.01	15.11	5.95	8.27	5.86	3.60	2.03	1.33
Mean 10 ⁶ x M ³				0.15	0.48	0.50	0.19	0.27	0.19	0.12	0.06	0.04
Maximum				0.38	1.30	1.31	0.51	0.71	0.51	0.31	0.18	0.11
Minimum				0.07	0.27	0.19	0.16	0.15	0.17	0.04	0.04	0.03
Monthly Runoff (mm)				18.6	63.6	64.0	25.2	35.0	24.8	15.2	8.6	5.6
Metered Flow (m ³ /s)				0.09	0.44	0.69	0.26			0.123	0.073	0.050

NOTES: 1. Discharges listed prior to installation of the hydrometric stations (from April to mid October) were determined through the use of manual staff gauge readings and metered discharge measurements. Daily discharges between actual field observations were interpolated.

2. Flows were also metered on May 9 - 0.85; May 15 - 0.47; May 18 - 0.36; June 16 - 0.74 m³/s.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Weary Creek WE 1.0

Drainage Area: 20.4 km²

Year: 1978

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03 BE	0.03 BE	0.03 B	0.05 BE	0.53 E	0.57 E	1.84	0.29	0.34	0.21	0.04	0.07 BE
2	0.03 BE	0.03 BE	0.03 B	0.05	0.73 E	0.79 E	1.40	0.25	0.33	0.22	0.04	0.07 BE
3	0.03 BE	0.03 BE	0.03 B	0.05	0.41 E	1.47 E	1.21	0.24	0.32	0.20	0.04	0.07 BE
4	0.03 BE	0.03 BE	0.03 B	0.05	0.18 E	2.44	1.14	0.25	0.32	0.19	0.05 BE	0.07 BE
5	0.03 BE	0.03 BE	0.03 B	0.05	0.09 E	3.15	1.03	0.26	0.32	0.18	0.05 BE	0.07 BE
6	0.03 BE	0.03 BE	0.03 B	0.05	0.06 E	3.20 *	0.98	0.25	0.31	0.17	0.05 BE	0.07 BE
7	0.03 BE	0.03 BE	0.03 B	0.06	0.04 E	2.80	1.50	0.25	0.30	0.17	0.05 BE	0.07 BE
8	0.03 BE	0.03 BE	0.03 B	0.06	0.04 E	2.84	2.37	0.25	0.30	0.15	0.05 BE	0.07 BE
9	0.03 BE	0.03 BE	0.03 B	0.06	0.09 E	2.73	1.51	0.24	0.29	0.14	0.05 BE	0.07 BE
10	0.03 BE	0.03 BE	0.03 B	0.06	0.16 E	1.93	1.23	0.24	0.29	0.14	0.05 BE	0.07 BE
11	0.03 BE	0.03 BE	0.03 B	0.06	0.16 E	1.21	1.03	0.26	0.28	0.12	0.05 BE	0.07 BE
12	0.03 BE	0.03 BE	0.02 BE	0.06	0.10 E	0.97	0.73	0.27	0.29	0.10	0.05 BE	0.07 BE
13	0.03 BE	0.03 BE	0.02 BE	0.06	0.08 E	1.43	0.63	0.28	0.30	0.10	0.05 BE	0.07 B
14	0.03 BE	0.03 BE	0.02 BE	0.07	0.24 E	1.69	0.56	0.28	0.28	0.10	0.05 BE	0.05 B
15	0.03 BE	0.03 BE	0.02 BE	0.07	0.55 E	1.12	0.54	0.29	0.25	0.10	0.05 BE	0.04 B
16	0.03 BE	0.03 BE*	0.02 BE	0.07	0.73 *	0.65	0.52	0.31	0.23	0.10	0.05 BE	0.05 B
17	0.03 BE	0.03 B	0.02 BE	0.07	0.38	0.58	0.63	0.32	0.22	0.10 *	0.05 BE	0.04 B
18	0.03 BE	0.03 B	0.03 BE	0.07	0.72	1.12	0.77	0.33	0.23	0.10	0.06 BE	0.04 B
19	0.03 BE	0.03 B	0.03 BE	0.07 *	1.80	0.68	0.67	0.33	0.24 *	0.09	0.06 BE	0.04 B
20	0.03 BE	0.03 B	0.03 BE	0.10 E	3.30	0.85	0.57	0.34	0.25	0.07	0.06 BE	0.04 B
21	0.03 BE	0.03 B	0.03 BE	0.05 E	4.04	1.70	0.54	0.36	0.29	0.06	0.06 BE	0.05 B
22	0.03 BE	0.03 B	0.03 BE	0.04 E	3.93	2.14	0.53	0.36*	0.29	0.05	0.06 BE	0.06 B
23	0.03 BE	0.03 B	0.03 BE	0.03 E	3.23	2.16	0.52	0.37	0.27	0.06	0.06 BE	0.07 B
24	0.03 BE	0.03 B	0.04 BE	0.02 E	1.69 E	2.29	0.52	0.35	0.25	0.05	0.06 BE	0.09 B
25	0.03 BE	0.03 B	0.04 BE	0.06 E	1.04 E	1.98	0.48	0.35	0.26	0.04	0.06 BE	0.09 B
26	0.03 BE	0.03 B	0.04 BE	0.11 E	0.85 E	1.66	0.43*	0.35	0.27	0.04	0.06 BE	0.09 B
27	0.03 BE	0.03 B	0.04 BE	0.13 E	0.70 E	1.84	0.37	0.34	0.24	0.04	0.06 BE	0.09 B
28	0.03 BE	0.03 B	0.04 BE	0.25 E	0.59 E	2.12	0.32	0.33	0.22	0.05	0.06 BE	0.07 B
29	0.03 BE	-	0.04 BE	0.29 E	0.53 E	2.34	0.30	0.33	0.21	0.05	0.06 BE	0.07 B
30	0.03 BE	-	0.04 BE	0.22 E	0.54 E	2.11	0.29	0.33	0.21	0.04	0.06 BE	0.06 B
31	0.03 BE	-	0.05 BE	-	0.62 E	-	0.30	0.33	-	0.04	-	0.10 B
Total	0.93	0.84	0.96	2.37	28.15	52.56	25.46	9.33	8.20	3.27	1.60	2.04
Mean 10 ⁶ x M ³	0.03	0.03	0.03	0.07	0.90	1.75	0.82	0.30	0.27	0.10	0.05	0.06
Maximum	0.03	0.073	0.083	0.205	2.432	4.54	2.20	0.80	0.71	0.28	0.138	0.176
Minimum	0.03	0.03	0.05	0.29	4.04	3.20	2.37	0.37	0.34	0.22	0.06	0.10
Monthly Runoff (mm)	3.92	3.56	4.1	10.0	119.2	222.6	107.8	39.5	34.7	13.8	6.8	8.6
Metered Flow (m ³ /s)		0.030		0.074	0.812	3.300	0.462	0.385	0.241	0.113		0.07

NOTES: 1. Maximum Instantaneous Discharge 4.31 m³/s on May 21.B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Weary Creek (WE 1.0)

Drainage Area: 20.4 km²

Year: 1979

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.07	0.08	0.09	0.07	0.09	1.13*	0.74	0.19	0.16	0.08	0.037	0.075
2	0.08	0.08	0.09	0.07	0.07	1.67	0.65	0.19	0.15	0.08	0.045	0.075
3	0.08	0.08	0.09	0.07	0.038	2.15	0.59	0.19	0.15	0.085	0.040	0.070
4	0.08	0.08	0.09	0.07	0.13	2.15	0.57	0.20	0.14	0.085	0.040	0.065
5	0.08	0.08	0.09	0.07	0.22	2.03*	0.61	0.19	0.13	0.085	0.035	0.060
6	0.08	0.08	0.09	0.07	0.11	1.00	0.62	0.18	0.12	0.085	0.030	0.053
7	0.08	0.08	0.08	0.07	0.042	1.08	0.62	0.18	0.11	0.088	0.034	0.045
8	0.08	0.08	0.08	0.07	0.023	1.00	0.59*	0.17	0.10	0.090	0.034	0.045
9	0.08	0.09	0.08	0.07	0.045	1.01	0.55	0.16	0.11	0.095	0.035	0.040
10	0.08	0.09	0.08	0.07	0.066	1.13	0.52	0.16	0.10	0.095	0.035	0.098
11	0.08	0.09	0.08	0.07	0.095	1.30	0.49*	0.17	0.10	0.095	0.030	0.035
12	0.08	0.09	0.08	0.065	0.15	1.48	0.45	0.18	0.09	0.095	0.030	0.035
13	0.08	0.09	0.08	0.075*	0.21	1.34	0.41	0.16	0.09	0.10	0.030	0.035
14	0.08	0.09	0.08	0.095	0.29	1.11	0.38	0.16	0.09*	0.11	0.054	0.035
15	0.08	0.09	0.08	0.145	0.72	0.94	0.36	0.15*	0.09	0.11	0.023	0.035
16	0.08	0.09	0.08	0.15	1.30*	0.97	0.33	0.13	0.09	0.10	0.053	0.093
17	0.08	0.09	0.08	0.165	1.17	0.99	0.32	0.13	0.09	0.10	0.020	0.055
18	0.08	0.09	0.08	0.185	1.05	1.01	0.30*	0.12	0.09	0.095	0.020	0.050
19	0.08	0.09	0.08	0.205	0.98	1.10	0.28	0.12	0.085	0.095	0.130	0.045
20	0.08	0.09	0.08	0.23	0.98	1.14	0.28	0.14	0.09	0.085	0.300	0.045
21	0.08	0.09*	0.08	0.24	1.09	1.04	0.29	0.13	0.085	0.080	0.180	0.045
22	0.08	0.09	0.08	0.25	1.37	0.97	0.29	0.12	0.085	0.075	0.160	0.035
23	0.08	0.09	0.08	0.25	1.93	0.95	0.29	0.18	0.085	0.075	0.130	0.035
24	0.08	0.09	0.08	0.21	2.39	0.91	0.30	0.22	0.08	0.070	0.108	0.035
25	0.08	0.09	0.07	0.20	2.37	0.87	0.29	0.24	0.08	0.065	0.100	0.035
26	0.08	0.09	0.07	0.20	2.56	0.85	0.27	0.22	0.075	0.061*	0.090	0.035
27	0.08	0.09	0.07	0.205	2.68	0.84	0.26	0.20	0.075	0.055	0.085	0.035
28	0.08	0.09	0.07	0.205	1.43	0.82	0.24	0.18	0.078	0.055	0.085	0.040
29	0.08		0.07	0.19	1.03	0.81	0.23	0.17	0.075	0.052	0.080	0.040
30	0.08		0.07	0.155	0.89	0.81	0.21	0.18	0.075	0.050	0.075	0.040
31	0.08		0.07		0.81		0.20	0.16	0.049			0.035
Total	2.47	2.44	2.56	4.19	26.33	34.60	12.53	5.57	2.97	2.54	2.15	1.50
Mean 10 ⁶ x M ³	0.08	0.09	0.08	0.14	0.85	1.15	0.40	0.18	0.10	0.08	0.07	0.05
Maximum	0.21	0.21	0.22	0.36	2.27	2.99	1.08	0.48	0.26	0.22	0.19	0.13
Minimum	0.08	0.09	0.09	0.25	2.68	2.15	0.74	0.24	0.16	0.11	0.30	0.10
	0.07	0.08	0.07	0.07	0.02	0.81	0.20	0.12	0.08	0.05	0.02	0.04
Monthly Runoff (mm)	10.5	10.3	10.8	17.8	111.5	146.5	53.1	23.6	12.6	10.7	9.1	6.4
Metered Flow (m ³ /s)		0.09		0.066	1.20	0.815	0.251	0.138	0.094	0.058		

NOTES: Flows also metered on June 5 (2.143 m³/s), June 8 (0.921 m³/s) and
June 11 (1.178 m³/s)

Maximum Instantaneous Discharge 3.50 m³/s on May 26.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Weary Creek WE 1.0

Drainage Area: 20.4 km²

Year: 1980

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.03BE	0.03BE	0.04BE	0.06BE	1.62	1.33	0.55	0.20	0.16	0.25	0.11	0.09BE
2	0.03BE	0.03BE	0.04BE	0.06BE	1.85	1.39	0.53	0.19	0.16	0.24	0.11	0.08
3	0.03BE	0.03BE	0.04BE	0.06BE	1.88	1.31	0.53	0.20	0.15	0.24	0.10	0.08
4	0.03BE	0.03BE	0.04BE	0.06BE	1.74	1.27	0.52	0.20	0.14	0.23	0.10	0.08
5	0.03BE	0.03BE	0.04BE	0.07BE	1.76	1.27	0.47	0.22	0.14	0.22	0.10	0.07
6	0.03BE	0.03BE	0.04BE	0.07BE	1.70	1.25	0.43	0.28	0.13	0.21	0.10	0.07
7	0.03BE	0.03BE	0.04BE	0.07BE	1.39	1.22	0.40	0.29	0.13	0.21	0.11	0.07
8	0.03BE	0.03BE	0.03BE	0.07BE	1.15	1.42	0.39	0.27	0.13	0.20	0.10	0.07
9	0.03BE	0.03BE	0.03BE	0.08BE	1.08	2.02	0.38	0.32	0.13	0.19	0.10	0.07
10	0.03BE	0.03BE	0.03BE	0.08BE	0.99	2.66*	0.38	0.35	0.13	0.18	0.10	0.07
11	0.03BE	0.03BE	0.03BE	0.08BE	0.92	2.63	0.36	0.51	0.12	0.18	0.10BE	0.06
12	0.03BE	0.03BE	0.03BE	0.08BE	0.89	1.98	0.33	0.81	0.13	0.17	0.10BE	0.06
13	0.03BE	0.03BE	0.03BE	0.09BE	0.85	1.64	0.31	0.60	0.13	0.17	0.10BE	0.06
14	0.03BE	0.03BE	0.03BE	0.09BE	0.82*	1.78	0.31	0.43	0.13	0.17	0.10BE	0.06
15	0.03BE	0.03BE	0.03BE	0.09BE	0.86	1.91	0.29	0.38	0.15	0.16	0.10BE	0.06
16	0.03BE	0.03BE	0.03BE	0.10	0.95	1.77	0.28	0.34	0.17*	0.16	0.10BE	0.04
17	0.03BE	0.03BE	0.03BE	0.16	1.01	1.67	0.28	0.31	0.17	0.16	0.10	0.02
18	0.03BE	0.03BE	0.03BE	0.22	1.03	1.62	0.26	0.29	0.18	0.15	0.09*	0.02BE
19	*0.03BE	0.03BE	0.03BE	0.25	1.09	1.30	0.26	0.27	0.19	0.14	0.09	0.03BE
20	0.03BE	0.04BE	0.03BE	0.32	1.15	1.25	0.25	0.27	0.19	0.14	0.09	0.03BE
21	0.03BE	0.04BE	0.04BE*	0.31	1.39	1.21	0.24	0.26	0.19	0.14	0.10	0.04BE
22	0.03BE	0.04BE	0.04BE	0.26	1.43	1.13	0.22*	0.25	0.18	0.13	0.10BE	0.04BE
23	0.03BE	0.04BE	0.04BE	0.39	1.29	1.02	0.25	0.24	0.17	0.13	0.10BE	0.05BE
24	0.03BE	0.04BE	0.04BE	0.64	1.38	0.90	0.25	0.22	0.17	0.13	0.10	0.05BE
25	0.03BE	0.04BE	0.04BE	0.84	1.35	0.81	0.24	0.21	0.16	0.13	0.10	0.06BE
26	0.03BE	0.04BE	0.04BE	0.97	2.25	0.77	0.24	0.19	0.16	0.12	0.10	0.06BE
27	0.03BE	0.04BE	0.04BE	1.20	1.80	0.73	0.23	0.18	0.16	0.12	0.10	0.14
28	0.03BE	0.04BE	0.05BE	1.42	1.53	0.67	0.23	0.19	0.16	0.12	0.09	0.07
29	0.03BE	0.04BE	0.05BE	1.47	1.46	0.62	0.23	0.17	0.17	0.12	0.09	0.05
30	0.03BE		0.05BE	1.38	1.40	0.58	0.22	0.17	0.23	0.12	0.09BE	0.04
31	0.03BE		0.05BE		1.32		0.21	0.17		0.11		0.03
Total	0.98	0.97	1.15	11.04	41.34	41.13	10.07	8.98	4.71	5.14	2.97	1.82
Mean 10 ⁶ x M ³	0.03	0.03	0.04	0.37	1.33	1.37	0.32	0.28	0.15	0.16	0.09	0.05
Maximum	0.085	0.084	0.099	0.954	3.572	3.551	0.857	0.749	0.388	0.429	0.233	0.134
Minimum	0.03	0.04	0.05	1.47	2.25	2.66	0.55	0.81	0.23	0.25	0.11	0.14
	0.03	0.03	0.03	0.06	0.82	0.58	0.21	0.17	0.12	0.11	0.09	0.02
Monthly Runoff (mm)	4.1	4.1	4.8	46.7	175.0	174.1	42.0	36.8	19.1	21.0	11.4	6.6
Metered Flow (m ³ /s)	0.031		0.034		0.808	2.302	0.213		0.170		0.097	

NOTES: 1. Maximum Instantaneous Discharge 3.20 m³/s on June 11.B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Weary Creek WE 1.0

Drainage Area: 20.4 km²

Year: 1981

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.048E	0.058E	0.048E	0.051B	0.98	1.91	1.82	0.56	0.19	0.17		
2	0.158E	0.058E	0.048E	0.043B	1.02	1.87	1.20	0.50	0.19	0.18		
3	0.098E	0.058E	0.048E	0.040B	0.69	2.22	1.21	0.45	0.18	0.17		
4	0.098E	0.058E	0.048E	0.037B	0.54	1.70	1.47	0.43	0.19			
5	0.088E	0.058E	0.048E	0.036B	0.46	1.44	1.33	0.38	0.25			
6	0.088E	0.058E	0.048E	0.034B	0.39	1.37	1.12	0.34	0.21			
7	0.088E	0.058E	0.048E	0.032B	0.35	1.27	0.93	0.37	0.22			
8	0.088E	0.058E	0.048E	0.031B	0.34	1.12	0.78	0.47	0.23			
9	0.078E	0.058E	0.048E	0.030B	0.39	1.00	0.69	0.42	0.23			
10	0.078E	0.058E	0.048E	0.027B	0.42	0.89*	0.65	0.34	0.23			
11	0.078E	0.058E	0.048E	0.026B	0.38	0.83	0.61	0.29	0.23			
12	0.068E	0.058E	0.048E	0.023B	0.35	0.81	0.62	0.28	0.23			
13	0.068*	0.058E	0.048E	0.021B	0.35	1.21	0.60	0.33*	0.21			
14	0.068E	0.058E	0.05B	0.022B	0.42*	1.34	0.73	0.32	0.18			
15	0.068E	0.058E	0.05B	0.033B	0.69	1.05	0.74	0.32	0.18			
16	0.068E	0.058E	0.05B	0.047	0.69	1.26	0.64	0.37	0.17*			
17	0.088E	0.058E	0.04B	0.058	0.61	1.30	0.66	0.58	0.17			
18	0.108E	0.058E	0.04B	0.096	0.69	1.12	0.70	0.53	0.16			
19	0.088E	0.058E	*0.049B	0.14	1.02	1.01	0.64	0.42	0.16			
20	0.078E	0.058E	0.047B	0.19	1.44	1.00	0.58	0.32	0.16			
21	0.078E	0.058E	0.051B	0.23	2.12	1.01	0.60	0.26	0.16			
22	0.068E	0.058E	0.046B	0.23	2.52	0.87	0.59	0.22	0.17			
23	0.068E	0.048E	0.042B	0.28	2.77	0.84	0.58	0.19	0.17			
24	0.058E	0.048E	0.042B	0.43	3.24	0.84	0.65	0.17	0.17			
25	0.058E	0.048E	0.045B	0.42	4.33	1.01	1.17	0.16	0.17			
26	0.058E	0.048E	0.047B	0.34	4.98	1.29	0.82	0.17	0.17			
27	0.058E	0.048E	0.044B	0.32	4.19	1.30	0.64	0.18	0.17			
28	0.058E	0.048E	0.045B	0.33	3.00	1.11	0.60	0.19	0.17			
29	0.058E		0.050B	0.32	2.41	1.13	0.58	0.19	0.17			
30	0.058E		0.049B	0.43	2.49	1.58	0.61	0.20	0.17			
31	0.058E		0.050B		2.41		0.60	0.19	0.17			
Total	2.04	1.34	1.32	4.35	46.68	36.70	25.16	10.14	5.66			
Mean 10 ⁶ x m ³	0.066	0.05	0.042	0.145	1.51	1.22	0.81	0.33	0.19			
Maximum	0.176	0.116	0.114	0.376	4.03	3.17	2.17	0.876	0.489			
Minimum	0.15	0.05	0.05	0.43	4.98	2.22	1.82	0.58	1.25			
Minimum	0.04	0.04	0.04	0.021	0.34	0.81	0.58	0.16	0.16			
Monthly Runoff (mm)	8.6	5.7	5.6	18.4	197.7	155.4	106.6	42.9	24.0			
Metered Flow (m ³ /s)	0.062		0.049		0.367	1.777		0.398	0.171		0.092	

NOTES: 1. Flows also metered June 2 - 1.777; June 3 - 2.331; June 4 - 1.676;
June 5 - 1.307; June 6 - 1.349; June 7 - 1.253; June 8 - 1.210;
June 9 - 1.034; and June 10 - 0.870 m³/s.

B - Ice Conditions
E - Estimated
* - Dates metered

2. Maximum Instantaneous Discharge 5.3 m³/s on May 26.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: WEARY CREEK (WE 1.0)

Drainage Area: 20.4 km²

Year: 1982

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	-	-	-	-	.159	1.02	1.03 B	.266E	.112	.079	.132	-
2	-	-	-	-	.222	1.14	.910E	.258E	.112	.090	.123B	-
3	-	-	-	-	.216	1.21	.900E	.185E	.117	.092	.128	-
4	-	-	-	-	.133	1.17	.845E	.185E	.180	.095	.138	-
5	-	-	-	-	.113	1.32	.780E	.167E	.145	.090	.143	-
6	-	-	-	-	.134	1.31	.765E	.148E	.120	.093	.138	-
7	-	-	-	-	.145	1.04	.770E	.123E	.113	.090	.132	-
8	-	-	-	-	.137	.875	.775E	.097E	.097	.087	.130B	-
9	-	-	-	-	.121	.918	.765E	.145E	.097	.084	.130B	-
10	-	-	-	-	.140	1.17	.705E	.150E	.093	.091	.132B	-
11	-	-	-	-	.257	1.46	.760E	.150E	.067	.099	.127	-
12	-	-	-	-	.420	1.64	.730E	.109E	.073	.099	.118	-
13	-	-	-	-	.417	1.93	.705E	.103E	.068	.100	.118B	-
14	-	-	-	-	.611	1.92	.705E	.117E	.063	.106	.121	-
15	-	-	-	-	.749	1.73	.670E	.112E	.062	.108	.140	-
16	-	-	-	-	.929	1.53*	.585E	.175E	.063	.109	.117	-
17	-	-	-	-	1.20	1.22	.472E	.130E	.060	.112	.110	-
18	-	-	-	-	1.13	1.15E	.435E	.123E	.070	.108	.145B	-
19	-	-	-	-	1.07	1.18E	.402E	.120E	.074	.112	.138B	-
20	-	-	-	-	1.15	1.28E	.455E	.172E	.066	.110	.145B	-
21	-	-	-	-	1.40	1.25E	.585E	.202E	.056	.112	.148B	-
22	-	-	-	-	1.47	1.22E	.515E	.140E	.054	.118	.142B	-
23	-	-	-	-	0.091*	1.48	1.22E	.445E	.052	.131	.145B	-
24	-	-	-	-	.090	1.67	1.08E	.370E	.047	.130	.137*B	-
25	-	-	-	-	.090	2.26	1.11E	.320E	.046	.135	-	-
26	-	-	-	-	.091	2.03	1.01E	.350E	.082	.138	-	-
27	-	-	-	-	.102	1.33	1.14E	.355E	.074	.136	-	-
28	-	-	-	-	.114	1.10*	1.22E	.350E	.080	.135	-	-
29	-	-	-	-	.108	.945	1.09E	.345E	.082	.134	-	-
30	-	-	-	-	.115	.885	1.08E	.300E	.079	.130	-	-
31	-	-	-	-	.890	-	.365E	.133	-	.129	-	-
Total				-	24.88	36.16	18.46	4.72	2.504	3.382	3.177	
Mean 10 ⁶ x m ³					.803	1.21	.596	.152	.083	.109	.132	
Maximum					2.150	3.124	1.595	.4075	.2163	.2922		
Minimum					2.26	1.93	1.03	.266	.180	.138	.148	
					.113	.875	.300	.097	.046	.079	.110	
Monthly Runoff (mm)					105.0	153.0	78.2	20.0	10.06	14.3	16.8E	
Metered Flow (m ³ /s)				0.091	1.12	1.44	-	0.183	-	-	0.137	

NOTES: 1. Maximum Instantaneous Discharge 2.26 m³/s on May 25, 1982.

B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: WEARY CREEK (WE-1.0)

Drainage Area: 20.4 km²

Year: 1983

Daily Discharge in Cubic Meters per Second

DAY	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1					0.08	1.12	0.56	0.18	0.05	0.07	0.051	0.0668
2					0.08	0.92	0.55	0.17	0.05	0.07	0.056	0.0798
3					0.09	0.90	0.61	0.20	0.04	0.06	0.086	0.0768
4					0.10	0.98	0.73	0.16	0.04	0.06	0.17	0.0658
5					0.10	1.02	0.71	0.15	0.04	0.06	0.10	0.0588
6					0.15	1.06	0.65	0.14	0.06	0.06	0.073	0.0548
7					0.31	1.09	0.62	0.13	0.06	0.05	0.065	0.0528
8					0.39	1.04	0.60	0.13	0.06	0.05	0.059	0.0528
9					0.31	0.93	0.59	0.12	0.05	0.04	0.058	0.0518
10					0.21	0.86	0.52	0.12	0.04	0.04	0.056	0.0508
11					0.21	0.76	0.46	0.11	0.04	0.04	0.055	0.0548
12					0.37	0.63	0.46	0.10	0.03	0.04	0.054	0.0648
13					0.50	0.56	0.49	0.09	0.03	0.04	0.053	0.0718
14					0.56	0.56	0.50	0.08	0.03	0.04	0.051	0.0768
15					0.59	0.56	0.44	0.07	0.02	0.04	0.050	0.0808
16					0.59	0.60	0.44	0.05	0.02	0.04	0.050	0.0818
17					0.04	0.66	0.59	0.07	0.03	0.04	0.051	0.0808
18					0.09	0.66	0.61	0.09	0.02	0.04	0.051	0.0768
19					0.07	0.61	0.47	0.10	0.03	0.04	0.050	0.0728
20					0.12	0.70	0.41	0.08	0.03	0.04	0.048	0.0668
21					0.17	1.06	0.33	0.07	0.03	0.04	0.0468	0.0618
22					0.20	1.26	0.38	0.06	0.04	0.04	0.0488	0.0508
23					0.18	1.75	0.56	0.06	0.09	0.04	0.051	0.0598
24					0.49	2.10	0.84	0.07	0.05	0.04	0.050	0.0578
25					0.43	2.25	0.67	0.06	0.04	0.04	0.052	0.0548
26					0.17	2.59	0.61	0.05	0.04	0.04	0.056	0.0528
27					0.09	2.45	0.61	0.05	0.06	0.04	0.061	0.0508
28					0.07	1.96	0.58	0.04	0.06	0.039	0.0618	0.0488
29					0.07	2.00	0.57	0.05	0.06	0.042	0.0608	0.0478
30					0.07	1.93	0.58	0.04	0.06	0.042	0.0588	0.0468
31					-	1.46	-	0.05	-	0.046	-	0.0478
Total	-	-	-	-	28.08	21.40	14.3	2.94	1.30	1.41	1.83	1.90
Mean	-	-	-	-	0.906	0.713	0.462	0.095	0.043	0.045	0.061	0.061
10 ⁶ x m ³	-	-	-	-	2.43	1.85	1.24	0.254	0.112	0.122	0.158	0.165
Maximum	-	-	-	-	2.59	1.12	1.73	0.20	0.09	0.07	0.17	0.081
Minimum	-	-	-	-	0.08	0.33	0.20	0.04	0.02	0.04	0.046	0.046
Monthly Runoff (mm)	-	-	-	14.9E	119	90.6	60.7	12.5	5.51	5.97	7.75	8.06
Metered Flow (m ³ /s)	-	-	-	0.087	3.02	0.706	-	0.242	-	0.078	-	-

NOTES: 1. Maximum Instantaneous Discharge 2.74 m³/s on May 26, 1984.

2. Estimated annual runoff 349 mm

B - Ice Conditions
E - Estimated
* - Dates metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Forsyth Creek (FO 1.6)

Drainage Area: 177.5 km²

Year: 1977

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1				0.17	1.9	3.1	2.2	0.97	2.0	1.1	0.50	0.29 E
2				0.18	2.1	4.9*	2.1	1.2	2.2	1.1	0.50	0.28 E
3				0.18	2.1	4.7	2.1	0.90	2.3	1.1	0.47	0.29 E
4				0.18	2.1	4.6	1.8	0.96	2.2	1.0	0.45	0.29 E
5				0.19	2.0	4.5	1.7	0.91	2.3	1.0	0.43	0.29 E
6				0.19	1.9	5.0	1.6	0.91	2.5	0.97	0.42	0.28 E
7				0.19	1.6*	6.3	1.5	1.1	2.4	0.95	0.42	0.28 E
8				0.20	1.9	8.8*	1.5	1.1	2.3	0.92	0.38	0.28 E
9				0.20	2.0	9.5	1.4	1.1	2.1	0.89	0.38	0.28 E
10				0.20	2.8	6.5	1.4	1.1	2.0	0.87	0.36	0.28 E
11				0.21	4.1	5.5	1.3	0.93	1.9	0.84	0.36	0.28 E
12				0.21	4.0	4.7	1.3	0.86	1.7	0.81	0.36	0.29 E
13				0.21	3.8	4.9	1.3	1.1	1.6	0.79	0.36	0.29 E
14				0.21	3.5	4.5	1.2	1.1	1.6	0.76	0.37*	0.28 E
15				0.22	3.4*	4.4	1.2	1.2	1.5	0.73	0.37	0.29 E
16				0.22	2.9	4.5	1.2	1.3	1.5	0.71	0.36	0.29BE
17				0.22	2.8	4.4	1.3	1.2	1.5	0.68*	0.32	0.28BE
18				0.23	2.5*	4.4	1.2	1.1	1.5	0.67	0.33	0.28BE
19				0.23	2.3	4.3	1.2	1.2	1.4	0.66	0.22	0.28BE
20				0.22	2.1	4.1	1.3	1.2	1.4	0.66	0.15	0.28BE
21				0.21	2.2	4.0	1.1	1.2	1.4	0.63	0.13E	0.27BE
22				0.20*	2.3	4.0	1.1	1.3	1.3	0.58	0.13E	0.27BE
23				0.37	2.5	3.8	1.1	1.3	1.3	0.56	0.14E	0.27BE
24				0.68	2.9	3.7	1.6	1.3	1.3	0.57	0.14E	0.26BE
25				0.93	3.2	3.6	1.1	2.7	1.3	0.61	0.26E	0.26BE
26				1.1	3.4	3.3	1.1	2.7	1.2	0.58	0.31E	0.26BE
27				1.2	3.6	3.4	1.1	1.7*	1.2	0.55	0.28E	0.26BE
28				1.3	3.5	3.3	1.1	1.7	1.2	0.53	0.27E	0.25BE
29				1.5	3.3	2.8	1.0	1.9	1.2	0.52	0.28E	0.25BE
30				1.6*	3.0	2.5	0.98	2.1	1.1	0.51	0.28E	0.25BE
31				-	3.0	-	0.98	2.1	-	0.50	-	0.24BE
Total				13.2	84.8	138.2	42.1	41.4	50.4	23.35	9.73	8.55
Mean 10 ⁶ x M ³				0.44	2.74	4.61	1.36	1.34	1.68	0.75	0.32	0.28
Maximum				1.18	7.34	11.95	3.64	3.59	4.35	2.01	0.83	0.75
Minimum				1.6	4.1	9.5	2.2	2.7	2.5	1.10	0.50	0.29
				0.17	1.6	2.5	0.98	0.91	1.1	0.50	0.13	0.24
Monthly Runoff (mm)				6.65	41.35	67.3	20.5	20.2	24.5	11.32	4.67	4.23
Metered Flow (m ³ /s)				0.20	1.56	4.95		0.20		0.68	0.37	0.29

NOTES: 1. Discharges listed prior to the installation of continuously recording equipment on October 17, 1977 were determined with daily staff gauge readings.

B - Ice Conditions

E - Estimated

* - Dates Metered

2. The stilling well froze on December 3, 1977 and the station was recommissioned on February 14, 1978.

3. Flows were also metered on April 30 - 1.49; May 15 - 3.4; May 18 - 2.70; June 8 - 8.89 m³/s.

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Forsyth Creek (FO 1.6)

Drainage Area: 177.5 km²

Year: 1978

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
1	0.24BE	0.15BE			2.00	4.03	7.36	2.10	0.69	1.12	0.47	0.33	
2	0.24BE	0.14BE			2.33	4.28	6.83	1.98	0.68	1.10	0.47	0.27	
3	0.23BE	0.14BE			2.47	5.47	6.23	1.79	0.65	1.08	0.47	0.30	
4	0.23BE	0.14BE			2.29	8.64	5.89	1.67	0.63	1.06	0.58	0.34	
5	0.23BE	0.14BE			2.04	14.39*	5.58	1.58	0.68	1.01	0.53	0.28	
6	0.22BE	0.13BE			1.83	18.99	5.43	1.52	0.68	0.97	0.49	0.31	
7	0.22BE	0.13BE			1.67	16.48	5.69	1.46	0.65	0.94	0.52	0.17	
8	0.22BE	0.13BE			1.62	15.99	5.92	1.40	0.70	0.90	0.62	0.19	
9	0.22BE	0.12BE			1.91	16.26	5.82	1.34	0.72	0.86	0.56	0.26	
10	0.21BE	0.12BE			2.25	13.23	5.75	1.31	0.72	0.82	0.39	0.30	
11	0.21BE	0.12BE			2.49	10.12	5.49	1.27	0.79	0.83	0.39	0.31	
12	0.21BE	0.11BE			2.59	8.33	4.93	1.23	0.78	0.80	0.45	0.29*	
13	0.20BE	0.11BE			2.60	8.05	4.56	1.20	0.76	0.76	0.44	0.22	
14	0.20BE	0.11BE*			2.87	8.33	4.45	1.19	0.75	0.73	0.39	0.27	
15	0.20BE	0.08			3.38	7.70	4.43	1.14	0.78	0.70	0.42	0.29	
16	0.20BE	0.08			3.77	6.75	4.27	1.13	0.80	0.66	0.41	0.27	
17	0.19BE	0.08E			3.93*	6.07	4.34	1.13	0.78	0.64	0.39	0.24	
18	0.19BE	0.07			0.20E*	4.14	6.65	4.35	1.08	0.77	0.62*	0.25	
19	0.19BE	0.08			0.24	4.59	7.29	4.28	1.06	0.76	0.59	0.28	
20	0.18BE	0.08			0.27	5.57	6.79	4.07	1.04	0.72*	0.57	0.24	
21	0.18BE	0.08			0.30	6.85	7.02	3.88	1.00	0.68	0.31	0.24	
22	0.18BE	0.08			0.32	7.74	8.05	3.67	0.96	0.70	0.39	0.24	
23	0.17BE	0.08			0.32	7.82	8.58	3.32	0.96*	0.82	0.42	0.23	
24	0.17BE	0.07			0.33	6.99	8.41	3.37	0.94	0.76	0.54	0.23	
25	0.17BE	0.08E			0.37	6.02	8.25	3.23	0.89	0.70	0.40	0.20	
26	0.17BE				0.46	5.21	7.93	3.05*	0.83	0.70	0.38	0.15	
27	0.16BE				0.55	4.43	7.72	2.88	0.80	0.77	0.36	0.18	
28	0.16BE				0.79	4.23	7.79	2.74	0.77	0.92	0.49	0.17	
29	0.16BE				1.19	4.17	8.17	2.57	0.75	1.00	0.34	0.14	
30	0.15BE				1.58	4.10	8.35	2.40	0.71	1.07	0.48	0.12	
31	0.15BE					4.15	2.23	0.69		0.47		0.13	
Total	6.05	2.65			6.92	118.05	274.11	139.01	36.92	22.61	22.45	12.52	7.40
Mean 10 ⁶ x M ³	0.20	0.11			0.53	3.81	9.14	4.48	1.19	0.75	0.42	0.24	
Maximum	0.54	0.24			0.60	10.20	23.69	12.00	3.19	1.94	1.09	0.64	
Minimum	0.24	0.15			1.58	7.82	18.99	7.36	2.10	1.07	0.62	0.34	
	0.15	0.07			0.20	1.62	4.03	2.23	0.69	0.63	0.47	0.12	
Monthly Runoff (mm)	3.04	1.35			3.35	57.49	133.47	67.60	17.96	10.95	10.86	6.13	3.62
Metered Flow (m ³ /s)		0.11			0.20	3.889	14.01	2.94	0.98	0.74	0.64		0.30

NOTES: Maximum Instantaneous Discharge 20.30 m³/s on June 6.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Forsyth Creek (FO 1.6)

Drainage Area: 177.5 km²

Year: 1979

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.14	0.11	0.06	0.09	0.87	6.70	4.73	1.10	0.56	0.34	0.18	0.07
2	0.14	0.10	0.06	0.09	0.85	7.23	4.19	1.07	0.53	0.33	0.17	0.07
3	0.14	0.09	0.06	0.09	0.99	9.09	3.58	1.11	0.52	0.32	0.16	0.08
4	0.15	0.08	0.06	0.09	1.12	11.02*	3.24	1.11	0.52	0.31	0.16	0.15
5	0.15	0.08	0.06	0.09	1.39	12.50	3.26	1.05	0.52	0.30	0.15	0.11
6	0.14	0.08	0.06	0.10	1.49	12.83*	3.45	0.99	0.51	0.29	0.14	0.10
7	0.13	0.08	0.06	0.11	1.39	9.95	3.78	0.95	0.49	0.28	0.12	0.10
8	0.12	0.07	0.06	0.10	1.34	8.03	3.70	0.91	0.48	0.29	0.12	0.10
9	0.12	0.07	0.06	0.11	1.25	6.99*	3.43	0.87	0.48	0.29	0.12	0.13
10	0.12	0.07	0.07	0.11	1.32	6.93	3.23	0.81	0.48	0.29	0.12	0.15
11	0.11	0.07	0.07	0.12	1.42	7.88*	3.06	0.83	0.47	0.28	0.12	0.11
12	0.11	0.07	0.07	0.12*	1.59	9.33	2.78	0.94	0.46	0.28	0.12	0.11
13	0.12	0.07	0.07	0.12	1.81	9.83	2.53	0.82	0.46*	0.28	0.12	0.11
14	0.13	0.09	0.07	0.12	2.13	8.44	2.35	0.80	0.45	0.28	0.11	0.11
15	0.13	0.09	0.07	0.12	2.66*	7.23	2.16	0.76*	0.44	0.28	0.11	0.10
16	0.12	0.08	0.07	0.12	3.93	6.41	1.89	0.68	0.42	0.28	0.10	0.10
17	0.12	0.07	0.07	0.13	4.15	5.98	1.86*	0.64	0.41	0.31	0.11	0.11
18	0.12	0.07	0.08	0.13	4.15	5.69	1.84	0.61	0.47	0.30	0.11	0.10
19	0.12	0.07	0.08	0.13	3.98	6.24	1.84	0.59	0.39	0.30	0.11	0.11
20	0.12	0.07	0.08	0.14	3.85	6.65	1.83	0.58	0.44	0.29	0.10	0.12
21	0.12	0.07	0.08	0.13	3.86	6.29	1.81	0.58	0.38	0.28	0.09	0.12
22	0.11	0.06*	0.09	0.13	4.36	6.03	1.78	0.55	0.37	0.28	0.09	0.12
23	0.11	0.06	0.09	0.13	5.48	6.03	1.71	0.56	0.37	0.28	0.09	0.11
24	0.11	0.06	0.09	0.13	7.56	5.90	1.64	0.59	0.36	0.28	0.09	0.11
25	0.11	0.06	0.09	0.14	11.30E	5.64	1.59	0.62	0.36	0.28	0.09	0.11
26	0.11	0.06	0.09	0.20	11.92E	5.38	1.51	0.59	0.34	0.28	0.09	0.11
27	0.10	0.06	0.09	0.30	15.13E	5.33	1.38	0.55	0.35	0.28*	0.09	0.10
28	0.10	0.06	0.09	0.44	12.88E	5.13	1.32	0.52	0.36	0.30	0.09	0.10
29	0.11		0.09	0.54	9.24E	5.11	1.25	0.50	0.36	0.28	0.09	0.10
30	0.11		0.09	0.69	7.92	5.08	1.23	0.52	0.34	0.25	0.08	0.09
31	0.11		0.09		7.00		1.15	0.58		0.21		0.10
Total	3.80	2.07	2.32	5.05	138.33E	220.87	75.10	23.38	13.09	8.92	3.43	3.36
Mean 10 ⁶ x M ³	0.12	0.07	0.07	0.16	4.46E	7.36	2.42	0.75	0.44	0.29	0.11	0.11
Maximum	0.33	0.18	0.20	0.44	11.95E	19.08	6.49	2.02	1.13	0.77	0.30	0.29
Minimum	0.16	0.11	0.09	0.55	15.13E	12.83	4.73	1.11	0.56	0.34	0.18	0.18
	0.10	0.06	0.06	0.09	0.85	5.08	1.15	0.50	0.34	0.21	0.08	0.07
Monthly Runoff (mm)	1.8	1.0	1.1	2.4	67.3E	107.5	36.5	11.3	6.3	4.3	1.6	1.6
Metered Flow (m ³ /s)		0.12		0.116	2.40	11.078	1.819	0.77	0.437	0.268		

NOTES: 1. Flow also metered on June 6 (12.366 m³/s), June 9 (7.091 m³/s) and June 11 (7.867 m³/s).

2. Maximum Instantaneous Discharge 15.3 m³/s (E) on May 27.

B - Ice Conditions
E - Estimated
* - Dates Metered

ELCO MINING LIMITED

STREAM GAUGING DATA

Station: Forsyth Creek FO 1.6

Drainage Area: 177.5 km²

Year: 1980

Daily Discharge in Cubic Meters Per Second

Day	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.10	0.06	0.07	0.09	6.36	9.62	4.36	1.17	0.79			
2	0.10	0.06	0.07	0.09	6.84	9.82	4.21	1.17	0.75			
3	0.10	0.06	0.07BE	0.09	7.30	9.95	4.08	1.22	0.71			
4	0.10	0.06	0.07BE	0.09	7.51	9.48	3.89	1.15	0.67			
5	0.09	0.06	0.07BE	0.09	7.59	9.10	3.64	1.14	0.63			
6	0.09	0.06	0.06	0.09	7.98	8.87	3.39	1.18	0.60			
7	0.08	0.06	0.06	0.10	7.97	8.37	3.15	1.11	0.57			
8	0.08	0.07	0.06	0.10	7.54	8.00	2.96	1.10	0.57			
9	0.08	0.06	0.06	0.10	7.27	8.27	2.81	1.30	0.55			
10	0.07	0.06	0.06	0.10	6.92	10.14*	2.79	1.35	0.53			
11	0.08	0.06	0.06	0.10	6.64	12.01	2.64	1.45	0.51			
12	0.08	0.07	0.06	0.11	6.52	12.16	2.43	1.67	0.51			
13	0.08	0.07	0.06	0.11	6.54*	10.96	2.25	1.67	0.52			
14	0.08	0.07	0.06	0.14	6.55*	11.16	2.19	1.66	0.51			
15	0.09	0.06	0.06	0.16	6.61	11.21	2.21	1.64	0.55			
16	0.09	0.06	0.06	0.18	6.99	11.03	2.18	1.55		*		
17	0.09	0.06	0.06	0.23	7.40	11.69	2.09	1.50				
18	0.09*	0.06	0.06	0.42	7.86	10.65	2.00	1.47				
19	0.08	0.06	0.06	0.58	8.66	9.47	2.01	1.38				
20	0.08	0.06	0.06*	0.74	9.11	8.71	1.89	1.33				
21	0.07	0.06	0.07	0.72	10.11	8.01	1.77	1.27				
22	0.07	0.06	0.07	0.81	11.35	7.53	1.70*	1.20				
23	0.07	0.06	0.07	1.07	11.00	7.06	1.69	1.14				
24	0.07	0.06	0.08	1.82	10.67	6.63	1.66	1.10				
25	0.07	0.06	0.08	2.69	9.78	6.24	1.59	1.04				
26	0.07BE	0.06	0.08	3.62	13.01	5.93	1.52	0.97				
27	0.07	0.06	0.08	3.97	13.07	5.55	1.45	0.90				
28	0.07BE	0.06	0.08	4.66	11.57	5.17	1.38	0.92				
29	0.07BE	0.07	0.08	5.42	11.10	4.90	1.33	0.89				
30	0.06		0.08	6.03	11.03	4.61	1.28	0.85				
31	0.06		0.08		10.37		1.23	0.82				
Total	2.48	1.79	2.10	34.52	269.22	262.35	73.77	38.31				
Mean 10 ⁶ x M ³	0.08	0.06	0.07	1.15	8.68	8.74	2.37	1.23				
Maximum	0.214	0.547	0.181	2.983	23.261	22.667	6.374	3.309				
Minimum	0.10	0.07	0.08	6.03	13.07	12.16	4.36	1.67				
	0.06	0.06	0.06	0.09	6.36	4.61	1.23	0.82				
Monthly Runoff (mm)	1.2	0.8	1.0	16.8	131.0	127.6	35.8	18.5				
Metered Flow (m ³ /s)	0.085		0.058		6.375	10.058	1.761		0.556			

NOTES: 1. Flow also metered on May 14 (6.547 m³/s).2. Maximum Instantaneous Discharge 13.65 m³/s on May 26.

3. Station discontinued September 16.

B - Ice Conditions

E - Estimated

* - Dates Metered

APPENDIX E

FORDING COAL LIMITED

HYDROMETRIC DATA

Eagle Mountain Project

APPENDIX EFORDING COAL LIMITEDHYDROMETRIC DATAEagle Mountain Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	PERIOD OF RECORD	REMARKS	PAGE
CC1	Clode Pond Decant	8.8	50° 12' 38" 114° 53' 10"	1981-82	regulated since 1971.01.29	E3
KC1	Kilmarnock Creek	44.9	50° 10' 06" 114° 51' 50"	1981-82	natural flow	E3
BR1	Brownie Creek	14.9	50° 10' 44" 114° 48' 58"	1982	regulated since 1976.06.02	E3
BL1	Blackhill Creek	2.1	50° 10' 48" 114° 49' 36"	1982	regulated since 1976.06.02	E3
BS1	Blackstone Creek	1.5	50° 10' 51" 114° 50' 08"	1981-82	regulated since 1976.06.02	E3

Source: "Eagle Mountain Project, Environmental Assessment, Phase 2 Study," Volumes I, II and III, for Fording Coal Ltd., Elkford, B.C., by Norecol Environmental Consultants Ltd., Vancouver, B.C. March, 1983.

SC1	Swift Creek		50° 09' 34" 114° 52' 26"	1981-83	regulated since 1974.02.11	E4
SC2	Swift Creek		50° 09' 38" 114° 52' 55"	1982-83	natural flow	E7

Source: "Annual Report Regarding The Performance Of The Swift Creek Rock Drain, First Year Results For 1982, Second Year Results - 1983," by Fording Coal Ltd.

Note: See Figure 18 for hydrometric site locations.

MONTHLY MEAN DISCHARGES (m³/s)

STATION NUMBER	STREAM	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEPT.
		1981						
CC1	Clode Pond Decant	0.062	0.097	0.718	0.556	0.066	0.048	-
KC1	Kilmarnock Creek	0.034	0.238	5.31	1.70	0.737	0.351	-
BS1	Blackstone Creek	-	-	0.289	0.179	0.061	0.0	-
		1982						
CC1	Clode Pond Decant	-	0.054	0.397	0.240	0.040	0.001	0.002
KC1	Kilmarnock Creek	-	0.141	3.05	2.93	0.597	0.227	0.352
BR1	Brownie Creek	-	0.044	0.702	0.542	0.100	0.020	0.012
BL1	Blackrill Creek	-	0.017	0.052	0.034	0.005	0.004	0.003
BS1	Blackstone Creek	-	0.019	0.042	0.026	0.004	0.0	0.0

DAILY DISCHARGE

Station Name Swift Creek Station No. SC1
 Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1				0.053									1
2						1.53							2
3													3
4													4
5													5
6					0.424		0.266						6
7													7
8													8
9				0.053		1.26							9
10													10
11			0.019										11
12					0.186								12
13													13
14							0.169						14
15				0.059		1.53							15
16													16
17			0.016										17
18													18
19					0.369								19
20													20
21					1.26								21
22				0.257	2.07								22
23					2.61								23
24			0.056		2.76	0.816							24
25					2.61								25
26					2.34								26
27					2.20	0.110							27
28					2.07								28
29					1.80								29
30						0.369							30
31													31
Type of Gauge:	_____												
Location:	50° 09' 34"; 114° 52' 26"												
Drainage Area:	_____												
Comments:	regulated since 1974.02.11												
Source:	_____												

DAILY DISCHARGE

Station Name Swift Creek Station No. SC1
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.573	0.292						1
2													2
3								0.018					3
4													4
5							0.230						5
6				0.015			0.187						6
7							0.137						7
8						0.613							8
9			0.009			0.534	0.094						9
10													10
11					0.215		0.069	0.019					11
12													12
13				0.054			0.054						13
14							0.067						14
15						0.774	0.065						15
16			0.009			0.708							16
17						0.634							17
18					0.404								18
19							0.045						19
20				0.041			0.047						20
21						0.388	0.040						21
22						0.482	0.044						22
23			0.009			0.412	0.034						23
24						0.383							24
25					1.70	0.368							25
26							0.026						26
27				0.142									27
28						0.255	0.014						28
29													29
30			0.013	0.170		0.260	0.011						30
31													31
Type of Gauge:	_____												Source:
Location:	50° 09' 34"; 114° 52' 26"												
Drainage Area:	_____												
Comments:	regulated since 1974.02.11												

DAILY DISCHARGE

Station Name Swift Creek Station No. SC1
 Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1											0.014	0.006	1
2													2
3					0.097								3
4													4
5						0.032							5
6									0.012				6
7						0.292							7
8													8
9													9
10					0.128								10
11													11
12				0.012			0.065						12
13													13
14						0.150							14
15		0.001	0.001										15
16								0.008					16
17					0.164								17
18													18
19				0.042									19
20									0.006				20
21						0.145							21
22			0.001										22
23													23
24					0.556								24
25													25
26				0.071									26
27													27
28						0.063							28
29													29
30					0.801								30
31					0.712								31

Type of Gauge: _____
 Location: 50° 09' 34"; 114° 52' 26"
 Drainage Area: _____
 Comments: regulated since 1974.02.11
 Source: _____

DAILY DISCHARGE

Station Name Swift Creek Station No. 502
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.501							1
2													2
3													3
4													4
5													5
6													6
7							0.117						7
8													8
9						0.506							9
10													10
11													11
12													12
13													13
14													14
15													15
16						0.741							16
17													17
18													18
19													19
20				0.032									20
21							0.036						21
22													22
23													23
24						0.375							24
25					0.162								25
26													26
27				0.033									27
28													28
29													29
30						0.228							30
31													31
Type of Gauge:													
Location:	50° 09' 38"; 114° 52' 55"												
Drainage Area:													
Comments:	natural flow												
Source:													

DAILY DISCHARGE

Station Name Swift Creek Station No. SC2
 Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1											0.017	0.006	1
2													2
3					0.106								3
4													4
5								0.032					5
6										0.010			6
7						0.382							7
8													8
9													9
10					0.138								10
11													11
12							0.065						12
13													13
14						0.153							14
15													15
16			0.001										16
17					0.163				0.013				17
18													18
19				0.042									19
20													20
21						0.145			0.008				21
22													22
23													23
24					0.551								24
25													25
26				0.122									26
27													27
28						0.082							28
29													29
30					0.782								30
31					0.727								31

Source:

Comments: natural flow

Type of Gauge:

Location: 50° 09' 38" N; 114° 52' 55" W

Drainage Area:

APPENDIX F

KAISER COAL OF CANADA LIMITED
HYDROMETRIC DATA

Hosmer-Wheeler Coal Project

APPENDIX FKAISER COAL OF CANADA LIMITEDHYDROMETRIC DATAHosmer-Wheeler Coal Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	PERIOD OF RECORD	DISCHARGE (m ³ /s)	REMARKS	PAGE
A	No Name Creek		49° 37' 32" 114° 55' 17"	1976		natural flow	F3
B	No Name Creek		49° 36' 53" 114° 56' 25"	September 9, 1976	0.076	natural flow	
C	No Name Creek		49° 36' 46" 114° 56' 38"	1976		natural flow	F4
D	No Name Creek		49° 36' 46" 114° 57' 14"	September 9, 1976	0.156	natural flow	
E	No Name Creek		49° 36' 20" 114° 57' 34"	September 9, 1976	0.062	natural flow	
F	No Name Creek		49° 36' 11" 114° 57' 13"	September 9, 1976	0.091	natural flow	
K4	No Name Creek	3.33	49° 36' 00" 114° 57' 11"	1976		natural flow	F5

Source: "Hosmer-Wheeler Coal Project, Stage II Environmental Assessment," Volume I, Table 6, for Kaiser Coal of Canada Ltd., Vancouver, B.C. by B.C. Research, Vancouver, B.C. October, 1976.

Note: See Figure 17 for hydrometric site locations.

DAILY DISCHARGE

Station Name No-Name Creek Station No. A
 Daily Discharge In Cubic Metres per Second for the Year 19 76

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.555							1
2						0.468			0.074				2
3						0.371							3
4						0.360		0.057					4
5								0.226					5
6													6
7													7
8						0.357							8
9						0.663		0.042	0.059				9
10								0.283	0.091				10
11													11
12													12
13								0.246					13
14													14
15													15
16													16
17													17
18													18
19													19
20							0.110	0.161					20
21													21
22							0.076						22
23													23
24													24
25													25
26													26
27						0.903		0.105					27
28						0.895	0.065						28
29						0.453							29
30								0.085					30
31						0.623							31

Type of Gauge: staff Source: _____
 Location: 49° 37' 32"; 114° 55' 17"
 Drainage Area: _____
 Comments: natural flow

DAILY DISCHARGE

Station Name No-Name Creek Station No. C
 Daily Discharge In Cubic Metres per Second for the Year 19 76

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4						0.411		0.110					4
5													5
6													6
7													7
8						0.411							8
9								0.612	0.105				9
10								0.198					10
11													11
12						0.142							12
13								0.362					13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22						0.059							22
23													23
24													24
25													25
26													26
27								0.190					27
28						0.079							28
29													29
30													30
31													31

Type of Gauge: staff
 Location: 49° 36' 46" N; 114° 56' 38" W
 Drainage Area: _____
 Comments: - measurements affected by dense aquatic vegetation
 - natural flow
 Source: _____

DAILY DISCHARGE

Station Name No-Name Creek Station No. K4
 Daily Discharge In Cubic Metres per Second for the Year 19 76

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3													3	
4													4	
5													5	
6													6	
7													7	
8													8	
9													9	
10													10	
11													11	
12													12	
13													13	
14							0.017						14	
15													15	
16													16	
17													17	
18													18	
19							0.011						19	
20							0.011						20	
21													21	
22							0.008						22	
23													23	
24													24	
25													25	
26													26	
27													27	
28													28	
29							0.006						29	
30													30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	49° 36' 00" N; 114° 57' 11" W												Source:	
Drainage Area:	3.33 km ²													

APPENDIX G

WESTAR MINING LIMITED
HYDROMETRIC DATA

Greenhills Mining Project

APPENDIX GWESTAR MINING LIMITED
HYDROMETRIC DATAGreenhills Mining Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	PERIOD OF RECORD	REMARKS	PAGE
WS1	Fording River	391	50° 02' 30" 114° 51' 38"		regulated since 1976.06.02	
WS2	Greenhills Creek	16.5	50° 02' 42" 114° 51' 14"	1979-81	natural flow	G3
WS2A	Greenhills Ck. trib.	16.4	50° 02' 47" 114° 51' 10"	1982-83	natural flow	G6
WS2B	Greenhills Creek	16.5	50° 02' 41" 114° 51' 14"	1981-84	natural flow	G8
WS3	Burnt Ridge Creek	1.4	50° 02' 26" 114° 49' 26"	1979-80	natural flow	G12
WS4	Fording River trib.	2.7	50° 01' 28" 114° 49' 41"	1979-80	natural flow	G14
WS5	Fording River trib.	26.0	50° 02' 00" 114° 48' 50"	1979-80	natural flow	G16
WS7	Britch Creek	6.1	50° 09' 02" 114° 51' 52"	1979-84	regulated	G18
WS8	Porter Creek	2.6	50° 07' 49" 114° 51' 06"	1979-84	natural flow	G25
WS9	Thompson Creek	9.4	50° 05' 08" 114° 55' 24"	1979-84	natural flow	G31
WS10	Wolfram Creek	3.9	50° 06' 14" 114° 55' 30"	1979 1981-84	natural flow	G37
WS11	Mickelson Creek	2.5	50° 06' 56" 114° 55' 35"	1979-84	natural flow	G42
WS13	Leask Creek	1.7	50° 06' 37" 114° 55' 30"	1979-84	natural flow	G48
WS14	Swift Creek	4.9	50° 09' 32" 114° 52' 18"	1979	regulated since 1974.02.11	G54
WS18	Elk River	961	50° 01' 25" 114° 54' 50"			

Note: See Figure 19 for hydrometric site locations.

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2
 Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2										0.002			2	
3													3	
4													4	
5						0.763							5	
6													6	
7													7	
8													8	
9													9	
10							0.023						10	
11													11	
12									0.004				12	
13													13	
14													14	
15													15	
16													16	
17													17	
18													18	
19						0.169							19	
20													20	
21													21	
22													22	
23													23	
24							0.011						24	
25													25	
26													26	
27								0.008					27	
28													28	
29													29	
30													30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 02' 42"; 114° 51' 14"													
Drainage Area:	16.5 km ²													
													Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.	

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2
 Daily Discharge In Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3													3	
4													4	
5						0.550							5	
6													6	
7													7	
8													8	
9						0.515							9	
10													10	
11													11	
12					0.373								12	
13													13	
14													14	
15													15	
16													16	
17													17	
18													18	
19													19	
20													20	
21						0.258							21	
22													22	
23													23	
24													24	
25													25	
26													26	
27													27	
28						0.464							28	
29													29	
30													30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 02' 42" N; 114° 51' 14" W													
Drainage Area:	16.5 km ²													
Source: "Greenhills Surface Coal Mining Project, Stage II Environmental Assessment," Volume II Appendices, Appendix 3.3.3, for Kaiser Resources Ltd., Sparwood, B.C., by B.C. Research, Vancouver, B.C. January, 1981.														

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2

Daily Discharge In Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2						1.02/1.42*							2	
3													3	
4								0.263					4	
5								.057/.368*		0.193			5	
6					0.906								6	
7													7	
8						0.623							8	
9							0.368						9	
10								.340/.481*					10	
11													11	
12								.263/.354*					12	
13					0.991			.481/.651*					13	
14													14	
15							0.623						15	
16													16	
17													17	
18													18	
19					1.08			0.071					19	
20													20	
21													21	
22													22	
23							0.028						23	
24						.623/.793*		.031/.088*					24	
25													25	
26						.595/.708*							26	
27				0.793	2.10		.057/.467*						27	
28							0.057						28	
29													29	
30				0.878		.651/1.08*							30	
31							.057/.368*						31	
Type of Gauge: <u>staff</u> Location: <u>50° 02' 42" N; 114° 51' 14" W</u> Drainage Area: <u>16.5 km²</u>													Source: <u>B.C. Coal Ltd. Environmental Control Report of Water Samples</u>	
Comments: <u>*derived from crest gauge</u> <u>natural flow</u>														

DAILY DISCHARGE

Station Name Greenhills Creek tributary Station No. WS2A
 Daily Discharge In Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.247							2
3													3
4													4
5													5
6					0.148	0.250							6
7													7
8						0.350	0.109						8
9													9
10													10
11													11
12													12
13													13
14					0.313	0.264							14
15							0.077						15
16													16
17						0.211							17
18													18
19													19
20					0.598								20
21													21
22													22
23													23
24						0.231							24
25								0.020					25
26					0.313								26
27													27
28						0.228	0.038						28
29				0.076									29
30						0.155							30
31													31
Type of Gauge:													
Location:	50° 02' 47" N; 114° 51' 10" W												
Drainage Area:	16.4 km ²												
Comments:	natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Greenhills Creek tributary Station No. WS2A
 Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4					0.157								4
5													5
6						0.221							6
7				0.035									7
8													8
9													9
10													10
11					0.224								11
12													12
13						0.146							13
14													14
15													15
16					0.317								16
17													17
18													18
19					0.089								19
20													20
21													21
22													22
23						0.135							23
24													24
25					0.390								25
26													26
27													27
28													28
29													29
30													30
31					0.293								31

Source: B.C. Coal Ltd.
 Environmental Control
 Report of Water Samples

Comments: natural flow

Type of Gauge:
 Location: 50° 02' 47" N; 114° 51' 10" W
 Drainage Area: 16.4 km²

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2B
 Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.042				1
2													2
3													3
4								0.136					4
5								0.136					5
6													6
7													7
8													8
9													9
10								0.076					10
11													11
12								0.074					12
13													13
14													14
15													15
16													16
17													17
18													18
19								0.041					19
20													20
21													21
22													22
23							0.133						23
24								0.059					24
25													25
26													26
27							0.187						27
28							0.193						28
29													29
30													30
31													31

Type of Gauge: staff Comments: natural flow Source: B.C. Coal Ltd. Environmental Control Report of Water Samples
 Location: 50° 02' 41"; 114° 51' 14"
 Drainage Area: 16.5 km²

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2B

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.122							2
3													3
4													4
5													5
6													6
7						0.212							7
8							0.034						8
9						0.260							9
10													10
11													11
12													12
13													13
14						0.264							14
15							0.030						15
16													16
17						0.121							17
18													18
19													19
20													20
21													21
22													22
23													23
24						0.052							24
25													25
26					0.204								26
27													27
28						0.084	0.014						28
29													29
30						0.065							30
31													31
Type of Gauge:	welf												
Location:	50° 02' 41"; 114° 51' 14"												
Drainage Area:	16.5 km ²												
Comments:	natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2B
 Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.132							1
2													2
3													3
4					0.132								4
5													5
6						0.156							6
7													7
8						0.101							8
9					0.156								9
10													10
11					0.132		0.011						11
12													12
13						0.042							13
14													14
15													15
16					0.156								16
17													17
18					0.181		0.011 e						18
19													19
20													20
21													21
22						0.015							22
23													23
24					0.264								24
25					0.264								25
26							0.011						26
27													27
28						0.015							28
29													29
30					0.156								30
31					0.156								31
Type of Gauge:	weir												
Location:	50° 02' 41" N; 114° 51' 14" W												
Drainage Area:	16.5 km ²												
Comments:	e, estimate natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Greenhills Creek Station No. WS2B

Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.010								1
2													2
3							0.069						3
4						0.181							4
5						0.156							5
6													6
7													7
8													8
9					0.069								9
10													10
11													11
12						0.263							12
13													13
14					0.132								14
15													15
16													16
17													17
18						0.207							18
19						0.221							19
20													20
21													21
22					0.181								22
23													23
24													24
25						0.133							25
26													26
27													27
28					0.156								28
29					0.181								29
30													30
31													31

Type of Gauge: weir Source: Westar Mining Ltd. Environmental Control Report of Water Samples

Location: 50° 02' 41"; 114° 51' 14"

Drainage Area: 16.5 km²

Comments: *derived from crest gauge
#pond stopped decanting early morning
of July 4 ; natural flow

DAILY DISCHARGE

Station Name Burnt Ridge Creek Station No. WS3

Daily Discharge In Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3													3	
4													4	
5													5	
6													6	
7													7	
8													8	
9													9	
10							0.004						10	
11													11	
12								0.001					12	
13													13	
14													14	
15													15	
16													16	
17													17	
18													18	
19						0.005							19	
20													20	
21													21	
22													22	
23													23	
24							0.002						24	
25													25	
26								0.001					26	
27													27	
28													28	
29													29	
30										0.0			30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 02' 26" N; 114° 49' 26" W													
Drainage Area:	1.4 km ²													
Source: "Greenhills Coal Project, Stage 1 Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.														

DAILY DISCHARGE

Station Name Burnt Ridge Creek Station No. WS3
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3													3	
4													4	
5						0.013							5	
6													6	
7													7	
8													8	
9						0.015							9	
10													10	
11													11	
12					0.007								12	
13					0.006								13	
14													14	
15													15	
16													16	
17													17	
18													18	
19													19	
20													20	
21													21	
22													22	
23						0.008							23	
24													24	
25													25	
26													26	
27													27	
28					0.011								28	
29													29	
30													30	
31													31	
Type of Gauge:	well												Comments:	natural flow
Location:	50° 02' 26"; 114° 49' 26"													
Drainage Area:	1.4 km ²													
Source: "Greenhills Surface Coal Mining Project, Stage II Environmental Assessment," Volume II, Appendices, Table 2.5, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C., January, 1981.														

DAILY DISCHARGE

Station Name Fording River tributary Station No. WS4

Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10							0.011						10
11													11
12								0.011					12
13													13
14													14
15													15
16													16
17													17
18													18
19						0.015							19
20													20
21													21
22													22
23													23
24							0.008						24
25													25
26													26
27								0.011					27
28													28
29													29
30										0.006			30
31													31

Comments: natural flow

Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, Appendix 3.3.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.

Type of Gauge: _____
 Location: 50° 01' 28" N; 114° 49' 41" W
 Drainage Area: 2.7 km²

DAILY DISCHARGE

Station Name Fording River tributary Station No. WS4
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.067							2
3													3
4													4
5													5
6													6
7													7
8													8
9						.056/.111*							9
10													10
11						.046/.059*							11
12						0.043							12
13													13
14													14
15					0.020								15
16						0.036							16
17													17
18													18
19													19
20					0.013								20
21													21
22													22
23					0.019	0.018							23
24													24
25													25
26													26
27					.111/.156*								27
28					0.069								28
29					0.076								29
30					.087/.102*								30
31													31

Comments: *derived from crest gauge

natural flow

Type of Gauge:

Location: 50° 01' 28"; 114° 49' 41"

Drainage Area: 2.7 km²

Source: "Greenhills Surface Coal Mining Project, Stage 11 Environmental Assessment," Volume 11, Appendices, Table 2.5, Appendix 3.3.3, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. January, 1981.

DAILY DISCHARGE

Station Name Fording River tributary Station No. WS5
 Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5						1.91							5
6													6
7													7
8													8
9													9
10							0.114						10
11													11
12									0.019				12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23													23
24							0.023						24
25													25
26													26
27								0.030					27
28													28
29													29
30													30
31													31

Comments: natural flow

Type of Gauge: staff
 Location: 50° 02' 00" N; 114° 48' 50" W
 Drainage Area: 26.0 km²
 Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.

DAILY DISCHARGE

Station Name Fording River tributary Station No. WS5
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2						1.56							2	
3													3	
4													4	
5													5	
6													6	
7													7	
8													8	
9						1.29							9	
10													10	
11						1.18							11	
12					1.09								12	
13													13	
14													14	
15													15	
16						1.08							16	
17													17	
18													18	
19													19	
20					1.25								20	
21													21	
22													22	
23					1.25	0.846							23	
24													24	
25													25	
26													26	
27					1.77								27	
28					1.84								28	
29					1.77								29	
30					1.77								30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 02' 00"; 114° 48' 50"													
Drainage Area:	26.0 km ²													
Source: "Greenhills Surface Coal Mining Project, Stage II Environmental Assessment," Volume II, Appendices, Table 2.5, Appendix 3.3.3, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. January, 1981.														

DAILY DISCHARGE

Station Name Britch Creek Station No. WS7

Daily Discharge In Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2										0.010			2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10							0.045						10
11													11
12								0.022					12
13													13
14													14
15													15
16													16
17													17
18													18
19						0.153							19
20													20
21													21
22													22
23													23
24							0.030						24
25													25
26													26
27								0.023					27
28													28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 09' 02"; 114° 51' 52"												
Drainage Area:	6.1 km ²												
Comments:	regulated flow												
	Source: "Greenhills Coal Project, Stage 1 Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.												

DAILY DISCHARGE

Station Name British Creek Station No. WS7
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.489							2
3													3
4													4
5						0.416							5
6													6
7													7
8													8
9						.366/.451*							9
10													10
11						0.322							11
12					0.234	.308/.718*							12
13													13
14													14
15					0.223								15
16						0.193							16
17						.183/.202*							17
18													18
19													19
20					0.277								20
21					0.245								21
22													22
23					0.245	0.115							23
24													24
25						0.104							25
26													26
27					0.550								27
28					0.470								28
29					0.470								29
30					.618/.692*								30
31													31

Source: "Greenhills Surface Coal Mining Project, Stage 11 Environmental Assessment," Volume 11, Appendices, Table 2.5, Appendix 3.3.3, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. January, 1981.

Comments: *derived from crest gauge

regulated flow

Type of Gauge: staff
 Location: 50° 09' 02" N; 114° 51' 52" W
 Drainage Area: 6.1 km²

DAILY DISCHARGE

Station Name Britch Creek Station No. WS7

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.079				1
2						0.538							2
3													3
4													4
5								.142/.170*					5
6					0.153								6
7													7
8						0.340							8
9							0.201						9
10													10
11													11
12								0.105					12
13					0.136								13
14													14
15							.133/.212*						15
16						.595/.850*							16
17													17
18													18
19								0.079					19
20				0.076									20
21													21
22													22
23						0.311	.153/.184*						23
24								.079/.085*					24
25													25
26													26
27					1.47/1.76*								27
28							.153/.170*						28
29													29
30						.368/.453*							30
31				0.210									31
Type of Gauge: <u>staff</u> Location: <u>50° 09' 02" N; 114° 51' 52" W</u> Drainage Area: <u>6.1 km²</u>													
Comments: <u>*derived from crest gauge</u> <u>regulated flow</u>													
Source: <u>B.C. Coal Ltd. Environmental Control Report of Water Samples</u>													

DAILY DISCHARGE

Station Name Britch Creek Station No. WS7
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3						0.165							3
4													4
5													5
6													6
7													7
8													8
9													9
10													10
11													11
12													12
13													13
14					0.422								14
15									0.013				15
16													16
17													17
18													18
19					0.470								19
20													20
21													21
22													22
23													23
24													24
25								0.019					25
26					0.187								26
27													27
28							0.028						28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 09' 02"; 114° 51' 52"												
Drainage Area:	6.1 km ²												
Comments:	regulated flow												
Source:	Wesstar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name British Creek Station No. WS7

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4					0.132								4
5													5
6						0.246							6
7													7
8			0.019										8
9					0.202								9
10							0.060						10
11													11
12						0.124							12
13			0.018										13
14													14
15													15
16													16
17					0.202		0.046						17
18													18
19			0.056										19
20													20
21								0.019					21
22													22
23													23
24					0.512					0.019			24
25													25
26							0.034						26
27			0.130										27
28													28
29						0.084							29
30					0.496			0.022					30
31													31
Type of Gauge:	staff												
Location:	50° 09' 02"; 114° 51' 52"												
Drainage Area:	6.1 km ²												
Comments:	regulated flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Britch Creek Station No. WS7

Daily Discharge In Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.088								1
2										0.016			2
3													3
4							0.130*		0.021				4
5						0.186							5
6													6
7								0.099 e					7
8													8
9					0.065		0.156*						9
10													10
11													11
12						0.303							12
13													13
14													14
15					0.196								15
16													16
17													17
18													18
19						0.190 e	0.147						19
20													20
21													21
22					0.191								22
23							0.142						23
24													24
25						0.184							25
26													26
27													27
28													28
29					0.210								29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 09' 02"; 114° 51' 52"												
Drainage Area:	6.1 km ²												
Comments:	*derived from staff gauge e, estimate regulated flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Porter Creek Station No. WS8

Daily Discharge In Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2										0.011			2	
3													3	
4													4	
5													5	
6													6	
7													7	
8													8	
9													9	
10						0.030							10	
11									0.034				11	
12													12	
13													13	
14													14	
15													15	
16													16	
17													17	
18													18	
19						0.146							19	
20													20	
21													21	
22													22	
23													23	
24							0.026						24	
25													25	
26													26	
27								0.030					27	
28													28	
29													29	
30													30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 07' 49" N; 114° 51' 06" W													
Drainage Area:	2.6 km ²													
Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.														

DAILY DISCHARGE

Station Name Porter Creek Station No. WS8

Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3													3	
4													4	
5						0.262							5	
6													6	
7													7	
8													8	
9						0.112							9	
10													10	
11													11	
12					0.262								12	
13													13	
14													14	
15					0.217								15	
16						0.185							16	
17						0.149							17	
18													18	
19													19	
20													20	
21					0.246								21	
22													22	
23					0.230	0.122							23	
24													24	
25						0.112							25	
26													26	
27													27	
28					0.296								28	
29													29	
30													30	
31													31	
Type of Gauge: <u>staff</u> Comments: <u>natural flow</u> Location: <u>50° 07' 49"; 114° 51' 06"</u> Drainage Area: <u>2.6 km²</u>													Source: <u>Greenhills Surface Coal Mining Project, Stage II Environmental Assessment," Volume II, Appendices, Table 2.5, Appendix 3.3.3, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. January, 1981.</u>	

DAILY DISCHARGE

Station Name Porter Creek Station No. WS8

Daily Discharge In Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.054				1
2													2
3													3
4													4
5								.102/.170*					5
6					0.015								6
7													7
8						.340/.552*							8
9							0.147						9
10													10
11													11
12								.071/.127*					12
13					0.015								13
14													14
15						0.510	.139/.226*						15
16													16
17													17
18													18
19								.071/.125*					19
20													20
21													21
22													22
23							.170/.340*						23
24						0.283		.054/.088*					24
25													25
26													26
27													27
28							.125/.198*						28
29													29
30				0.007		.283/.425*			0.054				30
31													31

Type of Gauge: staff
 Location: 50° 07' 49"; 114° 51' 06"
 Drainage Area: 2.6 km²
 Comments: *derived from crest gauge
natural flow
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Porter Creek Station No. WS8
 Daily Discharge In Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3						0.079							3
4													4
5													5
6					0.088								6
7													7
8													8
9													9
10													10
11													11
12													12
13													13
14					0.286								14
15								0.018					15
16													16
17													17
18													18
19					0.266								19
20													20
21													21
22													22
23													23
24													24
25								0.036					25
26					0.304								26
27													27
28							0.059						28
29				0.052									29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 07' 49" N; 114° 51' 06" W												
Drainage Area:	2.6 km ²												
Comments:	natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Porter Creek Station No. MS8

Daily Discharge In Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4					0.102								4
5							0.072						5
6						0.159							6
7													7
8				0.014									8
9													9
10					0.125								10
11							0.068						11
12													12
13				0.020		0.102							13
14													14
15													15
16													16
17					0.124								17
18							0.050						18
19				0.072									19
20													20
21									0.034				21
22													22
23													23
24					0.213					0.037 e			24
25													25
26							0.043						26
27													27
28													28
29						0.073							29
30					0.203			0.029					30
31													31

Type of Gauge: staff
 Location: 50° 07' 49"; 114° 51' 06"
 Drainage Area: 2.6 km²
 Comments: e, estimate
natural flow
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Porter Creek Station No. WS8
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.049					0.029			1
2													2
3													3
4							0.096*		0.025				4
5						0.109							5
6													6
7								0.127 e					7
8													8
9					0.045		0.092*						9
10													10
11													11
12						0.161							12
13													13
14													14
15					0.154								15
16													16
17													17
18													18
19						0.113 e	0.170						19
20													20
21													21
22					0.107								22
23							0.170						23
24													24
25						0.099							25
26													26
27													27
28													28
29					0.190								29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 07' 49" N; 114° 51' 06" W												
Drainage Area:	2.6 km ²												
Comments:	*derived from staff gauge e, estimate natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Thompson Creek Station No. WS9

Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2										0.011			2	
3													3	
4													4	
5													5	
6													6	
7													7	
8													8	
9													9	
10							0.011						10	
11													11	
12									0.015				12	
13													13	
14													14	
15													15	
16													16	
17													17	
18													18	
19						0.070							19	
20													20	
21													21	
22													22	
23													23	
24							0.023						24	
25													25	
26													26	
27								0.010					27	
28													28	
29													29	
30													30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 05' 08"; 114° 55' 24"													
Drainage Area:	9.4 km ²													
Source: "Greenhills Coal Project, Stage 1 Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.														

DAILY DISCHARGE

Station Name Thompson Creek Station No. MS9
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						.398/.599*							2
3													3
4													4
5						0.802							5
6													6
7													7
8													8
9						0.362							9
10													10
11						.297/.525*							11
12					0.241								12
13													13
14													14
15													15
16						.282/.501*							16
17						0.194							17
18													18
19													19
20													20
21					0.138								21
22													22
23					0.163	0.129							23
24													24
25						.145/.163*							25
26													26
27					0.362								27
28					0.297								28
29					0.465								29
30					.417/.574*								30
31													31

Comments: *derived from crest gauge

natural flow

Source: "Greenhills Surface Coal Mining Project, Stage II Environmental Assessment." Volume II, Appendices, Table 2.5, Appendix 3.3.3, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. January, 1981.

Type of Gauge: staff

Location: 50° 05' 08" N; 114° 55' 24" W

Drainage Area: 9.4 km²

DAILY DISCHARGE

Station Name Thompson Creek Station No. WS9

Daily Discharge In Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									.025/.057*				1
2						.340/.963*	.193/.340*						2
3													3
4													4
5								.062/.159*					5
6					0.297								6
7													7
8						.249/.411*							8
9						.198/.411*	.108/.238*						9
10								.057/.142*					10
11													11
12								0.040					12
13					0.326								13
14													14
15							.108/.238*						15
16						.411/.736*							16
17													17
18													18
19					0.736			.028/.057*					19
20													20
21													21
22													22
23							.108/.238*						23
24						.272/.496*		.025/.057*					24
25													25
26													26
27					.680/1.05*		.108/.467*						27
28							.108/.467*						28
29													29
30						.198/.311*							30
31													31

Type of Gauge: staff
 Location: 50° 05' 08" N; 114° 55' 24" W
 Drainage Area: 9.4 km²
 Comments: *derived from crest gauge
natural flow
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Thompson Creek Station No. WS9
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2						0.132							2	
3													3	
4													4	
5					0.102								5	
6													6	
7													7	
8													8	
9													9	
10													10	
11													11	
12					0.190								12	
13													13	
14													14	
15									0.012				15	
16													16	
17													17	
18													18	
19					0.541								19	
20													20	
21													21	
22													22	
23													23	
24													24	
25								0.014					25	
26													26	
27					0.212								27	
28													28	
29													29	
30													30	
31													31	
Type of Gauge: <u>staff</u> Comments: <u>natural flow</u> Location: <u>50° 05' 08" N; 114° 55' 24" W</u> Drainage Area: <u>9.4 km²</u>													Source: <u>Westar Mining Ltd. Environment Control Report of Water Samples</u>	

DAILY DISCHARGE

Station Name Thompson Creek Station No. MS9
 Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4					0.139								4
5							0.042						5
6													6
7													7
8				0.016		0.142							8
9													9
10													10
11					0.160								11
12							0.044						12
13				0.031									13
14						0.102							14
15													15
16													16
17													17
18				0.025	0.292								18
19													19
20									0.018				20
21						0.059	0.044						21
22													22
23													23
24										0.019 e			24
25					0.275		0.035						25
26													26
27						0.052							27
28													28
29													29
30													30
31					0.133			0.011					31
Type of Gauge: <u>staff</u> Location: <u>50° 05' 08"; 114° 55' 24"</u> Drainage Area: <u>9.4 km²</u> Comments: <u>e, estimate</u> <u>natural flow</u>													
Source: <u>Westar Mining Ltd. Environmental Control Report of Water Samples</u>													

DAILY DISCHARGE

Station Name Thompson Creek Station No. WS9

Daily Discharge In Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.042								1
2										0.011*			2
3							0.057*						3
4						0.085 e			0.008				4
5													5
6													6
7								0.028 e					7
8													8
9					0.079		0.040*						9
10													10
11						0.178							11
12													12
13													13
14					0.085 e								14
15													15
16													16
17						0.176	0.034						17
18													18
19													19
20													20
21													21
22					0.141								22
23							0.034						23
24				0.115									24
25						0.079							25
26													26
27													27
28					0.127								28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 05' 08"; 114° 55' 24"												
Drainage Area:	9.4 km ²												
Comments:	*derived from staff gauge e, estimate natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Wolfram Creek Station No. WS10

Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10							0.0						10
11													11
12									0.0				12
13													13
14													14
15													15
16													16
17													17
18													18
19						0.015							19
20													20
21													21
22													22
23													23
24							0.0						24
25													25
26													26
27								0.0					27
28													28
29													29
30													30
31													31

Type of Gauge: staff
 Location: 50° 06' 14" N; 114° 55' 30" W
 Drainage Area: 3.9 km²
 Comments: natural flow
 Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.

DAILY DISCHARGE

Station Name Wolfram Creek Station No. WS10

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						.156/.326*							2
3													3
4													4
5								0.027					5
6													6
7													7
8						0.076							8
9							0.053						9
10													10
11													11
12								0.024					12
13					0.294								13
14													14
15							.057/.068*						15
16						0.283							16
17													17
18													18
19					0.481			0.023					19
20													20
21													21
22													22
23							0.059						23
24						0.408		.020/.024*					24
25													25
26													26
27				0.204	0.340								27
28							.071/.076*						28
29													29
30						0.110							30
31													31
Type of Gauge:	staff												
Location:	50° 06' 14"; 114° 55' 30"												
Drainage Area:	3.9 km ²												
Comments:	*derived from crest gauge natural flow												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Wolfram Creek Station No. WS10
 Daily Discharge In Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3						0.057							3	
4													4	
5					0.067								5	
6													6	
7													7	
8													8	
9													9	
10													10	
11													11	
12					0.078								12	
13													13	
14													14	
15													15	
16													16	
17													17	
18													18	
19					0.309								19	
20													20	
21													21	
22													22	
23													23	
24													24	
25													25	
26													26	
27					0.102								27	
28													28	
29													29	
30													30	
31													31	
Type of Gauge:	staff												Comments:	natural flow
Location:	50° 06' 14" N; 114° 55' 30" W												Source:	Wester Mining Ltd. Environmental Control Report of Water Samples
Drainage Area:	3.9 km ²													

DAILY DISCHARGE

Station Name Wolfram Creek Station No. WS10

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2													2	
3													3	
4					0.103								4	
5							0.006						5	
6													6	
7													7	
8						0.040							8	
9													9	
10													10	
11					0.099								11	
12							0.003						12	
13													13	
14						0.022							14	
15													15	
16													16	
17													17	
18				0.010	0.114								18	
19													19	
20							0.003						20	
21						0.014							21	
22													22	
23													23	
24													24	
25					0.086		0.003						25	
26													26	
27													27	
28													28	
29													29	
30													30	
31					0.046								31	
Type of Gauge: <u>staff</u> Comments: <u>natural flow</u> Location: <u>50° 06' 14" N; 114° 55' 30" W</u> Drainage Area: <u>3.9 km²</u>													Source: <u>Westar Mining Ltd. Environmental Control Report of Water Samples</u>	

DAILY DISCHARGE

Station Name Wolfram Creek Station No. WS10

Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.024								1
2													2
3							0.007						3
4						0.042 e							4
5													5
6													6
7								< 0.014					7
8													8
9					0.028		0.020*						9
10													10
11						0.054							11
12													12
13													13
14					0.057 e								14
15													15
16													16
17							0.014						17
18						0.032							18
19													19
20													20
21													21
22					0.092								22
23							0.014						23
24				0.031									24
25						0.025							25
26													26
27													27
28					0.056								28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 06' 14"; 114° 55' 30"												
Drainage Area:	3.9 km ²												
Comments:	*derived from staff gauge e, estimate natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Mickelson Creek Station No. WS11
 Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10							0.0						10
11													11
12								0.0					12
13													13
14													14
15													15
16													16
17													17
18													18
19						0.007							19
20													20
21													21
22													22
23													23
24							0.0						24
25													25
26													26
27								0.0					27
28													28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 06' 56" N; 114° 55' 35" W												
Drainage Area:	2.5 km ²												
Comments:	natural flow												
	Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, Appendix 3.4.4, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.												

DAILY DISCHARGE

Station Name Mickelson Creek Station No. WS11
 Daily Discharge In Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10													10
11													11
12													12
13													13
14													14
15													15
16													16
17						0.022							17
18													18
19													19
20													20
21													21
22													22
23						0.013							23
24													24
25						0.011							25
26													26
27													27
28													28
29													29
30													30
31													31
Type of Gauge:	weir												Comments:
Location:	50° 06' 56"; 114° 55' 35"												Source: "Greenhills Surface Coal Mining Project, Stage II Environmental Assessment." Volume II, Appendices, Table 2.5, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C., January, 1981.
Drainage Area:	2.5 km ²												

DAILY DISCHARGE

Station Name Mickelson Creek Station No. WS11

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.032							2
3													3
4													4
5								0.005					5
6					0.027								6
7						0.020							7
8													8
9							0.008						9
10								.001/.017*					10
11													11
12								0.0					12
13					0.053								13
14													14
15							.008/.024*						15
16						.093/.098*							16
17													17
18													18
19					0.067								19
20													20
21													21
22													22
23							.006/.024*						23
24						0.031							24
25													25
26													26
27				0.023	0.071								27
28							.008/.015*						28
29													29
30						.027/.036*							30
31													31

Type of Gauge: _____
 Location: 50° 06' 56"; 114° 55' 35"
 Drainage Area: 2.5 km²
 Comments: *derived from crest gauge
natural flow
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Mickelson Creek Station No. WS11

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5					0.024								5
6													6
7							0.005						7
8													8
9						0.062							9
10													10
11													11
12					0.038								12
13													13
14													14
15													15
16						0.047							16
17													17
18													18
19					0.071								19
20													20
21													21
22													22
23						0.018							23
24													24
25													25
26													26
27					0.064								27
28													28
29						0.010							29
30													30
31													31

Type of Gauge: weir
 Location: 50° 06' 56"; 114° 55' 35"
 Drainage Area: 2.5 km²
 Comments: *derived from crest gauge
natural flow
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Mickelson Creek Station No. WS11

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4					0.031								4
5							0.005						5
6													6
7													7
8						0.018							8
9													9
10													10
11					0.040								11
12													12
13													13
14						0.008							14
15													15
16													16
17													17
18				0.017	0.033								18
19													19
20													20
21						0.004							21
22													22
23													23
24													24
25					0.040								25
26													26
27				0.027									27
28						0.010							28
29													29
30													30
31					0.025								31
Type of Gauge: <u>weir</u> Location: <u>50° 06' 56"; 114° 55' 35"</u> Drainage Area: <u>2.5 km²</u> Comments: <u>natural flow</u> Source: <u>Westar Mining Ltd. Environmental Control Report of Water Samples</u>													

DAILY DISCHARGE

Station Name Mickelson Creek Station No. WS11
 Daily Discharge In Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.004								1
2													2
3							0.003						3
4						0.017							4
5													5
6													6
7													7
8													8
9					0.011		0.001*						9
10													10
11						0.036							11
12													12
13													13
14					0.018								14
15													15
16													16
17				0.031									17
18						0.018							18
19													19
20													20
21													21
22					0.027								22
23													23
24				0.014									24
25						0.010							25
26													26
27													27
28					0.023								28
29													29
30													30
31													31
Type of Gauge:	weir												
Location:	50° 06' 56"; 114° 55' 35"												
Drainage Area:	2.5 km ²												
Comments:	*based on staff gauge natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Leask Creek Station No. WS13

Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10							0.0						10
11													11
12									0.0				12
13													13
14													14
15													15
16													16
17													17
18													18
19						0.009							19
20													20
21													21
22													22
23													23
24							0.0						24
25													25
26													26
27								0.0					27
28													28
29													29
30													30
31													31

Type of Gauge: staff Comments: natural flow

Location: 50° 06' 37" N; 114° 55' 30" W

Drainage Area: 1.7 km²

Source: "Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.

DAILY DISCHARGE

Station Name Leask Creek Station No. WS13

Daily Discharge In Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.067							2
3													3
4													4
5						0.102							5
6													6
7													7
8													8
9						0.076							9
10													10
11						0.061							11
12					0.029								12
13													13
14													14
15					0.024								15
16						0.031							16
17						0.029							17
18													18
19													19
20													20
21					0.011								21
22													22
23					0.016	0.013							23
24													24
25						0.010							25
26													26
27					0.068								27
28					0.064								28
29					0.076								29
30					0.078								30
31													31

Comments: natural flow

Type of Gauge: weir
 Location: 50° 06' 37"; 114° 55' 30"
 Drainage Area: 1.7 km²

Source: "Greenhills Surface Coal Mining Project, Stage II Environmental Assessment." Volume II, Appendices, Table 2.5, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C., January, 1981.

DAILY DISCHARGE

Station Name Leask Creek Station No. WS13

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.033							2
3													3
4													4
5								0.002					5
6													6
7													7
8						0.017							8
9							0.007						9
10													10
11													11
12													12
13					0.061								13
14													14
15							.005/.008*						15
16						.067/.093*							16
17													17
18													18
19					0.061								19
20													20
21													21
22													22
23							.004/.008*						23
24						0.033							24
25													25
26													26
27				0.044	0.082								27
28							.007/.015*						28
29													29
30						.023/.039*							30
31													31

Comments: *derived from crest gauge

natural flow

Source: B.C. Coal Ltd.
Environmental Control
Report of Water Samples

Type of Gauge: weir

Location: 50° 06' 37" N; 114° 55' 30" W

Drainage Area: 1.7 km²

DAILY DISCHARGE

Station Name Lesk Creek Station No. WS13

Daily Discharge In Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.039							2
3													3
4													4
5					0.040								5
6													6
7							0.002						7
8													8
9						0.067							9
10													10
11													11
12					0.046								12
13													13
14													14
15													15
16						0.047							16
17													17
18													18
19					0.116								19
20													20
21													21
22													22
23						0.018							23
24													24
25													25
26													26
27					0.080								27
28													28
29						0.007							29
30													30
31													31

Comments: *derived from crest gauge

natural flow

Source: Westar Mining Ltd.
Environmental Control
Report of Water Samples

Type of Gauge: well

Location: 50° 06' 37" N; 114° 55' 30" W

Drainage Area: 1.7 km²

DAILY DISCHARGE

Station Name Leask Creek Station No. WS13

Daily Discharge In Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4					0.051								4
5													5
6													6
7													7
8						0.018							8
9													9
10													10
11					0.051								11
12													12
13													13
14						0.007							14
15													15
16													16
17													17
18					0.046								18
19													19
20													20
21						0.002							21
22													22
23													23
24													24
25					0.040								25
26													26
27				0.043									27
28													28
29													29
30													30
31					0.020								31
Type of Gauge:	weir												
Location:	50° 06' 37"; 114° 55' 30"												
Drainage Area:	1.7 km ²												
Comments:	natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Leask Creek Station No. WS13
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.003								1
2													2
3							0.0						3
4						0.018							4
5													5
6													6
7													7
8													8
9					0.003								9
10													10
11						0.027							11
12													12
13													13
14					0.009								14
15													15
16													16
17													17
18						0.018							18
19													19
20													20
21													21
22					0.031								22
23													23
24				0.020									24
25						0.007							25
26													26
27													27
28					0.023								28
29													29
30													30
31													31

Type of Gauge: weir
 Location: 50° 06' 37" N; 114° 55' 30" W
 Drainage Area: 1.7 km²
 Comments: natural flow
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Swift Creek Station No. WS14

Daily Discharge In Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10							0.015						10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23													23
24							0.011						24
25													25
26													26
27								0.008					27
28													28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	50° 09' 32"; 114° 52' 18"												
Drainage Area:	4.9 km ²												
Comments:	regulated since 1974.02.11												
Source:	"Greenhills Coal Project, Stage I Environmental Assessment," Table 3.4.1.2-1, for Kaiser Resources Ltd., by B.C. Research, Vancouver, B.C. March, 1980.												

APPENDIX H

WESTAR MINING LIMITED

HYDROMETRIC DATA

Natal-Harmer Ridge Mining Project

APPENDIX HWESTAR MINING LIMITEDHYDROMETRIC DATANatal-Harmer Ridge Mining Project

STATION NUMBER	STREAM	DRAINAGE AREA (km ²)	GAUGE LOCATION	PERIOD OF RECORD	REMARKS	PAGE
BC1	Bodie Creek	5.96	49° 43' 10" 114° 50' 40"	1977-83	regulated since 1979,02,12	H4
BC4	Bodie Creek		49° 43' 15" 114° 50' 29"	1983-84	regulated since 1935,08,09	H11
BL1	Black Creek	1.58	49° 49' 01" 114° 48' 23"	1981	natural flow	H13
ED1	Erickson Creek	30.6	49° 43' 15" 114° 46' 32"	1981-84	natural flow	H3 H14
FC1	Fenelon Creek		49° 46' 22" 114° 52' 11"	1981-83		H16
GT1	Gate Creek	2.77	49° 42' 43" 114° 49' 49"	1982-83	natural flow	H19
GT2	Gate Creek	1.33	49° 42' 55" 114° 50' 02"	1983	natural flow	H21
GT3	Gate Creek	4.86	49° 42' 55" 114° 50' 19"	1981-82	natural flow	H22 H3
HD2	Harmer Dam Overflow	35.6	49° 49' 50" 114° 48' 52"	1979-84	regulated since 1969,01,09	H23
LC1	Lindsay Creek		49° 45' 56" 114° 52' 05"	1980-83	regulated since 1979,02,13	H29
LC2	Lindsay Creek	1.79	49° 45' 58" 114° 52' 15"	1984	regulated since 1979,02,13	H33
LT1	Little Creek	2.07	49° 48' 13" 114° 47' 28"	1981-83	natural flow	H34 H3
OC1	Otto Creek		49° 44' 48" 114° 53' 06"	1978-79 1981-84	regulated since 1972,05,05	H36
OCP1	Otto Creek		49° 45' 04" 114° 52' 41"	1982-83	regulated since 1972,05,05	H42 H3
S1	Milligan Creek	2.56	49° 41' 33" 114° 47' 39"	1981-84	natural flow	H3 H43
S2	Thresher Creek	1.69	49° 41' 31" 114° 48' 48"	1982-84	natural flow	H46
SC1	Sawmill Creek		49° 48' 36" 114° 47' 57"	1981,83	natural flow	H49 H3
SC2	Sawmill Creek	2.25	49° 48' 36" 114° 47' 47"	1982-83	regulated since 1981,07,07	H50
SM1	Six Mile Creek		49° 48' 48" 114° 52' 03"	1978-79	regulated since 1978,12,08	H52
SM2	Six Mile Creek	1.55	49° 48' 38" 114° 52' 12"	1981-84	regulated since 1978,12,08	H54

Note: See Figure 17 for hydrometric site locations.

STATION NUMBER	STREAM	DATE	DISCHARGE (m ³ /s)
ED1	Erickson Creek	Oct. 29, 1981	0.045
ED1	Erickson Creek	May 10, 1983	0.092
ED1	Erickson Creek	May 16, 1983	0.047
GT3	Gate Creek	April 23, 1982	0.079
LT1	Little Creek	June 29, 1983	0.016
OCP1	Otto Creek	May 11, 1983	0.052
S1	Milligan Creek	Nov. 18, 1981	0.0
SC1	Sawmill Creek	June 8, 1983	0.038

Note: All 1983 measurements were obtained from Westar Mining Ltd. Report of Water Samples; 1981 and 1982 measurements were obtained from B.C. Coal Ltd. Report of Water Samples.

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1

Daily Discharge in Cubic Metres per Second for the Year 19 77

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2		0.025											2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10								0.0					10
11					0.054								11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19	0.021						0.070						19
20				0.086					0.019				20
21						0.051							21
22													22
23													23
24		0.025											24
25													25
26													26
27													27
28													28
29						0.022							29
30			0.026										30
31					0.075								31
Type of Gauge:	staff												Source: B.C. Coal Ltd. Environmental Control Report of Water Samples
Location:	49° 43' 10"; 114° 50' 40"												
Drainage Area:	5.96 km ²												
Comments:	natural flow												

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1

Daily Discharge in Cubic Metres per Second for the Year 19 78

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10													10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19							0.070						19
20									0.019				20
21						0.051							21
22													22
23													23
24													24
25													25
26													26
27													27
28													28
29													29
30													30
31													31

Type of Gauge: staff Comments: natural flow Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

Location: 49° 43' 10"; 114° 50' 40"

Drainage Area: 5.96 km²

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1
 Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6						0.015							6
7													7
8													8
9													9
10													10
11						0.019							11
12													12
13													13
14													14
15					0.023 e	0.015							15
16													16
17					0.023								17
18													18
19													19
20													20
21						0.008							21
22													22
23													23
24													24
25							0.019						25
26						0.008							26
27						0.030							27
28													28
29													29
30													30
31								0.007					31

Type of Gauge: staff
 Location: 49° 43' 10" ; 114° 50' 40"
 Drainage Area: 5.96 km²
 Comments: e, estimate
regulated since 1979.02.12
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1

Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.017				1
2							0.019			0.034			2
3						0.146							3
4							0.010						4
5					0.146			0.009					5
6										.027/.054*			6
7													7
8					0.125		0.021	.017/.021*					8
9									0.021				9
10							0.017						10
11						0.149							11
12								0.009	0.007				12
13													13
14					0.067					.007/.123*			14
15								0.012	0.017				15
16				0.302	0.060		0.012		0.019				16
17						0.108							17
18							0.003				0.004		18
19									0.010				19
20					0.053	0.054							20
21													21
22					0.053		0.004	0.010		0.014			22
23						0.057			.009/.017*				23
24													24
25								0.005					25
26					0.166	0.024			0.007				26
27													27
28				0.306			.008/.012*			0.012			28
29					0.101								29
30									.060/.079*				30
31							0.007						31

Type of Gauge: staff
 Location: 49° 43' 10"; 114° 50' 40"
 Drainage Area: 5.96 km²
 Comments: *derived from crest gauge regulated since 1979.02.12
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1
 Daily Discharge In Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1				.102/.116*									1
2				0.096			.119/.212*						2
3									.042/.045*				3
4						.147/.238*							4
5													5
6				0.096	.195/.294*			.074/.091*					6
7							0.074						7
8					.170/.198*	0.110							8
9													9
10				0.059			.096/.105*						10
11													11
12													12
13								0.054					13
14				0.096	0.294								14
15													15
16				0.116									16
17						0.266	0.068						17
18			0.116			.283/.286*			0.031	.044/.058*			18
19													19
20					0.289			0.040					20
21										0.033			21
22						0.193							22
23				0.249			.059/.283*						23
24													24
25					.280/.294*	0.142							25
26													26
27			0.096					.042/.051*					27
28				.221/.294*	.204/.294*								28
29							.034/.068*		.041/.066*				29
30													30
31													31

Type of Gauge: staff
 Location: 49° 43' 10"; 114° 50' 40"
 Drainage Area: 5.96 km²
 Comments: *derived from crest gauge regulated since 1979.02.12
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1
 Daily Discharge In Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.071							2
3													3
4					0.334								4
5													5
6					0.221		0.034						6
7				0.091		0.082							7
8				0.181									8
9													9
10													10
11			0.068										11
12				0.164	0.221								12
13					0.238								13
14													14
15				0.130		0.068/0.113*							15
16													16
17					0.297								17
18													18
19					0.215								19
20													20
21													21
22			0.048	0.164									22
23				0.255		0.064							23
24						0.038							24
25			0.057										25
26				0.238	0.170								26
27					0.164								27
28													28
29			0.099	0.261									29
30						0.038							30
31			0.093										31
Type of Gauge:	staff												
Location:	49° 43' 10"; 114° 50' 40"												
Drainage Area:	5.96 km ²												
Comments:	*derived from crest gauge regulated since 1979.02.12												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC1
 Daily Discharge In Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.048							1
2						0.048							2
3													3
4				0.021	0.091								4
5													5
6				0.023									6
7						0.042							7
8						0.047							8
9			0.014										9
10					0.093								10
11				0.031	0.085								11
12							0.023						12
13				0.042			0.014						13
14						0.042							14
15						0.042							15
16					0.088								16
17					0.082								17
18				0.093									18
19													19
20				0.147		0.031							20
21						0.025							21
22													22
23			0.015										23
24			0.015										24
25													25
26				0.210	0.054								26
27				0.164	0.051	0.025							27
28			0.023										28
29						0.023							29
30			0.023										30
31													31
Type of Gauge:	90° v-notch weir												
Location:	49° 43' 10"; 114° 50' 40"												
Drainage Area:	5.96 km ²												
Comments:	*derived from crest gauge regulated since 1979.02.12												
Source:	Wester Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC4

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2					0.093	0.048							2
3													3
4				0.021							0.022		4
5													5
6													6
7						0.042							7
8													8
9													9
10					0.093								10
11				0.031	0.088								11
12							0.023						12
13													13
14						0.042							14
15													15
16					0.085								16
17													17
18				0.093									18
19													19
20						0.031							20
21													21
22													22
23													23
24													24
25													25
26				0.210									26
27					0.051	0.025							27
28			0.023										28
29													29
30			0.023										30
31													31

Comments: regulated since 1935.08.09

Source: Westar Mining Ltd.
Environmental Control
Report of Water Samples

Type of Gauge: _____
Location: 49° 43' 15" N; 114° 50' 29" W
Drainage Area: _____

DAILY DISCHARGE

Station Name Bodie Creek Station No. BC4
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.034					0.017	0.017		1
2								0.028					2
3				0.015			0.091	0.033					3
4						0.091							4
5			0.011				0.091						5
6							0.115						6
7								0.027	0.024				7
8					0.034	0.167		0.027					8
9	0.012			0.017									9
10							0.068			0.017			10
11						0.246	0.050						11
12					0.119*	0.256	0.054						12
13		0.011	0.017			0.208							13
14					.133/.159*				0.027				14
15						0.173							15
16				0.015			0.037	0.017					16
17					0.197*								17
18						0.136	0.034						18
19													19
20						0.139		0.024					20
21			0.019			0.133			0.028				21
22						.156/.215*				0.017			22
23					0.173			0.018					23
24				0.048	0.182*			0.011	0.033				24
25						0.126							25
26			0.017				0.028						26
27							0.030	0.011					27
28						0.115			0.021				28
29					0.156								29
30							.049/.062*						30
31													31

Type of Gauge: weir
 Location: 49° 43' 15"; 114° 50' 29"
 Drainage Area: _____
 Comments: *derived from crest gauge regulated since 1935.08.09
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Black Creek Station No. BL1

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2							.049/.059*						2
3													3
4													4
5													5
6								0.022					6
7							0.035						7
8													8
9													9
10							.035/.050*						10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21										0.024			21
22													22
23							0.027						23
24													24
25													25
26						.047/.142*							26
27													27
28													28
29									0.021				29
30							0.039						30
31													31
Type of Gauge:	staff												
Location:	49° 49' 01" N; 114° 48' 23" W												
Drainage Area:	1.58 km ²												
Comments:	*derived from crest gauge natural flow												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Erickson Creek Station No. ED1
 Daily Discharge In Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.016				1
2													2
3													3
4					0.245								4
5													5
6						0.082							6
7									0.003				7
8													8
9								0.029					9
10													10
11													11
12													12
13					0.150								13
14													14
15													15
16													16
17					0.212								17
18						0.039							18
19													19
20													20
21													21
22													22
23				0.198		0.031							23
24													24
25													25
26				0.175			0.039						26
27					0.198								27
28													28
29													29
30						0.014							30
31													31

Type of Gauge: staff Comments: natural flow
 Location: 49° 43' 15"; 114° 46' 32"
 Drainage Area: 30.6 km²
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Erickson Creek Station No. ED1

Daily Discharge In Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.017								1
2								0.004					2
3							0.048	0.006					3
4					0.011	.076/.139*							4
5							0.071						5
6							.059/.079*						6
7								.002/.019*					7
8					0.003	0.102		0.004					8
9							0.037						9
10							0.034						10
11						.255/.283*							11
12							0.031						12
13						0.201							13
14						0.193							14
15													15
16					0.130		0.020	0.001					16
17					.159/.161*								17
18						0.130							18
19							0.014						19
20						.133/.142*		.002/.005*					20
21						0.116							21
22					.150/.170*	.110/.127*							22
23				0.071	0.062								23
24				0.076	0.127			0.001					24
25					0.150	0.096							25
26				0.059			.008/.017*						26
27													27
28					0.099	.105/.110*							28
29					0.091								29
30					0.099		0.006						30
31					0.130								31

Type of Gauge: staff
 Location: 49° 43' 15"; 114° 46' 32"
 Drainage Area: 30.6 km²
 Comments: *derived from crest gauge
natural flow
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Fenelon Creek Station No. FC1

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2							.008/.026*						2
3									0.001				3
4						.005/.006*							4
5													5
6								0.002					6
7							.006/.028*						7
8													8
9													9
10							.013/.026*						10
11						0.002							11
12													12
13								0.002					13
14													14
15													15
16													16
17						.024/.037*	0.005						17
18						.018/.027*					.001/.003*		18
19													19
20													20
21										.001/.002*			21
22						.011/.019*							22
23							.004/.031*						23
24													24
25						.010/.017*							25
26													26
27								.001/.018*					27
28													28
29									.001/.002*				29
30							0.003						30
31													31

Type of Gauge: staff
 Location: 49° 46' 22"; 114° 52' 11"
 Drainage Area: _____
 Comments: *derived from crest gauge
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Fenelon Creek Station No. FC1

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day	
1													1	
2						0.009							2	
3													3	
4								0.001					4	
5													5	
6					0.010		0.004						6	
7									0.001				7	
8						0.010							8	
9													9	
10													10	
11													11	
12					0.010								12	
13													13	
14													14	
15						.007/.016*							15	
16													16	
17													17	
18													18	
19					0.023								19	
20													20	
21													21	
22													22	
23													23	
24						0.004							24	
25													25	
26					0.016		0.001	0.001					26	
27													27	
28													28	
29						0.003							29	
30													30	
31													31	
Type of Gauge: <u>staff</u> Location: <u>49° 46' 22"; 114° 52' 11"</u> Drainage Area: _____													Source: <u>B.C. Coal Ltd. Environmental Control Report of Water Samples</u>	
Comments: <u>*derived from crest gauge</u>														

DAILY DISCHARGE

Station Name Feneion Creek Station No. FC1
 Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.005							1
2													2
3													3
4					0.010						0.002		4
5													5
6			0.0										6
7													7
8						0.002							8
9													9
10													10
11					0.007								11
12							0.001						12
13				0.003									13
14													14
15						0.002							15
16													16
17					0.007								17
18										0.001			18
19													19
20													20
21				0.006		0.001			0.003				21
22													22
23								0.0					23
24													24
25					0.005								25
26													26
27				0.011									27
28													28
29						0.001							29
30													30
31													31

Source: Westar Mining Ltd.
 Environmental Control
 Report of Water Samples

Comments:

Type of Gauge: weir
 Location: 49° 46' 22"; 114° 52' 11"
 Drainage Area: _____

DAILY DISCHARGE

Station Name Gate Creek Station No. GT1

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.001				1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9								0.002					9
10													10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23													23
24													24
25													25
26							0.002						26
27													27
28													28
29													29
30													30
31													31
Type of Gauge: _____ Location: <u>49° 42' 43"; 114° 49' 49"</u> Drainage Area: <u>2.77 km²</u> Comments: <u>natural flow</u> Source: <u>B.C. Coal Ltd. Environmental Control Report of Water Samples</u>													

DAILY DISCHARGE

Station Name Gate Creek Station No. GTI

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.020							2
3													3
4				0.006									4
5													5
6													6
7													7
8													8
9													9
10					0.030								10
11				0.010									11
12							0.004			0.0			12
13													13
14													14
15						0.011							15
16					0.025								16
17													17
18				0.016									18
19													19
20						0.009							20
21													21
22			0.007										22
23													23
24													24
25													25
26				0.040									26
27					0.024	0.007							27
28			0.006										28
29													29
30													30
31													31
Type of Gauge:	weir												
Location:	49° 42' 43" N; 114° 49' 49" W												
Drainage Area:	2.77 km ²												
Comments:	natural flow												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Gate Creek Station No. GT2

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2					0.006	0.002							2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10					0.004								10
11													11
12							0.001						12
13													13
14						0.001							14
15													15
16					0.003								16
17													17
18				0.013									18
19													19
20						0.001							20
21													21
22													22
23													23
24													24
25													25
26				0.007									26
27					0.002	0.0							27
28													28
29													29
30													30
31													31

Type of Gauge: weir
 Location: 49° 42' 55" N; 114° 50' 02" W
 Drainage Area: 1.33 km²
 Comments: natural flow
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Gate Creek Station No. GT3
 Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2							.018						2
3									0.002				3
4													4
5													5
6							.006/.015*						6
7							.012/.020*						7
8													8
9													9
10							.013/.017*						10
11						.010/.010*							11
12													12
13								0.002					13
14													14
15													15
16													16
17						.032/.034*							17
18						0.034			0.0		0.001		18
19													19
20								.002/.003*					20
21										.001/.002*			21
22						0.031							22
23							.008/.023*						23
24													24
25						0.024							25
26													26
27								.002/.004*					27
28													28
29							.007/.010*		.001/.004*				29
30													30
31													31
Type of Gauge: <u>staff</u> Location: <u>49° 42' 55"; 114° 50' 19"</u> Drainage Area: <u>4.86 km²</u> Comments: <u>*derived from crest gauge</u> <u>natural flow</u> Source: <u>B.C. Coal Ltd. Environmental Control Report of Water Samples</u>													

DAILY DISCHARGE

Station Name Harmer Dam Overflow Station No. HD2

Daily Discharge in Cubic Metres per Second for the Year 19 79

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6						1.52			0.456				6
7													7
8													8
9					1.31								9
10													10
11													11
12													12
13					2.29								13
14													14
15					1.31	1.07							15
16													16
17					1.31								17
18													18
19													19
20													20
21						0.891							21
22													22
23					2.29								23
24													24
25				0.476									25
26						0.567							26
27													27
28													28
29			0.406										29
30													30
31					2.26		0.425	0.456					31

Type of Gauge: _____
 Location: 49° 49' 50" N; 114° 48' 52" W
 Drainage Area: 35.6 km²
 Comments: regulated since 1969.01.09
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Harmer Dam Overflow Station No. HD2
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									0.326				1
2							0.425						2
3						1.47							3
4											0.212		4
5													5
6					3.17	1.34			0.297				6
7													7
8							0.453						8
9									0.297				9
10				0.340									10
11						1.50							11
12			0.078								0.142		12
13										0.212			13
14													14
15													15
16				1.07			0.453		0.326				16
17						1.10							17
18						1.02					0.127		18
19													19
20					1.40								20
21													21
22				1.84			0.425		0.340				22
23						0.835			0.283				23
24													24
25											0.0		25
26					1.91								26
27													27
28										0.142			28
29													29
30									0.297				30
31													31
Type of Gauge:													
Location:	49° 49' 50"; 114° 48' 52"												
Drainage Area:	35.6 km ²												
Comments:	regulated since 1969.01.09												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Harmer Dam Overflow Station No. HD2

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1				0.595									1
2							1.64						2
3									1.87				3
4			0.283			2.83							4
5													5
6				0.538	2.04			0.566					6
7							1.30						7
8													8
9													9
10			0.311				1.08						10
11						1.70							11
12													12
13								0.538					13
14				0.425	1.78								14
15													15
16													16
17							0.759						17
18			0.538			2.69			0.278		0.538		18
19													19
20					2.44			0.736					20
21										0.538			21
22													22
23				1.53			0.878						23
24													24
25						1.81							25
26													26
27								0.765					27
28				1.95	3.40								28
29							0.728						29
30							.694/.878*		0.538				30
31													31
Type of Gauge:	staff												
Location:	49° 49' 50" N; 114° 48' 52" W												
Drainage Area:	35.6 km ²												
Comments:	*derived from crest gauge regulated since 1969.01.09												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Harmer Dam Overflow Station No. HD2
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						2.26							2
3													3
4								0.538					4
5													5
6					2.18		1.05						6
7									0.496				7
8				0.793									8
9						1.64							9
10													10
11			0.496		2.29								11
12													12
13													13
14													14
15				0.680		2.38							15
16			0.453										16
17													17
18													18
19					3.96								19
20													20
21													21
22				1.13									22
23													23
24						1.53							24
25			0.496										25
26					4.81		0.595	0.538					26
27													27
28													28
29				1.87		1.42							29
30													30
31			0.552										31
Type of Gauge:	staff												
Location:	49° 49' 50" N; 114° 48' 52" W												
Drainage Area:	35.6 km ²												
Comments:	regulated since 1969.01.09												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Harmer Dam Overflow Station No. HD2

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						1.87							1
2													2
3													3
4					1.53								4
5													5
6			0.354								0.326		6
7													7
8			0.326			1.67							8
9													9
10													10
11					1.42		0.552						11
12													12
13			0.354										13
14													14
15						1.02							15
16													16
17					1.56								17
18										0.320			18
19													19
20				0.991		0.793							20
21									0.561				21
22													22
23			0.326					0.566					23
24													24
25					3.26								25
26													26
27				1.50									27
28													28
29						0.595							29
30			0.326										30
31													31

Comments: regulated since 1969.01.09

Source: Westar Mining Ltd.
Environmental Control
Report of Water Samples

Type of Gauge: staff
 Location: 49° 49' 50"; 114° 48' 52"
 Drainage Area: 35.6 km²

DAILY DISCHARGE

Station Name Harmer Dam Overflow Station No. HD2
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.609								1
2													2
3				0.326									3
4						1.98							4
5			0.255										5
6								0.524					6
7													7
8					0.623								8
9	0.326			0.385									9
10													10
11						2.26							11
12													12
13		0.255	0.326										13
14					0.991								14
15													15
16				0.694									16
17													17
18					2.21								18
19													19
20													20
21			0.436										21
22										0.374			22
23					1.44								23
24				0.807					0.411				24
25						1.76							25
26			0.385										26
27													27
28													28
29					1.81								29
30													30
31													31
Type of Gauge:	staff												
Location:	49° 49' 50" ; 114° 48' 52"												
Drainage Area:	35.6 km ²												
Source:	Wester Mining Ltd. Environmental Control Report of Water Samples												
Comments:	regulated since 1969.01.09												

DAILY DISCHARGE

Station Name Lindsay Creek Station No. LC1
 Daily Discharge in Cubic Metres per Second for the Year 19 80

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1									.004/.005*				1
2							.007/.011*			0.004			2
3						.025/.039*							3
4							.007/.008*				0.005		4
5						.021/.026*		.004/.005*					5
6										0.004			6
7													7
8					0.021		.006/.008*	0.004					8
9									0.004				9
10							0.007						10
11						0.017							11
12								.007/.014*	0.004		0.004		12
13						0.015							13
14					0.014					0.004			14
15								.005/.006*	0.004				15
16					0.013		0.006		.005/.016*				16
17						0.013							17
18						0.011	.006/.009*				.004/.006*	.006/.014*	18
19									0.004				19
20					0.010	.011/.013*							20
21													21
22					0.011		.006/.015*	0.004		.005/.013*			22
23						0.010			0.004				23
24													24
25								0.004					25
26					.036/.039*				0.004				26
27						.010/.011*							27
28							0.004			.004/.008*			28
29					.015/.039*								29
30									.006/.015*				30
31							0.004						31
Type of Gauge:	staff												
Location:	49° 45' 56" N; 114° 52' 05" W												
Drainage Area:													
Comments:	*derived from crest gauge regulated since 1979.02.13												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Lindsay Creek Station No. LC1

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1				0.018									1
2				0.017			.014/.022*						2
3						0.014			0.006				3
4													4
5													5
6				0.014	0.034		.012/.027*	.008/.010*					6
7													7
8						.014/.020*							8
9	0.006						.015/.022*						9
10			0.010	0.011		.014/.016*							10
11													11
12			0.014					0.007					12
13													13
14				.011/.015*	0.024								14
15													15
16				0.014									16
17						.024/.043*	0.011						17
18			.015/.027*			.022/.040*			0.008		.005/.013*		18
19													19
20					0.047			.008/.014*					20
21										.005/.008*			21
22													22
23				0.019		.018/.024*	.012/.022*						23
24													24
25					0.022	.018/.020*							25
26													26
27			0.015					.007/.017*					27
28				.018/.020*	.022/.043*								28
29							0.00615*		0.006				29
30							.009/.014*						30
31													31

Source: B.C. Coal Ltd.
Environmental Control
Report of Water Samples

Comments: *derived from crest gauge
regulated since 1979.02.13

Type of Gauge: staff
Location: 49° 45' 56"; 114° 52' 05"
Drainage Area: _____

DAILY DISCHARGE

Station Name Lindsay Creek Station No. LC1

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.014							2
3													3
4								.004/.007*					4
5													5
6					0.018		0.008						6
7									.006/.010*				7
8				0.006									8
9						0.014							9
10													10
11					0.010								11
12													12
13													13
14													14
15				0.014		.012/.017*							15
16													16
17													17
18													18
19					0.021								19
20													20
21													21
22				0.022									22
23													23
24						0.009							24
25													25
26					0.021		0.005	0.004					26
27													27
28													28
29				0.025		0.010							29
30													30
31													31

Comments: *derived from crest gauge

regulated since 1979.02.13

Source: B.C. Coal Ltd.
Environmental Control
Report of Water Samples

Type of Gauge: staff
Location: 49° 45' 56"; 114° 52' 05"
Drainage Area: _____

DAILY DISCHARGE

Station Name Lindsay Creek Station No. LC1

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.013							1
2													2
3													3
4					0.013								4
5													5
6			0.013										6
7													7
8						0.006							8
9			0.018										9
10													10
11					0.008								11
12							0.007						12
13				0.009									13
14													14
15						0.005							15
16													16
17					0.008								17
18										0.003			18
19													19
20													20
21				0.011		0.007			0.003				21
22													22
23			0.005										23
24													24
25					0.006								25
26													26
27				0.016									27
28													28
29						0.004							29
30			0.010										30
31													31

Comments: regulated since 1979.02.13

Source: Westar Mining Ltd.
Environmental Control
Report of Water Samples

Type of Gauge: weir
Location: 49° 45' 56" N; 114° 52' 05" W
Drainage Area: _____

DAILY DISCHARGE

Station Name Lindsay Creek Station No. LC2
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.011								1
2													2
3				0.014									3
4													4
5			0.011										5
6													6
7								0.007					7
8					0.014								8
9	0.017												9
10													10
11						0.014							11
12													12
13			0.017										13
14					0.011								14
15													15
16							0.008						16
17													17
18						0.011							18
19													19
20													20
21			0.020										21
22													22
23					0.014								23
24				0.011									24
25													25
26			0.014										26
27													27
28													28
29					0.011								29
30													30
31													31
Type of Gauge:	weir												
Location:	49° 45' 58"; 114° 52' 15"												
Drainage Area:	1.79 km ²												
Comments:	regulated since 1979.02.13												
Source:	Westar Mining Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Little Creek Station No. LT1

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2							.081/.136*						2
3													3
4													4
5													5
6							.051/.119*	.025/.051*					6
7													7
8													8
9													9
10							.057/.076*						10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18						.198/.283*							18
19													19
20													20
21										0.016			21
22													22
23							0.031						23
24													24
25						0.085							25
26													26
27													27
28													28
29									0.009				29
30							.034/.119*						30
31													31
Type of Gauge:	staff												
Location:	49° 48' 13"; 114° 47' 28"												
Drainage Area:	2.07 km ²												
Comments:	*derived from crest gauge natural flow												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Little Creek Station No. LT1
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4								0.005					4
5													5
6						0.017							6
7													7
8													8
9													9
10													10
11													11
12					0.084								12
13													13
14													14
15													15
16													16
17													17
18													18
19					0.057								19
20													20
21													21
22													22
23													23
24													24
25													25
26						0.005		0.002					26
27													27
28						0.022							28
29													29
30													30
31													31
Type of Gauge:	staff												
Location:	49° 48' 13"; 114° 47' 28"												
Drainage Area:	2.07 km ²												
Comments:	natural flow												
Source	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Otto Creek Station No. 001
 Daily Discharge in Cubic Metres per Second for the Year 19 78

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7						0.072							7
8													8
9													9
10					0.030								10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23													23
24													24
25													25
26													26
27									0.024				27
28													28
29													29
30								0.026					30
31													31
Type of Gauge:													
Location:	49° 44' 48"; 114° 53' 06"												
Drainage Area:													
Comments:	regulated since 1972.05.05												
Source:	Kaiser Resources Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Otto Creek

Station No. OC1

Daily Discharge in Cubic Metres per Second for the Year 19 79

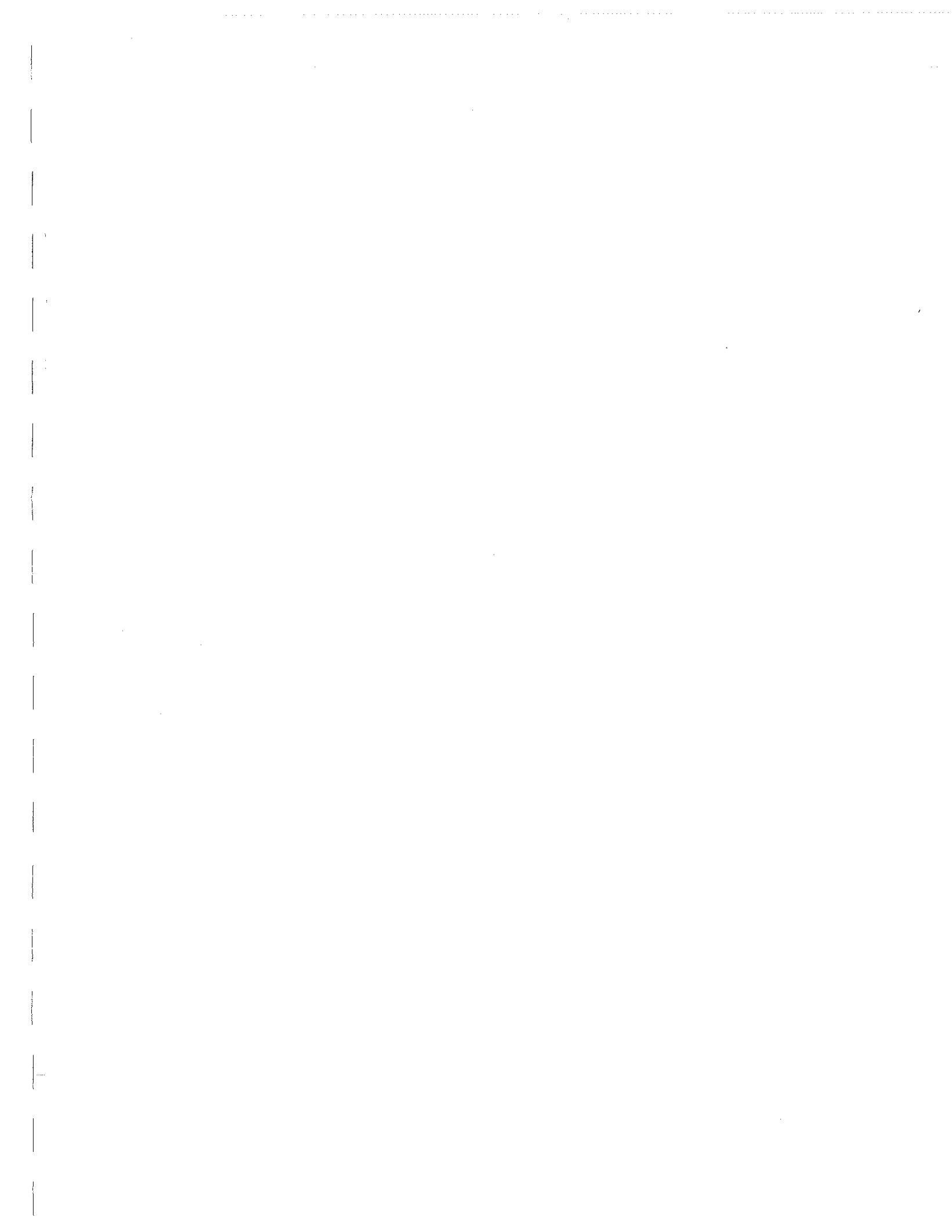
Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6									0.023				6
7													7
8													8
9													9
10													10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23					0.042								23
24													24
25				0.045									25
26						0.023							26
27													27
28													28
29													29
30													30
31							0.019						31
Type of Gauge:													
Location:	49° 44' 48"; 114° 53' 06"												
Drainage Area:													
Comments:	regulated since 1972.05.05												
Source:	Kaiser Resources Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Otto Creek Station No. OC1
 Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1							.042/.057*						1
2													2
3									0.018				3
4						.038/.043*							4
5													5
6								.029/.037*					6
7							.040/.044*						7
8													8
9													9
10							.044/.047*						10
11					0.031								11
12													12
13								.025/.033*					13
14													14
15													15
16							0.076						16
17						.040/.050*	.036/.085*						17
18						.034/.048*			0.015		0.035		18
19													19
20								.021/.029*					20
21							.033/.046*			0.018			21
22						.036/.040*							22
23							.040/.082*						23
24													24
25						.036/.040*							25
26													26
27								.022/.027*					27
28													28
29							0.031		.022/.023*				29
30													30
31													31

Type of Gauge: staff
 Location: 49° 44' 48"; 114° 53' 06"
 Drainage Area: _____
 Comments: *derived from crest gauge regulated since 1972.05.05
 Source: B.C. Coal Ltd. Environmental Control Report of Water Samples



DAILY DISCHARGE

Station Name Otto Creek Station No. OC1
 Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.022							2
3													3
4								.018/.022					4
5													5
6					0.037		0.026						6
7									.014/.018*				7
8				0.031									8
9						0.036		0.012					9
10													10
11													11
12					0.039								12
13													13
14													14
15				0.043		.032/.043*							15
16													16
17													17
18											0.008		18
19					0.039								19
20													20
21													21
22				0.043									22
23													23
24						0.025							24
25			0.042										25
26					0.048		0.021						26
27													27
28													28
29				0.027		0.024							29
30													30
31			0.037										31
Type of Gauge:	staff												
Location:	49° 44' 48"; 114° 53' 06"												
Drainage Area:													
Comments:	*derived from crest gauge regulated since 1972.05.05												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Otto Creek

Station No. OC1

Daily Discharge in Cubic Metres per Second for the Year

19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1		0.0				0.029							1
2													2
3													3
4					.026/.031*						0.021		4
5													5
6			0.014									0.006	6
7													7
8						0.025							8
9													9
10													10
11					0.023								11
12													12
13				.011/.018*			0.015						13
14													14
15						0.027							15
16													16
17					0.022								17
18										0.007			18
19													19
20				.013/.015*									20
21						0.027			0.004				21
22													22
23			.004/.005*					0.008					23
24													24
25													25
26					0.031								26
27				.026/.029*									27
28													28
29						0.013							29
30													30
31													31

Type of Gauge: _____
 Location: 49° 44' 48" ; 114° 53' 06"
 Drainage Area: _____

Comments: *derived from crest gauge regulated since 1972.05.05

Source: Westar Mining Ltd. Environment Control Report of Water Samples

DAILY DISCHARGE

Station Name Otto Creek Station No. OC1
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.006								1
2													2
3				0.006									3
4						0.011							4
5			0.004										5
6								0.006					6
7													7
8					0.007								8
9	0.007			0.004									9
10													10
11						0.010							11
12													12
13		0.005	0.006										13
14					0.007								14
15													15
16				0.003			0.012						16
17													17
18						0.011							18
19													19
20													20
21			0.011										21
22										0.001			22
23					0.011								23
24				0.004					0.003				24
25						0.013							25
26			0.006										26
27													27
28													28
29					0.010								29
30													30
31													31

Type of Gauge: _____
 Location: 49° 44' 48" N; 114° 53' 06" W
 Drainage Area: _____
 Comments: regulated since 1972.05.05
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples

DAILY DISCHARGE

Station Name Otto Creek Station No. 00P1

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2						0.031							2
3													3
4													4
5													5
6							0.019						6
7									0.012				7
8													8
9						0.043							9
10													10
11													11
12					0.038								12
13													13
14													14
15													15
16													16
17													17
18													18
19					0.047								19
20													20
21													21
22													22
23													23
24						0.023							24
25													25
26					0.049			0.006					26
27													27
28													28
29						0.019							29
30													30
31													31

Source: B.C. Coal Ltd.
Environmental Control
Report of Water Samples

Comments: regulated since 1972.05.05

Type of Gauge: _____
 Location: 49° 45' 04"; 114° 52' 41"
 Drainage Area: _____

DAILY DISCHARGE

Station Name Milligan Creek Station No. S1
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.006					0.0			1
2								0.001					2
3				0.001			0.009	0.001					3
4					0.005								4
5							0.007						5
6							.007/.010*						6
7						0.013		0.0/.003*					7
8					0.006	0.020							8
9							0.005	0.0					9
10							0.005			0.0			10
11						0.027							11
12						.025/.028*	0.004						12
13						0.024							13
14					0.023	0.023							14
15													15
16					.046/.050*		0.003	0.0					16
17					.040/.047*								17
18						.018/.024*							18
19													19
20						.017/.023*		0.0					20
21						0.016			0.002				21
22					0.025	.020/.022*							22
23				0.018	0.026								23
24					0.024			0.0					24
25					0.022								25
26				0.015			0.001						26
27					0.018	0.011	0.001						27
28					.018/.019*			0.020	0.0				28
29					0.016								29
30					.018/.027*		.002/.003*						30
31								0.0					31

Source: Westar Mining Ltd.
 Environmental Control
 Report of Water Samples

Comments: *derived from crest gauge
 natural flow

Type of Gauge:
 Location: 49° 41' 33" N; 114° 47' 39" W
 Drainage Area: 2.56 km²

DAILY DISCHARGE

Station Name Thresher Creek Station No. S2

Daily Discharge in Cubic Metres per Second for the Year 19 82

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10													10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23				0.0									23
24													24
25													25
26				0.004									26
27					0.018								27
28													28
29													29
30													30
31													31
Type of Gauge:													
Location:	49° 41' 31"; 114° 48' 48"												
Drainage Area:	1.69 km ²												
Comments:	natural flow												
Source:	B.C. Coal Ltd. Environmental Control Report of Water Samples												

DAILY DISCHARGE

Station Name Thresher Creek Station No. S2

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2					0.027								2
3													3
4													4
5													5
6													6
7													7
8													8
9													9
10					0.020								10
11													11
12													12
13													13
14													14
15													15
16					0.012								16
17													17
18													18
19													19
20													20
21													21
22													22
23													23
24													24
25													25
26				0.045									26
27													27
28													28
29													29
30													30
31													31

Source: B.C. Coal Ltd.
Environmental Control
Report of Water Samples

Comments: natural flow

Type of Gauge: _____
 Location: 49° 41' 31"; 114° 48' 48"
 Drainage Area: 1.69 km²

DAILY DISCHARGE

Station Name Thresher Creek Station No. S2
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2													2
3													3
4						.003/.011*							4
5													5
6													6
7						0.002							7
8					0.004	0.007							8
9													9
10													10
11						0.014							11
12						0.012							12
13						0.011							13
14					.012/.020*	0.010							14
15													15
16					.033/.041*								16
17					0.036								17
18						.004/.013*							18
19													19
20						.004/.005*							20
21						0.003							21
22					0.021	.007/.008*							22
23				0.028	0.020								23
24				0.004	0.018								24
25					0.016	0.002							25
26				0.002									26
27													27
28					0.010								28
29					.006/.012*								29
30					0.006								30
31					.008/.018*								31

Comments: *derived from crest gauge
 natural flow

Source: Westar Mining Ltd.
 Environmental Control
 Report of Water Samples

Type of Gauge:
 Location: 49° 41' 31"; 114° 48' 48"
 Drainage Area: 1.69 km²

DAILY DISCHARGE

Station Name Six Mile Creek Station No. SM2

Daily Discharge in Cubic Metres per Second for the Year 19 81

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1													1
2							.048/.142*						2
3									.082/.102*				3
4						0.102							4
5													5
6								.032/.057*					6
7													7
8						0.062							8
9													9
10							0.048						10
11						.048/.102*							11
12													12
13								.027/.059*					13
14													14
15													15
16													16
17						.311/.382*							17
18						.153/.382*			0.031		0.028		18
19													19
20								.034/.042*					20
21										0.031			21
22						0.093							22
23							0.042						23
24													24
25					.147/.255*	0.071							25
26													26
27								.040/.047*					27
28					.260/.354*								28
29							.027/.102*		.028/.037*				29
30							.040/.042*						30
31													31

Type of Gauge: _____
 Location: 49° 48' 38" N; 114° 52' 12" W
 Drainage Area: 1.55 km²
 Comments: *derived from crest gauge
 regulated since 1978.12.08
 Source: B.C. Coal Ltd.
 Environmental Control
 Report of Water Samples

DAILY DISCHARGE

Station Name Six Mile Creek Station No. SM2

Daily Discharge in Cubic Metres per Second for the Year 19 83

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1						0.059							1
2													2
3													3
4													4
5													5
6													6
7													7
8						0.019							8
9													9
10													10
11					0.010								11
12							0.002						12
13													13
14													14
15						0.010							15
16													16
17					0.007								17
18													18
19													19
20													20
21						0.007							21
22													22
23													23
24													24
25					0.027								25
26													26
27													27
28													28
29						0.002							29
30													30
31													31

Comments: regulated since 1978.12.08

Source: Westar Mining Ltd. Environmental Control Report of Water Samples

Type of Gauge: _____
 Location: 49° 48' 38" N; 114° 52' 12" W
 Drainage Area: 1.55 km²

DAILY DISCHARGE

Station Name Six Mile Creek Station No. SM2
 Daily Discharge in Cubic Metres per Second for the Year 19 84

Day	January	February	March	April	May	June	July	August	September	October	November	December	Day
1					0.004								1
2													2
3													3
4						0.035							4
5													5
6													6
7								0.003					7
8					0.010								8
9													9
10													10
11						0.060							11
12					0.012								12
13													13
14					0.035								14
15													15
16							0.012						16
17													17
18						0.040							18
19													19
20													20
21													21
22													22
23					0.035								23
24				0.012									24
25						0.031							25
26													26
27													27
28													28
29					0.040								29
30													30
31													31

Type of Gauge: _____
 Location: 49° 48' 38" N; 114° 52' 12" W
 Drainage Area: 1.55 km²
 Comments: regulated since 1978.12.08
 Source: Westar Mining Ltd. Environmental Control Report of Water Samples