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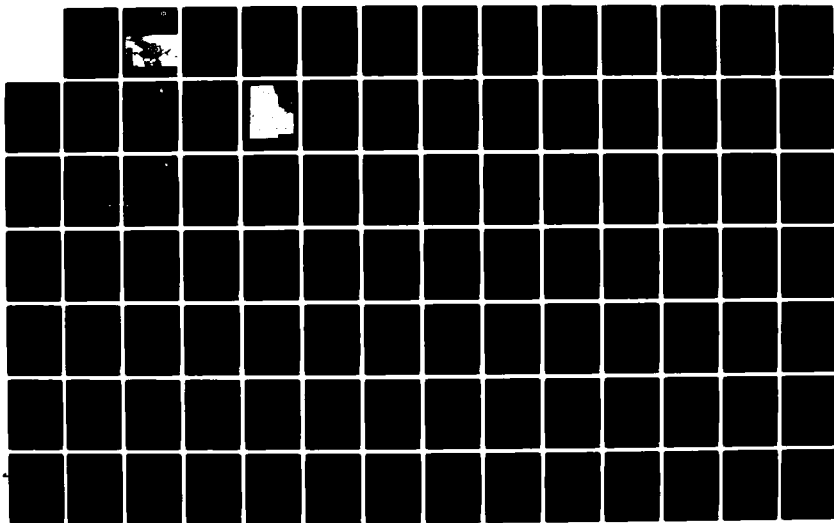
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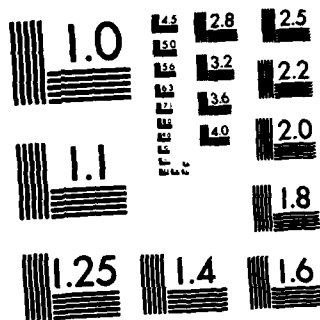
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## Special Report 82-21

October 1982



**US Army Corps  
of Engineers**

Cold Regions Research &  
Engineering Laboratory

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### *Limnological investigations: Lake Koocanusa, Montana*

*Part 1: Pre-impoundment Study, 1967 - 1972*

Thomas J.H. Bonde and Ronald M. Bush



Prepared in cooperation with  
U.S. ARMY ENGINEER DISTRICT, SEATTLE  
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## FOREWORD

The Kootenai River basin, Libby Dam and the resulting Lake Koocanusa, have been of interest to CRREL investigators since the mid-1970's. We have focused on a number of cold regions remote sensing, water quality, and limnological problems. Of particular interest are those associated with winter ice cover, spring snowmelt runoff, and low temperature chemical reactions in sediments and in the water column. Since CRREL and the Seattle District have conducted a number of short and long term studies on the Kootenai River and Lake Koocanusa, we considered it appropriate to make the results of those investigations readily available in a series of reports. Therefore, we are issuing these results in the CRREL Special Report series under the overall title *Limnological investigations: Lake Koocanusa, Montana*.

*Part 1: Pre-impoundment study: 1967-1972, with appendix, Basic data*  
(CRREL Special Report 82-21)

*Part 2: Environmental analyses in the Kootenai River region, Montana*  
(Reprint of CRREL Special Report 76-13)

*Part 3: Basic data, post-impoundment: 1972-1978*

*Part 4: Factors controlling primary productivity*  
(CRREL Special Report 82-15)

*Part 5: Phosphorus chemistry of sediments*  
(CRREL Special Report 81-15)

*Cover: Libby Dam and Lake Koocanusa, Montana,  
1975. (Photograph by U.S. Army Engineer  
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| REPORT DOCUMENTATION PAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                      | READ INSTRUCTIONS<br>BEFORE COMPLETING FORM                                       |
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| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br>This report documents the effects of the construction of Libby Dam upon the water quality of the United States portion of the Kootenai River during the pre-impoundment phase of a long-term water quality study. Water quality problems during dam construction appeared to be restricted to short-term increases in suspended sediment and turbidity which suppressed the aquatic insect population in the river downstream. Abnormally high background concentrations and abrupt chemical changes in water quality during the course of the study were attributed to industrial discharges from a fertilizer plant and mining operation. |                                      |                                                                                   |

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20. Abstract (cont'd)

located on an upstream tributary to the river. Nutrient loadings of nitrogen and phosphorus were found to be of sufficient magnitude to predict the development of eutrophic conditions following impoundment suggesting that efforts in controlling nutrient point sources be continued.



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## PREFACE

This report was originally prepared in 1975 by Thomas J.H. Bonde, Libby Dam Resident Office and Ronald M. Bush, Environmental Resources Section, Seattle District, Corps of Engineers. Publication of this report is in conjunction with the Corps of Engineers Civil Works Program, Environmental Quality, Work Unit 31013, Environmental Effects and Criteria for Engineering Works in Cold Regions.

While it would be impossible to thank the many friends, colleagues, and associates who have assisted in this study and measurably contributed to its progress, the contributions of several individuals deserve special recognition. Particular appreciation is given to Phillip L. Cole, Resident Engineer, Libby Dam, for his personal interest and encouragement throughout the study and Anthony V. Munch and others in the Libby Resident Office for their assistance in the study. General R.E. McConnell, district engineer during the early phase of the study, Sidney Steinborn, Robert Sato, Robert Ayres, Norm MacDonald, and Roger Ross all deserve a special thanks for their roles in the conception and growth of the study.

The contribution of Robert Rulifson of the Environmental Protection agency, Robert Schumacher and Joe Huston of the Montana Department of Fish and Game, and Phil Torangeau of the University of Montana were deeply appreciated. Much of the credit for the quality of the data can be given to George Pike and his staff, particularly Roger Knapton, Lynn Hull and the field personnel of the Kalispell office of the U.S. Geological Survey. The aid of Inez Herrig and the staff of the Lincoln County Library, who went out of their way to obtain needed reference material, is gratefully acknowledged.

The contents of this report are not to be used for advertising or promotional purposes. Citation of trade names does not constitute an official endorsement or recommendation of the use of such commercial products.

A study of the United States reach of the Kootenai River was undertaken in 1967 to document the effects on water quality from construction and operation of Libby Dam, Montana. This report presents the results of the first or preimpoundment phase of the ongoing study. In March 1972 the river was impounded and the reservoir, Lake Koocanusa, was formed. Lake Koocanusa is a relatively large reservoir with an average surface area of  $1.5 \times 10^8 \text{ m}^2$  ( $3.75 \times 10^3$  acres) and a mean depth of 43 m (113 ft). It is about 145 km (90 miles) in length at full pool, extending some 68 km (42 miles) in Canada. In the preimpoundment phase of the study, phosphorus and nitrogen loadings in the Kootenai River were found to be sufficiently high to predict the development of eutrophic conditions, particularly nuisance algal blooms, in the lake following the river impoundment. This prediction was realized when nuisance algal blooms occurred in Lake Koocanusa in the fall of 1974 and late summer and fall of 1975. The bloom species was Aphanizomenon flos-aquae, a blue-green algae characteristic of eutrophic

waters. The blue-green algae also occurred in the lake in 1973 but not in bloom proportions.

Current measures for control of eutrophication in Lake Koocanusa and the Kootenai River appear promising. The major source of phosphorus entering the Kootenai River system has been waste discharged from a fertilizer plant located on a tributary of the Kootenay River in British Columbia. Following the issuance of wastewater effluent regulations by the British Columbia Pollution Control Branch, the fertilizer company is undertaking a two-phase waste treatment program. The first phase, completed 30 September 1975, recycled gypsum waste and has reportedly achieved over 80% reduction in phosphorus in the effluent. The second phase, scheduled for completion in late 1977, will result in a reduction of phosphorus in the waste effluent of 99%. Furthermore, the communities that have been discharging domestic wastes into the river system in British Columbia are upgrading their treatment systems, with some communities choosing land application methods rather than discharging their effluent to surface waters.

The postimpoundment phase of the water quality study will document the effects on the limnology and water quality of Lake Koocanusa and the Kootenai River from treatment of wastewaters discharged into the river system. The first of the postimpoundment reports is expected to be completed in early 1977.

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## 1.0 SUMMARY AND CONCLUSIONS

This report documents the water quality of the United States reach of the Kootenai River for the period October 1967 through March 1972. The end date marks the impoundment of the river by Libby Dam in Montana and the beginning of a postimpoundment study, to be reported upon at a future date. The study was conducted by the U.S. Army Corps of Engineers with coordination and cooperation of state and Federal agencies and Canadian agencies. Published concurrent with this report is a report by the British Columbia Pollution Control Branch to document the quality of the Kootenai River within Canada prior to river impoundment (Crozier and Leinweber, 1975).

### 1.1 Findings.

A significant decrease in the values for a number of water quality parameters was observed in the Kootenai River in 1968 following the implementation of waste water treatment controls to an industrial discharge to a tributary of the Kootenay River in Canada. Nevertheless, the concentration of several constituents of the river's water, particularly phosphorus, continued to be higher than would have been found naturally in the Kootenay River.

The aquatic insect population of the river increased between 1968 and 1969 and remained high throughout the study. Such suggests that the chemical changes noted in the river after implementation of the industrial effluent control in Canada had a beneficial effect upon the insect population.

The nutrient concentrations and loadings, especially phosphorus, of the river were sufficiently high to predict the development of eutrophic conditions in the lake (Lake Koocanusa) formed by impoundment of the river by Libby Dam. A reduction in phosphorus input to the river system is necessary to prevent the development of eutrophic conditions such as nuisance algal blooms in Lake Koocanusa.

Water quality problems observed from Libby Dam project construction activities appeared to have been restricted to increases in suspended sediment and turbidity. Short-term increases in suspended sediment and turbidity due to channel diversions and such activities as drainage of settling ponds created occasional problems, but the major increases occurred coincident with higher river discharge when the hydraulic force and erosive capacity of the river was at its greatest. The increase in suspended sediment from dam construction activities had adverse biological effects on the river as indicated by the suppression of the aquatic insect population up to 14.5 km (9 miles) downstream of the dam site.

## 1.2 Recommendations.

The waters of the Kootenai River are potentially highly productive, principally as a result of man's activities. Progress has been made in controlling the cultural addition of nutrients and deleterious materials to the Kootenai River system during the course of the preimpoundment study, and facilities to effect further control are planned. The key factor for improving the water quality of the Kootenai River system is the close coordination and cooperation with the Canadian agencies, particularly the British Columbia Pollution Control Branch, through the Water Quality Task Force. Coordination with the Canadian agencies through the task force should be continued.

In order to (1) document the effects of the anticipated waste water control programs on the quality of the river system, (2) document the downstream effects from impoundment of the river by Libby Dam, (3) determine the conditions of the Libby Dam reservoir (Lake Koocanusa), and (4) make meaningful management decisions toward maintaining or improving the quality of the resource, the water quality study of the river system should be continued. The study should continue to be fully coordinated with the state, Federal, and Canadian agencies.

Water quality problems encountered during Libby Dam Project construction activities were principally high suspended sediment and turbidities. Although the increases in suspended sediment and turbidity were generally short term, they did have an adverse effect upon the aquatic ecosystem. The major causative factor appeared to be river diversions. With their inherent water quality problems, diversions should be discouraged. Where diversions are necessary, they should be scheduled to be constructed in the "dry" and utilized on a short-term basis during the period of low flows.

The incorporation of special provisions within construction contracts requiring compliance with state and Federal water quality standards is an effective tool in preventing or minimizing water pollution. Equally important are information pamphlets and preconstruction meetings which bring to the attention of the contractors the water quality standards and the fact that the standards will be strictly enforced. A water quality monitoring program is a compelling addition to these provisions and should be incorporated into the planning, construction, and operation of every major project.

Efforts to prevent water pollution problems during the construction phase of a project can be made more effective by actively seeking the advice and assistance of pollution control and fish and wildlife agencies and notifying them when problems occur, a major activity during the construction of Libby Dam. However, there is often little that can be done at the construction site to remedy water quality problems caused by what environmentally has been poorly planned, engineered, or designed. All projects and contracts should be thoroughly reviewed from a water quality standpoint prior to construction to ensure that they can be built with maximum benefits to the present and potential users of the water resource without deterioration of its quality.

## 2.0 INTRODUCTION

The Kootenai River (spelled Kootenay in Canada) is a major tributary of the Columbia River and drains parts of southeastern British Columbia, northern Idaho, and northwestern Montana. The river originates in Canada, enters the United States, re-enters Canada and flows into Kootenay Lake, and eventually enters the Columbia River at Castlegar, British Columbia.

In 1966 construction was begun on Libby Dam near Libby, Montana. Libby is one of four dams being constructed under an international treaty to develop the headwaters of the Columbia River. The dam and its reservoir, now officially called Lake Koocanusa, were designed to provide power, flood control, and recreation benefits.

With the start of construction, considerable concern was expressed over the possible detrimental effects that dam construction and river impoundment could have upon water quality and the aquatic ecosystem. Recognizing the many ecological unknowns in this field and the notable lack of specific data related to the Kootenai River, the Corps of Engineers, with the assistance of a number of state and Federal agencies, implemented a water quality study program. High phosphorus concentrations found in the river during early phases of the study and recognition of the potential eutrophic conditions that could result from high phosphorus loading following impoundment led to the development of a joint water quality program between Canada and the United States.

### 2.1 Purpose and Scope.

The principal objectives of this study as originally formulated in 1967 are threefold:

1. To provide reliable scientific data on various water quality parameters before, during, and after the construction of Libby Dam Project.
2. To utilize these data in predicting, insofar as possible, any detrimental changes in water quality that are occurring, or may be likely to occur, as a result of the project.
3. To recommend actions that can be taken to avoid or minimize water quality problems.

The lack of water quality data on the Kootenai River and its tributaries played a large part in the decision to undertake the study and in its ultimate design. Information on the portion of the river within the United States was virtually lacking. Public health, pollution control, and fish and wildlife agencies recommended that data be collected within their particular field of interest. These requests were accommodated whenever possible. In addition, it was felt that

there were valid scientific reasons for obtaining biological and limnological information on impoundment of a cold water stream. These reasons, coupled with a growing environmental awareness of the public as reflected in Congressional and Executive actions, determined the final direction of the study.

Following meetings with personnel of the British Columbia Pollution Control Branch beginning in 1969, the scope of the study was enlarged to include most of the basin lying upstream from Kootenay Lake. Additional parameters and sampling stations were located on the mainstem of the Kootenai River and its tributaries in both the United States and Canada. Efforts were made to standardize and improve sampling and analytical techniques and provide for the mutual exchange of data.

The purpose of this report is to: (1) present the results of water quality sampling on the United States' portion of the Kootenai River during construction of Libby Dam, incorporating more recent data with that contained in previous reports (U.S. Army Corps of Engineers, 1969, 1970, 1971), (2) to delineate and analyze any physical, chemical, or biological changes occurring in the river during this period, and (3) to provide recommendations for maintaining and improving water quality conditions throughout the entire basin.

## 2.2 History of Study.

Libby Dam and Reservoir Project was authorized by the 81st Congress of the United States in 1950. Preliminary planning began in 1952. As the project involved both upstream storage and downstream effects, not only in the United States but in Canada; the project was built under an international treaty relating to the cooperative water resource development of the Columbia River Basin. This treaty, which sanctioned construction of Libby and three Canadian dams, was ratified by the U.S. Congress in 1961 and by the Canadian Parliament in 1964. Construction work on the Libby Dam project began in 1966.

The Corps of Engineers, with the cooperation of the Federal Water Pollution Control Administration (FWPCA) (now under the Environmental Protection Agency), began preliminary planning for a water quality study in 1966. Final details of the study, through coordination with the U.S. Geological Survey, Montana Department of Health, and Montana Department of Fish and Game, were completed at a joint meeting in the spring of 1967. As a result of this meeting the Corps of Engineers agreed to a study plan in which the Corps would maintain sampling stations in the area from below the dam site upstream to the International Boundary, while the Environmental Protection Agency (EPA) would maintain those from Libby downstream to the International Boundary. Sampling began at Corps of Engineers stations in October 1967 and at EPA stations in March 1968. Contracts for the analysis of bottom fauna samples and the study of fish population were made with the University of Montana and the Montana Department of Fish and Game by the Corps of Engineers.

The Water Resources Service of the Province of British Columbia and the Corps of Engineers were the agencies designated by the Columbia

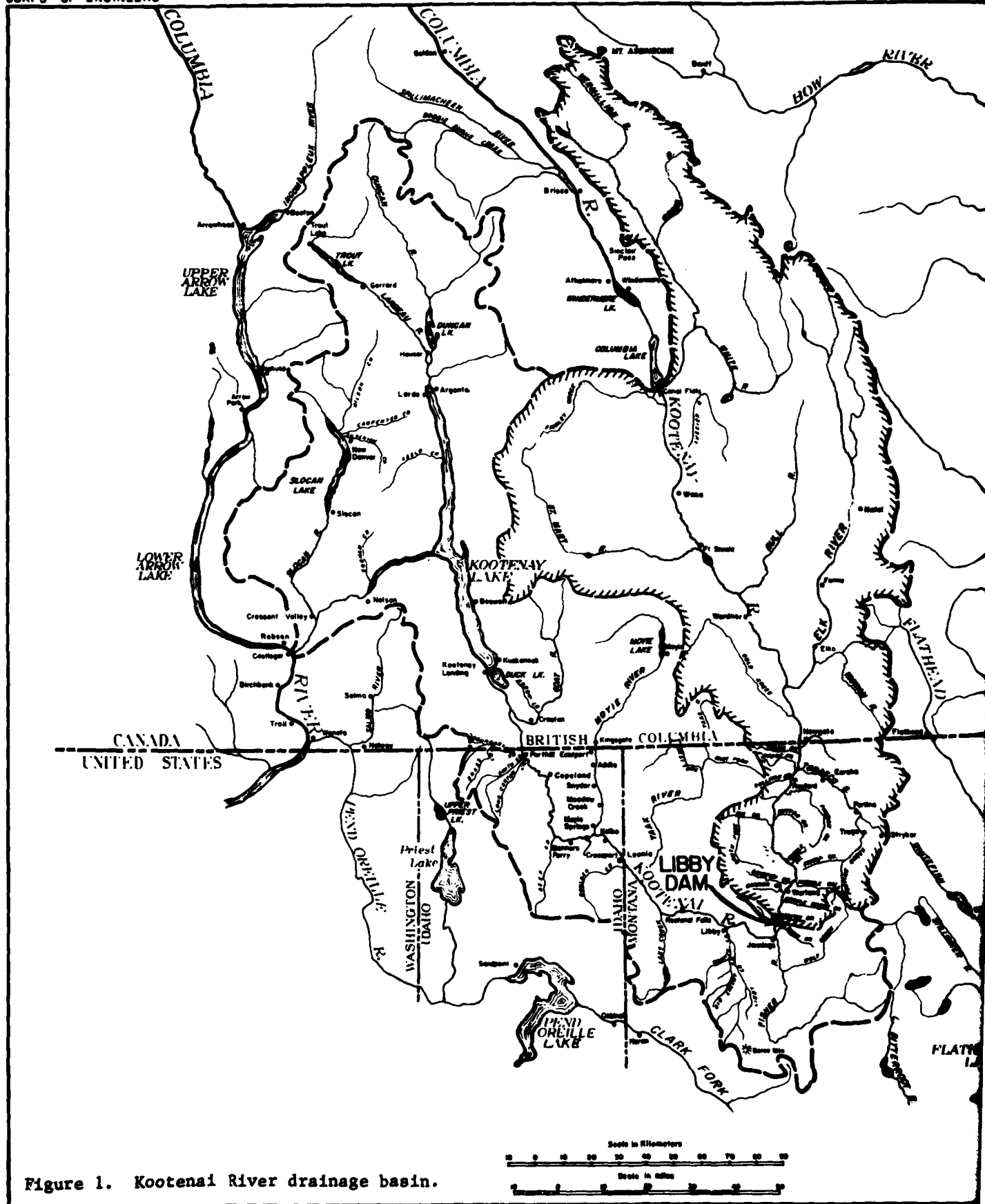
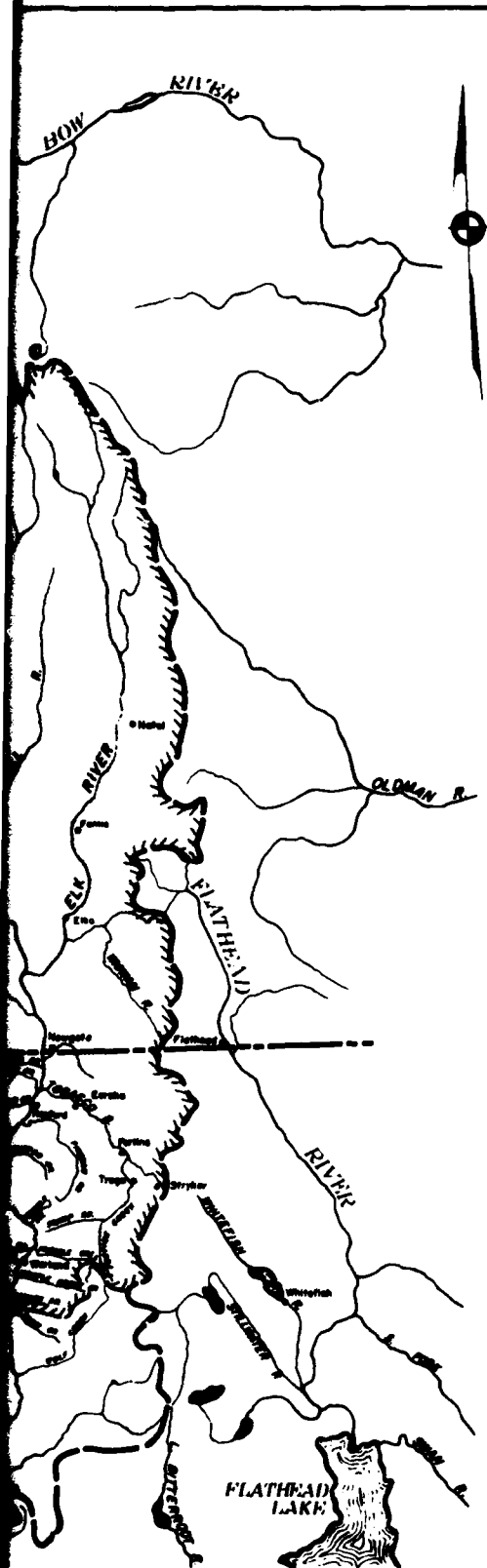


Figure 1. Kootenai River drainage basin.



#### LEGEND

-  Basin boundary
-  Drainage area of reservoir

River Treaty to represent Canada and the United States in activities related to the construction of Libby Dam. A task force consisting of the British Columbia Pollution Control Branch, the Corps of Engineers, and other United States' agencies was established in October 1969.

### 2.3 Watershed Characteristics.

#### 2.3.1 Description of the Basin.

The Kootenai River Basin is located between 48° and 51° North latitude and 115° and 118° West longitude and includes within its boundaries parts of southeastern British Columbia, northern Idaho, and northwestern Montana. A map of the Kootenai River drainage basin is presented in figure 1.

The basin measures 383 km (238 miles) long by 246 km (153 miles) wide and has an area of 49,987 sq km (19,300 sq miles). About one-quarter of the area, or about 12,432 sq km (4,800 sq miles), lies in the United States. An Earth Resources Technology Satellite (ERTS) mosaic taken from an altitude of 917 km (570 miles) and covering all but the most western part of the basin is shown in figure 2.

The basin ranges in elevation from about 418 m (1,370 ft) above mean sea level, where the Kootenai enters the Columbia River near Castlegar, B.C., to the 3,618 m (11,870 ft) peak of Mt. Assiniboine on the Continental Divide in the northeastern part of the basin. The section of the river lying in the United States ranges from an elevation of about 704 m (2,310 ft) as it enters the country to 533 m (1,750 ft) above mean sea level as it leaves the country.

#### 2.3.2 Geology.

The Kootenai River Basin lies in the Northern Rocky Mountain Physiographic Province. This province is characterized by successive mountain ranges trending north to northwest separated by long straight valleys lying parallel to the ranges. Major land features include the McDonald, Whitefish, and Salish Mountains on the east, the Purcell Mountains in the center, and the Cabinet and Selkirk Mountains on the south and west. Separating these ranges is the Rocky Mountain Trench on the east and the Purcell Trench on the west. Except for the relatively broad, flat valleys in these trenches where the terrain is moderate, the area is typified by narrow valleys and rugged steep slopes with frequent rock outcroppings.

The mountain ranges are composed of folded and faulted crustal blocks of metamorphosed, sedimentary rock materials of the Precambrian Belt Series. This series consists of durable siliceous argillites, quartzites, and impure limestones created during an earlier era from various mixtures of clay, silt, sand, and carbonates which were subjected to low-grade metamorphism. Minor basaltic flows are also present.

#### 2.3.3 Hydrogeology.

The occurrence and distribution of ground water in the drainage is closely related to the geology. Rock outcrops of the Belt series are

## Kootenai River Basin, Montana

This positive print photomosaic was prepared from three ERTS MSS Band 7 images by the Earth Sciences Branch, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire.



Figure 2. ERTS photomosaic of the Kootenai River drainage basin; images acquired on 7 and 8 Feb 73; approximate location of the United States-Canada border, Libby Dam (1), Lake Koocanusa (2), Kootenai River (3), and Kootenay Lake (4).

tightly compacted with little or no porosity or permeability and in these areas ground-water production is small. Glacial deposits consisting of a well-compacted, poorly sorted mixture of clay, silt, sand, and gravels interbedded with glacial lake sediments of finely laminated silty-clay created by periodic damming of the Kootenai River are characteristic of the valleys. In certain of these areas, wells produce an abundance of water. The complex heterogenous nature of these deposits makes their water-bearing characteristics highly variable and ground-water supplies range from virtually nil to excellent.

Numerous springs and seeps occur throughout the basin. Ground water provides much of the base flow of the river and its tributaries during a large part of the year. Characteristically, this water is of excellent quality but more mineralized than water derived from surface supplies.

#### 2.3.4 Climate.

The Kootenai River Basin at its nearest extension lies only 523 km (325 miles) from the Pacific coast and its climate is affected by both modified maritime and continental influences. Maritime influences are generally dominant in the winter and result in rain or snow when warm Pacific air masses are cooled on passing through the mountain ranges. Continental influences are generally dominant in the summer when northward extensions of low pressure areas from the hot southerly interior cause heavy convective-type showers with occasional cloud bursts. Winters are neither as wet nor as warm as the Pacific coastal areas, but are generally less severe than areas to the east of the Continental Divide. The coastal tendency for dry summers persists, but the dominant maritime influence gives way to continental influences as one moves eastward through the basin. Characteristic of most mountainous areas, weather patterns within the basin are complex, with local variations stemming from differences in elevation and specific location in relation to the various mountain ranges.

#### Temperature

A mean annual temperature of about 5.0°C (41°F) seems to be most representative of the basin as a whole with a fairly wide range between reporting stations. July is the warmest month with mean temperatures ranging from 19.4°C (67°F) at Libby to 13.9°C (57°F) at Sinclair Pass. The extreme maximum temperatures of record at the same stations are 42.8°C (109°F) and 36.1°C (97°F). January is the coldest month of the year with mean recorded temperatures ranging from -5.6°C (22°F) at Libby to -11.1°C (12°F) at Sinclair Pass. The extreme low temperatures at the same stations are -43.3°C (-46°F) and -42.2°C (-44°F) respectively. Extremely low temperatures are not common, however, and at Libby temperatures of -18°C (0°F) are reached on only 12 days in an average year. Oppressive heat and humidity combinations are also rare and the effects of hot summer days are moderated by strong nighttime cooling.

### Growing Season

The large difference between daily high and low temperatures is most pronounced in its effect in reducing the length of the growing season. The average frost-free period at Libby, Montana, is 79 days, Newgate, B.C., 93 days, and Cranbrook, B.C., 77 days. The shortness of the growing season limits agriculture and native vegetation to only the more hardy species.

### Precipitation

The mean annual precipitation for the basin is only 76 cm (30 in) with a variation within the basin of from about 36 cm (14 in) to an estimated 305 cm (120 in) at highest elevations. Approximately 70 percent of the total precipitation falls as snow. The annual snowfall varies from about 102 cm (40 in) at the lower elevations to 762 cm (300 in) in some parts of the mountain areas. Most of the snow falls during the November - March period, although heavy snowstorms can occur as early as mid-September or as late as 1 May.

### Cloud Cover

Winters are characteristically cloudy with overcast conditions prevailing as much as 75 percent of the time. Throughout the balance of the year, partly cloudy or clear weather prevails. During the summer months more than 50 percent of the days are clear.

### Winds

Being sheltered by the mountains, destructive winds are rare at lower elevations in the basin. The average wind speed at Cranbrook, B.C., is about 9.7 km/hr (6 mph).

#### 2.3.5 Vegetation.

The dominant vegetal type within the basin is coniferous forest with dense stands of trees covering perhaps as much as 90 percent of the basin area. Only a small amount of the area can be classified as agricultural and this is used largely for pasture or hay production. The amount of land devoted to cultivated crops is small.

#### 2.3.6 Cultural Development.

The portion of the Kootenai River Basin lying within the United States is sparsely inhabited. Cultural development has been restricted to the river valleys by the relatively steep mountainous terrain. Human habitation, and the few communities and industries that exist, are found along the Kootenai River and its major tributaries in Boundary County, Idaho, and Lincoln County, Montana. Population figures for these two counties provide a fairly accurate estimate of the basin population in the United States.

| <u>County</u> | <u>Population</u> |               |
|---------------|-------------------|---------------|
|               | <u>1960</u>       | <u>1970</u>   |
| Lincoln       |                   |               |
| Urban         | 4,942             | 5,980         |
| Rural         | <u>7,595</u>      | <u>11,420</u> |
| Total         | 12,537            | 17,400        |
| Boundary      |                   |               |
| Urban         | --                | 2,797         |
| Rural         | <u>5,809</u>      | <u>3,574</u>  |
| Total         | 5,809             | 6,371         |
| Total Both    | 18,346            | 23,771        |

The basin population has grown by 30 percent in the 10-year period, 1960 to 1970. Most of this increase has occurred in Lincoln County due in large part to the influx of construction personnel working on Libby Dam which, according to Mueller and Wirth (1970), has increased the county population by between 2,500 and 3,000 persons. While the basin population can be described as semi-rural with most people living in unincorporated communities of 2,500 people or less, the rural population is predominantly nonfarm.

The basic industries in the study area are the harvest and manufacture of timber products, mining, agriculture, and tourism. The construction industry has experienced considerable growth with the construction of Libby Dam, but this is believed to be a short-term gain which will decline following the completion of the dam. The quantity, availability, and the type of natural resources in the area would tend to indicate the economy of the area. While agriculture is not a major industry, with arable lands occupying only about 2 percent of the basin area (White, 1960), it does provide a degree of diversity to the economy. Tourism is an industry that has experienced considerable growth in this area in recent years and it is expected that its potential will be enhanced by the completion of the Libby Dam project.

## 2.4 Stream Characteristics.

### 2.4.1 Description of the River.

The Kootenai River has a length of approximately 780 km (485 miles) of which 266 km (165 miles), or about one-third of its length, is in the United States. The source of the Kootenai is located in Kootenay National Park, British Columbia, adjacent to the Continental Divide and about 48 km (30 miles) west of Banff, Alberta.

From its source it flows about 161 km (100 miles) south entering Rocky Mountain Trench near Canal Flats, only 2.4 km (1.5 miles) from Columbia Lake, the headwaters of the Columbia River. From this point the river continues southward another 161 km (100 miles) entering the United States in the vicinity of Rexford, Montana, where it leaves the Rocky Mountain Trench and continues, passing southward through the

mountains of the Purcell Range for about 80 km (50 miles) to the confluence of the Fisher River. Here the river turns abruptly west, passing over Kootenai Falls in a gap between the Cabinet and Purcell Mountains. Near Troy, the river trends northwestward to Bonners Ferry where it enters the Purcell Trench. At Bonners Ferry the valley widens and the river meanders northward some 76 km (47 miles), where it reenters Canada. Shortly after crossing the border, the river flows into Kootenay Lake. From the west arm of Kootenay Lake, the river flows 37 km (23 miles) west to its junction with the Columbia River.

#### 2.4.2 Discharge.

The mean annual discharge of the river at its mouth is 796 cu m/sec (28,100 c.f.s.) making the Kootenay the second largest tributary of the Columbia River System, exceeded in volume only by the Snake River. Tributary streams of various sizes are numerous and continuously add to the river's size throughout its length. The significance of the major tributaries in relation to the size of the river is shown in figure 3. Runoff contributed from drainages lying largely within the United States represents an average annual volume of over  $5 \times 10^9$  cu m (4,058,000 acre-feet), or about 20 percent of the average annual runoff of the river as it joins the Columbia River. A summary of the discharge of the river and its major tributaries at selected gaging stations in the United States can be found in the appendix, table 1.

The longest historical record for the Kootenai River is from the gaging station at Libby, Montana, with records extending back to 1910. A summary hydrograph showing daily means and extremes is shown in figure 4. Daily, monthly, and annual duration curves for the Kootenai River at Libby can be found in the appendix, figure 1.

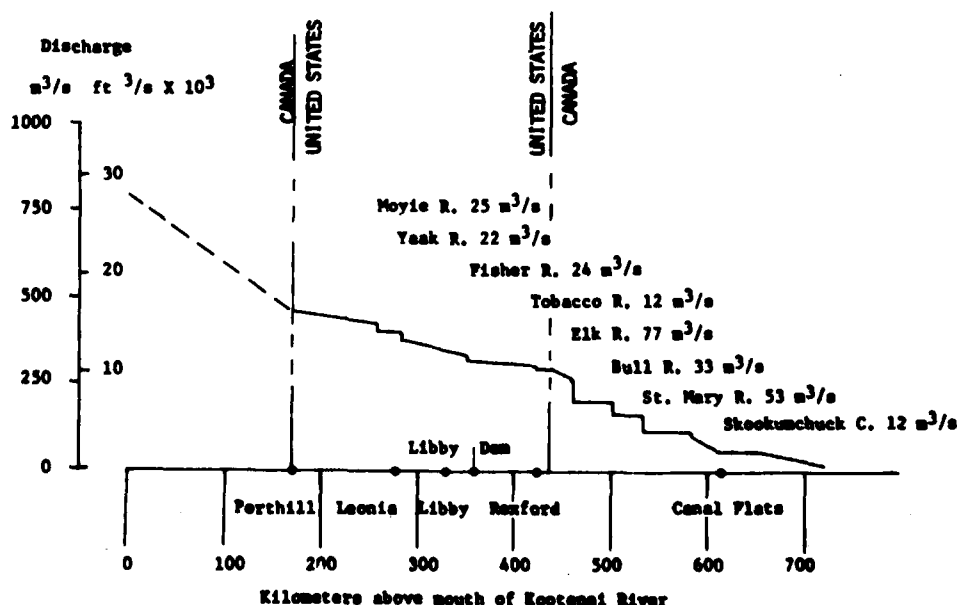


Figure 3. Mean discharge of the Kootenai River and its major tributaries.

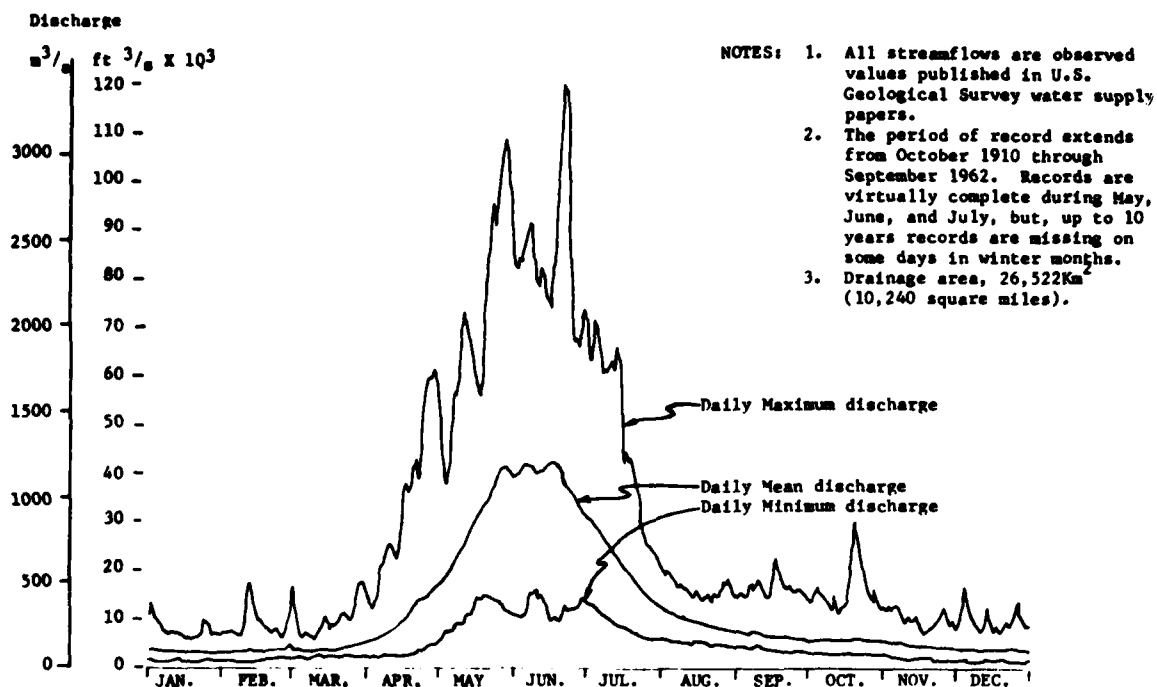


Figure 4. Summary hydrograph for the Kootenai River at Libby, Montana.

#### 2.4.3 Gradient.

A profile of the Kootenai River is shown in figure 5. The total fall from the mouth of the Vermillion River near its source downstream to the Columbia River is 732 m (2,400 ft), which in a distance of 727 km (451 miles) averages 1 m/km (5.3 ft/mile). The steepest parts of the river are between the mouth of the river and Kootenay Lake, where the river drops 105 m (345 ft) in a distance of 26 km (16 miles), and at Kootenai Falls, where the river drops 18 m (60 ft) in 3.2 km (2 miles). A large section of the river extending from Cora Linn Dam, which impounds Kootenay Lake, upstream to Bonners Ferry is virtually flat with the river level at Bonners Ferry being affected by the elevation of Kootenay Lake.

The portion of the river lying in the United States, a distance of 266 km (165 miles), has a fall of 169 m (555 ft) or about 0.6 m/km (3.4 ft/mile). The gradient from Kootenai Falls upstream to the International Boundary is about 0.9 m/km (4.5 ft/mile).

#### 2.4.4 River Bottom and Bank Characteristics.

In general, the river channel up to the high-water mark consists of bottom materials ranging in size from gravel to boulder. The smaller of these materials, due to their instability in periods of high-water velocities, are continually being modified, forming gravel bars and braided channels with alternating pools and riffles. In contrast to upper Kootenai, the lower portion of the river from Bonners Ferry to Kootenai Lake is flat. The river slows and drops its sediment load

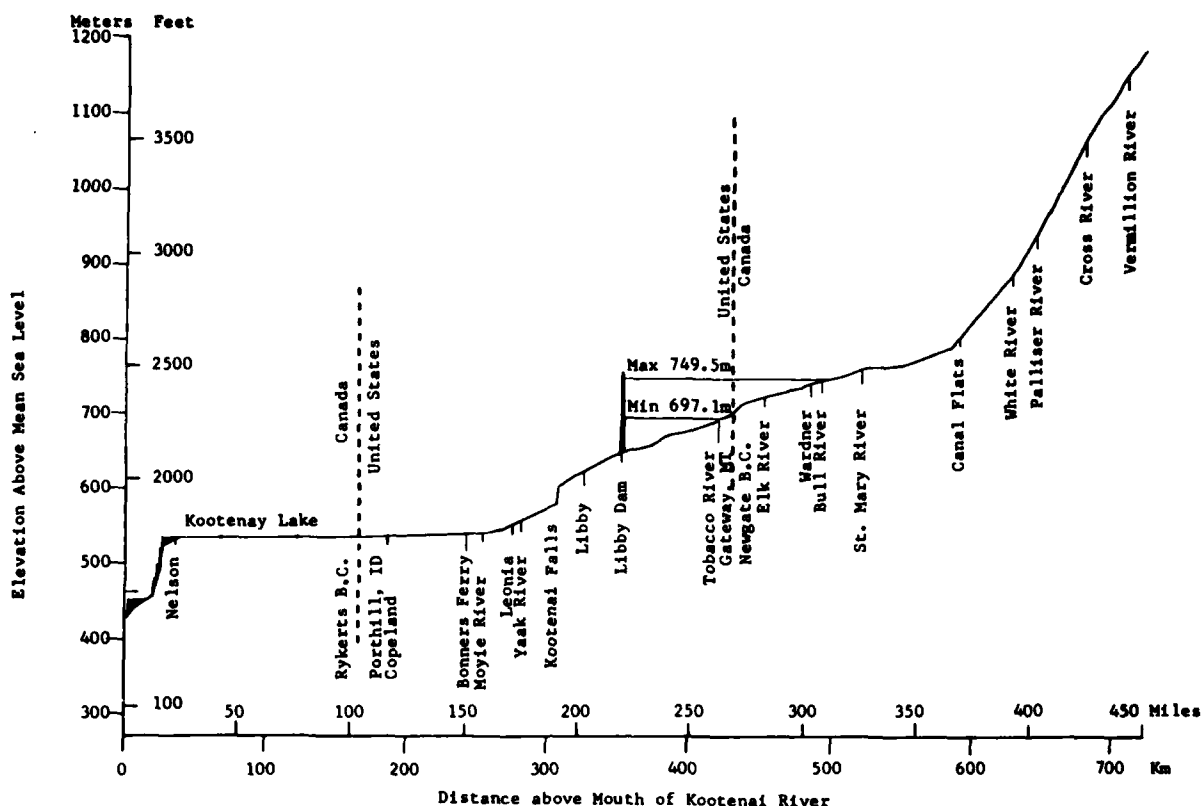


Figure 5. Profile of the Kootenai River.

in this area and, in times of high water, overtops its banks. The dominant bottom type in this area is silt.

#### 2.4.5 Water Use.

Water is one of the most abundant resources in the Kootenai River Basin and is used for a number of purposes, including domestic and industrial supply, waste disposal, power production, irrigation, and recreation.

Water for domestic and industrial purposes in the basin is obtained from both ground water and surface water sources. Some communities such as Eureka and Troy have municipal wells to supplement their surface supplies. Bonners Ferry has solved a problem of insufficient flow in their tributary source by pumping directly from the Kootenai River. The rural population depends almost entirely upon ground water from wells and springs for domestic purposes.

Irrigation represents the major consumptive use in the basin. A report by the Bureau of Reclamation (White, 1960) indicated that only about 2,873 ha (7,100 acres) within the basin boundaries in Idaho and Montana were under irrigation. The depletion was estimated to be about  $11.1 \times 10^6$  cu m (9,000 acre-ft) of water annually.

Hydroelectric developments existing prior to the construction of Libby Dam consisted of only two small installations which made it necessary for this portion of the basin to import electrical energy. Montana Light and Power, owned by the St. Regis Company, operates a plant on Lake Creek near Troy with a total installed capacity of 4,500 kW and a peaking capacity of 5,350 kW. The community of Bonners Ferry operates a hydro plant on the Moyie River near Moyie Springs with a rated capacity of 2,650 kW and a peaking capacity of 2,850 kW. Both plants are operated as run-of-the-river plants with little or no storage capacity and therefore have little effect upon normal discharge routings in the basin.

Fishing is the most popular recreational use of water in the river and its tributaries. From all indications, fishing pressure is increasing throughout the basin. Fishing through the ice for trout and whitefish is a popular winter sport on the Kootenai River. Bait or fly fishing, either from shore or by boat, occurs the remainder of the year, making fishing a year-round form of recreation on the Kootenai River. Float trips appeal to a small segment of the population and raft trips are a part of Libby's annual "Logger Days." Swimming is done on some of the tributary streams. Furbearers and waterfowl utilize both the mainstem Kootenai and tributaries as well as the lakes of the basin, although trapping of furbearers and waterfowl hunting would be considered a minor use compared to fishing.

#### Waste Water Sources.

The location and character of point waste discharges within the United States' portion of the basin are indicated in the appendix, table 2. The more significant of these discharges are discussed below.

#### Municipal Discharges.

Libby, Montana. The treatment plant for Libby serves approximately 3,000 people and consists of a clarifier, heated digester, and chlorine contact tank. Dry weather discharges of 1892.5 cu m/day (0.5 mgd) increase to more than 5677.5 cu m/day (1.5 mgd) during spring runoff. The plant serves only a fraction of the people living within the metropolitan area.

Eureka, Montana. The treatment plant for Eureka serves about 1,100 people and consists of a bar screen, grit chamber, Spiragester (combination clarifier and cold digester), chlorinator and chlorine contact tank. Chlorination is done during the months of June through October.

Bonners Ferry, Idaho. The treatment plant for Bonners Ferry serves about 2,000 people and consists of a series of aerated sewage lagoons with a retention time which averages 25 days. Discharge volume is about 757 cu m/day (0.2 mgd).

#### Industrial Discharges.

W. R. Grace Company. The W. R. Grace Company mines and processes vermiculite, a siliceous mineral widely used for insulation, from Vermiculite Mountain 11 km (6.8 miles) east-northeast of Libby. Turbid

waters resulting from thickening and concentration of the vermiculite and drainage from the tailings formerly caused water quality problems in Rainy Creek and the Kootenai River. In 1971, the mine facilities were expanded and the company constructed a closed-circuit recirculation system. Since that time there has been no discharge from their processing facility although some leaching from the tailings still occurs in the spring of the year.

St. Regis Company. The St. Regis Company operates a lumber and plywood mill in Libby. Sewage wastes are processed by a trickling-filter type plant consisting of a bar screen, primary-secondary clarifier, trickling filter, digester, chlorinator, and chlorine contact tank. Disinfection is done June through October.

While the plant has a capacity of 379 cu m/day (0.1 mgd), the discharge is normally around 227 to 284 cu m/day (0.05 - 0.08 mgd). A large volume of waste water resulting from operation of the log ponds, cooling, and wet stack scrubbers is continually flushed into a large settling pond which merges with the treated sanitary wastes prior to discharge into the Kootenai River. Discharge in 1972 generally ranged from 0.2 to 0.57 cu m/sec (7 to 20 c.f.s.). The company obtains an annual variance to discharge their wastes directly into Libby Creek during cleaning of the settling pond. Included among the characteristics of the log pond wastes is the problem of organic color.

Nonpoint Discharges. Agricultural land occupies only a small fraction of the total land area in the basin and agriculture therefore is believed to be a rather minor pollution source, although it may be significant on certain of the smaller drainages.

Septic systems are widely used throughout the basin and have caused water supply problems in the more populated areas, such as South Libby. The significance of septic systems in relation to groundwater quality and the quality of surface waters in the basin is unknown.

About 90 percent of basin area is classified as forest land and over two-thirds of the basin is classified as commercial forest land or land that is capable of growing an economically harvestable forest crop. No studies concerning the effect of forest practices upon the aquatic environment have been done in this area.

#### 2.4.6 Fishery Resources.

The Kootenai River system, which later was incorporated into Lake Koocanusa, supported a fish population consisting of mountain whitefish, cutthroat trout, rainbow trout, Dolly Varden trout, brook trout, burbot, white sturgeon, kokanee, and a number of associated species. A listing of the species known to occur in the Kootenai River proper is presented in the appendix, table 3. The rainbow, white sturgeon, and kokanee were indigenous to Kootenay Lake and Kootenai River upstream to Kootenai Falls. Brook trout and, likely, the rainbow have been introduced.

Information concerning the status of the fishery prior to 1967 is scarce. Personnel of the Montana Department of Fish and Game have

attempted to obtain historic information by contacting "old timers" in the Libby, Rexford, and Eureka areas. They found that these people told essentially the same story - that of a river with a changing fish population.

A number of persons indicated that prior to the late 1940's cut-throat and burbot were the most abundant fish caught, while rainbow were rare and whitefish were seldom caught. Beginning in the early 1950's a major shift in the population occurred. Burbot and cutthroat declined while whitefish and rainbow increased. Some people remarked that distinct changes in water quality accompanied this population shift. Whereas the river substrate had previously been clean and free of attached algae and silt, problems with attached algae (described as moss), silt, and sediment became more noticeable. Sediment loads during the spring appeared larger and more persistent and on occasion the river seemed to develop an odd color.

Creel census data collected by the Montana Department of Fish and Game for the 1949-64 period show relatively good fishing with an overall success rate of from 1.0 to 1.5 fish per man-hour. While the available evidence is scant, and there are differences of opinion as to the quality of fishing that existed prior to construction of Libby Dam, it seems to be a fair appraisal to say that the river and its tributaries provided good fishing in aesthetically pleasing surroundings. The prevailing opinion of the state from the standpoint of fish management during the preconstruction period was that the river and the associated fishery could be left to manage itself with little more than fishing regulations and occasional stocking. Stocking, for the most part, was confined to the tributaries and involved rainbow trout. Fishing pressure was considered to be relatively light.

### 3.0 WATER QUALITY PROGRAM

The monitoring program agreed upon in 1967 established that the Corps of Engineers would assume responsibilities for water quality monitoring and studies on the Kootenai River above the city of Libby, while the FWPCA would assume monitoring responsibilities for the area from Libby downstream to the International Border.

#### 3.1 Sampling Locations.

The locations of sampling stations on the United States' portion of the Kootenai River and its tributaries are presented below and shown in figure 6.

##### Stations in the United States:

Station 1: Kootenai River near Rexford, Montana, located 62 km (38.5 miles) upstream of Libby Dam site and 16.9 km (10.5 miles) downstream of the International Border.

Station 2: Kootenai River at Warland, Montana, located 10.7 km (6.6 miles) upstream of Libby Dam site.

Station 3: Kootenai River below Libby Dam, located 6 km (3.7 miles) downstream of Libby Dam site.

Station 4: Kootenai River at Lowry Gulch, located 14.5 km (9 miles) downstream of Libby Dam site.

Station 5: Fisher River.

Station 6: Tobacco River

Station 7: Kootenai River at Libby, Montana, located 28 km (17.4 miles) downstream of Libby Dam site (FWPCA monitoring station).

Station 8: Kootenai River near Leonia, Idaho, located 81 km (50.3 miles) downstream of Libby Dam site (FWPCA monitoring station).

Station 9: Kootenai River near Copeland, Idaho, located 157 km (97.7 miles) downstream of Libby Dam site (FWPCA monitoring station).

Station 10: Kootenai River at Porthill, Idaho, located 187 km (116.3 miles) downstream of Libby Dam site (FWPCA monitoring station).

Station 11: Yaak River.

Station 7 at Libby, Station 8 at Leonia, and Station 10 at Porthill were FWPCA monitoring stations. Chemical sampling was moved from Station 10 at Porthill to Station 9 at Copeland in 1969. The data from these two stations have been combined and are referenced to this report as results of Station 9-10.

The Canadian-U.S.A. Water Quality Task force recommended the following stations receive primary consideration in the development of the joint water quality program:

In the U.S.A.:

Kootenai River near Rexford - (Station 1)  
Kootenai River below Libby Dam - (Station 3)  
Tobacco River - (Station 6)  
Kootenai River near Porthill - (Station 9-10)

In British Columbia:

Kootenay River near Wardner - (Station 17 and 38); Station 17, monitored prior to May 1971 and Station 38 thereafter, located 158.2 km (98.3 miles) upstream of the Libby Dam site.  
Bull River - (Station 30)  
Elk River - (Station 16)  
Kootenay River at Canal Flats - (Station 20); located 257.7 km (160.1 miles) upstream of the Libby Dam site.

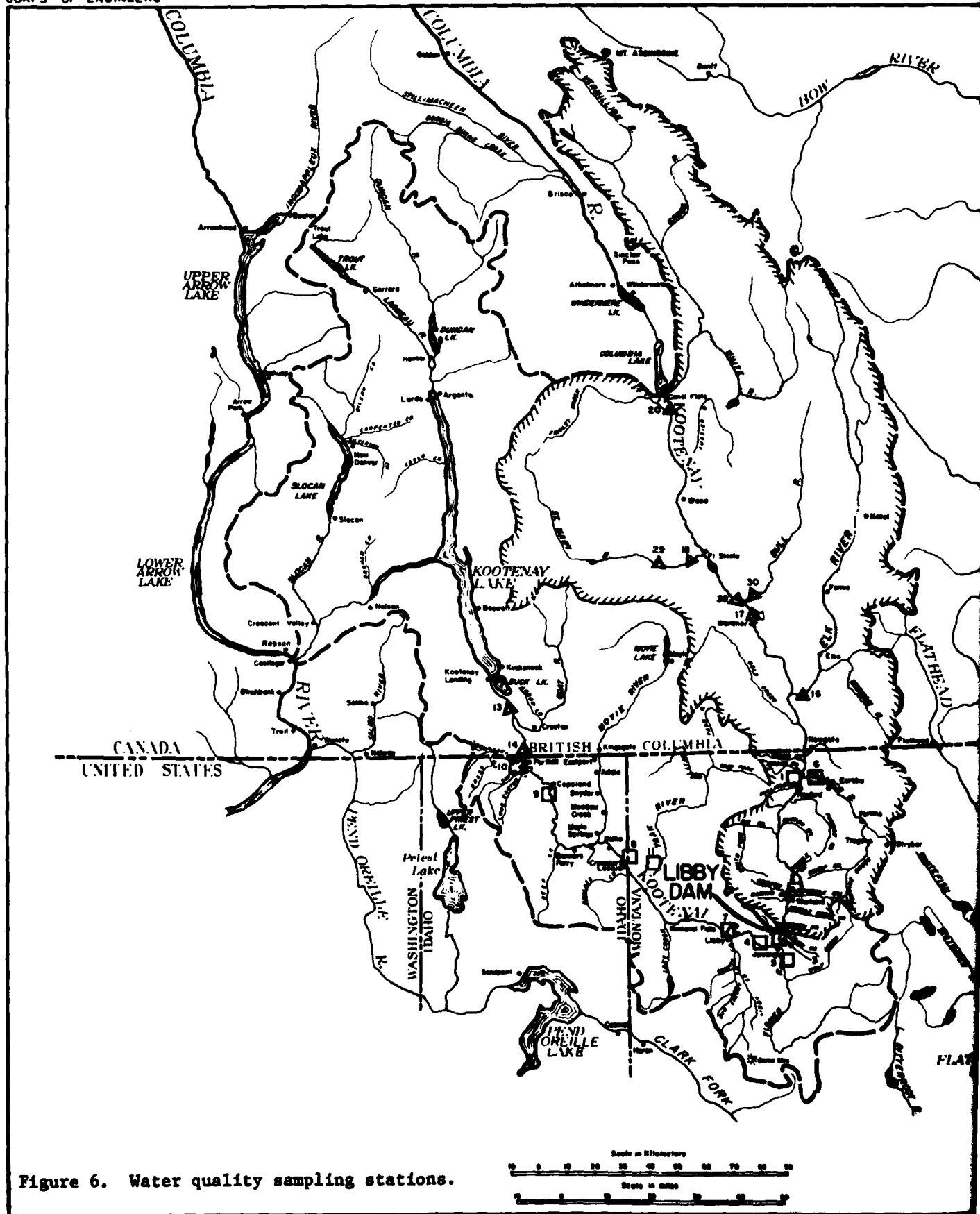
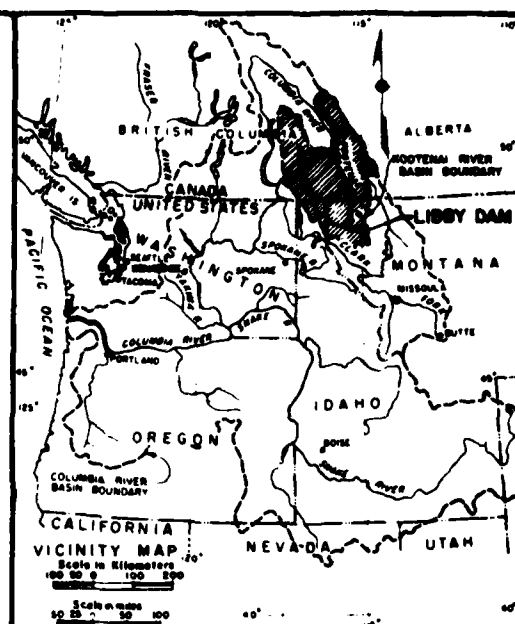
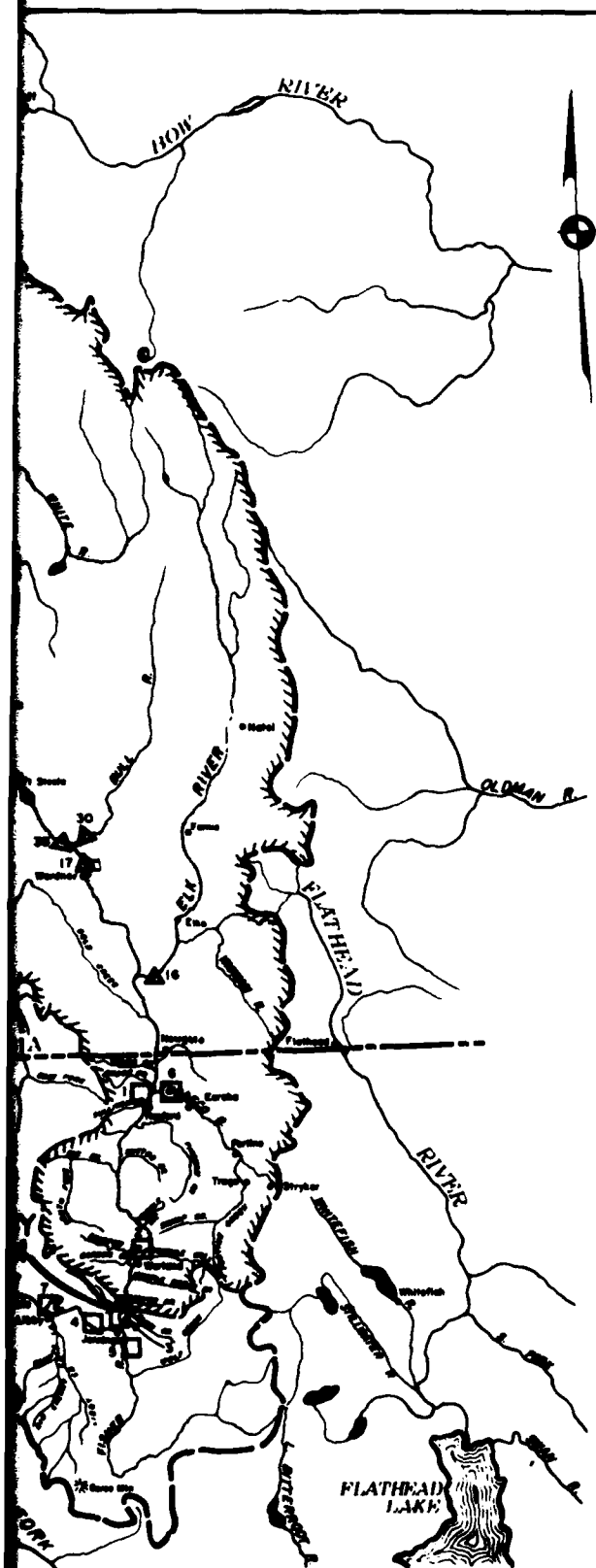


Figure 6. Water quality sampling stations.



#### LEGEND

-  Basin boundary
-  Drainage area of reservoir
-  United States Water Quality Station
-  Canadian Water Quality Station

### Additional Stations Monitored in British Columbia:

Station 29: Upper St. Mary River.

Station 18: Lower St. Mary River.

Station 14: Kootenai River near Porthill, Idaho, located 187 km (116.3 miles) downstream of the Libby Dam site.

Station 13: Kootenai River at Creston Flats, B.C., located 210.2 km (130.6 miles) downstream of the Libby Dam site.

### 3.2 Methods employed by United States agencies are indicated below.

#### 3.2.1 Discharge.

Stage records were obtained from Stevens A-35 or digital water stage recorders, supplemented by readings from wire-weight gages installed and maintained by the U.S. Geological Survey. Long-term records were available from most stations. The discharge at station 2 was used for station 3 until September 1971. Daily readings from a wire-weight gage installed immediately below the dam plus data from downstream records were used in calculating the discharge for the remainder of the study period.

#### 3.2.2 Water Temperature.

In 1962 the U.S. Geological Survey, under contract with the Corps of Engineers, installed Ryan Thermographs in the Kootenai River at station 2 and station 8. Similar installations were made in the Kootenai River at Waldo, B.C., in the Elk River (station 16), in the Fisher River (station 5) and Yaak River (station 11) in 1963, and below Libby Dam (station 3) in 1968. These data were supplemented by information from a Stevens A-35T Recorder at Porthill (station 10). Problems with freezing prevented year-round use of the Ryan Thermographs and records for complete months extend only from April or May through October or November, missing the colder months of the year.

Thermograph records were supplemented by once-daily or monthly spot observations taken in connection with sediment or chemical samples. Field personnel used calibrated mercury thermometers or a Model FT-3 Marine Hydrographic Thermometer (Applied Research Austin, Inc.).

#### 3.2.3 Suspended Sediment.

Suspended sediment concentrations, expressed as milligrams of dry sediment per liter of the water-sediment mixture, were determined by the U.S. Geological Survey using methodology of Guy and Norman (1970).

#### 3.2.4 Turbidity.

Turbidity was determined from daily suspended sediment samples. Turbidity concentrations were measured with a Hach 2100 Laboratory Turbidimeter. The turbidity of these samples, some of which had been stored up to 30 days or more, was read after 10 seconds agitation.

These data were supplemented by "grab" samples collected during the monthly chemical sampling, or more frequently as necessary, to define specific turbidity problems. A candle turbidimeter used early in the study for field determination by the U.S. Geological Survey was later replaced with a Hach 2100.

### 3.2.5 Chemical.

Most of the field and laboratory chemical analyses were accomplished by the U.S. Geological Survey under contract with either the Corps of Engineers or FWPCA. Samples collected prior to July 1969 at stations 7 through 10 were analyzed by FWPCA in their Corvallis Laboratory, Corvallis, Oregon. A number of field determinations were made by Corps of Engineers project personnel.

Recognized procedures of sampling and analysis were followed. The U.S. Geological Survey used the methods of Rainwater and Thatcher (1960) until 1969 and Brown, Skougstad and Fishman (1970) throughout the remainder of the study. The FWPCA used methods reported in Analytical Techniques (FWPCA, 1969a) and FWPCA Methods for Chemical Analysis of Water and Wastes (FWPCA, 1969b) with Standard Methods for the Examination of Water and Wastewater, (APHA, 1973) and ASTM Standards, Part 23, Water; Atmospheric Analysis (ASTM, 1966) as basic references. A listing of the methodology employed by the U.S. Geological Survey is included in the appendix, table 4.

A monthly sampling frequency was maintained at all stations except stations 2 and 4, which were primarily aquatic insect sampling stations. Stations 3 and 5 were sampled on a daily schedule from October 1967 through September 1969. <sup>1/</sup> These daily samples were composited on the basis of specific conductance using a discharge - weighted method. Composited periods ranged from 10 to 30 days, necessitating a delay of at least 30 days between sampling and analysis.

All phosphorus and nitrogen determinations have been expressed as P and N, respectively.

Daily loadings were calculated using the formula:  
 $\text{Concentration (mg/l)} \times \text{mean daily flow (c.f.s.)} \times 2.447 = \text{Loading (kg/day)}$

The validity of completed analyses was checked by balancing the chemical equivalents of the major ions. Where the sum of the cations was not within reasonable proximity to the sum of the anions, the determination was rerun. Additional checks were made, wherever possible, by comparing values for dissolved solids with corresponding specific conductance values. The relationship--specific conductance ( $\mu\text{mhos}$ )  $\times 0.65 \pm 0.1 =$  dissolved solids--reported by Rainwater and Thatcher (1960) as being applicable to most waters was used to check the data. Determinations falling outside the above range were rejected.

<sup>1/</sup> Water quality characteristics of tributary streams (stations 5, 6, and 11) will be contained in a future report.

Some of the early pH determinations at stations 1 and 3 were done in the laboratory rather than in the field. Although the laboratory data have been included with the analytical field data in the appendix, they were not used in the graphs or for calculation of  $\text{CO}_2$ . Likewise, total alkalinity as  $\text{CaCO}_3$ , which can be calculated from the laboratory bicarbonate data by multiplying  $\text{mg/l HCO}_3^-$  by 0.8202, was not reported as total alkalinity unless the determination was done in the field.

### 3.2.6 Bottom Fauna.

Bottom fauna sampling was undertaken to determine the existing status of the benthic invertebrate population and to measure any changes occurring during dam construction. Since previous aquatic insect data were not sufficiently definitive for purposes of comparison, and dam construction was already in progress, two control areas above Libby Dam were selected to be compared with two affected areas below the dam. The sites selected were the Kootenai River at Rexford (station 1), at Warland (station 2), below Libby Dam (station 3), and at Lowry Gulch (station 4). Detailed descriptions of each sampling station are contained in the appendix, table 5.

Two different types of samplers were used in the aquatic insect study. The first, used from 1968 through 1971, was a sampler similar to that developed by Waters and Knapp (1961). This sampler was constructed of steel rod with a 9 cm (3.5 in) cutting edge enclosing a sample area of 0.093 sq m (1 sq ft). The framework had a height of 0.52 m (1.7 ft) and was covered with Nitex<sup>1</sup> netting having a mesh size of 471 microns (38 apertures to the in). Sampling was therefore limited to shallow riffles having a depth less than 0.5 m (1.6 ft). Three samples were collected from each sampling site on each sampling date.

The second method, used only during 1968 and 1969, employed cylindrical substrate samplers as described by Anderson and Mason (1966). These samplers are cylindrical chromium-plated baskets 18 cm (7 in) in diameter and 28 cm (11 in) long filled with coarse native gravels 1.9 to 5.1 cm (0.7 - 2 in) in size. The samples were suspended 1 m (3.3 ft) below the water surface at quarter-points in the river by means of buoys for a period of about 6 weeks as suggested by Mason, Anderson and Morrison (1967). The samples were then lifted, placed in plastic bags and transported to the laboratory where they were washed through a 0.59 mm sieve (U.S. Sieve series 30).

All sorting was accomplished in the laboratory, occasionally using rose bengal as a staining agent to facilitate sorting. Samples were preserved in either 10 percent formalin or 75 percent ethanol. The specimens were identified, to genus if possible, enumerated and the various orders weighed by volumetric displacement.

Fluctuating river levels in spring and early summer and anchor ice in winter occasionally restricted sampling.

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<sup>1</sup>/Trademark of Tobler, Ernst and Traber, Inc.

## 4.0 RESULTS

Results obtained during the course of the study are summarized below. Detailed data for each parameter and each of the sampling locations can be found in the appendix. Published concurrent with this report is a report by the British Columbia Pollution Control Branch to document the quality of the Kootenai River within Canada prior to river impoundment (Crozier and Leinweber, 1975). The results presented by Crozier and Leinweber are for the period October 1969 through March 1972. To facilitate data comparison, much of the water quality data presented in this report are summarized for two periods of time: before October 1969 and October 1969 through March 1972.

### 4.1 Physico-Chemical Data.

#### 4.1.1 Discharge.

Comparison of the mean discharge at the Libby gaging station (station 7) for the period 1910-72 with calendar years 1967 through 1971 (table 1) shows that flows 118 to 120 percent of normal characterized the years 1967, 1969, and 1971. The year 1968, with 99 percent of normal, can be considered a normal year. Year 1970 is characterized as a low-water year, with streamflows of only 75 percent of normal. As a whole, flows during the study period appeared only slightly above average. The mean discharge for the study period appeared only slightly above average. The mean discharge for the study period was 366 cu m/sec. (12,922 c.f.s.) or 106 percent of the 345 cu. m/sec. (12,170 c.f.s.) recorded for the 62-year period of record. Annual summaries for other gaging stations, similar to that provided for the Libby gaging station, are presented in the appendix, table 6 through 10. Monthly mean discharges were computed from daily discharge data and are presented in figure 7. Shown in figure 7 is the downstream increase in discharge which occurs due to the influx of both tributaries and ground water, the magnitude of annual

Table 1. Discharge of the Kootenai River at Libby, Montana, 1967-1971.

| <u>Discharge</u>                                                                        | <u>Calendar Year</u> |             |             |             |             |                |
|-----------------------------------------------------------------------------------------|----------------------|-------------|-------------|-------------|-------------|----------------|
|                                                                                         | <u>1967</u>          | <u>1968</u> | <u>1969</u> | <u>1970</u> | <u>1971</u> | <u>1967-71</u> |
| Total m <sup>3</sup> /sec-day                                                           | 149076               | 124486      | 151484      | 93806       | 149304      |                |
| ft <sup>3</sup> /sec-day                                                                | 5264530              | 4396170     | 5349570     | 3312710     | 5272610     |                |
| Mean m <sup>3</sup> /sec                                                                | 408                  | 340         | 415         | 257         | 409         | 366            |
| ft <sup>3</sup> /sec                                                                    | 14420                | 12010       | 14650       | 9076        | 14450       | 12922          |
| Maximum m <sup>3</sup> /sec                                                             | 2172                 | 187         | 1968        | 1591        | 1945        |                |
| ft <sup>3</sup> /sec                                                                    | 76700                | 66200       | 69500       | 56200       | 68700       |                |
| Minimum m <sup>3</sup> /sec                                                             | 60                   | 57          | 57          | 47          | 48          |                |
| ft <sup>3</sup> /sec                                                                    | 2110                 | 2000        | 2000        | 1650        | 1700        |                |
| Percent 62-yr mean<br>(1910-72; 345 m <sup>3</sup> /sec,<br>12170 ft <sup>3</sup> /sec) | 118                  | 99          | 120         | 75          | 119         | 106            |

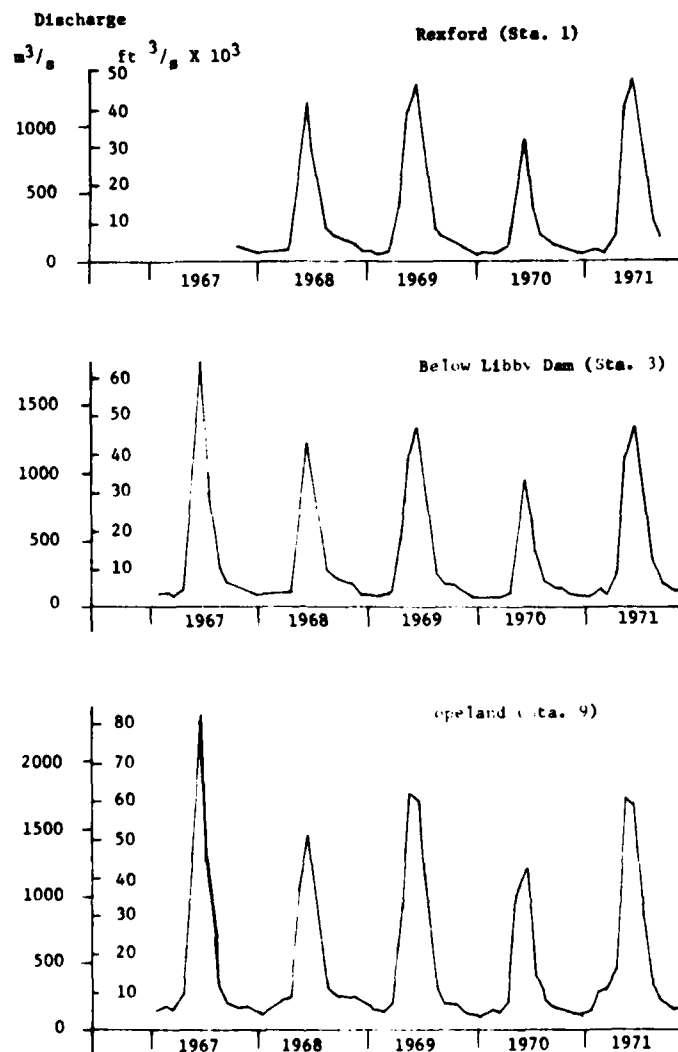


Figure 7. Mean monthly discharge at three stations on the Kootenai River, 1967-1971.

variation in discharge, and the fact that most of the discharge occurs during the months of April, May, and June.

For the years 1967 and 1971, the Kootenai River at Newgate, British Columbia, shortly before it enters the United States, had a mean discharge of 309 cu m/sec (10,906 c.f.s.). At Libby Dam site (station 3), the river had increased in volume to a mean of 341 cu m/sec (12,043 c.f.s.), an increase of 10 percent, indicating that about 90 percent of water passing Libby Dam site is contributed by sources outside of the United States. As the river leaves the United States at Porthill, Idaho (station 10), volume had increased to a mean of 489 cu m/sec (17,274 c.f.s.), or by 58 percent. About 63 percent of the discharge passing station 10 during the years 1967 through 1971 originated in Canada and 37 percent originated in the United States.

Of significance from the physico-chemical and biological standpoints are the large seasonal variations in discharge. Maximum and minimum daily means 1967 through 1971 ranged from 1993 to 37 cu m/sec (70,400 to 1,290 cfs) at Newgate, B.C., and from 2,784 to 74 cu m/sec (98,300 to 2,620 cfs) at Porthill, Idaho. Extremes for the 62-year period of record at Libby range from 3,426 cu m/sec (121,000 c.f.s.) down to 25 cu m/sec (895 c.f.s.), a 135-fold increase between extremes. During the year of study a 40-fold difference between the extremes appeared typical of the upstream stations with a somewhat smaller range at stations further downstream.

#### 4.1.2 Water Temperatures.

Water temperatures of the portion of the river within the United States normally remained at or slightly above freezing from December through February. The development of anchor ice was a common occurrence during the winter with many of the quiet backwaters forming an ice cover. On rare occasions, parts of the river have frozen completely over. Water temperatures increase slowly with the approach of spring, reaching their peak in late July and early August, and decline fairly rapidly in the fall. Water temperatures were normally near 0°C (32°F) about 3 months of the year, above 5°C (41°F) for about 8 months of the year, and above 10°C (50°F) for about 4 months with peak temperatures of about 20°C (68°F).

Annual temperature means for station 10 for calendar years 1964 through 1968 ranged from 7.5°C to 8.4°C (36°-47°F) with a mean for all 5 years of 8.0°C (46.4°F). Although the 1969 data are incomplete, the remaining information does show that mean temperatures during the months of June, July, and August, 1970, and August, 1971, were considerably above normal. The August 1971 mean of 20.1°C (68°F) was the highest monthly mean recorded, not only at station 10, but at all the stations upstream of station 10.

The Kootenai River increases in temperature during spring and summer months with flow downstream; the greatest difference between stations occurred during the month of August when, on the average, the river warmed about 1°C (1.8°F) for each 95 km (59 miles) of length. During the remainder of the year the temperature difference between upstream and downstream stations was less, with the river becoming isothermal during the winter months. While this was the case for mean temperatures, there was considerable daily variation in river temperature, probably due to tributary inflow and local climatic conditions. Some of these variations can be noted in the plots of mean daily temperature in the appendix, figures 2 through 6.

While it is obvious that there is a range of temperature which spans these daily means and that there is considerable year to year difference between monthly and annual means, it should be noted that water temperatures in the river do follow a fairly consistent, predictable pattern which varies little from year to year. Figure 8 shows the deviation between temperature extremes and the 1962-1971 mean.

Spot observations of river temperature made between 1967 and 1972 are graphed in figure 9. Other than normal annual fluctuations, no long-term trends were indicated during the period of study.

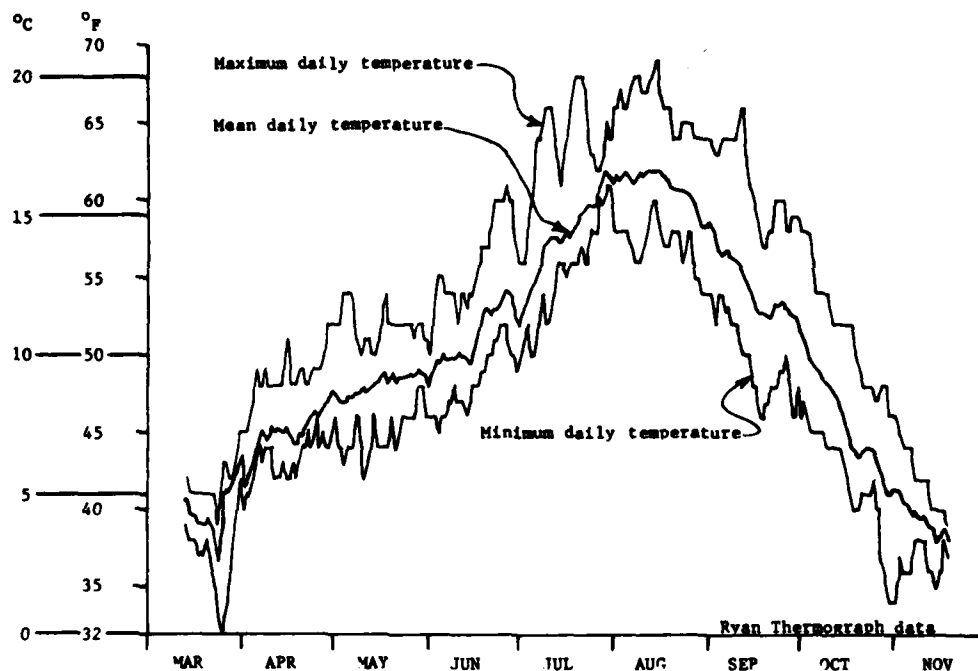


Figure 8. Summary thermograph for the Kootenai River at Warland, Montana, 1962-1971.

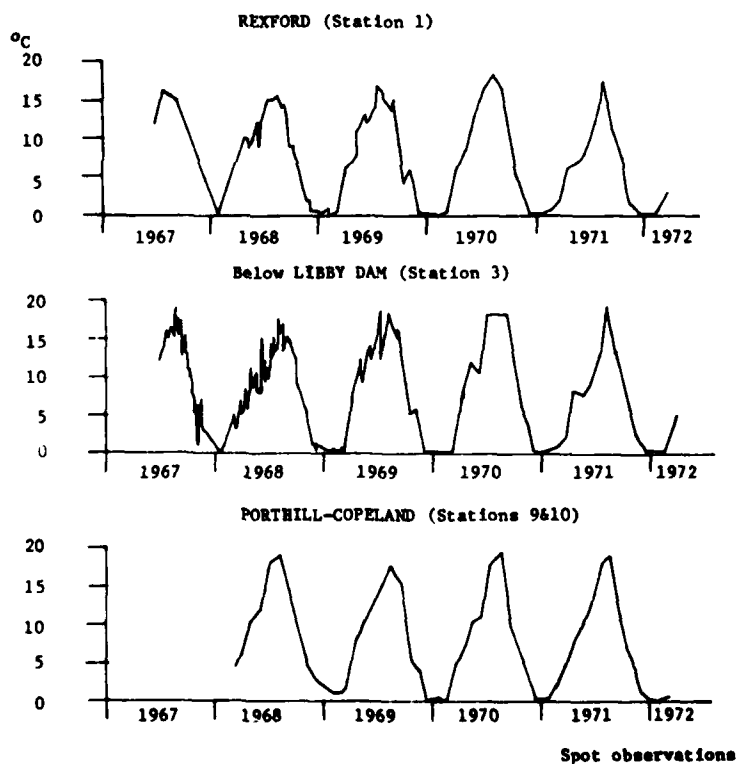


Figure 9. Water temperatures at three locations in the Kootenai River, 1967-1972.

#### 4.1.3 Suspended Sediment.

Between October 1967 and September 1971 the Kootenai River, near station 1, contained a mean (time-weighted) suspended sediment concentration of 39 mg/l. Concentrations increased to a mean of 47 mg/l, or by 21 percent, at station 3, dropping to 34 mg/l near station 9. Discharge-weighted means, although considerably higher than the time-weighted means, follow much the same pattern with values of 115, 140, and 108 mg/l respectively. Individual determinations ranged from 1 to 1,200 mg/l with high concentrations coinciding with periods of peak discharge. Calendar year values (tables 2, 3, and 4) show that concentrations during a year of high water (i.e. 1969) were as much as 2-1/2 times the mean found during a low water year (i.e. 1970). These differences among years are depicted in a graph (figure 10) of monthly mean (time-weighted) concentrations. Graphs comparing daily concentrations of suspended sediment are presented in the appendix, figures 7 through 11. These data reveal that, with the exception of high concentrations created below Libby Dam during periods of peak discharge in 1968 and 1969, there was little difference in suspended sediment concentrations being carried by the river at any of the stations sampled.

The suspended sediment load as calculated from daily samples and mean daily discharges for the period October 1967 through September 1971 totaled  $4.7 \times 10^6$  metric tons<sup>1/</sup> at station 1. This increased to  $5.8 \times 10^6$  metric tons at station 3 and  $6.3 \times 10^6$  metric tons at station 9. Mean daily loads were 3,242 metric tons at station 1, 3,562 at station 2, and 3,866 at station 9. This amounts to an increase of  $1.1 \times 10^5$  metric tons, or 10 percent, between stations 1 and 3, and  $5 \times 10^5$  metric tons, or a 9 percent increase, between stations 3 and 9.

Table 2. Suspended sediment concentrations and loadings for the Kootenai River near Rexford, Montana (Station 1), October 1967 - September 1971.

| Concentration                              | Calendar Year |           |         | Period        |
|--------------------------------------------|---------------|-----------|---------|---------------|
|                                            | 1968          | 1969      | 1970    | Oct 67-Sep 71 |
| Mean (time-weighted) mg/l                  | 36            | 46        | 21      | 39            |
| Mean (discharge-weighted) mg/l             | 104           | 134       | 54      | 115           |
| Maximum daily, mg/l                        | 870           | 537       | 223     | 870           |
| Minimum daily, mg/l                        | 3             | 1         | 2       | 1             |
| Loadings                                   |               |           |         |               |
| Total, tons (metric) <sup>1/</sup>         | 1,040,118     | 1,620,937 | 386,878 | 4,736,800     |
| Mean daily, tons (metric) <sup>1/</sup>    | 2,842         | 4,441     | 1,060   | 3,242         |
| Maximum daily, tons (metric) <sup>1/</sup> | 136,080       | 81,557    | 27,125  | 136,080       |
| Minimum daily, tons (metric) <sup>1/</sup> | 23            | 7         | 13      | 7             |

<sup>1/</sup>Metric tons x 1.102 = tons (short)

Table 3. Suspended sediment concentrations and loadings for the Kootenai River below Libby Dam (Station 3), October 1967 - March 1972.

| Concentration                              | Calendar Year |           |         |           | Period            |                   |
|--------------------------------------------|---------------|-----------|---------|-----------|-------------------|-------------------|
|                                            | 1968          | 1969      | 1970    | 1971      | Oct 67-<br>Sep 71 | Oct 67-<br>Mar 72 |
| Mean (time-weighted) mg/l                  | 49            | 68        | 21      | 47        | 47                | 43                |
| Mean (discharge-weighted) mg/l             | 139           | 198       | 57      | 131       | 140               | 135               |
| Maximum daily mg/l                         | 1,200         | 851       | 213     | 692       | 1,200             | 1,200             |
| Minimum daily mg/l                         | 1             | 1         | 2       | 2         | 1                 | 1                 |
| Loadings                                   |               |           |         |           |                   |                   |
| Total, tons (metric) <sup>1/</sup>         | 1,414,871     | 2,423,433 | 429,283 | 1,561,880 | 5,842,376         | 5,856,103         |
| Mean daily, tons (metric) <sup>1/</sup>    | 3,866         | 6,640     | 1,176   | 4,279     | 3,999             | 3,562             |
| Maximum daily, tons (metric) <sup>1/</sup> | 182,347       | 144,245   | 24,676  | 113,400   | 182,347           | 182,347           |
| Minimum daily, tons (metric) <sup>1/</sup> | 11            | 8         | 7       | 12        | 7                 | 7                 |

<sup>1/</sup>Metric tons x 1.102 = tons (short)

Table 4. Suspended sediment concentrations and loadings for the Kootenai River near Copeland, Idaho (Station 9), October 1967 - March 1972.

| Concentration                             | Calendar Year |           |         |           | Period            |                   |
|-------------------------------------------|---------------|-----------|---------|-----------|-------------------|-------------------|
|                                           | 1968          | 1969      | 1970    | 1971      | Oct 67-<br>Sep 71 | Oct 67-<br>Mar 72 |
| Mean (time-weighted) mg/l                 | 27            | 46        | 20      | 47        | 34                | 31                |
| Mean (discharge-weighted) mg/l            | 76            | 135       | 65      | 134       | 108               | 104               |
| Maximum daily mg/l                        | 573           | 580       | 211     | 515       | 583               | 583               |
| Minimum daily mg/l                        | 1             | 1         | 1       | 1         | 1                 | 1                 |
| Loadings                                  |               |           |         |           |                   |                   |
| Total tons (metric) <sup>1/</sup>         | 1,046,749     | 2,359,103 | 666,825 | 2,224,659 | 6,298,772         | 6,356,956         |
| Mean daily tons (metric) <sup>1/</sup>    | 2,860         | 6,463     | 1,827   | 6,095     | 4,311             | 3,866             |
| Maximum daily tons (metric) <sup>1/</sup> | 106,142       | 117,936   | 44,179  | 92,534    | 117,936           | 117,936           |
| Minimum daily tons (metric) <sup>1/</sup> | 9             | 14        | 7       | 6         | 6                 | 6                 |

<sup>1/</sup>Metric tons x 1.102 = tons (short)

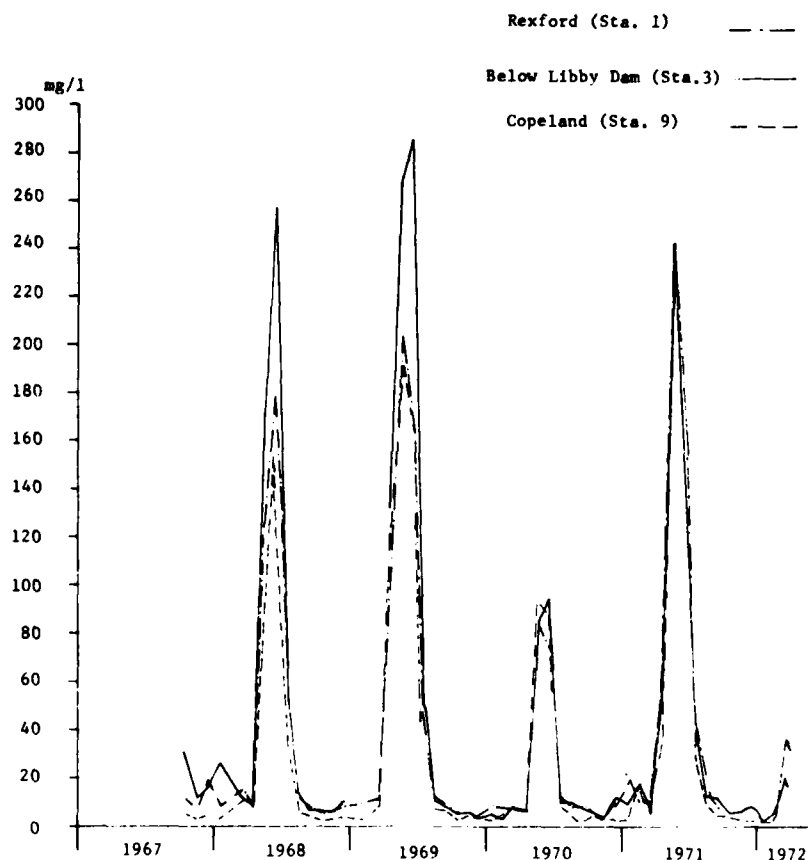


Figure 10. Monthly mean suspended sediment concentrations.

An overall increase of  $1.5 \times 10^6$  metric tons, or 19 percent, in sediment loading is therefore indicated for the section of the river between Rexford, Montana, and Copeland, Idaho.

Comparison of the data for each of the three stations (tables 2 through 4) shows considerable year to year variation. In 1968, which is considered a normal year in terms of discharge, the Kootenai River at station 1 carried a total suspended load of  $1.0 \times 10^6$  metric tons. In 1969, a high-water year, the load increased to  $1.6 \times 10^6$  metric tons, or by 60 percent. In the year which followed, this dropped to slightly under  $4 \times 10^5$  metric tons, or by 76 percent, demonstrating the cumulative effect that increases and decreases in discharge have upon sediment loadings. Values for station 3 were consistently higher than station 1 with  $1.4 \times 10^6$  metric tons in 1968,  $2.4 \times 10^6$  in 1969, and  $4.3 \times 10^5$  in 1970. Suspended sediment values for station 9 were lower than station 3 with a load of  $1.0 \times 10^6$  metric tons in 1968, nearly the same with about  $2.4 \times 10^6$  metric tons in 1969, and considerably higher in 1970 and 1971 with  $7 \times 10^5$  and  $2.2 \times 10^6$  metric tons respectively.

The fluctuation in suspended sediment loading among the three stations is shown in table 5. Particularly large increases of  $3.7 \times 10^5$

Table 5. Amount of downstream change in the suspended sediment load carried by the Kootenai River, October 1967-March 1972.

| Inclusive Dates     | Metric Tons <sup>1/</sup> Difference Between |                   |                   |
|---------------------|----------------------------------------------|-------------------|-------------------|
|                     | Sta. 1 and Sta. 3                            | Sta. 3 and Sta. 9 | Sta. 1 and Sta. 9 |
| Oct 1967 - Dec 1967 | + 8,405                                      | - 13,904          | - 5,499           |
| Jan 1968 - Dec 1968 | +374,753                                     | -368,122          | + 6,630           |
| Jan 1969 - Dec 1969 | +802,497                                     | - 64,330          | +738,166          |
| Jan 1970 - Dec 1970 | + 42,405                                     | +237,542          | +279,946          |
| Jan 1971 - Sep 1971 | -122,412                                     | +665,140          | +542,728          |
| Oct 1967 - Sep 1971 | +1,105,647                                   | +456,325          | +1,561,972        |
| Oct 1971 - Dec 1971 |                                              | - 2,361           |                   |
| Jan 1972 - Mar 1972 |                                              | + 46,925          |                   |
| Oct 1967 - Mar 1972 |                                              | +500,889          |                   |

<sup>1/</sup>Metric tons x 1.102 = tons (short)

and  $8.0 \times 10^5$  metric tons can be noted between stations 1 and 3 in the years 1968 and 1969. These increases were not reflected in the data for station 9 in 1968 and did not become apparent there until 1969, 1970, and 1971.

It is evident from the data presented that there was a considerable increase in suspended sediment below Libby Dam, particularly during the period of high discharge in the years 1968 and 1969. The greater part of the increase at station 3, which amounted to almost  $1.2 \times 10^6$  metric tons during the 1968-69 period, is believed to have been, in large part, caused by river diversions necessitated by first- and second-stage coffer-dam construction at the Libby Dam Project. These diversions, which were completed in November 1967 and November 1968, caused only short-term increases as they were completed during periods of low flows. Spring runoff, however, with increased volumes and velocities, resorted the bottom materials in the vicinity of these diversions. This placed in suspension large quantities of sediment, almost all of which was silt, being of a grain-size of 0.25 mm or smaller (appendix, table 21). The decrease of  $1.2 \times 10^5$  metric tons between stations 1 and 3, January through September 1971, resulted from settling of material in suspension in the small pool that was created behind the dam in 1971. The apparent delay in the quantity of sediment being carried by the river between stations 3 and 9 deserves further study.

#### 4.1.4 Turbidity.

Daily turbidity determinations below Libby Dam (station 3) for the period extending from March 1968 through March 1972 are presented in the appendix, tables 24 through 28. These data are supplemented

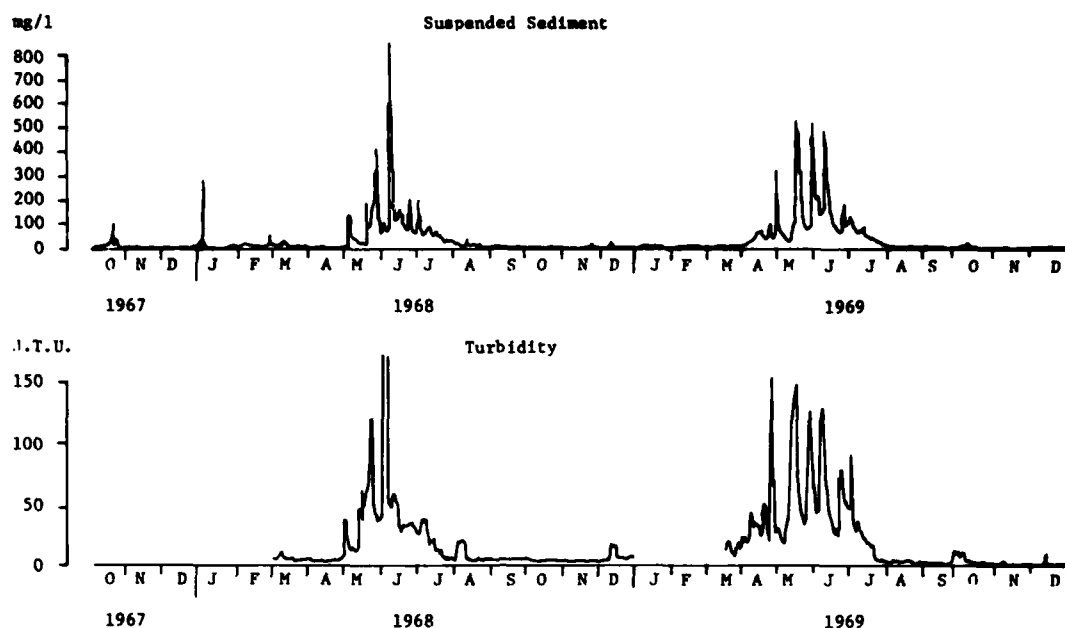


Figure 11. Suspended sediment concentrations and turbidity in the Kootenai River below Libby Dam, October 1967-December 1969.

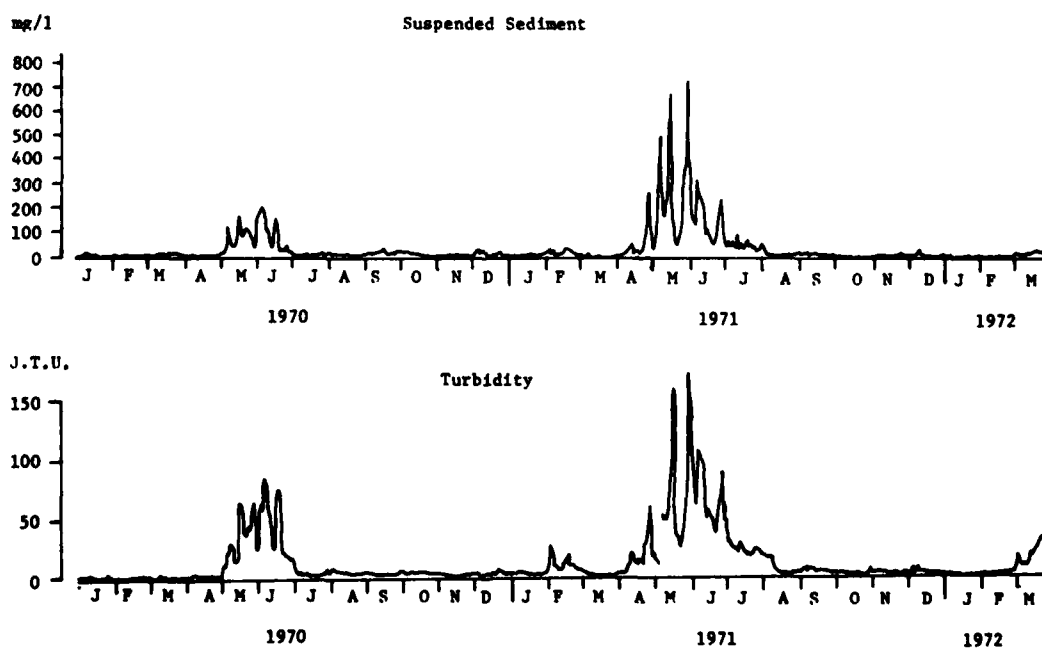


Figure 12. Suspended sediment concentration and turbidity in the Kootenai River below Libby Dam, January-March 1972.

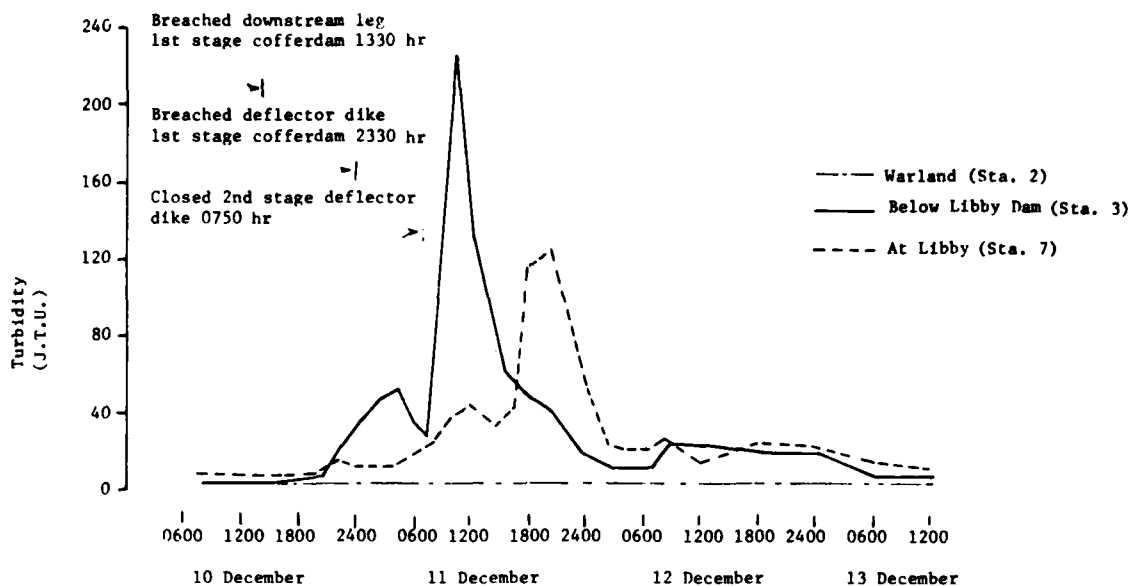


Figure 13. Turbidity created during second-stage diversion, 10-13 December 1968.

by monthly and miscellaneous observations (appendix tables 29 through 32) made both above and below the dam to define specific problems.

Turbidity values below the dam site closely paralleled the trends shown for suspended sediment concentrations (figures 11 and 12) and typically remained at about five units or less during periods of base flow. Large increases, at times exceeding 100 turbidity units, appeared only during the spring runoff. Maximums of over 170 units occurred below the dam in June 1969. Occasional freshets and major construction activities created short-term turbidities usually of 25 units or less.

The highest turbidity recorded during the study was 225 units on 11 December 1968 during second-stage diversion of the river. Turbidity readings taken both above and below the diversion are presented in the appendix, table 33, and graphed in figure 13. The peak of the slug which passed station 3 at 1025 hours 11 December was encountered at station 7, 22.2 km (13.8 miles) downstream, almost 10 hours later. The peak of the slug dropped from 225 turbidity units at station 3 to 125 units at station 7, or by 56 percent during this period. The slug widened considerably in downstream flow. A somewhat similar pattern was indicated during drainage of the contractor's settling pond 25-26 November 1969 (appendix, table 34). In both operations, turbidity levels returned rather quickly to normal background levels.

A comparison of monthly turbidity determinations is shown below:

| Location  | Period          | n  | Formazin Turbidity Units |         |      |
|-----------|-----------------|----|--------------------------|---------|------|
|           |                 |    | Maximum                  | Minimum | Mean |
| Sta. 1    | Oct 69 - Mar 72 | 30 | 43                       | 0       | 6    |
| Sta. 3    | Oct 69 - Mar 72 | 30 | 75                       | 1       | 10   |
| Sta. 9-10 | Apr 68 - Sep 69 | 15 | 32                       | 0       | 6    |
|           | Oct 69 - Mar 72 | 23 | 30                       | 0       | 4    |

These data indicate a mean increase of four turbidity units between stations 1 and 3 for the period October 1969 through March 1972 and a mean decrease of six units between station 3 and 9-10, giving a mean decrease of two units between stations 1 and 9-10.

A summary of daily turbidity determinations at station 3 covering the period from March 1968 through March 1972, except for a 2-1/2 month period in January to March 1969, is shown below:

| <u>Location</u> | <u>Period</u>  | <u>n</u> | <u>Formazin Turbidity Units</u> |                |             |
|-----------------|----------------|----------|---------------------------------|----------------|-------------|
|                 |                |          | <u>Maximum</u>                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 3          | Mar - Dec 1968 | 306      | 175                             | 2              | 15          |
|                 | Mar - Dec 1969 | 290      | 150                             | 1              | 22          |
|                 | Jan - Dec 1970 | 365      | 83                              | 1              | 9           |
|                 | Jan - Dec 1971 | 365      | 160                             | 1              | 17          |
|                 | Jan - Mar 1972 | 91       | 30                              | 1              | 8           |
|                 | Mar 68-Mar 72  | 1,417    | 175                             | 1              | 15          |

While some statistical problems exist in evaluating the turbidity, or relative transparency, of the river and the downstream changes which have occurred, it is evident from the data that the river is naturally turbid during the high-water period and particularly during years of extremely high flows. Construction activities undoubtedly increased the turbidity of the river, but the increases appeared limited to periods of high discharge, to occasional short-term additions during periods of low flow, and to the early years of the study when the major foundation work and river diversions were being done at the Libby Dam project. Even with the increased turbidity caused by the construction of Libby Dam and related road and railroad relocations on the Fisher River, monthly turbidity determinations at Porthill-Copeland showed the water to be less turbid (more transparent) on the average than the water found near Rexford.

#### 4.1.5 Color.

True color of a water sample was determined after the sample was clarified by centrifugation to remove turbidity. The color is attributable to the presence of such constituents in the water as metallic ions, plankton, and plant residues. The color of the Kootenai River ranged from 0 to 25 Platinum-Cobalt (Pt-Co) color units throughout the study period. Values of five units or less were generally characteristic of the water, except for the months of May and June when the color increased to maximums of from 10 to 25 units. Other than these seasonal fluctuations, which coincided with periods of high discharge, the color data exhibited no particular temporal trends which might be indicative of changing conditions in the section of the river within the United States.

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Pt-Co Units</u> |                |             |
|-----------------|-----------------|----------|--------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>     | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Jun 67 - Sep 69 | 23       | 12                 | 1              | 3           |
|                 | Oct 69 - Mar 72 | 29       | 13                 | 0              | 5           |
| Sta. 3          | Jun 67 - Sep 69 | 16       | 10                 | 1              | 4           |
|                 | Oct 69 - Mar 72 | 30       | 20                 | 0              | 5           |
| Sta. 9-10       | Oct 69 - Mar 72 | 23       | 10                 | 0              | 5           |

The above data show a small increase occurred in water color between station 1, with a mean of three units, and stations 9-10 with a mean of eight units during the early phases of the study. A mean of five units characterized all stations during the latter phase, October 1969 through March 1972.

#### 4.1.6 Dissolved Oxygen.

Dissolved oxygen concentrations in the section of the Kootenai River under study were generally high, covering a range of from 8.0 to 14.9 mg/l, and were typically near saturation, ranging from 87 to 122 percent saturation. Concentrations of 10 mg/l or more were characteristic of the river during all but the warmest months of the year. As dissolved oxygen concentration fluctuates inversely with water temperature, the concentrations follow a definitive pattern of seasonal change. Figures 14 and 15 show the magnitude of these fluctuations.

While there appear to be slight differences between upstream and downstream sampling stations, there is no evidence of any long-term temporal trends at any of the stations sampled.

Comparison of the dissolved oxygen data from station 1 with the downstream stations for the period October 1969 through March 1972 shows a progressive downstream increase between stations 1 and 3 and stations 7 and 8 with a decline noted only between stations 8 and 9-10.

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l Dissolved Oxygen</u><br><u>(% Saturation)</u> |                |               |
|-----------------|-----------------|----------|-------------------------------------------------------|----------------|---------------|
|                 |                 |          | <u>Maximum</u>                                        | <u>Minimum</u> | <u>Mean</u>   |
| Sta. 1          | Oct 69 - Mar 72 | 30       | 13.4<br>(108)                                         | 8.4<br>(87)    | 11.5<br>(99)  |
| Sta. 3          | Oct 69 - Mar 72 | 30       | 14.6<br>(117)                                         | 8.4<br>(87)    | 11.9<br>(103) |
| Sta. 7          | Oct 69 - Mar 72 | 30       | 14.5<br>(119)                                         | 8.4<br>(87)    | 11.9<br>(103) |
| Sta. 8          | Oct 69 - Mar 72 | 30       | 14.9<br>(120)                                         | 10.1<br>(99)   | 12.7<br>(109) |
| Sta. 9-10       | Oct 69 - Mar 72 | 30       | 14.8<br>(117)                                         | 9.0<br>(96)    | 12.1<br>(104) |

The mean concentration of 11.5 mg/l at station 1 increased to 12.7 mg/l at station 8 and dropped to 12.1 mg/l at station 9. Percent saturation increased from 99 percent at station 1 to 109 percent at station 8 and dropped to 104 percent at station 9-10. Such differences between the stations are neither particularly large nor of a magnitude where a water quality problem is suspect. High oxygen concentrations in the river indicate the river was not only able to satisfy the high respiratory demands of desirable species of adequate life but also was able to satisfy demands placed on the resource by industrial and domestic waste discharges.

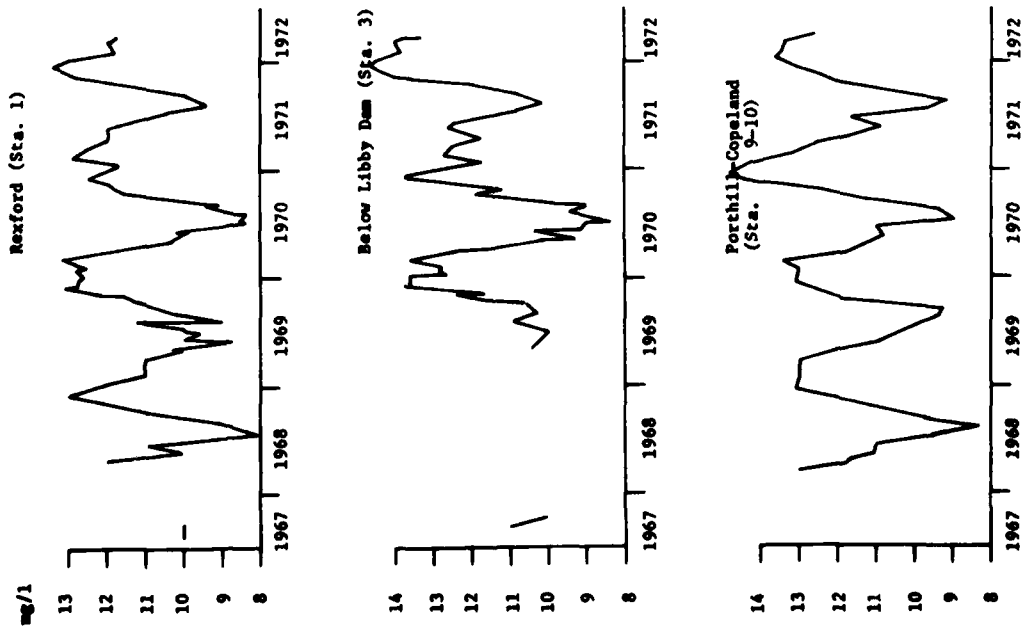


Figure 14. Dissolved oxygen concentrations in the Kootenai River, 1967-1972.

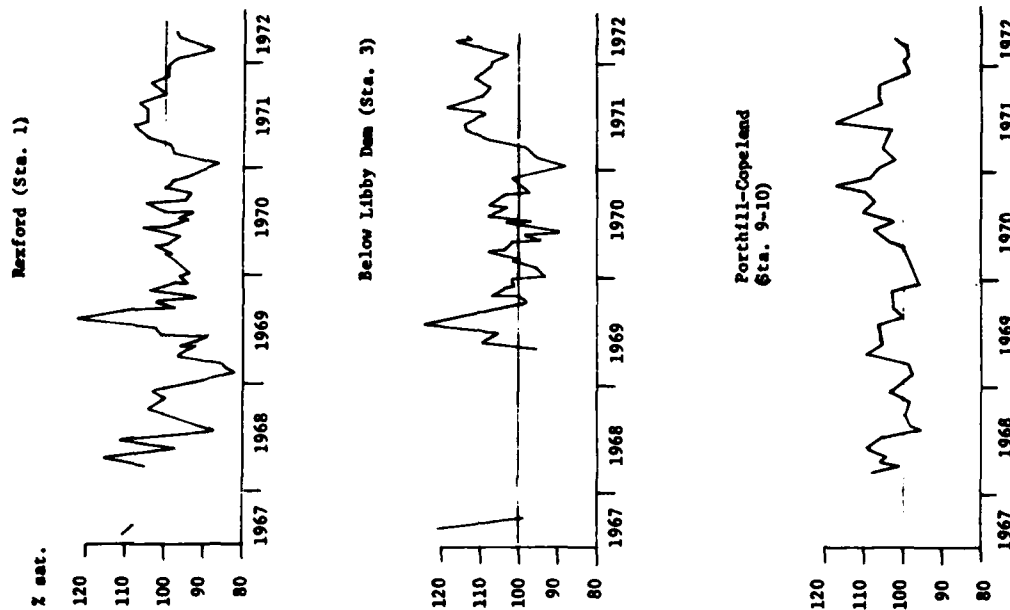


Figure 15. Dissolved oxygen percent saturation in the Kootenai River, 1967-1972.

#### 4.1.7 Biochemical Oxygen Demand (BOD).

BOD determinations were done concurrent with dissolved oxygen determinations at three of the downstream stations. The results showed oxygen demands ranging from 0.1 to 4.9 mg/l for the river as a whole, with means of 1.2 mg/l at station 7, 2.0 mg/l at station 8, and 1.6 mg/l at station 9-10.

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l BOD</u> |                |             |
|-----------------|-----------------|----------|-----------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 7          | Oct 69 - Mar 72 | 30       | 4.8             | 0.3            | 1.2         |
| Sta. 8          | Oct 69 - Mar 72 | 29       | 4.9             | 0.5            | 2.0         |
| Sta. 9-10       | Oct 69 - Mar 72 | 30       | 3.7             | 0.1            | 1.6         |

The mean BOD at station 8 (2.0 mg/l), which lies downstream from the communities of Libby and Troy, was slightly higher than the 1.2 mg/l at station 7, which is representative of the river above Libby, and the 1.6 mg/l at station 9-10, as the river leaves the United States.

#### 4.1.8 Total Organic Carbon (TOC).

TOC determinations were made at stations 7, 8, and 9-10 beginning in June 1968, but were not begun at stations 1 and 3 until October 1970. Comparison was therefore based on two separate time periods as shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l TOC</u> |                |             |
|-----------------|-----------------|----------|-----------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 16       | 14              | 0              | 4           |
| Sta. 3          | Oct 70 - Mar 72 | 17       | 18              | 0              | 5           |
| Sta. 7          | Jun 68 - Sep 70 | 27       | 15              | 0              | 3           |
|                 | Oct 70 - Mar 72 | 12       | 58              | 0              | 11          |
| Sta. 8          | Jun 68 - Sep 70 | 19       | 12              | 0              | 3           |
|                 | Oct 70 - Mar 72 | 11       | 3.5             | 0              | 2           |
| Sta. 9-10       | Jun 68 - Sep 70 | 22       | 14              | 0              | 3           |
|                 | Oct 70 - Mar 72 | 11       | 3               | 1              | 1           |

TOC was generally found to be 5 mg/l or less with only occasional higher values. Means at stations 7, 8, and 9-10 were 3 mg/l from June 1968 through September 1970. Higher values of 4 and 5 mg/l were found at stations 1 and 3, respectively, during the period October 1970 through March 1972. Two extremely high determinations of 58 mg/l on 13 October 1970 and 36 mg/l on 9 December at station 7 were recorded. The two high values coincided with high values for BOD at station 7. Graphs of total organic carbon for stations 1, 3, and 9-10 are presented in figure 16.

#### 4.1.9 pH.

The pH of the Kootenai River was generally within a range of pH 7.0 to 9.0. Field determinations of pH at stations 1, 3, and 9-10 are shown in graphic form in figure 17.

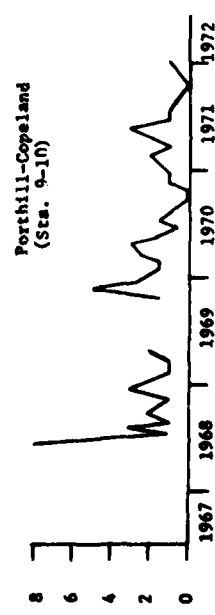
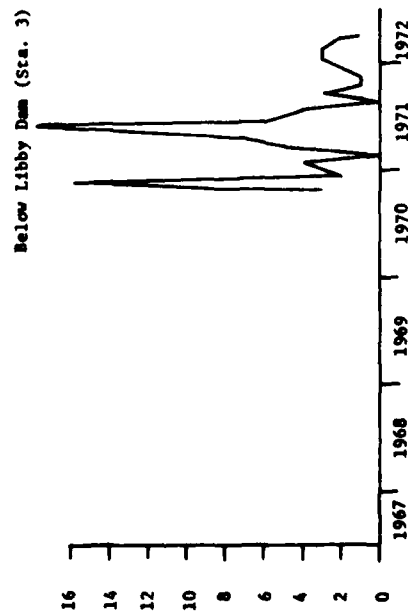
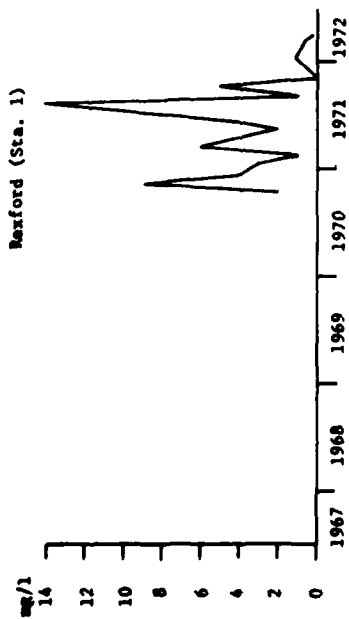


Figure 16. Total organic carbon concentrations in the Kootenai River, 1967-1972.

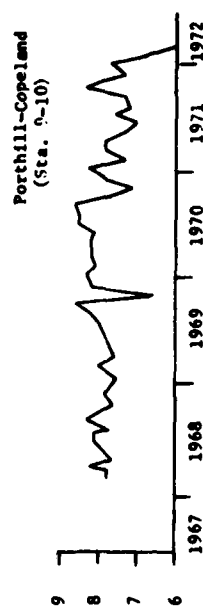
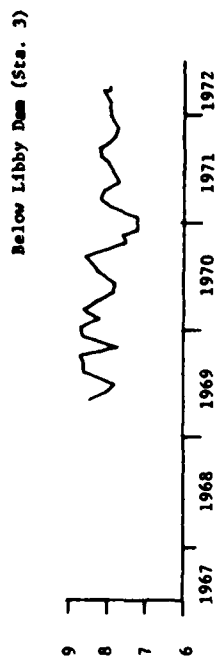
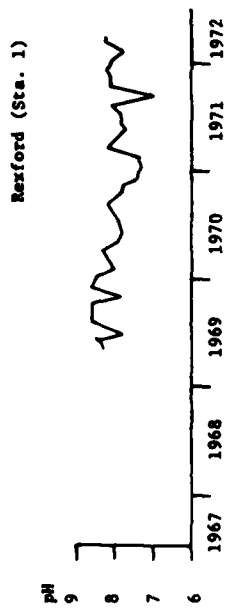


Figure 17. pH of the Kootenai River, 1967-1972.

Dominating features of the pH data are the irregular short-term fluctuations of the monthly observations developing into what appears to be evidence of a long-term, downward trend. A downstream decrease in pH as the river traverses the United States is evident. Some of the short-term fluctuations, such as the decline noted in late 1970 and early 1971, appear to be characteristic of the river system as a whole in that the pH was noted to decline at each of the sampling stations. Other fluctuations seem to be purely local in nature with low pH at only one or two of the stations while the values elsewhere were high. The abrupt decline to a pH of 6.0 at station 9 in March 1972, which happens to be the minimum pH value found during the study, fits the latter category.

While the specific causes of these local short-term changes in pH are difficult to evaluate, it should be noted that the pH at all stations was generally high and at no time did it enter the range where it might be expected to have a detrimental effect upon water uses and aquatic life.

#### 4.1.10 Total Alkalinity - Bicarbonates.

Field analyses of total alkalinity, expressed as  $\text{CaCO}_3$ , ranged from 54 mg/l to 152 mg/l in the portion of the Kootenai River under study. Maximum, minimum, and mean total alkalinities at three of the sampling locations are shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l Total Alkalinity as <math>\text{CaCO}_3</math></u> |                |             |
|-----------------|-----------------|----------|------------------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                             | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 69 - Mar 72 | 28       | 152                                                        | 75             | 115         |
| Sta. 3          | Oct 69 - Mar 72 | 28       | 142                                                        | 66             | 110         |
| Sta. 9-10       | Mar 68 - Sep 69 | 17       | 114                                                        | 59             | 83          |
|                 | Oct 69 - Mar 72 | 30       | 122                                                        | 54             | 98          |

Comparison shows that the total alkalinity of the river decreased from a mean of 115 mg/l at station 1 to 98 mg/l at station 9 during the period from October 1969 through March 1972.

Prior to October 1969, alkalinity determinations for stations 1 and 3 were analyzed in the laboratory and reported as bicarbonate ( $\text{HCO}_3^-$ ) and carbonate ( $\text{CO}_3^{2-}$ ) ions. At other stations alkalinities as  $\text{CaCO}_3$  were reported. For purpose of comparison, alkalinities were converted to bicarbonate ions. The resultant bicarbonate data, which combine both field and laboratory analyses, are shown in graphic form in figure 18.

This information shows that bicarbonate concentrations fluctuated seasonally during the preimpoundment period with highest concentrations occurring during periods of base flow in midwinter and lowest concentrations occurring during the period of peak runoff in the late spring. Water entering the United States near station 1 normally had a higher bicarbonate content and thus a higher "buffering" capacity than waters leaving the United States. The downstream decrease was progressive, implicating tributary dilution with waters of lower alkalinity. It is significant to note that the highly alkaline concrete wastes from dam construction had little, if any, effect upon the rivers' bicarbonate concentration.

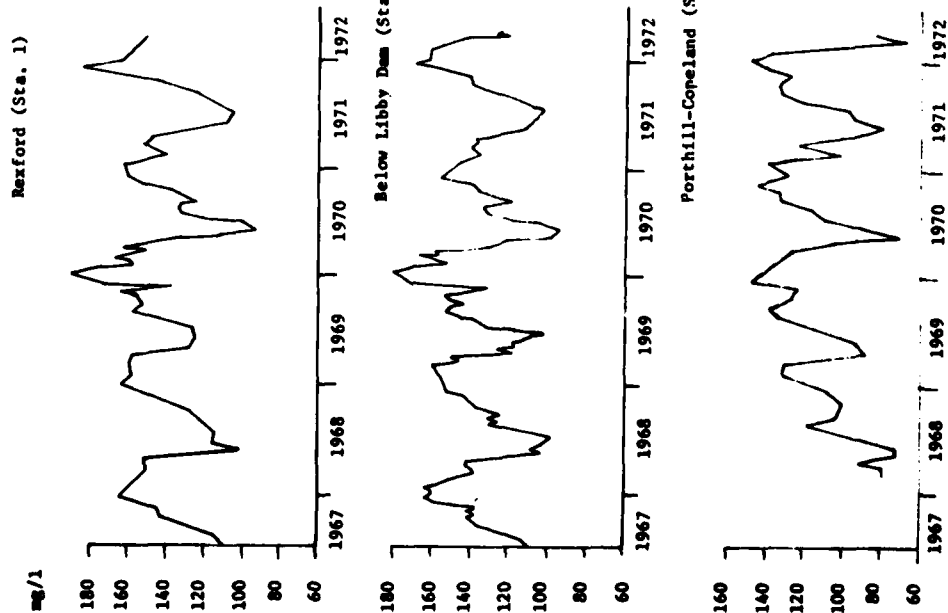


Figure 18. Bicarbonate concentrations in the Kootenai River, 1967-1972.

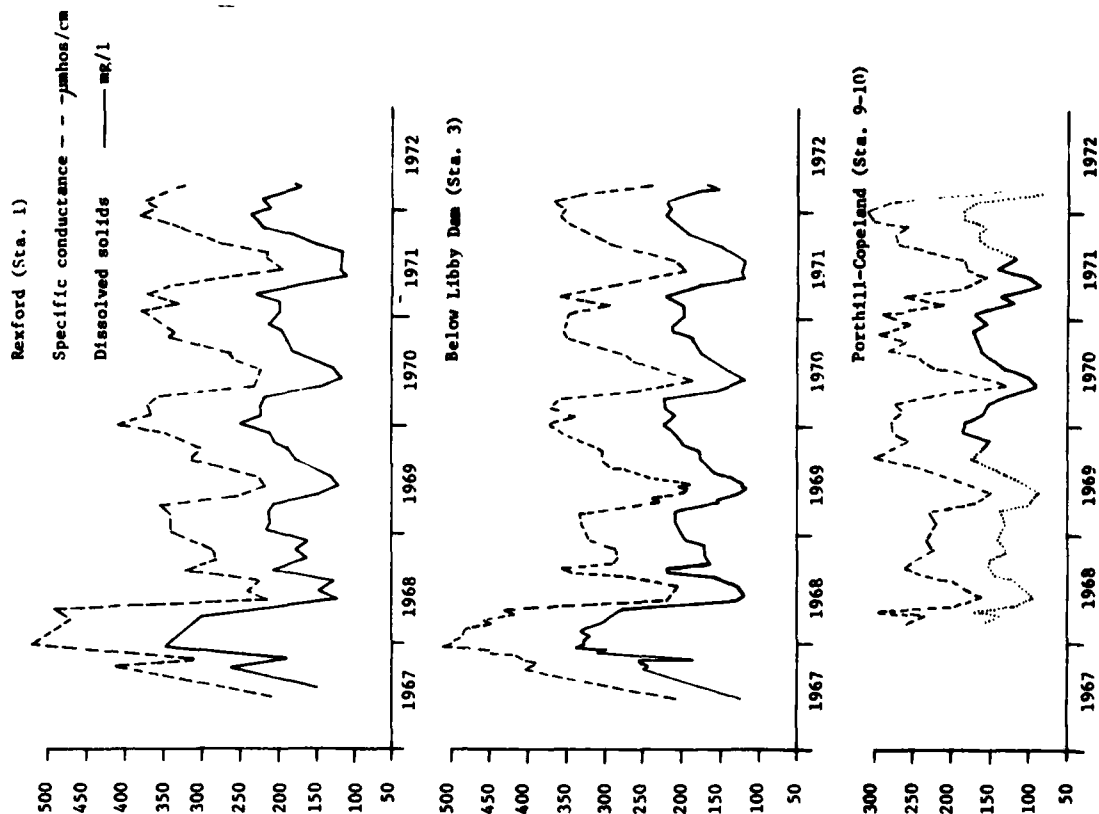


Figure 19. Specific conductance and dissolved solids concentrations in the Kootenai River, 1967-1972.

#### 4.1.11 Carbon Dioxide (CO<sub>2</sub>).

Field pH and alkalinity determinations were used to estimate the amount of free CO<sub>2</sub> in solution. Although the calculations show the river as having a relatively wide range of from 0.4 to 105.6 mg/l free CO<sub>2</sub>, most determinations were under 4 mg/l. The values obtained are summarized below:

| Location  | Period          | n  | mg/l CO <sub>2</sub> |         |      |
|-----------|-----------------|----|----------------------|---------|------|
|           |                 |    | Maximum              | Minimum | Mean |
| Sta. 1    | Oct 69 - Mar 72 | 27 | 20.3                 | 0.5     | 3.8  |
| Sta. 3    | Oct 69 - Mar 72 | 28 | 16.0                 | 0.4     | 3.4  |
| Sta. 9-10 | Mar 68 - Sep 69 | 17 | 6.3                  | 0.8     | 2.4  |
|           | Oct 69 - Mar 72 | 80 | 105.6                | 0.5     | 10.0 |

High CO<sub>2</sub> concentrations appeared to occur more frequently during the fall and winter months than during the rest of the year and more frequently at the downstream stations than those upstream.

#### 4.1.12 Total Dissolved Solids - Specific Conductance.

Determinations of specific conductance and the amount of total dissolved solids, or to be more precise the filterable residue, in the water were made at a number of the sampling stations on the Kootenai River. A summary of the results from three of these stations is presented in figure 19 and tabulated below:

| Location  | Period           | n            | mg/l total dissolved solids<br>(Specific Conductance $\mu$ mhos/cm 25°C) |         |       |
|-----------|------------------|--------------|--------------------------------------------------------------------------|---------|-------|
|           |                  |              | Maximum                                                                  | Minimum | Mean  |
| Sta. 1    | June 67 - Sep 69 | 24           | 349                                                                      | 122     | 193   |
|           |                  | 24           | (522)                                                                    | (216)   | (315) |
|           | Oct 69 - Mar 72  | 30           | 252                                                                      | 112     | 184   |
|           |                  | 27           | (411)                                                                    | (195)   | (327) |
| Sta. 3    | Jun 67 - Sep 69  | 16           | 338                                                                      | 122     | 190   |
|           |                  | 16           | (511)                                                                    | (199)   | (304) |
|           | Oct 69 - Mar 72  | 32           | 226                                                                      | 118     | 182   |
|           |                  | 31           | (372)                                                                    | (190)   | (302) |
| Sta. 9-10 | Mar 68 - Sep 69  | 16 <u>1/</u> | 179                                                                      | 91      | 136   |
|           |                  | 16           | (300)                                                                    | (150)   | (224) |
|           | Oct 69 - Mar 72  | 30 <u>1/</u> | 189                                                                      | 83      | 147   |
|           |                  | 30           | (311)                                                                    | (129)   | (242) |

The concentration of total dissolved solids ranged from a maximum of 349 mg/l at station 1 in December 1967 to a minimum of 83 mg/l for station 9 in March 1972. The total dissolved solids data indicate downstream dilution as the river traverses the United States. Specific conductance, as might be expected, follows practically the same pattern in the Kootenai River as seen in dissolved solids. Values range from 522  $\mu$ mhos at station 1 to 129  $\mu$ mhos at station 9.

1/Estimates based partially or wholly on conductance values.



Figure 20. Specific conductance for the Kootenai River below Libby Dam, 1967-1972.

Figure 19 indicates that conductance and dissolved solids concentrations were significantly higher in the winter of 1967-68 than during the remaining years of study. Daily determinations of specific conductance at station 3 for the period October 1967 through September 1969 are contained in the appendix, table 35. A graph of that information (figure 20) indicates not only the high conductance values which characterized the winter of 1967-68, but also a rather abrupt decrease which occurred between the 17th and 18th of September 1968 when the conductance dropped from 356  $\mu$ mhos to 287  $\mu$ mhos.

The abnormally high conductivity values observed from the beginning of the study through September 1968 can be attributed to industrial waste discharges in Canada and the decline attributed to efforts to control the wastes discharged to the river system. Since October 1968, total dissolved solids concentrations and conductance values have remained relatively stable, apparently fluctuating only with variations in discharge.

#### 4.1.13 Hardness.

The water of the Kootenai River is moderately hard to hard. Total hardness concentrations, reported as  $\text{CaCO}_3$ , ranged from 273 mg/l at station 1 in December 1967 to 64 mg/l at station 9 in May 1970. A summary of the data for three of the stations sampled is shown below:

| Location | Period          | n  | mg/l Total Hardness |         |      |
|----------|-----------------|----|---------------------|---------|------|
|          |                 |    | Maximum             | Minimum | Mean |
| Sta. 1   | Jun 67 - Sep 69 | 24 | 273                 | 103     | 157  |
|          | Oct 69 - Mar 72 | 30 | 194                 | 91      | 150  |
| Sta. 3   | Jun 67 - Sep 69 | 16 | 263                 | 101     | 152  |
|          | Oct 69 - Mar 72 | 30 | 184                 | 82      | 148  |
| Sta. 9   | Apr 68 - Sep 69 | 15 | 256                 | 80      | 131  |
|          | Oct 69 - Mar 72 | 25 | 152                 | 64      | 121  |

Total hardness follows the same general trends established for total dissolved solids. Peak concentration, which exceeded 250 mg/l over the winter of 1967-68, declined and fluctuated throughout the remainder of the preimpoundment period around a mean of from 120 to 150 mg/l.

Noncarbonate hardness, which reached 137 mg/l at station 1 in December 1967, did not exceed 50 mg/l at any of the stations after October 1968 and was noted to reach zero at some of the downstream stations during the latter part of the study.

#### 4.1.14 Calcium (Ca).

Calcium is among the most common of the substances in water and is usually more abundant than any of the other alkaline-earth metals. As is magnesium, Ca is essential to plant growth and is among the least toxic cations in the aquatic environment. Calcium was found to be the dominant cation in the Kootenai River. Calcium concentrations ranged from a maximum of 85 mg/l at station 1 in December 1967 to 18 mg/l at station 9 in March 1972. A summary of the data for three of the stations sampled is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l Ca</u> |                |             |
|-----------------|-----------------|----------|----------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u> | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Jun 67 - Sep 69 | 24       | 85             | 31             | 45          |
|                 | Oct 69 - Mar 72 | 30       | 51             | 26             | 41          |
| Sta. 3          | Jun 67 - Sep 69 | 16       | 81             | 30             | 44          |
|                 | Oct 69 - Mar 72 | 30       | 50             | 23             | 40          |
| Sta. 9-10       | Oct 69 - Mar 72 | 19       | 41             | 18             | 32          |

Mean Ca concentrations ranged from 40 to 45 mg/l as the river entered the United States to about 30 mg/l as it left the country.

Calcium concentrations obtained during the course of the study are graphed in figure 21. It is significant to note here that the trend for Ca, as did that for total hardness, parallels that previously noted for total dissolved solids.

#### 4.1.15 Magnesium (Mg).

Magnesium concentrations ranged from 16 mg/l at stations 1 and 3 in January 1970 to 4.6 mg/l at station 9 in May 1971. A summary of the data for three of the stations sampled is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l Mg</u> |                |             |
|-----------------|-----------------|----------|----------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u> | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Jun 67 - Sep 69 | 24       | 15             | 6.3            | 11          |
|                 | Oct 69 - Mar 72 | 30       | 16             | 6.3            | 12          |
| Sta. 3          | Jun 67 - Sep 69 | 16       | 15             | 6.3            | 10          |
|                 | Oct 69 - Mar 72 | 30       | 16             | 6.0            | 12          |
| Sta. 9-10       | Oct 69 - Mar 72 | 19       | 12             | 4.6            | 9.3         |

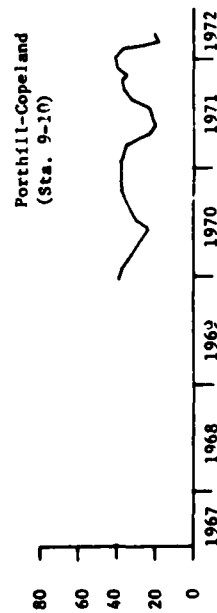
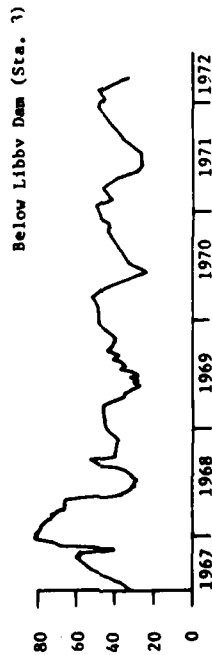
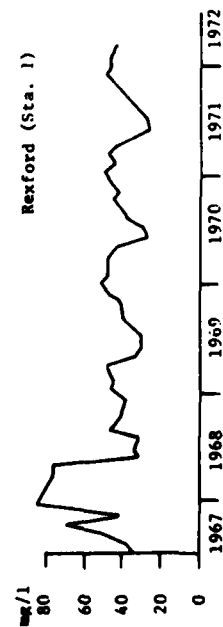


Figure 21. Calcium concentrations in the Kootenai River, 1967-1972.

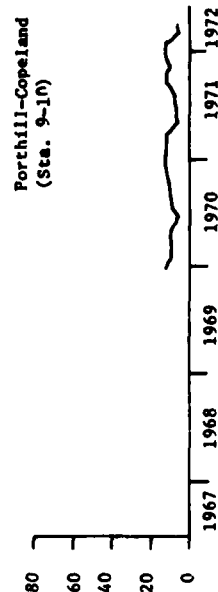
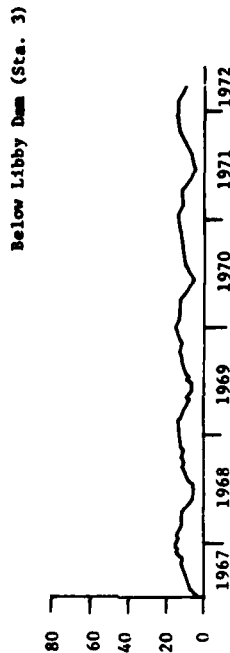
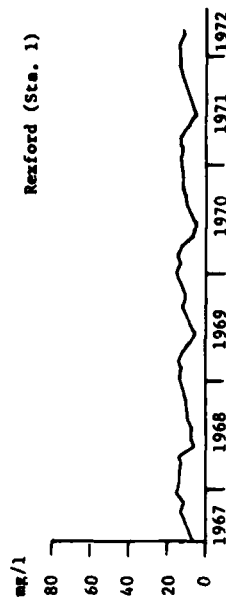


Figure 22. Magnesium concentrations in the Kootenai River, 1967-1972.

Magnesium concentrations averaged about 12 mg/l as the river entered the United States, diluting downstream to 9 mg/l as the river re-entered Canada. A graph of Mg concentrations is shown in figure 22. An interesting feature of Mg is that concentrations remained relatively stable throughout the study period, apparently lacking the high concentrations which characterized some of the other parameters such as Ca.

#### 4.1.16 Sodium (Na).

Sodium concentrations ranged from 6.9 mg/l at station 3 in November 1970 to 0.8 mg/l at station 3 in June 1971. A summary of the data for three of the stations sampled is shown below:

| Location  | Period          | n  | mg/l Na |         |      |
|-----------|-----------------|----|---------|---------|------|
|           |                 |    | Maximum | Minimum | Mean |
| Sta. 1    | Jun 67 - Sep 69 | 24 | 4.2     | 1.1     | 2.7  |
|           | Oct 69 - Mar 72 | 30 | 6.3     | 1.1     | 4.0  |
| Sta. 3    | Jun 67 - Sep 69 | 16 | 3.8     | 1.0     | 2.6  |
|           | Oct 69 - Mar 72 | 30 | 6.9     | 0.8     | 4.0  |
| Sta. 9-10 | Apr 68 - Sep 69 | 15 | 3.6     | 1.0     | 2.3  |
|           | Oct 69 - Mar 72 | 14 | 4.6     | 1.5     | 3.2  |

Sodium concentrations, which averaged 2.7 mg/l at station 1 during the earlier phase of the study, increased to 4.0 mg/l in the later phase. Figure 23 shows this increase being reflected throughout the system. Highest concentrations appeared during the winters of 1969-70 and 1970-71.

#### 4.1.17 Potassium (K).

Potassium concentrations ranged from 2.8 mg/l at station 3 in December 1971 to 0.2 mg/l at station 1 in June 1971. A summary of the data for three of the stations is shown below:

| Location  | Period          | n  | mg/l K  |         |      |
|-----------|-----------------|----|---------|---------|------|
|           |                 |    | Maximum | Minimum | Mean |
| Sta. 1    | Jun 67 - Sep 69 | 24 | 1.2     | 0.4     | 0.8  |
|           | Oct 69 - Mar 72 | 30 | 1.4     | 0.2     | 0.8  |
| Sta. 3    | Jun 67 - Sep 69 | 16 | 2.0     | 0.5     | 1.0  |
|           | Oct 69 - Mar 72 | 30 | 2.8     | 0.4     | 0.9  |
| Sta. 9-10 | Mar 67 - Sep 69 | 16 | 1.0     | 0.5     | 0.8  |
|           | Oct 69 - Mar 72 | 20 | 1.6     | 0.3     | 0.9  |

Mean K concentration ranged from 0.8 to 1.0 mg/l at the various stations sampled. The apparent stability of K ion concentrations is shown in figure 24. Unlike many of the other chemical parameters, K did not appear to follow any seasonal or long-term trends and concentrations entering the United States are roughly the same as concentrations leaving the United States.

#### 4.1.18 Sulfate (SO<sub>4</sub>).

Sulfate concentrations in the Kootenai River ranged from 138 mg/l to 11 mg/l. A summary of the data for three of the stations sampled is shown below:

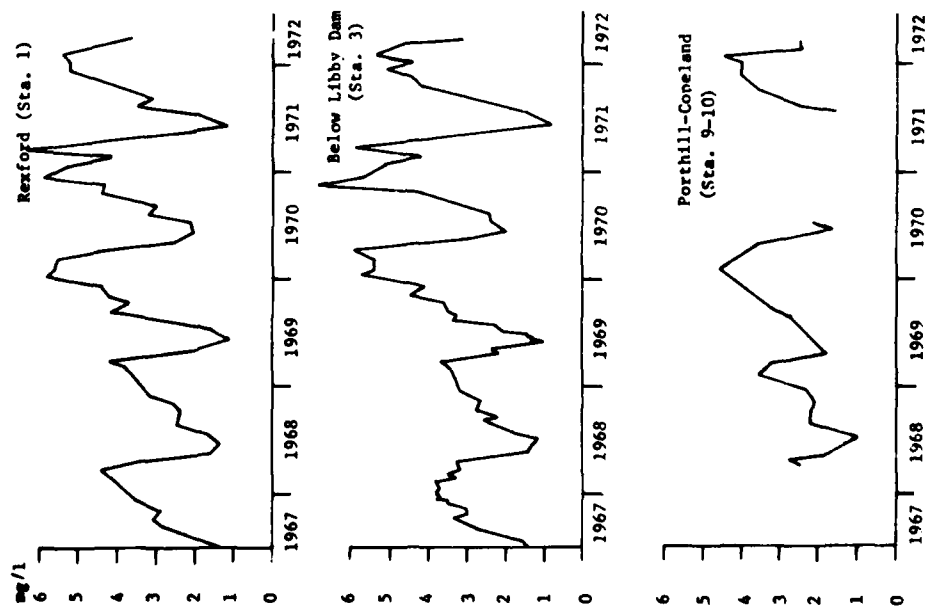


Figure 23. Sodium concentrations in the Kootenai River, 1967-1972.

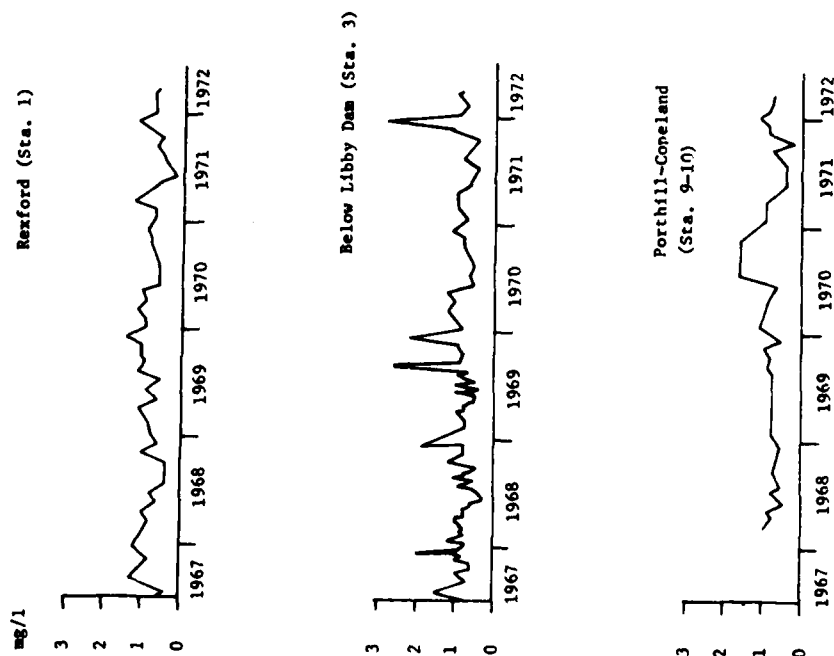


Figure 24. Potassium concentrations in the Kootenai River, 1967-1972.

| Location  | Period          | n  | mg/l SO <sub>4</sub> |         |      |
|-----------|-----------------|----|----------------------|---------|------|
|           |                 |    | Maximum              | Minimum | Mean |
| Sta. 1    | Jun 67 - Sep 69 | 24 | 138                  | 12      | 49   |
|           | Oct 69 - Mar 72 | 30 | 51                   | 12      | 36   |
| Sta. 3    | Jun 67 - Sep 69 | 16 | 133                  | 12      | 36   |
|           | Oct 69 - Mar 72 | 30 | 51                   | 11      | 34   |
| Sta. 9-10 | Apr 68 - Sep 69 | 15 | 58                   | 14      | 30   |
|           | Oct 69 - Mar 72 | 18 | 53                   | 13      | 27   |

A graph of the SO<sub>4</sub> concentrations is shown in figure 25. Sulfate is one of the major anions in freshwater and the second most abundant anion in the Kootenai River, exceeded in quantity only by bicarbonates. Unlike bicarbonates, however, which have remained rather stable, SO<sub>4</sub> concentrations have undergone fluctuations similar to those experienced by the major cation Ca. Following the peaks in SO<sub>4</sub> concentration experienced early in the study, concentrations have varied between 11 and 53 mg/l with little difference in range among sampling stations, although the mean for downstream stations was less than that for upstream stations. A summary of SO<sub>4</sub> for the upstream and downstream stations on the Kootenai River in the United States is presented below:

| Location  | Period             | n  | SO <sub>4</sub> Loading, Metric Tons/Day |         |       |
|-----------|--------------------|----|------------------------------------------|---------|-------|
|           |                    |    | Maximum                                  | Minimum | Mean  |
| Sta. 1    | Jun 67 - Dec 67    | 6  | 2,200                                    | 379     | 1,163 |
|           | 1968 Calendar year | 9  | 2,384                                    | 378     | 1,159 |
|           | 1969 Calendar year | 12 | 1,683                                    | 307     | 666   |
|           | 1970 Calendar year | 12 | 1,249                                    | 146     | 509   |
|           | 1971 Calendar year | 12 | 1,853                                    | 257     | 649   |
| Sta. 9-10 | Mar 68 - Dec 68    | 10 | 3,793                                    | 492     | 1,368 |
|           | 1969 Calendar year | 6  | 2,799                                    | 295     | 976   |
|           | 1970 Calendar year | 6  | 1,117                                    | 408     | 612   |
|           | 1971 Calendar year | 9  | 874                                      | 256     | 470   |

An approximate 50 percent decrease in mean daily SO<sub>4</sub> loading in the river occurred after 1968.

#### 4.1.19 Chloride (Cl).

Chloride concentrations ranged from 7.1 mg/l at station 1 in December 1971 to less than 1.0 mg/l at station 10 on a number of occasions during 1968 and 1969. A summary of these data for three of the stations sampled is shown below:

| Location  | Period          | n  | mg/l Cl |         |      |
|-----------|-----------------|----|---------|---------|------|
|           |                 |    | Maximum | Minimum | Mean |
| Sta. 1    | Jun 67 - Sep 69 | 24 | 3.0     | 0.4     | 1.8  |
|           | Oct 69 - Mar 72 | 30 | 7.1     | 1.1     | 2.7  |
| Sta. 3    | Jun 67 - Sep 69 | 16 | 2.8     | 0.8     | 1.8  |
|           | Oct 69 - Mar 72 | 29 | 6.0     | 1.0     | 3.5  |
| Sta. 9-10 | Apr 68 - Sep 69 | 15 | 3.0     | 1.0     | 1.7  |
|           | Oct 69 - Mar 72 | 23 | 4.5     | 1.4     | 3.1  |

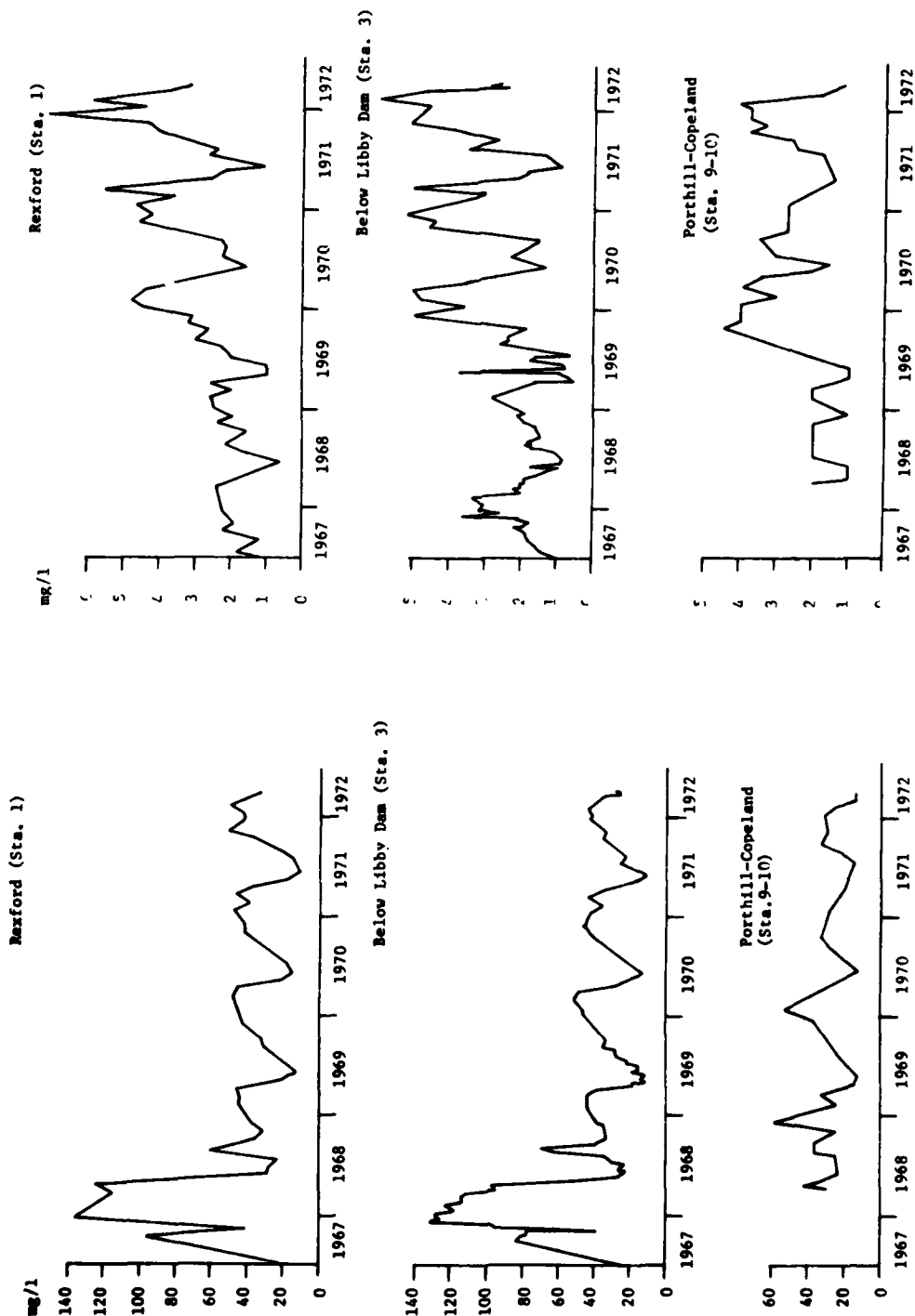


Figure 25. Sulfate concentrations in the Kootenai River, 1967-1972.

Figure 26. Chloride concentrations in the Kootenai River, 1967-1972.

Mean Cl concentrations at station 1 increased from 1.8 mg/l during the early phase of the study to 2.7 mg/l during the later phase, with the downstream stations reflecting increases of similar magnitude. A graph of the Cl data is shown in figure 26. The temporal increases noted in Cl ions parallel, in many respects, increases noted in the Na ion.

#### 4.1.20 Fluoride (F).

Fluoride concentrations in the river were high, with mean concentrations of 0.6 - 0.8 mg/l. Lower concentrations characterized downstream stations, indicating dilution as the river flowed through the United States. A graph of F concentrations for stations 1, 3, and 9-10 is presented in figure 27. A summary of the data for these stations is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l F</u>  |                |             |
|-----------------|-----------------|----------|----------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u> | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Jun 67 - Sep 69 | 24       | 3.4            | 0.0            | 0.9         |
|                 | Oct 69 - Mar 72 | 30       | 1.6            | 0.1            | 0.8         |
| Sta. 3          | Jun 67 - Sep 69 | 16       | 2.0            | 0.2            | 0.7         |
|                 | Oct 69 - Mar 72 | 30       | 1.5            | 0.2            | 0.7         |
| Sta. 9-10       | Mar 67 - Sep 69 | —        | —              | —              | —           |
|                 | Oct 69 - Mar 72 | 13       | 1.1            | 0.2            | 0.6         |

As can be seen in figure 27, there was a decline in observed peak F concentrations after mid-1968. The decline in F in the river is also reflected in the loading data, tables 47-49 of the appendix. For example, the mean F loading at station 1 for June 1967-December 1968 is 21.4 metric tons/day and for January 1969-March 1972 it is calculated to be 11 metric tons/day.

#### 4.1.21 Silica (SiO<sub>2</sub>).

Silica concentrations observed range from 10 mg/l at station 10 in April 1969 to 0.8 mg/l at station 3 in August 1970. Silica concentrations monitored at stations 1, 3, and 9-10 are graphed in figure 28 and a summary of the data for these stations is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l SiO<sub>2</sub></u> |                |             |
|-----------------|-----------------|----------|-----------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>              | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Jun 67 - Sep 69 | 24       | 8.5                         | 4.1            | 5.9         |
|                 | Oct 69 - Mar 72 | 30       | 7.7                         | 1.3            | 5.7         |
| Sta. 3          | Jun 67 - Sep 69 | 16       | 8.3                         | 2.8            | 6.0         |
|                 | Oct 69 - Mar 72 | 30       | 8.9                         | 0.8            | 5.8         |
| Sta. 9-10       | Mar 68 - Sep 69 | 16       | 10.0                        | 3.2            | 6.9         |

The mean SiO<sub>2</sub> concentrations for these three stations ranged from 5.8 to 6.9 mg/l with the higher value characterizing the downstream stations. While SiO<sub>2</sub> concentrations appear to demonstrate some of the trends characteristic of parameters such as Ca, the decline appeared to be more gradual, occurring over a period of years and culminating in the low concentrations noted in the summer of 1970.

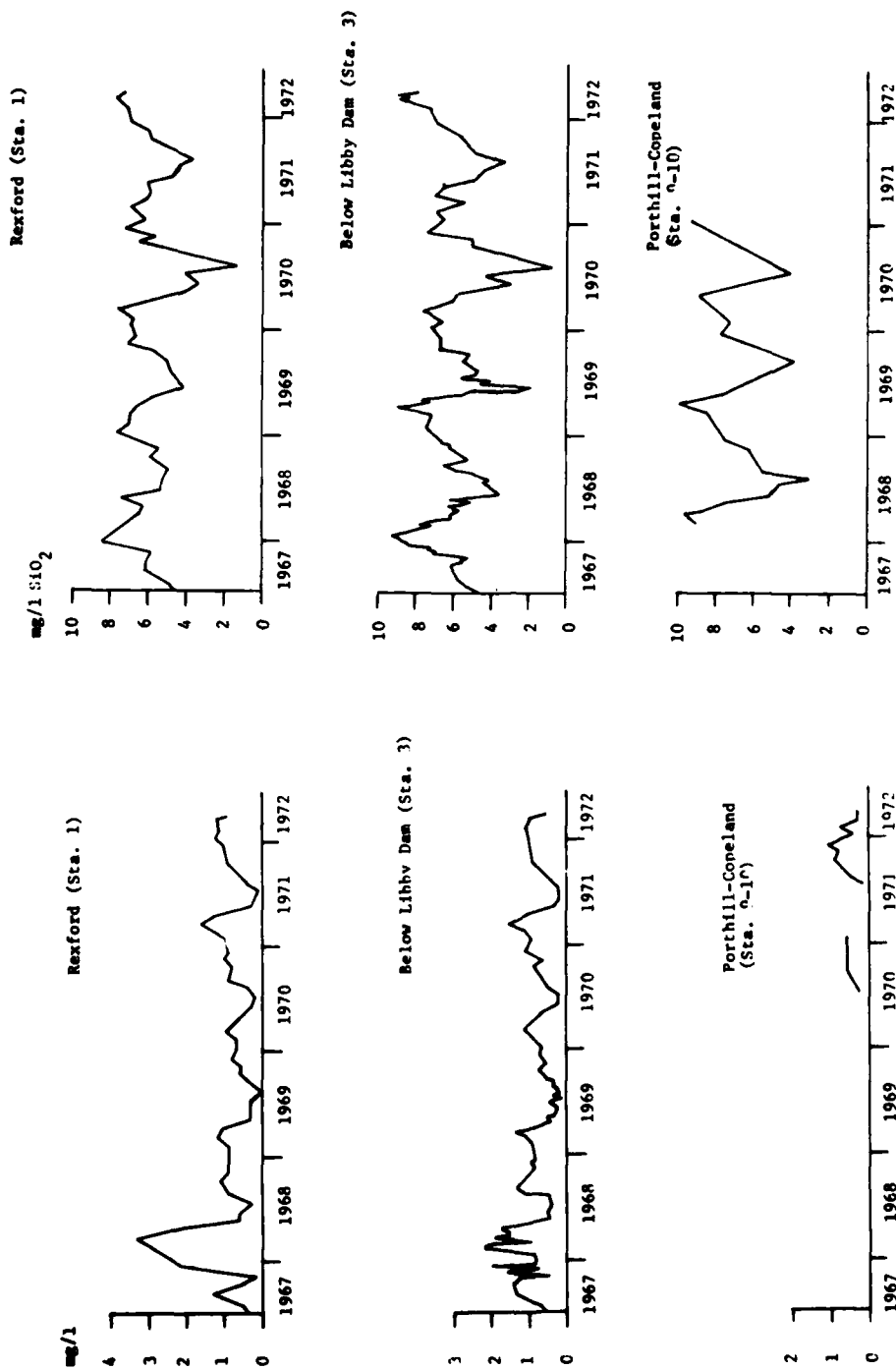


Figure 27. Fluoride concentrations in the Kootenai River, 1967-1972.

Figure 28. Silica concentrations in the Kootenai River, 1967-1972.

#### 4.1.22 Phosphorus.

A plot of total and ortho P concentrations for the study period for stations 1, 3, and 9-10 is presented in figure 29 and a summary of P data is presented below:

| Location  | Period          | n  | mg/l Ortho-P |         |      |
|-----------|-----------------|----|--------------|---------|------|
|           |                 |    | Maximum      | Minimum | Mean |
| Sta. 1    | Oct 67 - Dec 67 | 3  | 0.92         | 0.07    | 0.52 |
|           | 1968            | 10 | 0.97         | 0.14    | 0.42 |
|           | 1969            | 10 | 0.26         | 0.01    | 0.08 |
|           | 1970            | 12 | 0.35         | 0.04    | 0.12 |
|           | 1971            | 12 | 0.17         | 0.01    | 0.06 |
|           | Jan 72 - Mar 72 | 3  | 0.15         | 0.06    | 0.11 |
| Sta. 3    | Oct 67 - Dec 67 | 4  | 0.53         | 0.08    | 0.37 |
|           | 1968            | 9  | 1.08         | 0.11    | 0.48 |
|           | 1969            | 10 | 0.23         | 0.01    | 0.11 |
|           | 1970            | 12 | 0.37         | 0.01    | 0.12 |
|           | 1971            | 12 | 0.16         | 0.00    | 0.07 |
|           | Jan 72 - Mar 72 | 5  | 0.13         | 0.01    | 0.08 |
| Sta. 9-10 | Mar 68 - Dec 68 | 11 | 0.25         | 0.05    | 0.15 |
|           | 1969            | 6  | 0.18         | 0.022   | 0.06 |
|           | 1970            | 6  | 0.13         | 0.06    | 0.10 |
|           | 1971            | 12 | 0.10         | 0.00    | 0.05 |
|           | Jan 72 - Mar 72 | 3  | 0.13         | 0.02    | 0.07 |

| Location  | Period          | n  | mg/l Total dissolved P |         |      |
|-----------|-----------------|----|------------------------|---------|------|
|           |                 |    | Maximum                | Minimum | Mean |
| Sta. 1    | Oct 67 - Dec 67 | 3  | 0.94                   | 0.09    | 0.55 |
|           | 1968            | 9  | 1.09                   | 0.17    | 0.49 |
|           | 1969            | 10 | 0.34                   | 0.03    | 0.16 |
|           | 1970            | 9  | 0.15                   | 0.04    | 0.09 |
| Sta. 3    | Oct 67 - Dec 67 | 4  | 0.72                   | 0.09    | 0.55 |
|           | 1968            | 8  | 1.20                   | 0.15    | 0.52 |
|           | 1969            | 10 | 0.49                   | 0.02    | 0.15 |
|           | 1970            | 9  | 0.18                   | 0.04    | 0.10 |
| Sta. 9-10 | 1969            | 6  | 0.18                   | 0.00    | 0.09 |
|           | 1970            | 12 | 0.17                   | 0.01    | 0.07 |
|           | 1971            | 12 | 0.13                   | 0.00    | 0.07 |
|           | Jan 72 - Mar 72 | 3  | 0.14                   | 0.05    | 0.09 |

| Location  | Period          | n  | mg/l Total P |         |      |
|-----------|-----------------|----|--------------|---------|------|
|           |                 |    | Maximum      | Minimum | Mean |
| Sta. 1    | Oct 69 - Dec 69 | 3  | 0.33         | 0.14    | 0.21 |
|           | 1970            | 12 | 0.41         | 0.05    | 0.21 |
|           | 1971            | 10 | 0.31         | 0.04    | 0.18 |
|           | Jan 72 - Mar 72 | 3  | 0.22         | 0.16    | 0.19 |
| Sta. 3    | Oct 69 - Dec 69 | 3  | 0.55         | 0.19    | 0.34 |
|           | 1970            | 12 | 0.43         | 0.08    | 0.20 |
|           | 1971            | 11 | 0.27         | 0.04    | 0.16 |
|           | Jan 72 - Mar 72 | 5  | 0.18         | 0.11    | 0.14 |
| Sta. 9-10 | Mar 68 - Dec 68 | 11 | 0.33         | 0.072   | 0.20 |
|           | 1969            | 9  | 0.18         | 0.01    | 0.09 |
|           | 1970            | 12 | 0.20         | 0.02    | 0.09 |
|           | 1971            | 11 | 1.10         | 0.05    | 0.19 |
|           | Jan 72 - Mar 72 | 3  | 0.15         | 0.11    | 0.13 |

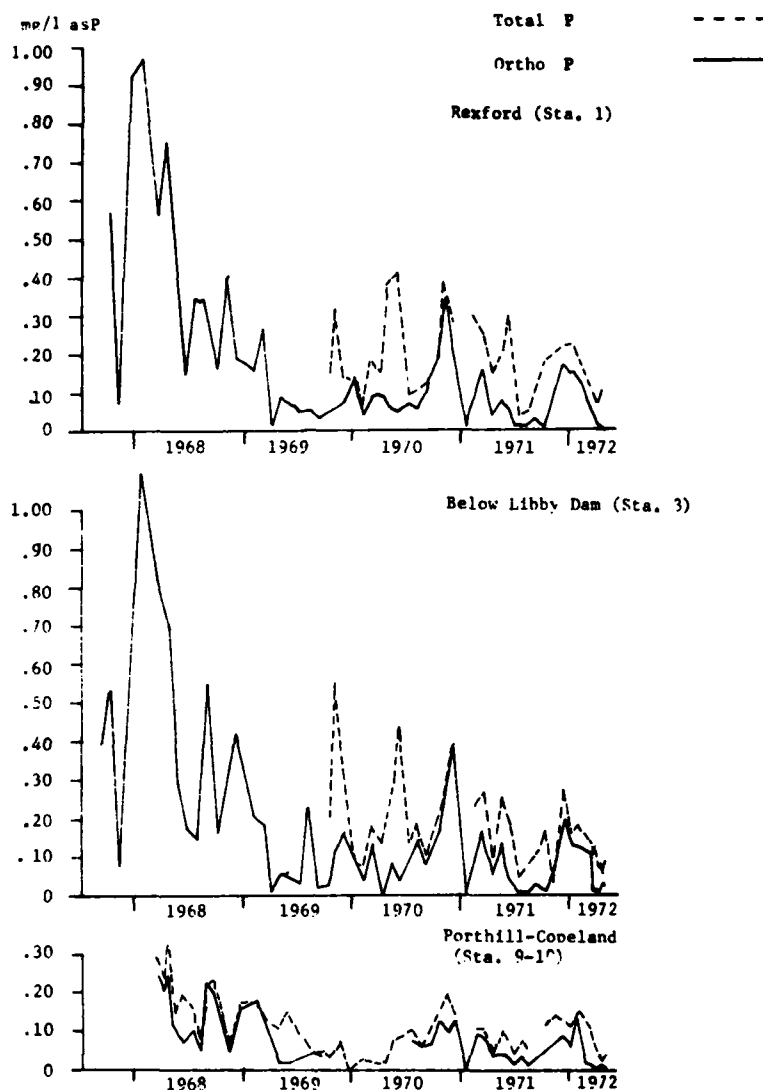


Figure 29. Total and ortho-phosphorus concentrations in the Kootenai River, 1967-1972.

As shown in figure 29 and reflected in the above table, there was a significant reduction in P levels in the river after 1968. Ortho-P concentrations in 1968 reached as high as 0.97 mg/l at station 1 and 1.08 mg/l at station 3. After 1968, peak ortho-P concentrations were 0.35 and 0.37 mg/l for stations 1 and 3, respectively. The mean ortho-P concentration decreased from 0.44, 0.45, and 0.15 mg/l at stations 1, 3, and 9-10, respectively in 1967-1968, to 0.09, 0.10, and 0.07 mg/l, respectively, after 1968.

Lower mean ortho and total dissolved P concentrations were more characteristic of the downstream stations in the Kootenai River than upstream stations.

Phosphorus loading in the Kootenai River for the days sampled are presented in the appendix (tables 47, 48, and 49) and summarized below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Ortho P Loading</u><br><u>metric tons/day</u> |                |             |
|-----------------|-----------------|----------|--------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                   | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | 1968            | 10       | 33.2                                             | 1.9            | 9.2         |
|                 | 1969            | 10       | 4.0                                              | 0.1            | 1.4         |
|                 | 1970            | 12       | 3.9                                              | 0.2            | 1.7         |
|                 | 1971            | 12       | 9.2                                              | 0.1            | 1.7         |
| Sta. 3          | 1968            | 9        | 29.1                                             | 3.2            | 10.2        |
|                 | 1969            | 10       | 6.5                                              | 0.2            | 1.8         |
|                 | 1970            | 12       | 4.4                                              | 0.1            | 2.0         |
|                 | 1971            | 12       | 9.6                                              | 0.0            | 1.8         |
| Sta. 9-10       | Mar 68 - Dec 68 | 11       | 2.9                                              | 0.6            | 1.8         |
|                 | 1969            | 6        | 4.0                                              | 0.6            | 1.8         |
|                 | 1970            | 6        | 3.0                                              | 1.0            | 1.5         |
|                 | 1971            | 12       | 5.6                                              | 0.0            | 1.5         |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Total P Loading</u><br><u>Metric Tons/Day</u> |                |             |
|-----------------|-----------------|----------|--------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                   | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | 1970            | 12       | 32.0                                             | 0.3            | 5.5         |
|                 | 1971            | 10       | 46.3                                             | 1.3            | 7.5         |
| Sta. 3          | 1970            | 12       | 42.8                                             | 0.5            | 5.9         |
|                 | 1971            | 11       | 28.4                                             | 0.4            | 5.8         |
| Sta. 9-10       | Mar 68 - Dec 68 | 11       | 6.3                                              | 1.6            | 3.2         |
|                 | 1969            | 9        | 30.0                                             | 0.1            | 5.2         |
|                 | 1970            | 12       | 7.7                                              | 0.1            | 2.4         |
|                 | 1971            | 11       | 16.0                                             | 1.2            | 4.7         |

The sharp reduction in P level in the Kootenai River after 1968 is demonstrated by the ortho-P loading data. Mean ortho-P loading at stations 1 and 3 decreased from 9.2 and 10.2 metric tons/day, respectively, in 1968, to 1.4-1.7 and 1.8-2.0 metric tons/day, respectively, in 1969, 1970 and 1971. Such a dramatic reduction was not as evident at stations 9-10.

A reduction in the average daily amount of P being carried by the river in its flow through the United States is indicated by the loading data.

Annual P loading was estimated by summation of computed daily loading which is calculated using mean daily discharge and estimated daily P concentrations as computed from linear interpolation of observed data. Estimated annual loadings for stations 1 and 3 are presented below:

| <u>Metric Tons Total P/Year</u> |               |               |               |
|---------------------------------|---------------|---------------|---------------|
|                                 |               | <u>Sta. 1</u> | <u>Sta. 3</u> |
| 1970                            | calendar year | 1,827         | 1,905         |
| 1971                            | calendar year | —             | 1,924         |

| <u>Metric Tons Ortho-P/Year</u> |               |               |               |
|---------------------------------|---------------|---------------|---------------|
|                                 |               | <u>Sta. 1</u> | <u>Sta. 3</u> |
| 1968                            | calendar year | 3,225         | 3,259         |
| 1969                            | calendar year | 840           | 816           |
| 1970                            | calendar year | 595           | 688           |
| 1971                            | calendar year | —             | 705           |

The sharp decrease after 1968 of P being carried by the river as it enters the United States is shown by the data. After 1968, loading remained rather stable. In the order of 2,000 metric tons per year total P, about 35 percent being ortho-P, is expected to enter Lake Kootcanusa annually upon impoundment of the river if loading remains consistent with that estimated for 1969, 1970, and 1971.

#### 4.1.23 Nitrogen (N).

The four forms of N sampled during the study were ammonia ( $\text{NH}_3\text{-N}$ ), nitrite ( $\text{NO}_2\text{-N}$ ), nitrate ( $\text{NO}_3\text{-N}$ ), and organic N which, in sum, provide an estimate of the total N present in the water.

Nitrites are unstable in the presence of dissolved oxygen and are quickly oxidized to  $\text{NO}_3$ . As would be expected,  $\text{NO}_2\text{-N}$  was generally found to be below detectable limits in the highly oxygenated waters of the Kootenai River and on the average represented 2 percent of the total N.

##### Ammonia Nitrogen ( $\text{NH}_3\text{-N}$ )

Ammonia nitrogen concentrations ranged from 0.93 mg/l (station 8, March 1971) to undetectable levels, with undetectable levels occurring rather frequently at stations throughout the river system. A summary of  $\text{NH}_3\text{-N}$  concentrations at three of the sampling stations is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l <math>\text{NH}_3\text{-N}</math></u> |                |             |
|-----------------|-----------------|----------|-----------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 69 - Mar 72 | 30       | .37                                           | .00            | .11         |
| Sta. 3          | Oct 69 - Mar 72 | 30       | .36                                           | .00            | .08         |
| Sta. 9-10       | Mar 68 - Sep 69 | 16       | .12                                           | .01            | .05         |
|                 | Oct 69 - Mar 72 | 30       | .21                                           | .00            | .07         |

Ammonia concentrations have been graphed in figure 30; no long-term trends are indicated.

##### Nitrate Nitrogen ( $\text{NO}_3\text{-N}$ ).

Nitrate nitrogen concentrations ranged from 2.0 mg/l at station 8 in March 1972 to below detectable limits. Concentrations observed at three of the stations sampled are graphed in figure 30 and summarized below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l <math>\text{NO}_3\text{-N}</math></u> |                |             |
|-----------------|-----------------|----------|-----------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 69 - Mar 72 | 30       | .28                                           | .00            | .14         |
| Sta. 3          | Oct 69 - Mar 72 | 30       | .79                                           | .00            | .16         |
| Sta. 9-10       | Mar 68 - Sep 69 | 17       | .25                                           | .01            | .09         |
|                 | Oct 69 - Mar 72 | 30       | .44                                           | .00            | .09         |

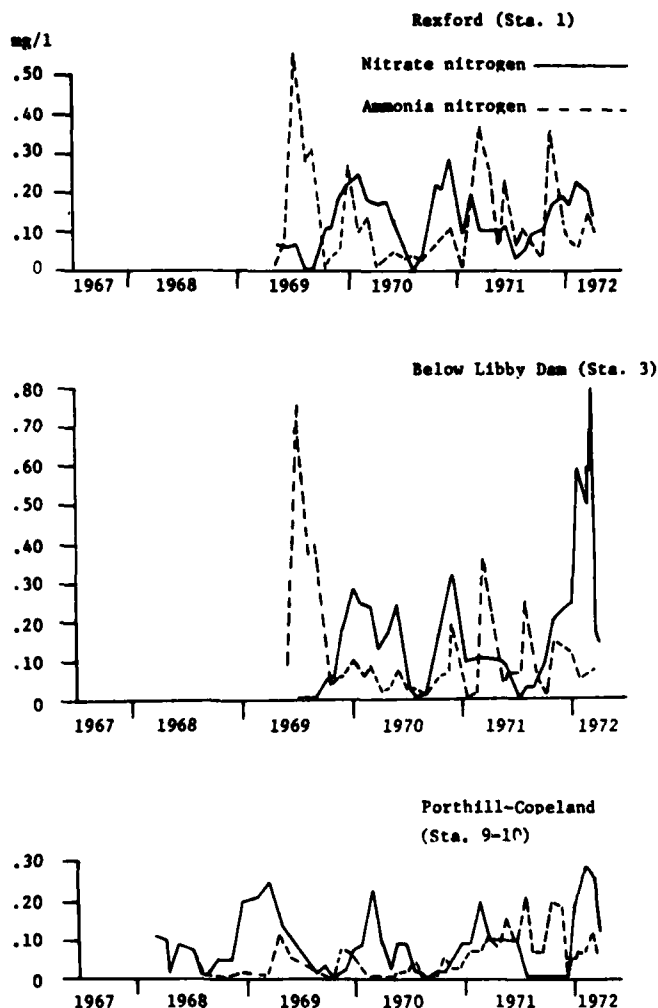


Figure 30. Ammonia nitrogen and nitrate nitrogen concentrations in the Kootenai River, 1967-1972.

A decrease in  $\text{NO}_3\text{-N}$  concentration as the river flows through the United States is indicated by the data. Seasonal trends which occurred at all stations differ somewhat from the parameters previously discussed in that minimum concentrations occur in late summer and early fall, rather than during the usual April to June period of peak stream-flow.

#### Organic Nitrogen.

Concentration of organic N ranged from 2.9 mg/l at station 9 in January 1972 to below detectable limits on a number of occasions, mostly in 1970 and 1971. A summary of the determinations made at three of the sampling stations is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>mg/l Organic N</u> |                |             |
|-----------------|-----------------|----------|-----------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>        | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 69 - Mar 72 | 30       | 0.41                  | 0.00           | 0.13        |
| Sta. 3          | Oct 69 - Mar 72 | 30       | 0.31                  | 0.00           | 0.14        |
| Sta. 9-10       | Mar 68 - Sep 69 | 16       | 0.69                  | < 0.04         | < 0.28      |
|                 | Oct 69 - Mar 72 | 28       | 0.40                  | 0.00           | 0.09        |

Mean organic N concentrations for the period October 1969 through March 1972 were 0.13 mg/l at station 1, 0.14 mg/l at station 3, and 0.09 mg/l at stations 9-10.

#### Total Nitrogen.

Estimated total N concentration (the sum of the organic and inorganic components) is graphed in figure 31. In general, concentrations of both organic and inorganic N are higher in the upstream areas than downstream. On the average, organic N, NO<sub>3</sub>-N, NO<sub>2</sub>-N, and NH<sub>3</sub>-N at station 1 was 34, 38, 2, and 26 percent of total N, respectively. At stations 9-10 the mean percent of total N that was organic increased to 39 percent, while the percent that was NO<sub>3</sub>-N and NH<sub>3</sub>-N decreased to 36 and 23 percent, respectively. There is indication that N concentrations at station 9 increased following the particularly low concentration of 1970 and early 1971.

Total N loading for the days sampled is presented in tables 47, 48, and 49 of the appendix and summarized below:

| <u>Location</u> | <u>Period</u> | <u>n</u> | <u>Total N Loading<br/>(metric tons/day)</u> |                |             |
|-----------------|---------------|----------|----------------------------------------------|----------------|-------------|
|                 |               |          | <u>Maximum</u>                               | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | 1970          | 12       | 27.3                                         | 1.1            | 7.1         |
|                 | 1971          | 12       | 55.6                                         | 0.6            | 11.2        |
| Sta. 3          | 1970          | 12       | 50.8                                         | 1.0            | 8.5         |
|                 | 1971          | 12       | 52.5                                         | 0.6            | 11.1        |
| Sta. 9-10       | 1969          | 9        | 45.9                                         | 1.0            | 13.1        |
|                 | 1970          | 12       | 16.8                                         | 0.4            | 4.2         |
|                 | 1971          | 10       | 68.1                                         | 1.4            | 17.1        |

Low runoff and relatively low N concentrations characterized the Kootenai River in 1970 and may explain the low N loading values in 1970. The large discrepancy between 1970 and 1971 N loading at stations 9-10 may be the result of delay in transport of N downstream due to the differences in discharge between 1970 and 1971.

An estimate of annual N loading in the river at stations 1 and 3 is presented below:

| <u>Period</u> | <u>Total N Loading<br/>Metric tons N/annum</u> |                  |
|---------------|------------------------------------------------|------------------|
|               | <u>Station 1</u>                               | <u>Station 3</u> |
| 1970          | 2,376                                          | 2,825            |
| 1971          | 4,070                                          | 4,057            |

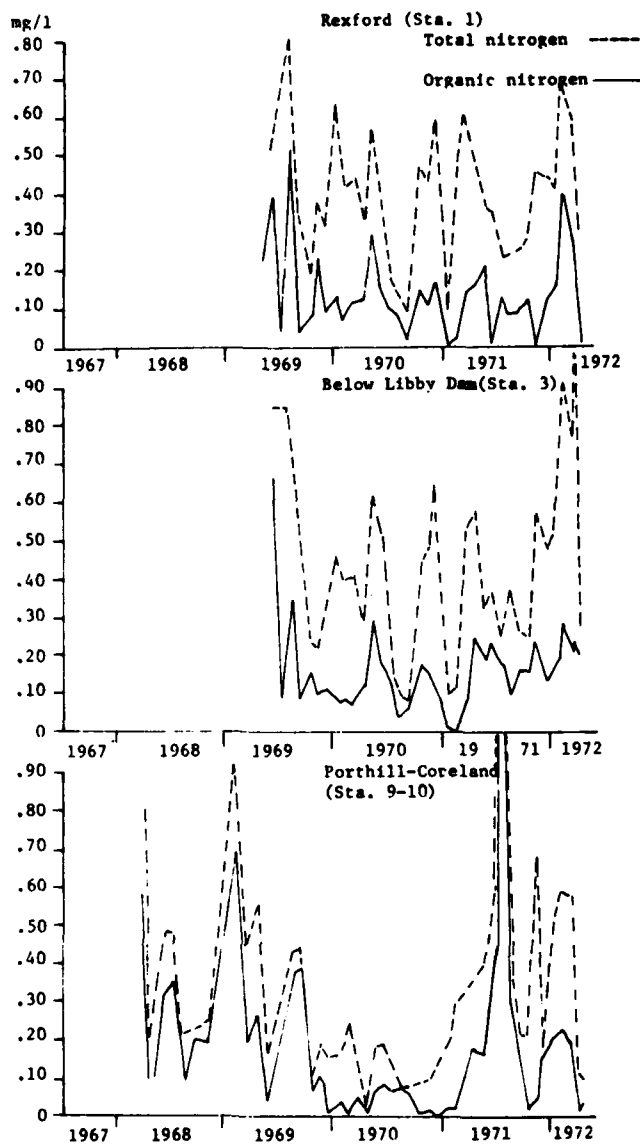


Figure 31. Total and organic nitrogen concentrations in the Kootenai River 1967-1972.

The annual loading was estimated by summing computed daily loadings which were calculated from mean daily discharges and estimated daily N concentrations as computed from linear interpolation of observed concentration data.

If stream loadings of N were to remain consistent with those recorded for 1969-71, an estimated N loading in excess of 3000 metric tons/year would be expected to enter Lake Koocanusa following impoundment of the Kootenai River by Libby Dam.

#### 4.1.24 Trace Elements.

Fresh waters contain a number of elements which under normal conditions are found in extremely small quantities, usually less than a milligram per liter. Many of the trace elements are essential for biological functions of aquatic organisms, although some of these same essential elements are toxic to life if present in appreciable quantities.

Among the trace elements monitored in the Kootenai River were Fe, Mn, Cu, Pb, Zn, Mo, Co, B, V, Al, Li, Se, Ba, Ni, Ag, Be, Sr, Cd, As, Hg, and Cr.

##### Iron (Fe).

Among the trace elements monitored that are essential for the operation of living systems is Fe. Concentrations of dissolved Fe ranged from a maximum of 240  $\mu\text{g/l}$  to undetectable levels during the period of study. A summary of Fe data for three of the stations sampled is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Fe <math>\mu\text{g/l}</math></u><br><u>(Kg Fe/day)</u> |                |             |
|-----------------|-----------------|----------|----------------------------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                                       | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 69 - Mar 72 | 30       | 240                                                                  | 0              | 63          |
|                 | Oct 69 - Mar 72 | 30       | (7,840)                                                              | (0)            | (1,192)     |
| Sta. 3          | Oct 69 - Mar 72 | 30       | 160                                                                  | 0              | 52          |
|                 | Oct 69 - Mar 72 | 30       | (8,516)                                                              | (0)            | (1,114)     |
| Sta. 9-10       | Nov 69 - Mar 72 | 18       | 200                                                                  | 10             | 41          |
|                 | Nov 69 - Mar 72 | 18       | (9,935)                                                              | (136)          | (1,320)     |

Although the mean concentrations of dissolved iron in the river declined from 63  $\mu\text{g/l}$  at station 1 to 41  $\mu\text{g/l}$  at station 9 during the period extending from October 1969 through March 1972, a small increase (about 11 percent) in the mean daily loading between station 1 and stations 9-10 was observed.

Monitoring of total Fe during the last year of study indicated that the greater part of the Fe present in the river was in suspended or particulate form. A graph of Fe concentrations is shown in figure 32. No particular trend, other than that which might be attributed to downstream dilution, is apparent in the data.

##### Manganese (Mn).

Manganese is essential to all organisms and plays a role in algal nitrogen metabolism and photosynthesis. Manganese concentrations ranged from 430  $\mu\text{g/l}$  at station 1 to below detectable limits during the period from October 1969 through March 1972. A summary of the data for three of the locations sampled is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u><math>\mu\text{g/l}</math> Mn</u> |                |             |
|-----------------|-----------------|----------|--------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                       | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 69 - Mar 72 | 30       | 430                                  | 0              | 46          |
| Sta. 3          | Oct 69 - Mar 72 | 29       | 250                                  | 0              | 34          |
| Sta. 9-10       | Nov 69 - Jun 71 | 10       | 390                                  | 0              | 55          |

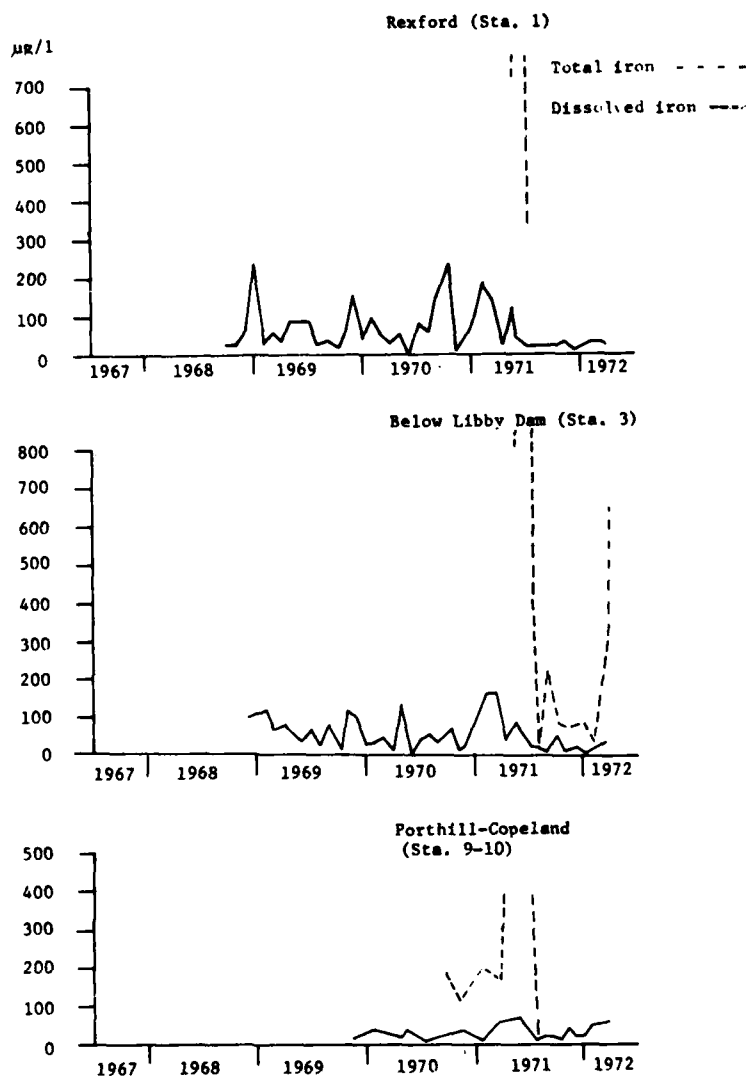


Figure 32. Iron concentrations in the Kootenai River, 1967-1972.

Mean concentrations were 46 µg/l at station 1, 34 µg/l at station 3, and 55 µg/l at station 9. A graph of the Mn data is presented in figure 33. Mn concentrations remained low except for a single analysis at stations 1 and 3 in February and Station 9 in March 1971.

Total Mn was sampled during the last year of the study. Anomalies occasionally appeared in analysis of total Mn which indicated levels lower than dissolved Mn.

#### Copper (Cu).

Although Cu is required by all organisms, any appreciable amount in the water may be lethal to fish and other aquatic life. For example, levels of 20 µg/l Cu have been reported to be toxic to fish and, under

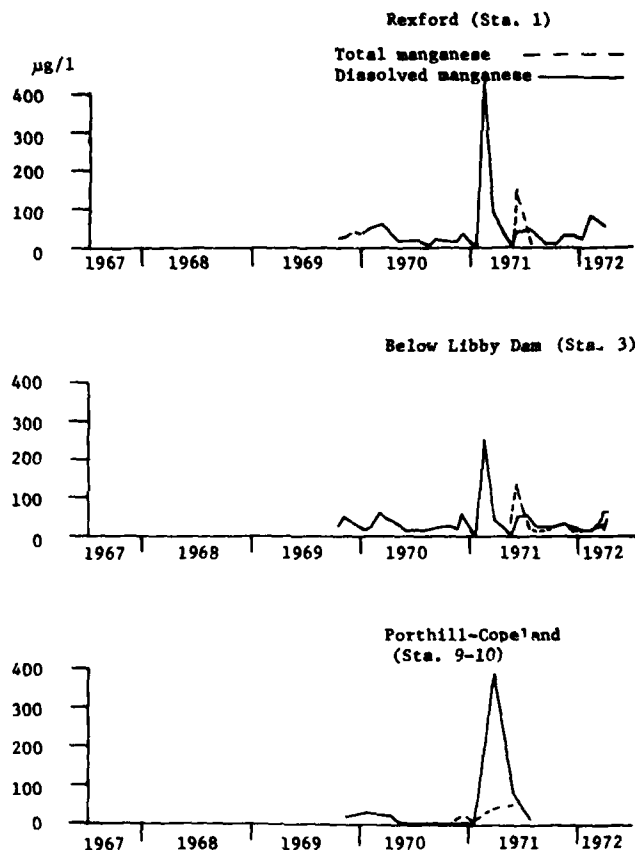


Figure 33. Manganese concentrations in the Kootenai River, 1967-1972.

some conditions, 10 µg/l have been found to be lethal to some aquatic organisms (Buhler, 1973). Cu concentrations in the Kootenai River ranged from below the detectable limit up to 30 µg/l. A summary of the data is shown below:

| Location | Period          | n  | Dissolved Cu µg/l |         |      |
|----------|-----------------|----|-------------------|---------|------|
|          |                 |    | Maximum           | Minimum | Mean |
| Sta. 1   | Oct 70 - Mar 72 | 18 | 6                 | 0       | 1    |
| Sta. 3   | Oct 70 - Mar 72 | 18 | 17                | 0       | 2    |
| Sta. 9   | Oct 69 - Sep 70 | 5  | 30                | 4       | 10   |
|          | Oct 70 - Mar 72 | 13 | 2                 | 0       | 1    |

With the exception of determinations of 30 µg/l at stations 9-10 in November 1969 and 17 µg/l at station 3 in October 1970, dissolved Cu concentrations did not exceed 8 µg/l and only rarely exceeded 2 µg/l during the last year and one-half of the study. Determinations of total Cu were infrequent but those that were done showed the river to contain, with one exception, less than 10 µg/l.

### Lead (Pb).

Dissolved Pb concentrations in the Kootenai River ranged from below detectable limits up to 23 µg/l, and thereby did not appear to be present in sufficient quantity to be normally lethal to aquatic organisms. Under some conditions, however, the lethal concentration for Pb can be as low as 10 µg/l (Buhler, 1973). A summary of the data is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>µg/l Dissolved Pb</u> |                |             |
|-----------------|-----------------|----------|--------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>           | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 8                        | 0              | 2           |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 6                        | 0              | 1           |
| Sta. 9          | Oct 69 - Sep 70 | 5        | 23                       | 7              | 11          |
|                 | Oct 70 - Mar 72 | 13       | 14                       | 0              | 2           |

Dissolved Pb concentrations only rarely exceed 10 µg/l. Concentrations of 1-2 µg/l were characteristic of the river during the last year and one-half of the study. The maximum concentration of total Pb was 60 µg/l but most total Pb values were under 10 µg/l.

### Zinc (Zn).

Zinc is required in minute amounts by algae. As with Cu, however, any appreciable amount in the water is toxic to aquatic life, particularly fish. Concentrations as low as 10 µg/l have been reported to be toxic to fish, although in general concentrations in excess of 90 µg/l are reported to be toxic in bioassay studies. Dissolved Zn concentrations ranged from below detectable limits up to 170 µg/l. A summary of the data is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>µg/l Zn</u> |                |             |
|-----------------|-----------------|----------|----------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u> | <u>Maximum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 78             | 0              | 34          |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 60             | 0              | 25          |
| Sta. 9          | Oct 69 - Sep 70 | 5        | 30             | 10             | 14          |
|                 | Oct 70 - Mar 72 | 13       | 170            | 0              | 51          |

Zinc only rarely occurred in concentrations below the detectable limit and was most frequently found within the range of 10 to 80 µg/l. While mean concentrations dropped from 34 µg/l at station 1 to 25 µg/l at station 3, occasional high values increased the mean to 51 µg/l at station 9. Determinations for total Zn were infrequent, but concentrations of total Zn were invariably under 50 µg/l.

### Molybdenum (Mo), Cobalt (Co), Boron (B), Vanadium (V)

Despite being normally present in river water in extremely small quantities, Mo, Co, B, and V play an important role in the biological functions of organisms in the aquatic ecosystem.

Molybdenum is involved in algal nitrate assimilation and the fixation of molecular nitrogen. Concentrations of dissolved Mo in the Kootenai River ranged from 0-12 µg/l and averaged 1.6 µg/l.

The most pronounced biological importance of Co is that it is a constituent of Vitamin B-12, an organic catalyst required by most aquatic organisms. Cobalt is generally found in fresh waters at concentrations less than 5 µg/l. The maximum concentration of Co found in the Kootenai River was 9 µg/l; the mean was less than 2 µg/l.

Boron is generally found in freshwater in concentrations around 13 µg/l. It is an essential element for the growth of plants and some algae, although its full biological function is not known. Concentrations recorded in the Kootenai River ranged from undetectable to 102 µg/l, with a mean of 13 µg/l.

Vanadium has been reported to be essential to some algae and is a normal constituent of animal and plant matter, although its vital function is not certain. In freshwater, the concentration of V averages 1 µg/l. The average concentration found in the Kootenai River was 0.2 µg/l and the maximum recorded was 1 µg/l.

A summary of the Mo, Co, B, and V data for stations 1, 3, and 9-10 is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Mo, µg/l</u> |                |             |
|-----------------|-----------------|----------|---------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>            | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 12                        | 0              | 1.8         |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 8                         | 0              | 1.6         |
| Sta. 9-10       | Nov 69 - Jul 71 | 9        | 3                         | 0              | 1.2         |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Co, µg/l</u><br>(Co total, µg/l) |                |             |
|-----------------|-----------------|----------|-----------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 4                                             | 0              | 0.8         |
|                 | May 71 - Jul 71 | 3        | (4)                                           | (<1)           | (<2)        |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 9                                             | 0              | 1           |
|                 | May 71 - Mar 72 | 11       | (9)                                           | (0)            | (<2)        |
| Sta. 9-10       | Nov 69 - Jul 71 | 10       | 3                                             | 0              | 1.5         |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved B, µg/l</u><br>(B total, µg/l) |                |             |
|-----------------|-----------------|----------|---------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                              | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Jun 69 - Sep 69 | 24       | 60                                          | 0              | 10          |
|                 | Oct 69 - Mar 72 | 30       | 102                                         | 0              | 17          |
| Sta. 3          | Jun 69 - Sep 69 | 16       | 100                                         | 0              | 14          |
|                 | Oct 69 - Mar 72 | 30       | 41                                          | 0              | 10          |
| Sta. 9-10       | Nov 69 - Jul 71 | 10       | 20                                          | 0              | 10          |
|                 | Sep 70 - Mar 71 | 5        | (20)                                        | (<10)          | (<14)       |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved V, µg/l</u> |                |             |
|-----------------|-----------------|----------|--------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>           | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 1.0                      | 0              | 0.2         |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 0.8                      | 0              | 0.2         |
| Sta. 9-10       | Nov 69 - Mar 72 | 13       | 2.2                      | 0              | 0.4         |

Aluminum (Al), Lithium (Li), Selenium (Se), Nickel (Ni), Silver (Ag),  
Beryllium (Be), and Cadmium (Cd).

Average concentrations of dissolved Al, Li, Se, Ni, Ag, Be, and Cd found in the waters of the Kootenai River were similar to those reported in the literature for river waters. The mean concentrations for these seven dissolved elements averaged for stations 1, 3, and 9-10 in the Kootenai River were 171, 5.6, 4, 3.2, 0.6, 1.0, and less than 0.3  $\mu\text{g/l}$ , respectively.

A summary of the Al, Li, Se, Ni, Ag, Be, and Cd data for three of the stations sampled is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Al, <math>\mu\text{g/l}</math></u> |                |             |
|-----------------|-----------------|----------|-------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 400                                             | 0              | 156         |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 400                                             | 0              | 156         |
| Sta. 9-10       | Nov 69 - Jul 71 | 10       | 600                                             | 0              | 226         |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Li, <math>\mu\text{g/l}</math></u> |                |             |
|-----------------|-----------------|----------|-------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 25                                              | 0              | 5           |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 22                                              | 0              | 6           |
| Sta. 9-10       | Jul 71          | 1        | 8                                               | -              | 8           |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Se, <math>\mu\text{g/l}</math></u> |                |             |
|-----------------|-----------------|----------|-------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 9-10       | Nov 69 - Jan 72 | 11       | 13                                              | 0              | 4           |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Ni, <math>\mu\text{g/l}</math></u> |                |             |
|-----------------|-----------------|----------|-------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 15                                              | 0              | 3           |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 4                                               | 0              | 2           |
| Sta. 9-10       | Nov 69 - Jul 71 | 10       | 10                                              | 0              | 5.5         |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Ag, <math>\mu\text{g/l}</math></u> |                |             |
|-----------------|-----------------|----------|-------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 1                                               | 0              | 0.3         |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 1                                               | 0              | 0.3         |
| Sta. 9-10       | Nov 69 - Jul 71 | 8        | 10                                              | 0              | 2.2         |

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Be, <math>\mu\text{g/l}</math></u> |                |             |
|-----------------|-----------------|----------|-------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                  | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 10                                              | 0              | 1.3         |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 5                                               | 0              | 0.3         |
| Sta. 9-10       | Nov 69 - Jul 71 | 10       | 10                                              | 0              | 1.5         |

| Location  | Period          | n  | Dissolved Cd, $\mu\text{g/l}$<br>(total Cd, $\mu\text{g/l}$ ) |         |        |
|-----------|-----------------|----|---------------------------------------------------------------|---------|--------|
|           |                 |    | Maximum                                                       | Minimum | Mean   |
| Sta. 1    | Oct 70 - Mar 72 | 18 | 1                                                             | 0       | 0      |
|           | May 71 - Jul 71 | 3  | (1)                                                           | (<1)    | (<1)   |
| Sta. 3    | Oct 70 - Mar 72 | 18 | 1                                                             | 0       | 0      |
|           | May 71 - Mar 72 | 11 | (2)                                                           | (<1)    | (<1)   |
| Sta. 9-10 | Nov 69 - Oct 71 | 11 | 3                                                             | 0       | 1.4    |
|           | Sep 70 - Jan 72 | 4  | (3)                                                           | (<1)    | (<1.5) |

#### Strontium (Sr), Barium (Ba).

Dissolved Sr concentrations observed ranged from 30-360  $\mu\text{g/l}$ , with the average concentration at stations 1 and 3 being about 200  $\mu\text{g/l}$  and the average at station 9 being 138  $\mu\text{g/l}$ . The maximum and mean values for Sr found in the waters of the Kootenai River are somewhat higher than those found in natural streams and lakes. Similarly, concentrations of Ba found in the Kootenai River were higher than those reported for natural lakes and streams. The concentration of Ba in the Kootenai River ranged from undetectable to 1 mg/l and averaged 83, 91, and 161  $\mu\text{g/l}$  at stations 1, 3, and 9, respectively.

A summary of the Sr and Ba concentrations monitored at stations 1, 3, and 9-10 is presented below:

| Location  | Period          | n  | Dissolved Sr, $\mu\text{g/l}$<br>(total Sr, $\mu\text{g/l}$ ) |         |      |
|-----------|-----------------|----|---------------------------------------------------------------|---------|------|
|           |                 |    | Maximum                                                       | Minimum | Mean |
| Sta. 1    | Oct 70 - Mar 72 | 18 | 300                                                           | 30      | 197  |
| Sta. 3    | Oct 70 - Mar 72 | 18 | 360                                                           | 40      | 200  |
| Sta. 9-10 | Nov 69 - Jul 71 | 6  | 200                                                           | 80      | 138  |
|           | Nov 70 - May 71 | 5  | (140)                                                         | (60)    | (98) |

| Location  | Period          | n  | Dissolved Ba, $\mu\text{g/l}$ |         |      |
|-----------|-----------------|----|-------------------------------|---------|------|
|           |                 |    | Maximum                       | Minimum | Mean |
| Sta. 1    | Oct 70 - Mar 72 | 18 | 320                           | 0       | 83   |
| Sta. 3    | Oct 70 - Mar 72 | 18 | 600                           | 0       | 91   |
| Sta. 9-10 | Nov 69 - Jul 71 | 10 | 1,000                         | 0       | 161  |

#### Mercury (Hg).

The dissolved Hg level monitored in the Kootenai River was, on the average, slightly in excess of 0.1  $\mu\text{g/l}$ . Excluding the single value of 1.0  $\mu\text{g/l}$  at station 3 on 13 March 1972 and the single high value of 3.1  $\mu\text{g/l}$  at stations 9-10 on 2 March 1972, the mean dissolved Hg for stations 1, 3, and 9-10 were 0.1, 0.1, and 0.3  $\mu\text{g/l}$ , respectively. Only a few determinations of total Hg were made and the level found was often less than the level of detection for the method of analysis used. A summary of the Hg data for stations 1, 3, and 9-10 is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Hg, µg/l</u><br><u>(total Hg, µg/l)</u> |                |             |
|-----------------|-----------------|----------|------------------------------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                                       | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 0.3                                                  | 0              | 0.1         |
|                 | Jan 71 - Jul 71 | 3        | (<0.5)                                               | (0)            | (<0.3)      |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 1.0                                                  | 0              | 0.2         |
|                 | May 71 - Mar 72 | 9        | (1.2)                                                | (<0.5)         | (<0.6)      |
| Sta. 9-10       | Sep 70 - Mar 72 | 15       | 3.1                                                  | <0.1           | <0.5        |
|                 | Nov 70 - Jan 71 | 3        | (0.3)                                                | (0.2)          | (0.3)       |

#### Arsenic (As).

Concentrations of dissolved As monitored in the Kootenai River were low. Mean values for stations 1, 3, and 9-10 were 4, 6, and 2 µg/l, respectively. A summary of dissolved As for the three stations is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved As, µg/l</u> |                |             |
|-----------------|-----------------|----------|---------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>            | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 10                        | 0              | <4          |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 40                        | 0              | 6           |
| Sta. 9-10       | Nov 69 - Jan 72 | 12       | 10                        | 0              | <2          |

#### Chromium (Cr).

Concentrations of Cr monitored in the Kootenai River were very low and maximum values observed were well below levels reported to adversely affect aquatic life. The maximum total Cr concentration observed was 4 µg/l at station 7; the maximum dissolved Cr and hexavalent Cr concentrations observed were 2 and 1 µg/l, respectively. A summary of Cr data for stations 1, 3, and 9-10 is presented below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Dissolved Cr, µg/l</u>  |                |             |
|-----------------|-----------------|----------|----------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>             | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | May 71 - Mar 72 | 11       | 0                          | 0              | 0           |
| Sta. 3          | Oct 70 - Mar 72 | 17       | 2                          | 0              | 0           |
| Sta. 9-10       | Nov 69 - Mar 72 | 9        | 2                          | 0              | 0.6         |
| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>total Cr, µg/l</u>      |                |             |
|                 |                 |          | <u>Maximum</u>             | <u>Minimum</u> | <u>Mean</u> |
| Sta. 9-10       | Oct 70 - Jan 72 | 7        | 2                          | <1             | <1.3        |
| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Hexavalent Cr, µg/l</u> |                |             |
|                 |                 |          | <u>Maximum</u>             | <u>Minimum</u> | <u>Mean</u> |
| Sta. 1          | Oct 70 - Mar 72 | 18       | 1                          | 0              | 0           |
| Sta. 3          | Oct 70 - Mar 72 | 18       | 1                          | 0              | 0           |

#### 4.1.25 Methylene Blue Active Substances (MBAS).

Presence of MBAS indicates the occurrence of detergents in water. Concentrations of MBAS were sampled only at stations 1 and 3 during the last 1-1/2 years of study. Results indicated traces of detergents at

station 1 in November-December 1970 and January 1971, but no detectable amounts thereafter. Only on one occasion during monthly sampling from October 1970 - March 1972 at station 3 has MBAS been detected.

#### 4.2 Bacteriological Data.

##### 4.2.1 Coliform Bacteria.

Sampling for the presence of bacteria of the coliform group was done to obtain an indication of the sanitary quality of the waters of the river. Since coliform bacteria naturally inhabit the soil, vegetation, and water, as well as being normal inhabitants of fecal discharges, the abundance of coliform bacteria is not solely adequate for determination of fecal contamination.

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Coliforms/100 ml</u> |                |             |
|-----------------|-----------------|----------|-------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>          | <u>Minimum</u> | <u>Mean</u> |
| Sta. 7          | Mar 68 - Sep 69 | 17       | 3,600                   | 8              | 680         |
|                 | Oct 69 - Mar 72 | 28       | 830                     | 1              | 121         |
| Sta. 8          | Mar 68 - Sep 69 | 12       | 2,500                   | 55             | 920         |
|                 | Oct 69 - Mar 72 | 28       | 3,300                   | 16             | 726         |
| Sta. 9-10       | Mar 68 - Sep 69 | 15       | 1,400                   | 10             | 565         |
|                 | Oct 69 - Mar 72 | 27       | 2,400                   | 17             | 398         |

Coliform counts ranged from 3,600/100 ml at station 7 in June 1968 to 1/100 ml at the same station in March 1971. Maximum concentrations correlate with periods of high flows. Mean numbers increased between stations 7 and 8 but declined at stations 9-10 during the study.

##### 4.2.2 Fecal Coliforms.

Analyses for fecal coliforms were added to the program at stations 7, 8, and 9 in October 1969. A summary of the results is shown below:

| <u>Location</u> | <u>Period</u>   | <u>n</u> | <u>Fecal Coliforms/100 ml</u> |                |             |
|-----------------|-----------------|----------|-------------------------------|----------------|-------------|
|                 |                 |          | <u>Maximum</u>                | <u>Minimum</u> | <u>Mean</u> |
| Sta. 7          | Oct 69 - Mar 72 | 29       | 120                           | 0              | 19          |
| Sta. 8          | Oct 69 - Mar 72 | 18       | 260                           | 1              | 63          |
| Sta. 9          | Oct 69 - Mar 72 | 19       | 215                           | 1              | 39          |

Coliforms of fecal origin ranged from 0 to 260/100 ml. Mean concentrations of 19/100 ml at station 7 increased to 63/100 ml at station 8 and then dropped to 39/100 ml at station 9.

#### 4.3 Bottom Fauna.

Results from the 4 years of sampling involving 230 bottom samples and 50 cylindrical substrate samples showed that the invertebrate population of the Kootenai River was, for all practical purposes, dominated by insects. Only two other major groups of invertebrates were found to be present: Gastropods (snails) probably of the genus Physa and aquatic earthworms and leeches of the Phylum Annelida. These organisms occurred only rarely and formed a rather insignificant part of the number and biomass of aquatic invertebrates present.

Table 6. Listing of insects collected from the Kootenai River, 1968-1971.

| Order           | Suborder                    | Family                          | Subfamily                        | Genus                                                               |                                             |
|-----------------|-----------------------------|---------------------------------|----------------------------------|---------------------------------------------------------------------|---------------------------------------------|
| Plecoptera      | Holognatha<br>(=Filipalpia) | Pteronarcidae                   |                                  | Pteronarcys<br>Pteronarcella                                        |                                             |
|                 |                             | Nemouridae                      | Capniinae                        | Capnia<br>Isocapnia                                                 |                                             |
|                 |                             |                                 | Taeniopteryginae                 | Brachyptera                                                         |                                             |
|                 |                             |                                 | Nemourinae                       | Nemoura                                                             |                                             |
|                 |                             | Systellognatha<br>(=Setipalpia) | Perlodidae                       | Isogeninae                                                          | Isogenus<br>Arcynopteryx                    |
|                 | Isoperlinae                 |                                 |                                  | Isoperla                                                            |                                             |
|                 | Perlidae                    |                                 | Perlodinae                       | Diura                                                               |                                             |
|                 |                             |                                 | Acroneurinae                     | Acroneuria<br>Claassenia                                            |                                             |
|                 |                             |                                 | Chloroperlidae                   | Chloroperlinae                                                      | Allerperla                                  |
|                 | Ephemeroptera               | Baetidae                        | Baetidae                         | Baetis<br>Callibaetis                                               |                                             |
| Siphonuridae    |                             | Siplonurinae <u>1/</u>          | Amaletus<br>Paramaletus          |                                                                     |                                             |
|                 |                             | Ephemerellidae                  | Ephemerellinae <u>1/</u>         | Ephemerella                                                         |                                             |
| Leptophlebiidae |                             | Leptophlebiinae <u>1/</u>       | Leptophlebia<br>Paraleptophlebia |                                                                     |                                             |
|                 |                             | Heptageniidae                   | Heptageniidae                    | Heptagenia<br>Rhithrogena<br>Cinygmula<br>Epeorus<br>Subgenus-Irona |                                             |
| Trichoptera     |                             | Hydropsychidae                  |                                  | Hydropsyche<br>Parapsyche<br>Arctopsyche<br>Cheumatopsyche          |                                             |
|                 |                             |                                 | Brachycentridae                  | Brachycentrus                                                       |                                             |
|                 |                             |                                 | Glossosomatidae                  | Glossosoma                                                          |                                             |
|                 |                             |                                 | Rhyacophilidae                   | Rhyacophila                                                         |                                             |
|                 |                             |                                 | Limnephilidae                    | Neothremma                                                          |                                             |
|                 | Diptera                     | Nematocera                      | Tandipididae (=Chironomidae)     |                                                                     |                                             |
|                 |                             |                                 | Tipulidae                        | Tipulinae                                                           | Tipula<br>Holorusia<br>Hexatoma<br>Simulium |
|                 |                             |                                 |                                  | Limoniinae                                                          |                                             |
|                 |                             |                                 | Simuliidae (=Melusinidae)        |                                                                     |                                             |
|                 |                             |                                 | Tanyderidae                      |                                                                     |                                             |
| Brachycera      |                             | Rhagionidae (=Leptidae)         | Atherix                          |                                                                     |                                             |
|                 |                             | Empididae                       |                                  |                                                                     |                                             |
|                 |                             | Tabanidae                       |                                  |                                                                     |                                             |
|                 |                             | Agrionidae                      | Agrion                           |                                                                     |                                             |
|                 |                             | Elmidae                         |                                  |                                                                     |                                             |
| Odonata         | Zygoptera                   |                                 |                                  |                                                                     |                                             |
|                 | Polyphaga                   | Hydrophilidae                   | Hydrophilus                      |                                                                     |                                             |
|                 |                             | Dytiscidae                      |                                  |                                                                     |                                             |
|                 | Adephaga                    | Gyrinidae                       |                                  |                                                                     |                                             |
|                 |                             | Sialidae                        | Sialis                           |                                                                     |                                             |
| Megaloptera     |                             | Corixidae                       |                                  |                                                                     |                                             |
| Hemiptera       |                             |                                 |                                  |                                                                     |                                             |

1/Classified under family Baetidae in Usinger, 1963.

#### 4.3.1 Insects.

A listing of the aquatic insects collected and their taxonomic affinities is shown in table 6. While 51 individual taxa representing eight major insect orders were found to be present, only Plecoptera (stoneflies), Ephemeroptera (mayflies), Trichoptera (caddisflies), and Diptera (true

flies) were common. Taxa within these four orders made up over 99 percent of the insects in a sample composed of more than 100,000 insects weighing almost a kilogram (2.2 lb). The remaining 1 percent consisted of Odonata (dragon flies), Coleoptera (beetles, mostly of the family Elmidae), Megaloptera (alderflies), and Hemiptera (aquatic bugs, all in the family Corixidae).

For purposes of clarity, discussion of the results will be confined only to the first four insect orders, with results of bottom and cylindrical substrate sampling being treated separately.

#### 4.3.2 Bottom Sampling.

The 230 bottom fauna samples collected between 1968 and 1971 contained a total of 75,217 insects weighing 713.27 g. This is an average of 327 insects weighing 3.1 g/sq m (equivalent to an insect standing crop of about 300 lb/acre). Summaries of bottom fauna are presented in the appendix, tables 50 through 64.

The insect population, considering all areas combined, increased in both numbers and weight during the period of study. Numbers of insects almost doubled, increasing from a mean of 2,159/sq m in 1968 to 4,124/sq m in 1971. Weight of insects more than tripled, rising from a mean of 19.3 g/sq m to 58.7 g/sq m during the same period.

The trend for an increasing insect population was evident at each of the four sampling locations. Insect populations at the two sampling stations above Libby Dam (stations 1 and 2) appeared to be quite similar, particularly in terms of weight, with 4-year means of 3,918 and 4,582 insects, respectively, weighing 43.7 and 45.9 g/sq m, respectively. Combined, the data from these two stations show an increase from a mean of 2,673 insects weighing 28.8 g/sq m in 1968 to 4,996 insects weighing 78.5 g/sq m in 1971. This is an increase of 187 percent in numbers and 273 percent in weight between 1968 and 1971.

Insect populations at the two stations below Libby Dam were smaller than at the two stations above Libby Dam with 4-year means of 3,027 and 2,553 insects weighing 23.9 and 20.1 g/sq m, respectively. Combined, the data from stations 3 and 4 show an increase from a mean of 1,645 insects weighing 9.9 g/sq m in 1968 to 3,253 insects weighing 38.8 g/sq m in 1971. This is an increase of 198 percent in numbers and 392 percent in weight between 1968 and 1971.

Comparison of the 4-year mean at stations 1 and 2 (4,253 insects weighing 48.4 g/sq m) with the 4-year mean for stations 3 and 4 (2,788 insects weighing 22.0 g/sq m) indicates that the insect population below Libby Dam averaged 66 percent of the population above the dam in terms of numbers and 45 percent in terms of weight.

The similarities and differences between the control and test areas, along with variations in numbers and biomass that occur within the course of each year, are shown in figure 34. Large temporal variations can be noted not only within areas, but between areas. Accepting the fact that insect population data can be highly variable, there appears to be relatively good agreement between the data collected at stations

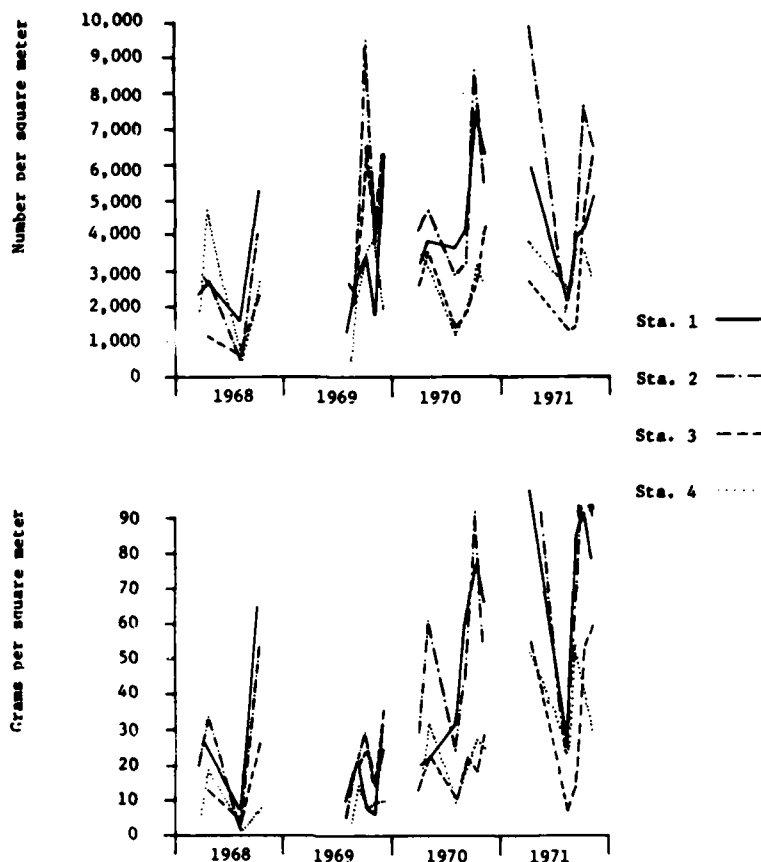


Figure 34. Mean number and weight of insects per square meter at four stations in the Kootenai River, 1968-1971.

1 and 2 and between the data collected at stations 3 and 4. The trend of the insect population at stations 1 and 2, when compared with stations 3 and 4, indicates that some factor, or factors, prevented the populations at stations 3 and 4 from reaching their full potential. This is particularly noticeable in 1970 and 1971.

#### Plecoptera.

Plecoptera (stoneflies) composed 16 percent of the total number of insects and 29 percent of the total by weight. The mean for all samples was 571 stoneflies weighing 9.6 g/sq m.

Combined, the data from stations 1 and 2 show a mean of 672 stoneflies averaging 13.4 g/sq m while stations 3 and 4 had a mean of 471 stoneflies weighing 5.8 g/sq m. This indicates that the stonefly population below Libby Dam was about 70 percent of the size of the stonefly population above Libby Dam in terms of numbers and 43 percent in terms of weight.

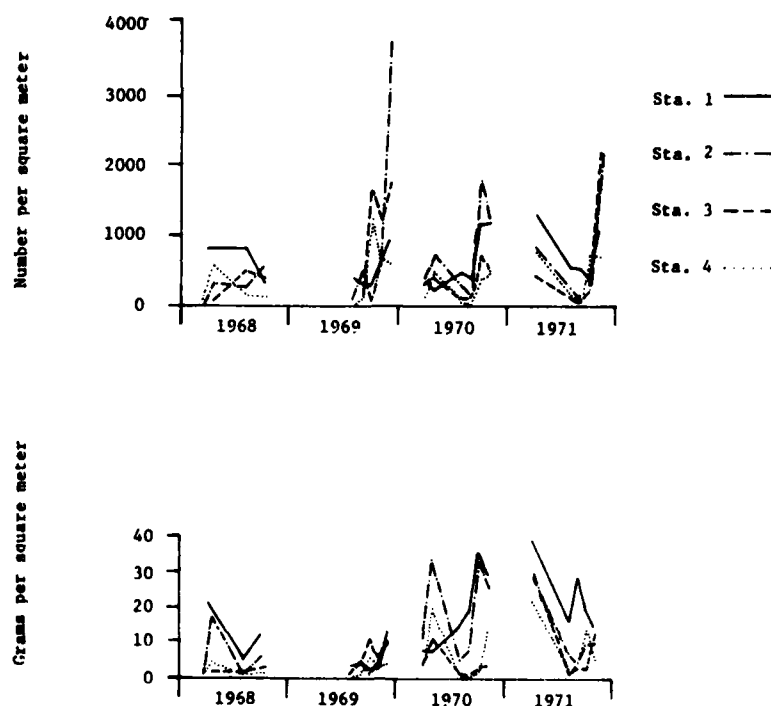


Figure 35. Mean number and weight of Plecoptera per square meter at four locations in the Kootenai River, 1968-1971.

While a generally increasing trend can be noted in the sample means plotted for the stonefly population, as shown in figure 35, the increase is neither as large nor as consistent as that for the insect population as a whole. Number of stoneflies at stations 3 and 4 apparently declined after 1969, but biomass continued to increase. Indications that this decline was probably not of a permanent nature can be seen in the fact that over 2,100 stoneflies/sq m were found at station 3 in November 1971.

A remarkable feature of the data is the mean of 3,771 stoneflies/sq m collected at station 2 in December 1969. These samples were dominated by winter stoneflies of the genus Capnia and Brachyptera which, due to their small size, were taken in numbers only during this period of the year.

Five stonefly families, containing 13 genera, were found to be present. While an attempt was made throughout the study to identify nymphs to the generic level, identification, particularly of the early instars, was difficult. In some cases confusion appears to have existed in the identification of families. For this reason, no attempt has been made to evaluate the composition of the stonefly population other than to say that the smaller population below Libby Dam seems to be due to a factor, or factors, which affected the order as a whole as opposed to the elimination or reduction of a particular family.

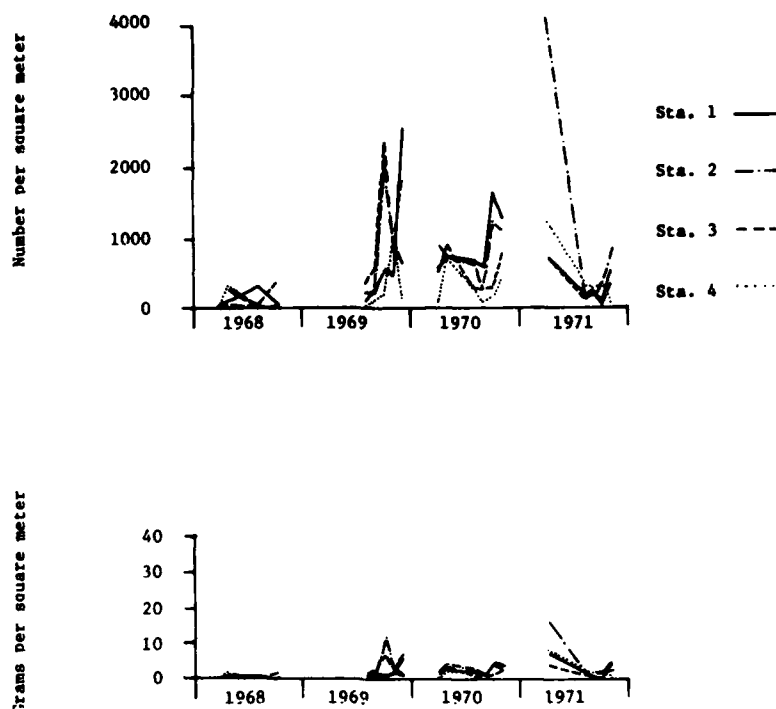


Figure 36. Mean number and weight of Ephemeroptera per square meter at four stations in the Kootenai River, 1968-1971.

#### Ephemeroptera.

Ephemeroptera, the mayflies, composed 16 percent of the total number of insects, the same percentage as the stoneflies, but due to their small size they made up only 7 percent of the total weight. The mean for all samples was 554 mayflies weighing 2.2 g/sq m.

Combining the data from stations 1 and 2 shows a mean of 680 mayflies weighing 2.6 g/sq m while stations 3 and 4 had 428 mayflies weighing 1.8 g/sq m. This indicates that the mayfly population below Libby Dam was about 70 percent of the size of the mayfly population above the dam in terms of both numbers and weight.

There was a trend between 1968 and 1969 for an increasing mayfly population at all sampling sites (figure 36). The population at stations 2, 3, and 4 reached the peak in 1969 and progressively declined in 1970 and 1971, while the population at station 1 did not reach its peak until 1970. While relatively good populations were maintained at stations 3 and 4 throughout 1970 and 1971, there is some indication that fall populations failed to reach their full potential as indicated by the control stations.

Five mayfly families, including 11 genera, were found to be present. Baetis constituted 76 percent of the total number of mayflies present and occurred at an overall density of 420/sq m. The two sampling loca-

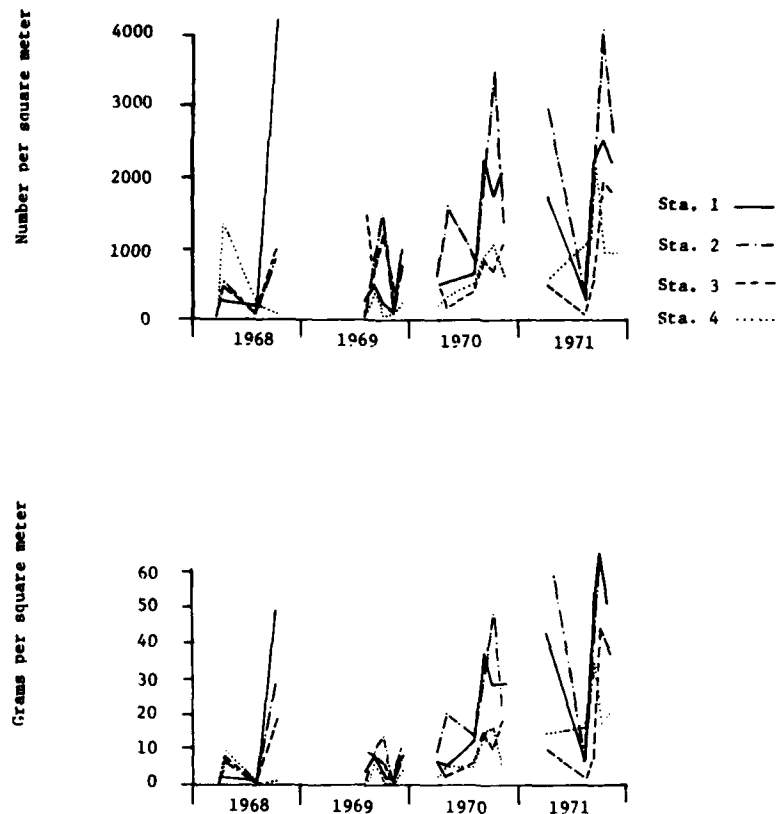


Figure 37. Mean number and weight of Trichoptera per square meter at four stations in the Kootenai River, 1968-1971.

tions below Libby Dam average 317 Baetis/sq m compared to an average of 520/sq m at the two stations above the dam. This indicates that Baetis were considerably more abundant above the project than below. Ephemerella, which made up 11 percent of the total number of mayflies taken, averaged 62/sq m, with the population below the dam being 77 percent of the size of that above the dam.

#### Trichoptera.

Trichoptera (caddisflies) composed 27 percent of the total numbers of insects and nearly half (49 percent) of the sample by weight. The mean for all samples was 960 caddisflies weighing 16.4 g/sq m.

Combined, the data from stations 1 and 2 show a mean of 1,276 caddisflies/sq m with a weigh of 22.6 g/sq m, while stations 3 and 4 had a mean of 643 caddisflies/sq m with a weight of 10.1 g/sq m. This indicates that the caddisfly population below Libby Dam was about 50 percent of the size of the caddisfly population above Libby Dam in terms of numbers and 45 percent in terms of weight.

Rather extraordinary increases in both numbers and weight that occurred throughout the course of the study can be seen in figure 37.

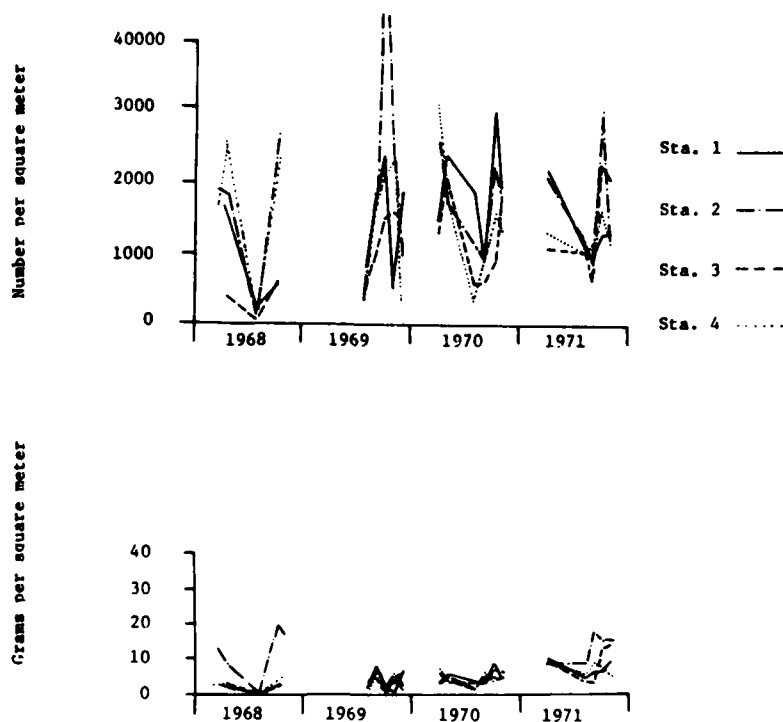


Figure 38. Mean number and weight of Diptera per square meter at four stations in the Kootenai River, 1968-1971.

The caddisfly population above the dam, and particularly at station 2, increased by many orders of magnitude between 1968 and 1971, with individual samples taken in October 1970 and 1971 totaling more than 6,000 caddisflies/sq m with sample means of from 3,000 to 4,000/sq m. With few exceptions, caddisflies were more abundant at stations 1 and 2 than at stations 3 and 4 in 1970 and 1971, again indicating the existence of some factor affecting the population below the dam site.

Five caddisfly families were noted during the course of the study and, with the possible exception of the Limnephilidae which occurred only during the early years of study, no substantive changes have been noted in the diversity of the population. Representatives of the family Hydropsychidae made up 94 percent of the caddisfly population, with the genus *Hydropsyche* dominating. The major trends in the population are therefore due to fluctuation occurring among the members of this family.

#### Diptera.

Diptera, the true flies, composed 41 percent of the total number of insects, but, due to the small size of the dominant family (Tendipididae), members of this insect order made up only 15 percent of the sample by weight. The mean for all samples was 1,428 Diptera weighing 5.2 g/sq m.

Combined, the data from stations 1 and 2 show a mean of 1,613 Diptera weighing 6.1 g/sq m, while stations 3 and 4 had a mean of

1,243 Diptera weighing 4.3 g/sq m. This indicates that the Diptera population below Libby Dam was about 77 percent of the size of the population above Libby Dam in terms of numbers and 70 percent in terms of weight.

Population trends for Diptera are shown in figure 38. Although Diptera biomass exhibits an increasing trend, the population in terms of numbers seems to be stable. Only numbers of true flies at stations 1 and 3 appear to have increased. The most notable feature of the data is the relatively similar population levels found in both control and test areas.

Seven families were found to be present, but the most important by far were members of the family Tendipididae (=Chironomidae), or midges, which made up 97 percent of the total Diptera.

#### 4.3.3 Cylindrical Substrate Sampling.

A total of 50 cylindrical substrate samples were collected during the years 1968 and 1969 containing 29,934 insects weighing 228.23 g (thereby averaging 539 insects weighing 4.6 g/sample). Summaries of the cylindrical substrate sampling data are contained in the appendix, tables 65 through 67.

The number of insects/samples increased from 374 in 1968 to 679 in 1969 while at the same time biomass decreased from 6.3 g/sample in 1968 to 3.1 g/sample in 1969. Insects at station 3 below the dam occurred in considerably larger numbers than at the two stations above the dam during both years of study. In 1968, station 3 averaged 754 insects/sample and this increased to 1,161 insects/sample in 1969. Biomass, however, decreased from 12.7 g in 1968 to 4.9 g/sample in 1969. Numbers increased from 131 insects/samples at stations 1 and 2 in 1968 to 438 insects/sample in 1969. Biomass, however, remained stable, averaging 2.1 g/sample in 1968 and 2.2 g/sample in 1969. Figure 39 shows the average number and weight of insects taken at each of the three sampling stations.

It is evident that unusually large numbers of caddisflies dominated the insect population and constituted 58 percent of the total number of insects collected. The dominating influence of caddisflies was particularly evident at station 3 both in September 1968 and September 1969 (figure 40). The three September 1968 samples averaged 1818 caddisflies weighing 31.3 g/sample and the three September 1969 samples averaged 1614 caddisflies weighing 8.74 g/sample. A notable feature of the data is the sharp insect population decline in the samples taken late in the year.

Population trends for Plecoptera are shown in figure 41. Plecoptera which averaged 35/sample in 1968 increased to 105/sample in 1969, largely due to the large numbers occurring at stations 2 and 3. Somewhat similar trends are shown for Ephemeroptera (figure 42) and Diptera (figure 43).

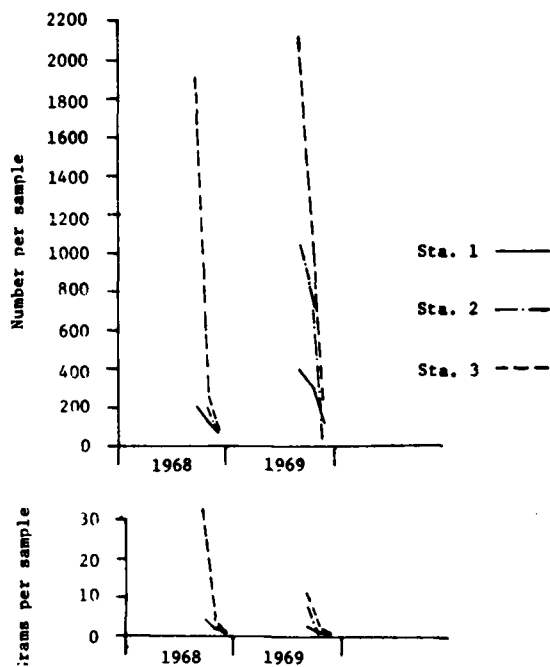


Figure 39. Mean number and weight of insects per cylindrical substrate sample at three stations in the Kootenai River, 1968 and 1969.

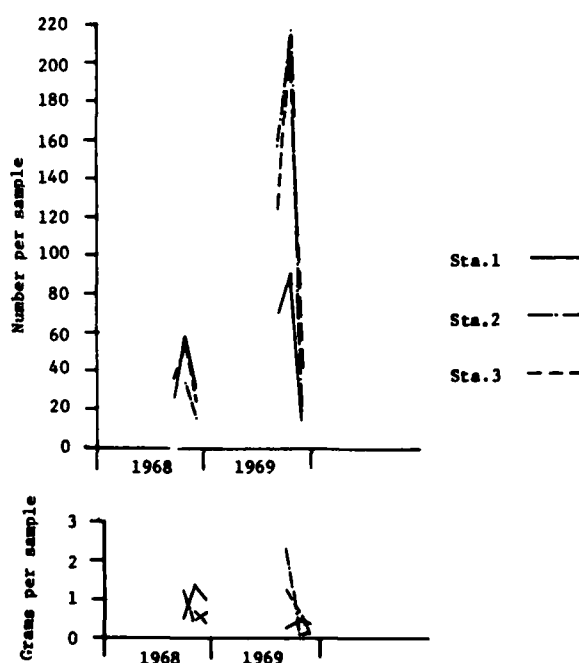


Figure 40. Mean number and weight of Plecoptera per cylindrical substrate sample at three stations in the Kootenai River, 1968 and 1969.

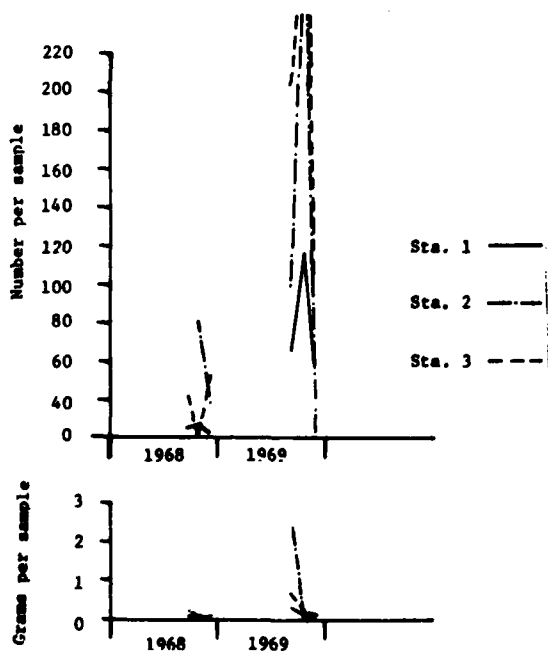


Figure 41. Mean number and weight of Ephemeroptera per cylindrical substrate sample at three stations in the Kootenai River, 1968 and 1969.

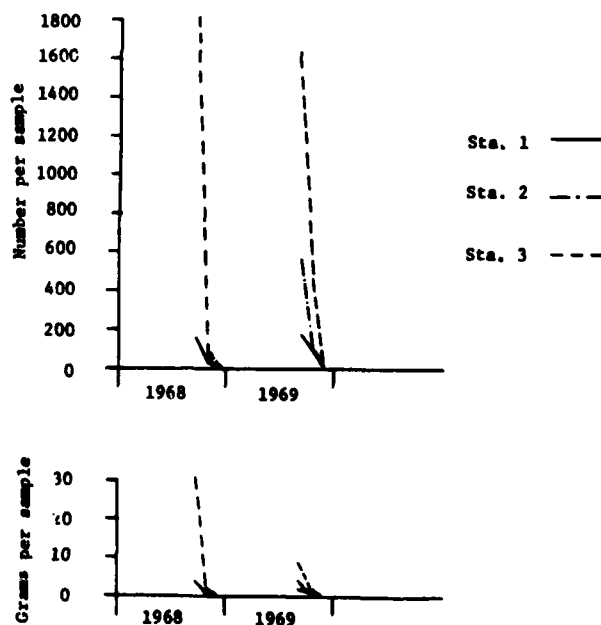


Figure 42. Mean number and weight of Trichoptera per cylindrical substrate sample at three stations in the Kootenai River, 1968 and 1969.

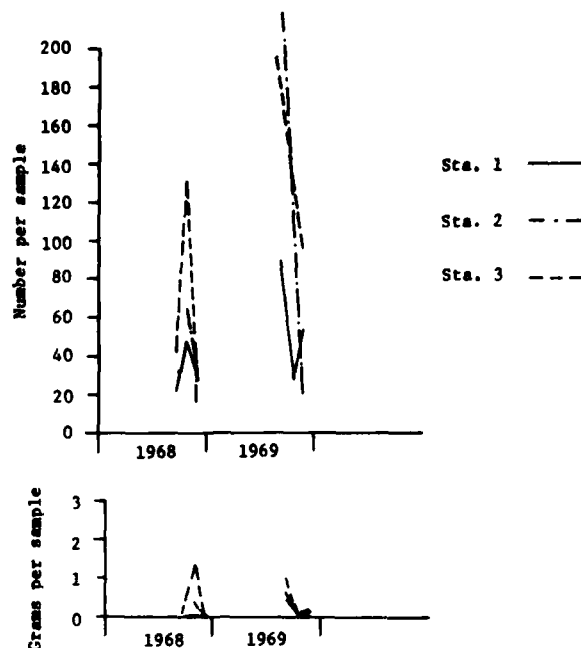


Figure 43. Mean number and weight of Diptera per cylindrical substrate sample at three stations in the Kootenai River, 1968 and 1969.

## 5.0 DISCUSSION

The Kootenai River is the second largest tributary of the Columbia River, with a discharge of nearly 800 cu m/sec (28,200 c.f.s.). The river, which has a length of about 780 km (485 miles) and a basin of almost 50,000 sq km (19,300 sq miles), is shared by Canada and the United States. Most of the river and its basin, along with the source and mouth of the river, lie in Canada. About one-third of the river's length and one-quarter of the basin area lie within the United States. The portion of the basin within the United States produces about one-fifth of the water discharged at the river mouth.

Practically all of the water that passes the background station at Rexford, near the Canadian-United States border, originates in Canada. At the Libby Dam site, about 90 percent of the water originates in Canada. The Canadian contribution of runoff in the river declines to 63 percent at the downstream border station near Porthill, Idaho. The water quality characteristics at the upstream station are, thereby, largely determined within the Canadian portion of the basin. Some of the many factors affecting water quality in the basin are delineated in previous reports (U.S. Army Corps of Engineers, 1969, 1970 and 1971) and by Shurr (1969) and Northcote (1972, 1973). Factors affecting water quality in the Canadian portion of the Kootenai River are discussed in the Canadian report (Crozier and Leinweber, 1975) published concurrent with this

report to document the water quality of the river prior to impoundment by Libby Dam.

River discharge for the study period was 106 percent of normal, based on the period 1910-1972. River discharge of 118 to 120 percent of normal characterized the years 1967, 1969, and 1971. The year 1968 was a normal year in respect to discharge and 1970 was a low water year having 75 percent of normal flow.

Wide seasonal fluctuations in discharge are characteristic of the river. Flows entering the United States between calendar years 1967-1971 ranged from 37 to 1994 cu m/sec (1,300 to 70,376 c.f.s.) with a mean of 309 cu m/sec (10,906 c.f.s.). The range at Porthill is 74 to 2,784 cu m/sec (2,620 to 98,300 c.f.s.) with a mean of 488 cu m/sec (17,247 c.f.s.). Roughly, 70 percent of the river's mean annual flow occurs during the spring and early summer. These fluctuations have rather dramatic effects upon the quality of the water. Suspended sediment concentrations, which are low during periods of base flow, increase during high water, while dissolved solids concentrations, which are high during base flow, decrease during high flows. With the bulk of the discharge occurring during the months of May, June, and July, dissolved and suspended loadings increase and are higher during that period than in the entire remaining 9 months of the year.

During the preimpoundment study period, the Kootenai River was a fast-flowing, cold-water river containing moderately hard to hard water of the calcium bicarbonate type. The river was quite fertile, as indicated by the high dissolved solids content and a large and diverse aquatic insect population. Dissolved oxygen concentrations invariably remained at or near saturation. High dissolved oxygen concentrations, along with the relatively low observed values for biochemical oxygen demand, indicate that the river was effective in assimilating organic loads without respiratory stress to aquatic life. For about 8 months of each year, the water was clear, transparent, and almost colorless. During periods of high discharge the river picked up a large suspended sediment load and became turbid and the true color increased. Increases could also be detected in total coliforms during periods of high water, but human contamination was not indicated since fecal coliforms were generally low (and within Montana's water quality standards for the river). The pH of the river water was often rather high for natural waters and the free carbon dioxide content, which strongly influences the pH, was generally low. The water, with bicarbonate as the dominant anion, had a high alkalinity which gave the river a high "buffering capacity."

Dissolved solids content of streams entering the Kootenai River from the Cabinet and Purcell Mountains was lower than that of the Kootenai and the river became more dilute as it traversed the United States; there was, however, an overall increase in the total dissolved solids load. This same phenomenon was noted to occur with most of the major ions as well as with suspended sediments.

An important feature of the study was the detection of an abrupt decrease in a number of water quality parameters in the Kootenai River in September 1968 which could be attributed to treatment of an industrial discharge entering the St. Mary River, a tributary of the Kootenai

River in British Columbia. The decrease was observed to occur in the concentrations of Ca, SO<sub>4</sub>, F, and PO<sub>4</sub> and was reflected in specific conductance and hardness determinations.

Concurrent with the reduction of the above stated water quality parameters was an observed change in the aquatic insect population. The population of aquatic insects increased between 1968 and 1969 and remained high throughout the remainder of the study. Such strongly suggests that the chemical changes in the river, following the waste water treatment of the industrial discharge in British Columbia, had a beneficial effect on the insect population.

Concentrations of trace elements monitored in the river were low or within the range characteristic of natural waters, except for Zn, Ba, and Sr. Only Zn, however, was observed in concentrations which may have, at times, exerted sublethal effects on aquatic organisms in the river.

The high F concentrations observed during the early part of the study were of concern as the concentration approached and, at times, exceeded, particularly at low flow, the level considered to be toxic to aquatic life (McKee and Wolf, 1963). As stated above, the F concentration significantly decreased after 1968.

Ammonia concentrations observed in the river were often very high; levels as high as 0.93 mg/l were observed. The mean level at the upstream border station was 11 mg/l. The high observed concentrations of NH<sub>3</sub> indicate that NH<sub>3</sub> toxicity may have been a problem in the upper reaches of the river. The high pH of the Kootenai River would have tended to increase the toxicity of ammonia.

Na and Cl concentrations increased during the study period. While the reason for the increase is not entirely clear, increases in industrial and domestic wastes are suspect.

Concentration of P in the Kootenai River as it entered the United States was high, particularly in 1967 and 1968. Mean Ortho-P concentrations for 1967, 1968, 1969, 1970 and 1971 were 0.52, 0.42, 0.08, 0.12, and 0.06 mg/l, respectively. Total P was not monitored at the upstream border station until mid-1969; the mean concentration for 1969-71 ranged from 0.18 to 0.21 mg/l. The high P concentrations in the river are attributable to the waste discharges of a fertilizer plant to the St. Mary River in British Columbia (Northcote, 1972, 1973). Despite the waste water controls of the fertilizer industry in 1968, the levels in the river remained high.

Lower mean total and Ortho-P concentrations were characteristic of the downstream stations as the result of dilution from low P runoff waters to the river, to a loss of P by sedimentation processes, and to uptake by aquatic organisms.

Ortho-P loading of the Kootenai River entering the United States is estimated to have been in excess of 3,000 metric tons/year in 1968, declining to around 785 metric tons/year for the remainder of the study period. Northcote (1973) indicates that the PO<sub>4</sub>-P loading of the Kootenai River below its confluence with the St. Mary River has approached

1,000 metric tons/annum since the 1960's. Total P loading for 1970 and 1971 is estimated to have been in the order of 2,000 metric tons/year.

Total N concentrations of the Kootenai River entering the United States were high. The mean for September 1969 through March 1972 was 0.41 mg/l. On the average, organic -N,  $\text{NO}_3\text{-N}$ ,  $\text{NO}_2\text{-N}$ , and  $\text{NH}_3\text{-N}$  were 34, 38, 2, and 26 percent of total N, respectively. Upon leaving the United States, the percent of total N in the river that was organic increased to 39 percent, while the percent that was  $\text{NO}_3\text{-N}$  and  $\text{NH}_3\text{-N}$  decreased to 36 and to 23 percent, respectively.

The N loading of the Kootenai River entering the United States is estimated to have been in excess of 3,000 metric tons/year for 1970 and 1971.

Concern for the development of eutrophic conditions in the reservoir (Lake Koocanusa) formed by impoundment of the Kootenai River by Libby Dam, as a result of high P concentrations and loadings in the river, has been expressed since initiation of the preimpoundment study. According to the best available guidelines on permissible P loading for lakes (Vollenweider, 1968 1973), Lake Koocanusa will be receiving sufficient P to place it well into the category of eutrophic lakes if the P loading of the Kootenai River remains consistent with that found for 1969-1972. The annual P loading expressed per unit lake surface area would be in the order of  $10 \text{ g/m}^2$ , the estimate being based on a conservative estimate of total P loading, 1,500 metric tons/yr, and an average lake elevation of 738 meters (2,420 ft) with an average surface area of  $1.5 \times 10^8 \text{ m}^2$  ( $3.75 \times 10^3$  acres). For a lake with the mean depth (43 m (113 ft)) and retention time (0.5 yr) expected for Lake Koocanusa, the "permissible" and "dangerous" P loading levels in regard to eutrophication given by Vollenweider (1973) are 1.0 and  $2.0 \text{ g/m}^2 \text{ yr}$ , respectively. The total P loading estimated for Lake Koocanusa will be an order of magnitude greater than the "permissible" guideline presented by Vollenweider and the dissolved P loading will be approximately 4 times the guideline for "permissible" loading in respect to eutrophication. The dissolved portion would provide an immediate source of P for algal growth.

The critical concentration of N in a lake at the beginning of the growing season above which excessive algae blooms may be expected to occur is 0.2-0.3 mg/l when P concentrations are from 0.01 to 0.02 mg/l (Sawyer, 1947; Mackenthun, 1965; Vollenweider, 1968). The mean N concentration of the Kootenai River upon entry into the United States was 0.41 mg/l while the P concentration was an order of magnitude greater than the critical 0.02 mg/l value. The "permissible" and "dangerous" N loading level in respect to potential development of eutrophic conditions for a lake with the mean depth expected for Lake Koocanusa is predicted at  $4 \text{ g/m}^2 \text{ yr}$  and  $8 \text{ g/m}^2 \text{ yr}$ , respectively (Vollenweider, 1968). The estimated loading to Lake Koocanusa, based on river loading for the study period, is  $20 \text{ g/m}^2 \text{ yr}$ , of which about two-thirds is inorganic N.

Although the exact biological response of a lake to nutrient enrichment is exceedingly difficult to determine, the state of the art does allow statements regarding a lake if it is threatened. It is noteworthy that Vollenweider's loading criteria in relation to development of eutrophic conditions in a lake are in excellent agreement with

limnological experience. Lake Koocanusa can be expected to develop eutrophic conditions, particularly nuisance algae blooms, if P and N loading remains consistent with that found during this study.

The high nutrient content of the Kootenai River has resulted in eutrophic conditions developing in Kootenay Lake. The principal inflow to Kootenay Lake is the Kootenai River and, according to Northcote (1972, 1973), the accelerated eutrophication of Kootenay Lake is attributable to the single industrial outfall on the St. Mary River which is the major source of P in the Kootenai River. Northcote reports that the biological changes that have occurred in Kootenay Lake since the industry began to discharge to the St. Mary River have been increased algae abundance with extensive blooms occurring in some years and localized blooms on others. The extensive algae blooms have been reported to impart offensive odor and taste to the water and to fish.

The effect of dam construction on the river water quality appeared to be limited to increases in suspended sediment and turbidity. During the study period, the increase in suspended sediment between the sampling stations upstream and downstream of the dam site averaged around 10 percent. For short periods of time, considerable increases in suspended sediment did occur, however, particularly during the periods of high discharge in 1968 and 1969. The two major events which led to large increases in suspended sediment and turbidity were the river diversions for the first and second stage cofferdam construction.

The aquatic insect population for 14.5 km (9 miles) below the Libby Dam site was found to be smaller than the population above the dam site. The suppression of the insect population below the dam is attributed to the increase in suspended sediment caused by construction activities related to the Libby Dam Project.

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APPENDIX: WATER QUALITY DATA AND RELATED INFORMATION FOR THE  
UNITED STATES REACH OF THE KOOTENAI RIVER FOR THE PERIOD  
OCTOBER 1967 THROUGH MARCH 1972

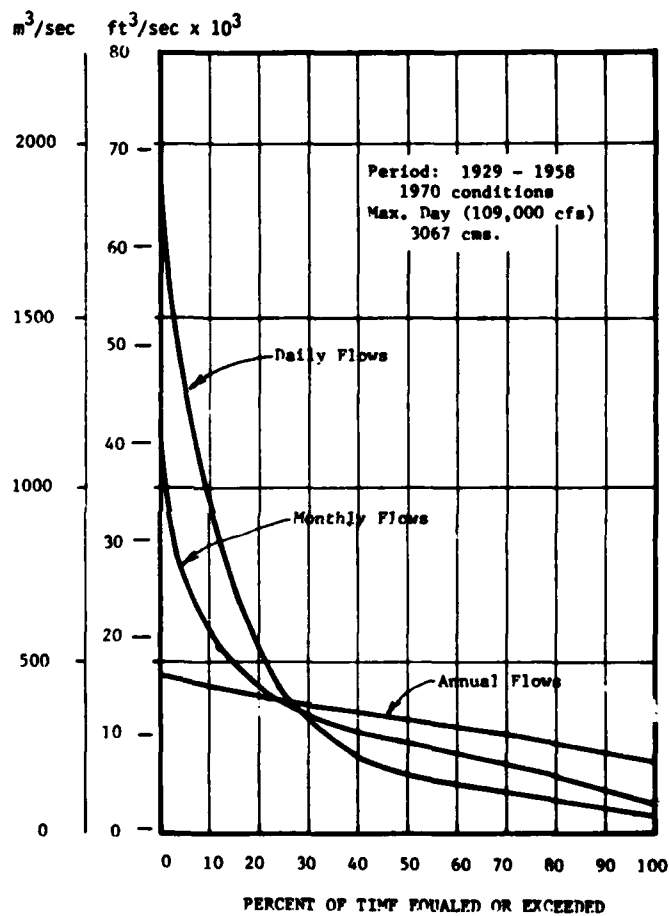


Figure 1. Duration curves, Kootenai River at Libby, Montana.

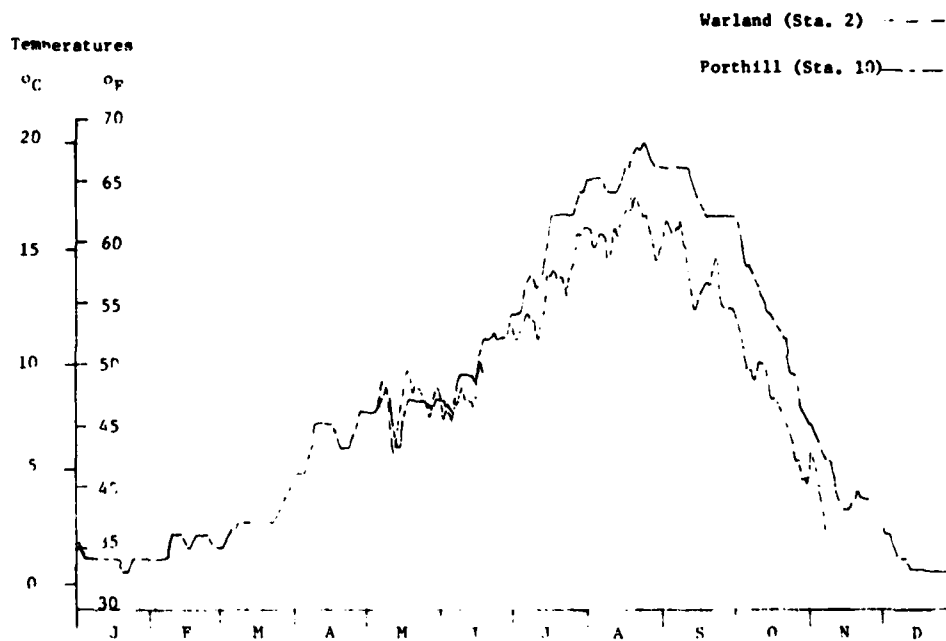


Figure 2. Mean daily water temperatures in the Kootenai River, 1967.

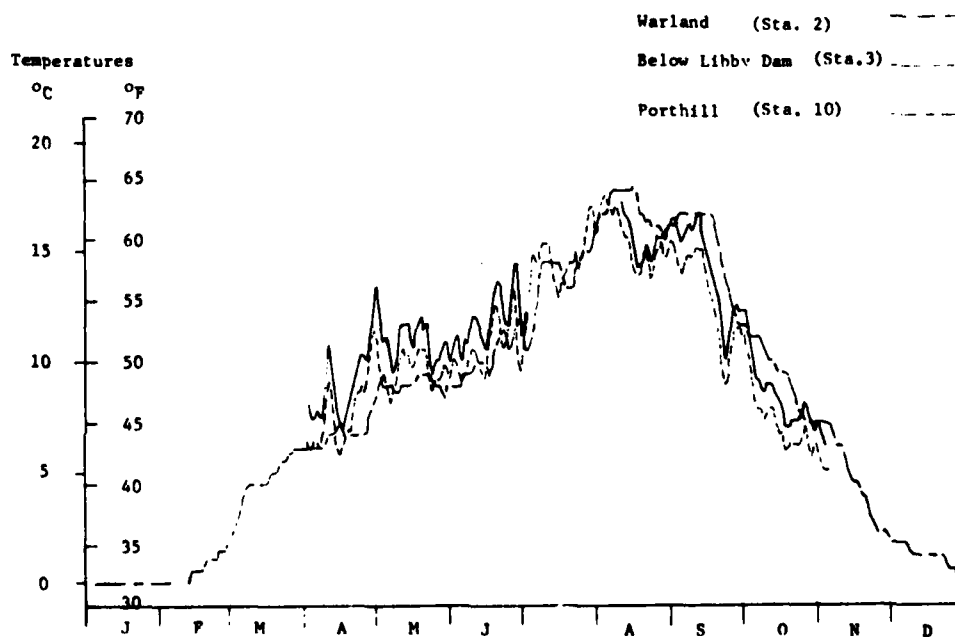


Figure 3. Mean daily water temperatures in the Kootenai River, 1968.

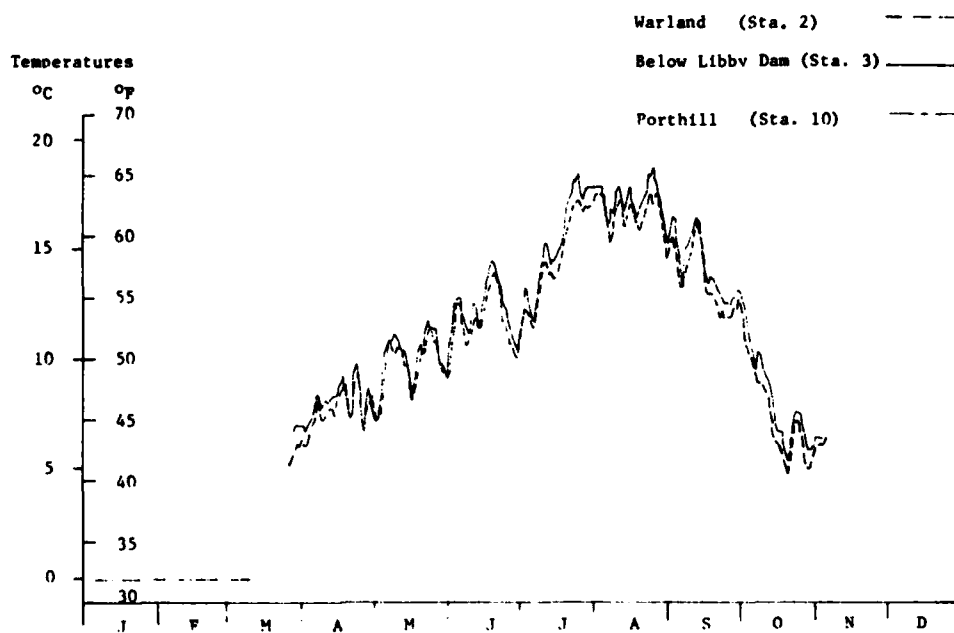


Figure 4. Mean daily water temperatures in the Kootenai River. 1969.

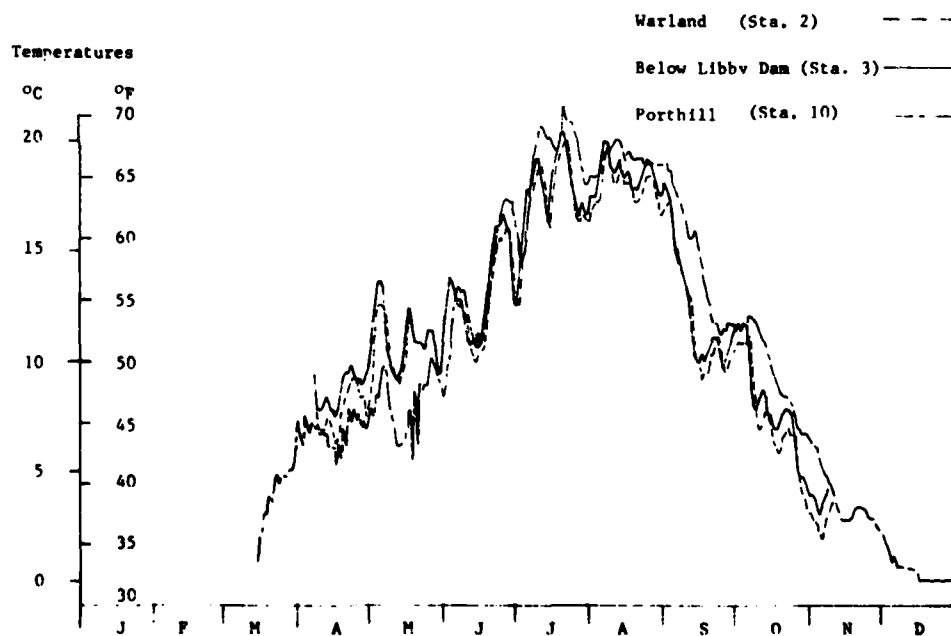


Figure 5. Mean daily water temperatures in the Kootenai River, 1970.

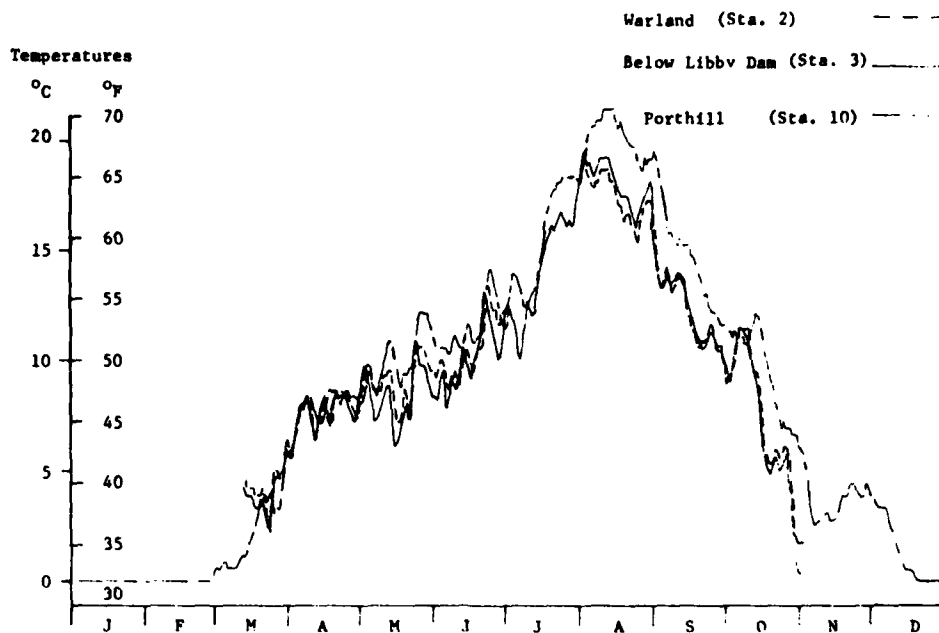


Figure 6. Mean daily water temperatures in the Kootenai River, 1971.

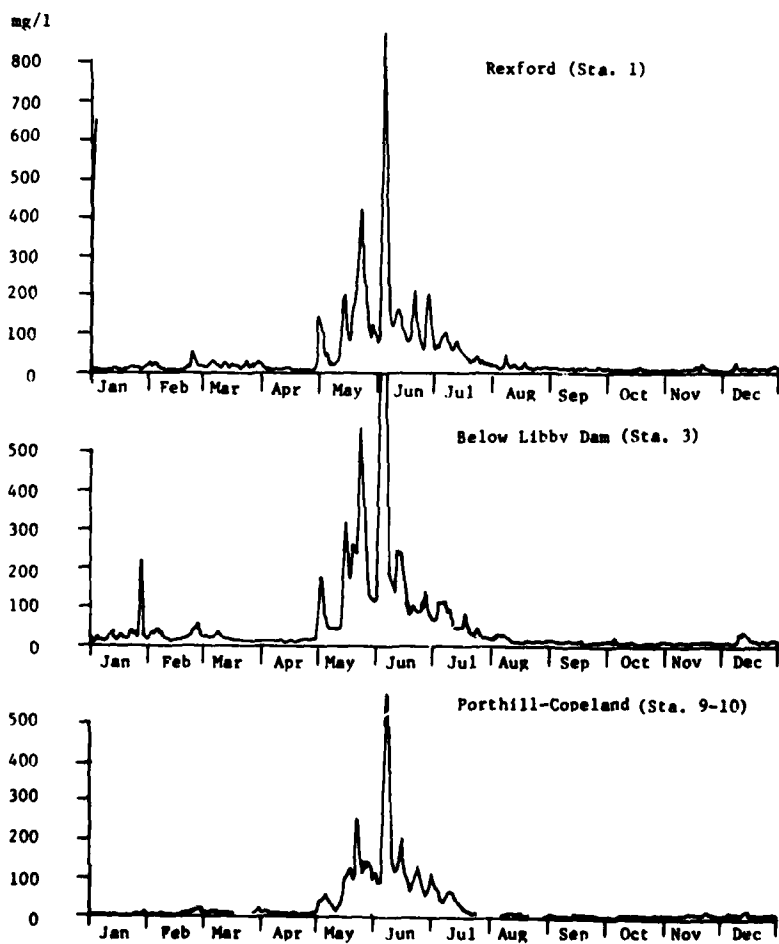


Figure 7. Suspended sediment concentrations in the Kootenai River, 1968.

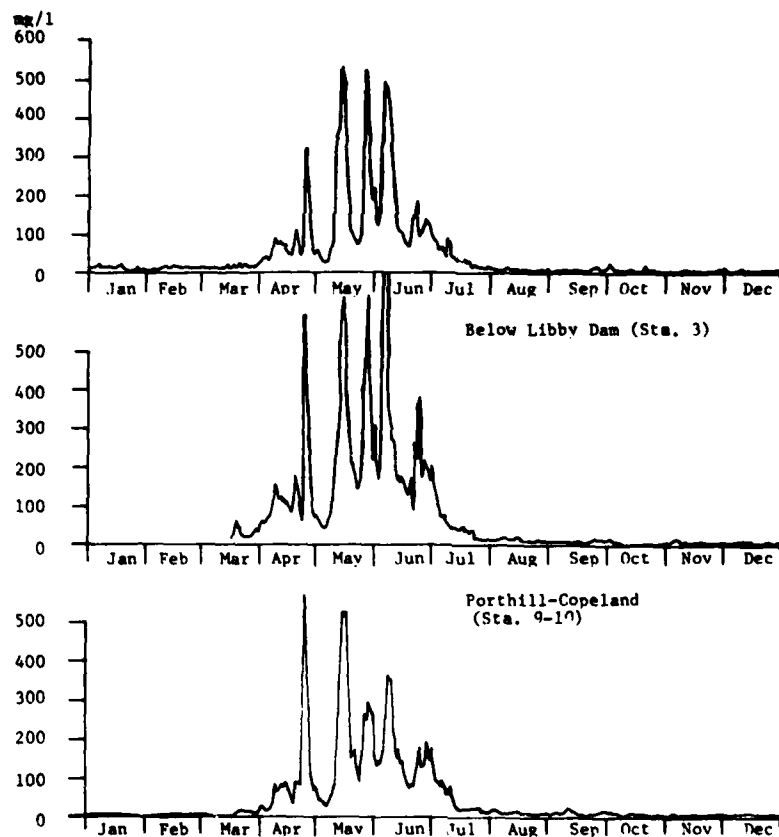


Figure 8. Suspended sediment concentrations in the Kootenai River, 1969.

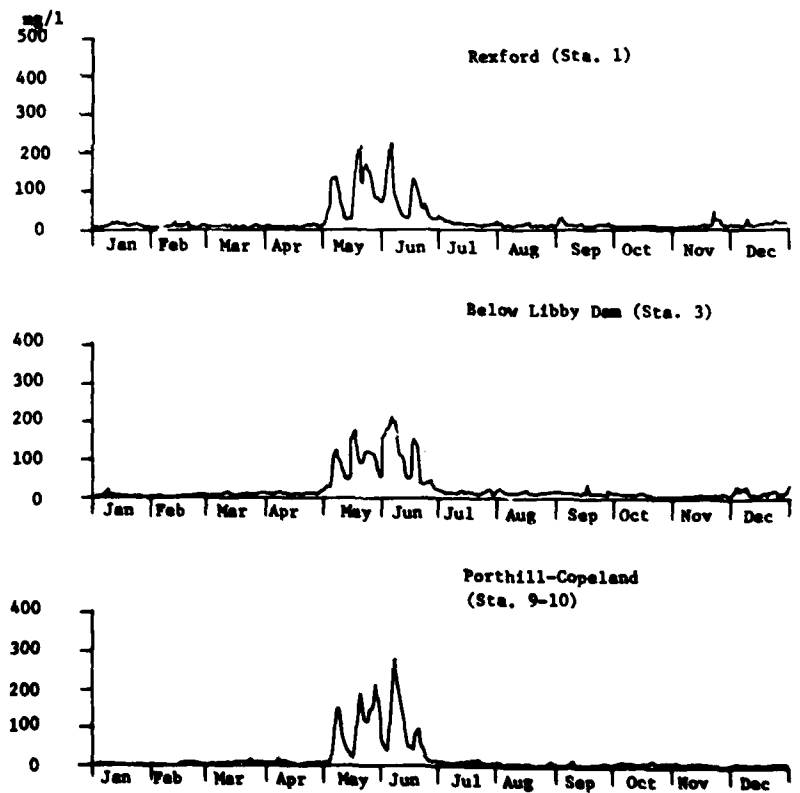


Figure 9. Suspended sediment concentrations in the Kootenai River, 1970.

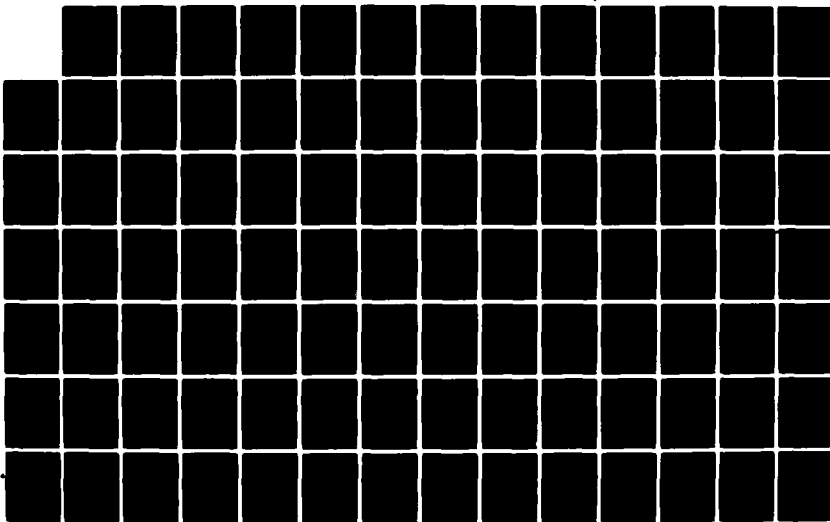
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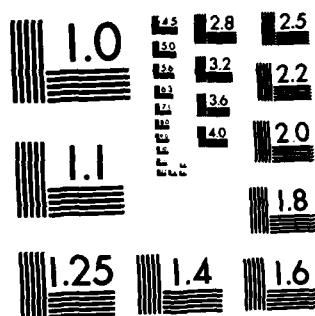
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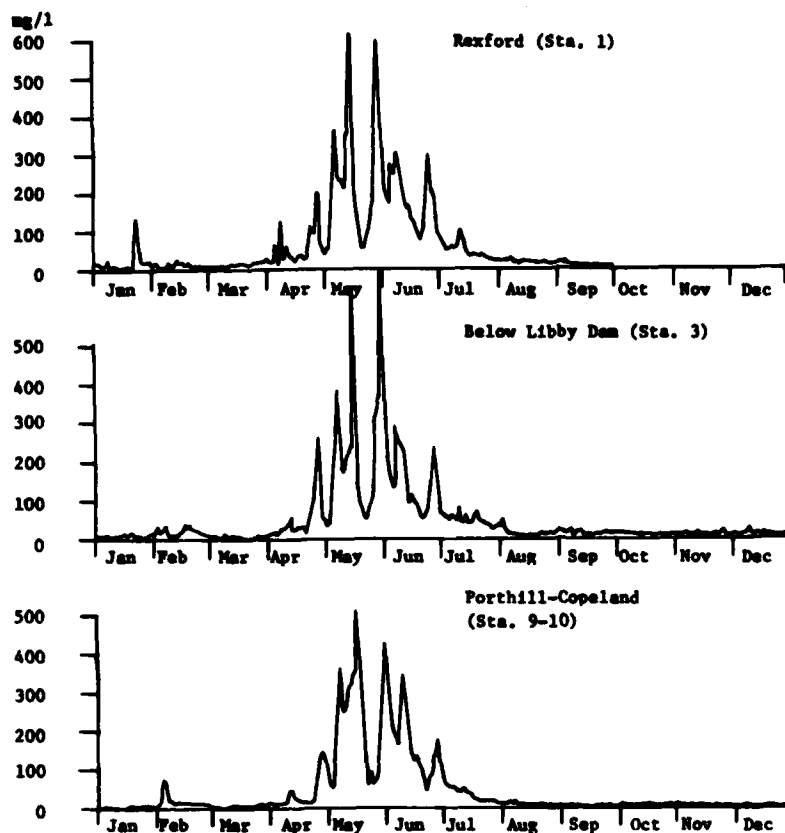


Figure 10. Suspended sediment concentrations in the Kootenai River, 1971.

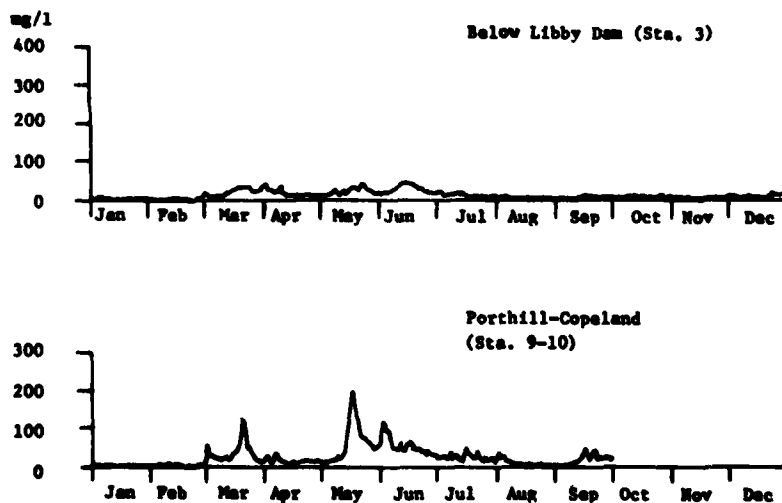


Figure 11. Suspended sediment concentrations in the Kootenai River, 1972.

Table 1. Drainage Area and Discharge at Selected Gaging Stations in the Kootenai River Basin.

| Location                        | Drainage Area<br>Sq. Mi. | Discharge<br>Mean ann.<br>c.f.s. | Runoff<br>in/yr | Runoff<br>ac-ft/yr<br>x 10 <sup>3</sup> | Period of Record                                               |
|---------------------------------|--------------------------|----------------------------------|-----------------|-----------------------------------------|----------------------------------------------------------------|
| Kootenai River Newgate, B.C.    | 7,660                    | 10,520                           | 18.65           | 7,622                                   | Oct 30 - Mar 72 (41 years)                                     |
| Tobacco River Eureka, Mont.     | 440                      | 285                              | 8.80            | 206.5                                   | Sep 58 - Sep 72 (14 years)                                     |
| Kootenai River Rexford, Mont.   | 8,720                    | 10,130                           | 16.34           | 7,339                                   | Mar 29 - Nov 40<br>Oct 67 - Sep 71 (15 years)                  |
| Kootenai River Warland, Mont.   | 8,892                    | 11,920                           | 18.20           | 8,636                                   | Jul 61 - Sep 71 (10 years)                                     |
| Kootenai River Libby Dam, Mont. | 8,985                    |                                  |                 |                                         | Dec 68 - Sep 72                                                |
| Fisher River Libby, Mont.       | 838                      | 604                              | 9.79            | 437                                     | Sep 67 - Sep 72 (5 years)                                      |
| Kootenai River Libby, Mont.     | 10,240                   | 12,170                           | 16.14           | 8,817                                   | Oct 10 - Sep 72 (62 years)                                     |
| Yaak River Troy, Mont.          | 766                      | 940                              | 16.67           | 681                                     | Oct 10 - Sep 16<br>Mar 56 - Sep 72 (16 years)                  |
| Kootenai River Leonia, Id.      | 11,740                   | 14,060                           | 16.26           | 10,190                                  | Mar 28 - Sep 72 (44 years)                                     |
| Moyie River Elleen, Id.         | 755                      | 888                              | 15.98           | 643                                     | Oct 25 - Sep 72 (47 years)                                     |
| Kootenai River Copeland, Id.    | 13,400                   | 15,750                           | 15.95           | 11,410                                  | Oct 27 - Sep 72 (43 years)                                     |
| Kootenai River Porthill, Id.    | 13,700                   | 16,120                           | 15.98           | 11,680                                  | May to Jul 04 & Oct to Mar 28<br>& Apr 28 to Sep 72 (44 years) |

Source:

U.S. Geological Survey, 1972. Water Resources Records for Montana. Part 1. Surface Water Records

U.S. Geological Survey 1972. Water Resources Records for Idaho. Part 1. Surface Water Records.

Table 2. Waste Source Discharges in the Kootenai River Basin Prior to 1972.<sup>1</sup>

| Source                   | Type of Treatment                        | Receiving Water | Volume MGD (m <sup>3</sup> /day) | TSS mg/l (kg/day) | BOD <sup>5</sup> mg/l (kg/day) | COD mg/l (kg/day) | pH      | Fecal Coliform no/100 ml | P.Z. Raw Treated |
|--------------------------|------------------------------------------|-----------------|----------------------------------|-------------------|--------------------------------|-------------------|---------|--------------------------|------------------|
| City of Eureka           | Primary with Chlorination (Spiragaster)  | Tobacco R.      | 0.1 (378.5)                      | 70 (26)           |                                | 134 (51)          | 6.7     | 17x10 <sup>6</sup>       | 1100 800         |
| City of Libby            | Primary with Chlorination                | Kootenai R.     | 1.0 (3785)                       | 46 (174)          | 105 (397)                      | 100 (378)         | 7.3     | 42x10 <sup>4</sup>       | 3000 2000        |
| St. Regis Co. (Sewage)   | Secondary Trickling Filter               | Kootenai R.     | 0.07 (265)                       | 50 (13)           | 25 (7)                         |                   | 6.5-7.2 |                          | 250 88           |
| St. Regis Co. (log pond) | Settling ponds                           | Kootenai R.     | 13.6 (51476)                     | 22 (1134)         | 5 (258)                        | 35 (1805)         | 6.5-7.3 | 350                      |                  |
| W. R. Grace Co.          | Complete Retention Recycle <sup>2/</sup> | Rainy Cr.       | none                             |                   |                                |                   |         |                          |                  |
| Granite Concrete         | Settling Ponds                           | Libby Cr.       | none                             |                   |                                |                   |         |                          |                  |
| City of Bonners Ferry    | Aerated Lagoon                           | Kootenai R.     | 0.2 (757)                        | 20+               | 20                             |                   | 7.5-8.0 |                          | 2000             |

<sup>1</sup>/Source reference: Nunnallee and Boltz, 1973; Water Quality Inventory and Management Plan, Kootenai River Basin, Montana. Montana Department of Health and Environmental Sciences. Helena, Montana.  
Jones, Roy. 1975. Personal Communication, Superintendent, City of Bonners Ferry Power and Light, 17 March 1975.

<sup>2</sup>/Facilities completed in 1971.

Table 3. Fish Species Known to Occur in the Kootenai River Prior to the Impoundment by Libby Dam

| Common Name                        | Scientific Name                  |
|------------------------------------|----------------------------------|
| White Sturgeon <sup>1</sup> .      | <u>Acipenser transmontanus</u>   |
| Belly Varden trout                 | <u>Salvelinus malin</u>          |
| Brook trout <sup>2</sup> .         | <u>Salvelinus fontinalis</u>     |
| Cutthroat trout                    | <u>Salmo clarki</u>              |
| Rainbow trout <sup>3</sup> .       | <u>Salmo gairdneri</u>           |
| Kokanee <sup>1</sup> .             | <u>Oncorhynchus nerka</u>        |
| Mountain whitefish                 | <u>Protopium williamsi</u>       |
| Pygmy whitefish <sup>1</sup> .     | <u>Protopium coulteri</u>        |
| Burbot                             | <u>Lota lota</u>                 |
| Northern squawfish                 | <u>Ptychocheilus oregonensis</u> |
| Largescale sucker                  | <u>Catostomus macrocheilus</u>   |
| Longnose sucker                    | <u>Catostomus catostomus</u>     |
| Pomouth chub                       | <u>Mylocheilus caurinus</u>      |
| Redside shiner                     | <u>Richardsonius balteatus</u>   |
| Longnose dace                      | <u>Minichthys cataractae</u>     |
| Prickley sculpin                   | <u>Cottus asper</u>              |
| Slimy sculpin                      | <u>Cottus cognatus</u>           |
| Largemouth bass <sup>2</sup> .     | <u>Micropterus salmoides</u>     |
| Pumpkinseed sunfish <sup>2</sup> . | <u>Lepomis gibbosus</u>          |

1. Known only from below Kootenai Falls.
2. Introduced.
3. Present, but probably introduced above Kootenai Falls; indigenous below.

Table 4. Methods of Chemical Analysis used by the U.S. Geological Survey in Libby Dam Pre-Impoundment Studies

| Parameter             | Method of Analysis                      | Note                                     |
|-----------------------|-----------------------------------------|------------------------------------------|
| Alkalinity            | Volumetric, Potentiometric              | Method changed July 1969                 |
| Aluminum              | Ferron - orthophenanthroline            |                                          |
| Arsenic               | Silver diethyldithiocarbamate           |                                          |
| Barium                | Complexometric                          |                                          |
| Beryllium             | Atomic absorption                       |                                          |
| Bicarbonate           | (see alkalinity)                        |                                          |
| Boron                 | Dianthrone                              |                                          |
| Cadmium               | Atomic absorption                       |                                          |
| Calcium               | Complexometric, atomic absorption       | A.s.s. adopted prior to Dec 69           |
| Carbon, total organic | Carbaceous analyzer                     |                                          |
| Carbon dioxide        | Calculation                             |                                          |
| Chloride              | (see alkalinity)                        |                                          |
| Chromium              | Mercurimetric                           |                                          |
| Cobalt                | Atomic absorption                       |                                          |
| Color                 | Comparison                              |                                          |
| Copper                | Atomic absorption                       |                                          |
| Fluoride              | Zirconium - eriochrome cyan. R          | Method changed July 1969                 |
| Hardness              | Complexometric                          |                                          |
| Iron                  | Bipyridine                              |                                          |
| Lead                  | Atomic absorption                       | Method changed July 1969                 |
| Lithium               | Atomic absorption                       | Method changed July 1969                 |
| Magnesium             | Atomic absorption                       | Method changed July 1969                 |
| Manganese             | Atomic absorption                       |                                          |
| MDAS (detergents)     | Standard                                |                                          |
| Molybdenum            | Dithiol                                 |                                          |
| Nickel                | Atomic absorption                       |                                          |
| Nitrogen, ammonia     | Distillation - neaslerization           | Method changed July 1969                 |
| Nitrogen, nitrate     | Phenoldisulfonic acid, Brucine          | Brucine adopted Apr 1969                 |
| Nitrogen, nitrite     | Diazotization                           | Method changed July 1969                 |
| Nitrogen, organic     | Kjeldahl                                | Method changed July 1969                 |
| Oxygen, dissolved     | Arde Idometric or Instr.                |                                          |
| Oxygen demand, BOD    | Standard                                |                                          |
| Oxygen demand, COD    | Standard                                |                                          |
| Phenolic cpds.        | Gibbs reaction, 4-Aminoantipyrine       | Method changed July 1969                 |
| Phosphorus            | Phosphomolybdate (Persulfate oxidation) | Method changed Feb 1969                  |
| Potassium             | Flame photometry, Atomic absorption     |                                          |
| Selenium              | Diaminobenzidine                        |                                          |
| Silica                | Molybdate blue                          | Method changed July 1969                 |
| Silver                | Atomic absorption                       |                                          |
| Sodium                | Flame photometry, Atomic absorption     | A.s.s. introduced after Dec 1969         |
| Solids, dissolved     | Residue-on-evaporation                  |                                          |
| Solids, suspended     | Filtration                              |                                          |
| Specific conductance  | Instrumental                            |                                          |
| Strontium             | Atomic absorption                       |                                          |
| Sulfate               | Spectrophotometric thorin               |                                          |
| Turbidity             | Hellige turbidimeter, Nephelometric     | Nephelometric introduced after July 1969 |
| Vanadium              | Catalytic oxidation                     |                                          |
| Zinc                  | Atomic absorption                       |                                          |

Table 5 . Bottom Puma Sampling Stations on the Kootenai River, 1968 - 1971.  
Bottom Sampling Locations

|                                 |                                                                                                                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Station 1.                      | Downstream from the town of Rexford, Montana on the west bank at river kilometer 414.4, 1.6 kilometer upstream from the new reservoir bridge and 37.3 kilometers upstream from Libby Dam. |
| Station 2.                      | Near the town of Warland, Montana on the west bank at river kilometer 369.5, 1.6 kilometer upstream from the Warland Bridge and 12.3 kilometers upstream from Libby Dam.                  |
| Station 3.                      | East bank of the river at river kilometer 352.3, 1.1 kilometer upstream of the Highway 37 Bridge and 4.8 kilometers downstream from Libby Dam.                                            |
| Station 4.                      | North bank of the river near Lowry Gulch at river kilometer 342.6, 14.5 kilometers below Libby Dam.                                                                                       |
| Cylindrical Substrate Locations |                                                                                                                                                                                           |
| Station 1.                      | Buoys attached to the St. Regis Bridge at river kilometer 419.2, 62.1 kilometers upstream from Libby Dam.                                                                                 |
| Station 2.                      | Buoys attached to the Warland Bridge at river kilometer 367.9, 10.8 kilometers upstream from Libby Dam.                                                                                   |
| Station 3.                      | Buoys anchored in river at river kilometer 351.5, 0.3 kilometer upstream from the Highway 37 Bridge and 5.6 kilometers downstream from Libby Dam.                                         |

Table 6 . Discharge of the Kootenai River at Newgate, B.C., 1967-1971

| Discharge                                       | Calendar Year |         |         |                   |
|-------------------------------------------------|---------------|---------|---------|-------------------|
|                                                 | 1967          | 1968    | 1969    | 1970 1971 1967-71 |
| Total $m^3/sec-day$                             | 126751        | 108834  | 127547  | 78441 122355      |
| $ft^3/sec-day$                                  | 4476130       | 3843410 | 4504250 | 2770120 4320890   |
| Mean $m^3/sec$                                  | 347           | 297     | 349     | 215 335 309       |
| $ft^3/sec$                                      | 12260         | 10500   | 12340   | 7589 11840 10906  |
| Maximum $m^3/sec$                               | 1994          | 1761    | 1858    | 1422 1688         |
| $ft^3/sec$                                      | 70400         | 62200   | 65600   | 50200 59600       |
| Minimum $m^3/sec$                               | 46            | 47      | 52      | 37 44             |
| $ft^3/sec$                                      | 1620          | 1670    | 1820    | 1290 1570         |
| Percent 41 yr. mean                             | 117           | 100     | 117     | 72 113 104        |
| (1930-71, 298 $m^3/sec$ ,<br>10520 $ft^3/sec$ ) |               |         |         |                   |

Table 7. Discharge of the Kootenai River Near Rexford, Montana, 1967-1971

| Discharge                                                                   | Calendar Year |         |         |      |      |
|-----------------------------------------------------------------------------|---------------|---------|---------|------|------|
|                                                                             | 1967          | 1968    | 1969    | 1970 | 1971 |
| Total $m^3/sec-day$                                                         | 115472        | 140118  | 83600   |      |      |
| $ft^3/sec-day$                                                              | 4077820       | 4948210 | 2952280 |      |      |
| Mean $m^3/sec$                                                              | 345           | 384     | 229     |      |      |
| $ft^3/sec$                                                                  | 11140         | 13560   | 8088    |      |      |
| Maximum $m^3/sec$                                                           | 1758          | 1960    | 1405    |      |      |
| $ft^3/sec$                                                                  | 62100         | 69200   | 49600   |      |      |
| Minimum $m^3/sec$                                                           | 57            | 48      | 37      |      |      |
| $ft^3/sec$                                                                  | 2000          | 1700    | 1300    |      |      |
| Percent 15-yr. mean<br>(1929-40, 67-71, 287 $m^3/sec$<br>10130 $ft^3/sec$ ) | 110           | 134     | 80      |      |      |

Table 8. Discharge of the Kootenai River Below Libby Dam, 1967 - 1971.<sup>1</sup>

| Discharge                                                              | Calendar Year |         |         |         |         |
|------------------------------------------------------------------------|---------------|---------|---------|---------|---------|
|                                                                        | 1967          | 1968    | 1969    | 1970    | 1971    |
| Total $m^3/sec-day$                                                    | 139490        | 117524  | 141282  | 86452   | 137454  |
| $ft^3/sec-day$                                                         | 4926010       | 4150290 | 4989310 | 3053020 | 4854120 |
| Mean $m^3/sec$                                                         | 382           | 321     | 387     | 237     | 378     |
| $ft^3/sec$                                                             | 13500         | 11340   | 13670   | 8364    | 13299   |
| Maximum $m^3/sec$                                                      | 2078          | 1753    | 1954    | 1424    | 1863    |
| $ft^3/sec$                                                             | 73400         | 61900   | 69000   | 50300   | 65800   |
| Minimum $m^3/sec$                                                      | 54            | 51      | 45      | 37      | 45      |
| $ft^3/sec$                                                             | 1900          | 1800    | 1600    | 1300    | 1600    |
| Percent 10-yr. mean<br>(1961-71, 338 $m^3/sec$ ,<br>11920 $ft^3/sec$ ) | 113           | 95      | 115     | 70      | 112     |

1. Figures prior to September 1971 were obtained from the stream gage at Harland.

Table 9. Discharge of the Kootenai River near Copeland, Idaho, 1967-1971.

| Discharge                                        | Calendar Years |         |         |         |         |         |
|--------------------------------------------------|----------------|---------|---------|---------|---------|---------|
|                                                  | 1967           | 1968    | 1969    | 1970    | 1971    | 1967-71 |
| Total $m^3/sec-day$                              | 190079         | 160270  | 202491  | 118790  | 191435  |         |
| $ft^3/sec-day$                                   | 6712540        | 5659850 | 7150880 | 4194990 | 6760430 |         |
| Mean $m^3/sec$                                   | 521            | 438     | 555     | 325     | 524     | 473     |
| $ft^3/sec$                                       | 18390          | 15460   | 19590   | 11490   | 18520   | 16692   |
| Maximum $m^3/sec$                                | 2710           | 2101    | 2500    | 1812    | 2469    |         |
| $ft^3/sec$                                       | 95700          | 74200   | 88300   | 64000   | 87200   |         |
| Minimum $m^3/sec$                                | 85             | 89      | 78      | 72      | 71      |         |
| $ft^3/sec$                                       | 3000           | 3150    | 2770    | 2560    | 2500    |         |
| Percent 43-yr. mean                              | 117            | 98      | 124     | 73      | 118     | 106     |
| (1927-72, 446 $m^3/sec$ ,<br>15,750 $ft^3/sec$ ) |                |         |         |         |         |         |

| Discharge                                       | Calendar Year |         |         |         |         |         |
|-------------------------------------------------|---------------|---------|---------|---------|---------|---------|
|                                                 | 1967          | 1968    | 1969    | 1970    | 1971    | 1967-71 |
| Total $m^3/sec-day$                             | 195480        | 165996  | 209127  | 122999  | 198204  |         |
| $ft^3/sec-day$                                  | 6903290       | 5862060 | 7385220 | 4343650 | 6999460 |         |
| Mean $m^3/sec$                                  | 535           | 454     | 573     | 337     | 543     | 488     |
| $ft^3/sec$                                      | 18910         | 16020   | 20230   | 11900   | 19180   | 17247   |
| Maximum $m^3/sec$                               | 2784          | 2129    | 2588    | 1863    | 2554    |         |
| $ft^3/sec$                                      | 98300         | 75200   | 91400   | 65800   | 90200   |         |
| Minimum $m^3/sec$                               | 88            | 91      | 79      | 75      | 74      |         |
| $ft^3/sec$                                      | 3100          | 3220    | 2800    | 2650    | 2620    |         |
| Percent 44-yr. mean                             | 117           | 99      | 125     | 74      | 119     | 107     |
| (1928-72, 456 $m^3/sec$ ,<br>16120 $ft^3/sec$ ) |               |         |         |         |         |         |

Table 10. Discharge of the Kootenai River at Porthill, Idaho, 1967-71

Table 11. Monthly Mean Water Temperature in the Kootenai River at Waldo, B.C., 1962 - 1971.

| Year | Degrees C |     |     |     |      |      |      |      |      |     |     |     |
|------|-----------|-----|-----|-----|------|------|------|------|------|-----|-----|-----|
|      | Jan       | Feb | Mar | Apr | May  | Jun  | Jul  | Aug  | Sep  | Oct | Nov | Dec |
| 1962 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1963 |           |     |     |     |      | 9.0  |      | 12.8 | 7.9  |     |     |     |
| 1964 |           |     |     |     |      | 9.2  | 13.5 | 13.7 | 10.4 |     |     |     |
| 1965 |           |     |     |     |      | 10.1 | 14.6 | 16.3 | 10.3 | 7.7 |     |     |
| 1966 |           |     |     |     |      | 10.4 | 13.7 | 15.4 | 14.0 | 7.8 |     |     |
| 1967 |           |     |     |     | 7.8  | 8.1  | 12.2 | 14.4 | 12.8 | 7.0 |     |     |
| 1968 |           |     |     |     | 9.7  | 10.0 | 13.9 | 14.9 | 12.7 | 7.2 |     |     |
| 1969 |           |     |     |     | 8.7  | 10.1 | 13.2 | 14.9 | 12.1 | 6.1 |     |     |
| 1970 |           |     |     |     | 10.3 | 12.0 | 16.3 | 16.6 | 10.9 | 6.7 |     |     |
| 1971 |           |     |     |     | 8.9  | 9.7  | 12.9 | 16.2 | 11.4 | 7.1 |     |     |

Table 12. Monthly Mean Water Temperatures in the Elk River at Phillips Bridge, B.C., 1962 - 1971.

| Year | Degrees C |     |     |     |     |      |      |      |      |     |     |     |
|------|-----------|-----|-----|-----|-----|------|------|------|------|-----|-----|-----|
|      | Jan       | Feb | Mar | Apr | May | Jun  | Jul  | Aug  | Sep  | Oct | Nov | Dec |
| 1962 |           |     |     |     |     |      |      |      |      |     |     |     |
| 1963 |           |     |     |     |     | 7.8  |      | 12.7 | 12.1 | 7.3 |     |     |
| 1964 |           |     |     |     |     | 7.8  | 11.9 | 11.8 | 9.0  | 5.7 |     |     |
| 1965 |           |     |     |     |     | 9.6  | 13.2 | 14.7 | 9.9  | 8.6 |     |     |
| 1966 |           |     |     |     |     |      | 12.8 | 13.7 | 12.6 | 7.1 |     |     |
| 1967 |           |     |     |     | 6.1 | 7.7  | 11.9 | 13.7 |      |     |     |     |
| 1968 |           |     |     |     | 8.3 | 10.1 | 14.0 | 14.2 | 12.0 | 7.3 |     |     |
| 1969 |           |     |     |     | 6.6 | 9.1  | 11.7 | 13.1 | 10.3 | 3.9 |     |     |
| 1970 |           |     |     |     | 7.3 | 10.2 | 13.6 | 14.3 | 9.3  | 6.4 |     |     |
| 1971 |           |     |     |     | 8.6 | 10.6 | 13.5 |      | 11.6 | 7.9 |     |     |

Table 13. Monthly Mean Water Temperatures in the Kootenai River at Warland, 1962 - 1971.

| Year | Degrees C |     |     |     |      |      |      |      |      |     |     |     |
|------|-----------|-----|-----|-----|------|------|------|------|------|-----|-----|-----|
|      | Jan       | Feb | Mar | Apr | May  | Jun  | Jul  | Aug  | Sep  | Oct | Nov | Dec |
| 1962 |           |     |     |     |      |      | 14.1 | 14.9 | 11.7 | 6.4 |     |     |
| 1963 |           |     |     | 5.8 |      |      | 13.0 | 16.5 | 14.3 | 8.8 | 3.0 |     |
| 1964 |           |     |     |     | 8.1  | 8.4  | 12.8 | 13.1 | 10.7 | 7.8 |     |     |
| 1965 |           |     |     |     | 8.7  |      |      | 16.6 | 10.3 | 7.6 |     |     |
| 1966 |           |     |     |     |      | 11.6 |      |      |      | 9.3 |     |     |
| 1967 |           |     |     |     |      |      | 13.5 | 16.1 | 14.1 | 8.1 |     |     |
| 1968 |           |     |     | 7.6 | 9.7  | 10.6 | 14.4 | 15.4 | 12.8 | 7.2 |     |     |
| 1969 |           |     |     | 7.8 | 9.7  | 11.8 | 14.7 | 16.7 | 13.6 | 7.3 |     |     |
| 1970 |           |     |     |     | 10.7 | 12.9 | 17.3 | 17.9 | 11.8 | 7.0 |     |     |
| 1971 |           |     |     | 7.6 | 9.1  |      |      | 17.4 | 12.2 | 7.4 |     |     |

Table 14. Monthly Mean Water Temperatures in the Kootenai River below Libby Dam, 1962 - 1971.

| Year | Degrees C |     |     |     |      |      |      |      |      |     |     |     |
|------|-----------|-----|-----|-----|------|------|------|------|------|-----|-----|-----|
|      | Jan       | Feb | Mar | Apr | May  | Jun  | Jul  | Aug  | Sep  | Oct | Nov | Dec |
| 1962 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1963 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1964 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1965 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1966 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1967 |           |     |     |     |      |      |      |      |      |     |     |     |
| 1968 |           |     |     | 8.9 | 10.9 | 11.8 |      |      | 14.0 | 8.3 |     |     |
| 1969 |           |     |     | 8.0 | 9.9  | 12.2 | 15.3 | 17.2 | 14.2 | 8.0 |     |     |
| 1970 |           |     |     |     | 11.0 | 12.7 | 17.8 | 18.5 | 12.3 | 7.8 |     |     |
| 1971 |           |     |     | 7.6 | 8.3  | 10.0 | 14.1 | 18.1 | 12.3 | 7.2 |     |     |

Table 15. Summary of Monthly Mean Water Temperatures in the Kootenai River at  
Leonis, 1962 - 1971.

| Year | Degrees C |     |     |     |      |      |      |      |      |     |     |     |
|------|-----------|-----|-----|-----|------|------|------|------|------|-----|-----|-----|
|      | Jan       | Feb | Mar | Apr | May  | Jun  | Jul  | Aug  | Sep  | Oct | Nov | Dec |
| 1962 |           |     |     |     |      |      |      |      | 12.2 | 7.6 | 3.8 | 1.2 |
| 1963 |           |     |     | 6.3 |      | 11.8 | 13.9 | 16.8 | 14.6 | 9.4 | 3.6 |     |
| 1964 |           |     |     |     | 8.3  | 10.4 | 15.3 | 15.3 | 11.8 | 7.6 |     |     |
| 1965 |           |     |     |     | 9.6  | 11.5 | 16.3 | 18.3 | 11.8 | 9.3 |     |     |
| 1966 |           |     |     |     |      | 11.6 | 15.9 | 17.3 | 15.8 | 9.2 | 4.2 |     |
| 1967 |           |     |     |     | 6.3  | 10.3 |      | 16.9 | 14.8 | 8.8 |     |     |
| 1968 |           |     |     | 7.4 | 9.8  | 11.2 |      |      | 13.6 |     |     |     |
| 1969 |           |     |     | 7.6 | 10.1 | 12.6 | 16.1 |      |      |     |     |     |
| 1970 |           |     |     | 6.3 | 9.2  | 12.8 |      |      | 11.7 |     |     |     |
| 1971 |           |     |     | 7.7 | 9.4  | 11.0 | 15.5 | 19.1 | 13.5 | 8.6 |     |     |

Table 16. Monthly Mean Water Temperatures in the Kootenai River at Forthill,  
1962 - 1972

| Year | Degrees C |     |     |     |     |      |      |      |      |      |     |     |
|------|-----------|-----|-----|-----|-----|------|------|------|------|------|-----|-----|
|      | Jan       | Feb | Mar | Apr | May | Jun  | Jul  | Aug  | Sep  | Oct  | Nov | Dec |
| 1962 |           |     |     |     |     |      |      |      |      |      |     |     |
| 1963 |           |     |     |     |     | 11.7 | 14.4 | 18.5 | 16.2 | 11.6 | 4.9 | 0.5 |
| 1964 |           |     |     |     |     | 11.3 | 16.2 | 16.7 | 12.8 | 8.7  | 4.4 | 0.9 |
| 1965 |           |     |     |     |     | 11.3 | 15.6 | 18.5 | 11.6 | 8.5  | 4.7 | 1.2 |
| 1966 |           |     |     |     |     | 11.8 | 15.8 | 18.3 | 16.8 | 10.7 | 4.6 | 2.7 |
| 1967 |           |     |     |     |     | 10.0 | 15.4 | 18.8 | 17.7 | 11.8 | 4.4 | 0.9 |
| 1968 |           |     |     |     |     | 10.2 | 13.7 | 16.9 | 15.3 | 9.3  | 4.7 | 1.1 |
| 1969 |           |     |     |     |     |      |      |      |      |      |     |     |
| 1970 |           |     |     |     |     | 13.2 | 19.0 | 19.1 | 14.4 | 9.4  | 3.6 | 0.4 |
| 1971 |           |     |     |     |     | 10.0 | 11.4 | 15.4 | 20.1 | 14.9 | 9.7 | 3.8 |
| 1972 |           |     |     |     |     |      |      |      |      |      |     |     |

TABLE 17, KOOTENAI RIVER NEAR REKFORC, BCAT.  
DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | OCTOBER                    |                                 |                | NOVEMBER                   |                                 |                | DECEMBER                   |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 4600                       | 3                               | 37             | 4620                       | 6                               | 75             | 3210                       | 5                               | 43             |
| 2     | 4600                       | 7                               | 87             | 5660                       | 8                               | 120            | 3300                       | 6                               | 53             |
| 3     | 4710                       | 6                               | 76             | 5470                       | 9                               | 130            | 3420                       | 7                               | 65             |
| 4     | 4800                       | 7                               | 91             | 4930                       | 7                               | 93             | 3480                       | 5                               | 47             |
| 5     | 4690                       | 5                               | 63             | 4650                       | 8                               | 100            | 3450                       | 4                               | 37             |
| 6     | 4660                       | 6                               | 75             | 4200                       | 9                               | 100            | 3480                       | 5                               | 47             |
| 7     | 4690                       | 4                               | 51             | 4080                       | 7                               | 77             | 3300                       | 7                               | 62             |
| 8     | 4300                       | 2                               | 24             | 3970                       | 6                               | 64             | 3160                       | 6                               | 51             |
| 9     | 4300                       | 3                               | 35             | 3900                       | 6                               | 63             | 3090                       | 3                               | 25             |
| 10    | 4300                       | 2                               | 23             | 4320                       | 6                               | 70             | 3230                       | 4                               | 35             |
| 11    | 4520                       | 4                               | 48             | 4400                       | 6                               | 71             | 3400                       | 6                               | 55             |
| 12    | 4690                       | 6                               | 76             | 4200                       | 7                               | 79             | 3020                       | 5                               | 41             |
| 13    | 5150                       | 7                               | 97             | 4400                       | 6                               | 71             | 2600                       | 4                               | 28             |
| 14    | 5640                       | 20                              | 300            | 4020                       | 5                               | 55             | 2100                       | 6                               | 34             |
| 15    | 4970                       | 27                              | 360            | 4150                       | 5                               | 56             | 1850                       | 6                               | 30             |
| 16    | 4730                       | 92                              | 1200           | 4200                       | 14                              | 160            | 1850                       | 9                               | 45             |
| 17    | 4520                       | 43                              | 520            | 4240                       | 8                               | 92             | 2000                       | 7                               | 38             |
| 18    | 4320                       | 10                              | 120            | 3990                       | 4                               | 43             | 2100                       | 5                               | 28             |
| 19    | 4240                       | 37                              | 420            | 3950                       | 4                               | 43             | 2200                       | 5                               | 30             |
| 20    | 4320                       | 16                              | 190            | 3810                       | 6                               | 62             | 2300                       | 3                               | 15             |
| 21    | 4320                       | 3                               | 35             | 3840                       | 6                               | 62             | 2400                       | 2                               | 13             |
| 22    | 4360                       | 4                               | 47             | 3600                       | 6                               | 58             | 2520                       | 8                               | 54             |
| 23    | 4440                       | 4                               | 48             | 3600                       | 5                               | 49             | 2750                       | 13                              | 57             |
| 24    | 4420                       | 6                               | 72             | 3480                       | 5                               | 47             | 3230                       | 16                              | 140            |
| 25    | 4300                       | 5                               | 58             | 3900                       | 6                               | 57             | 3380                       | 14                              | 130            |
| 26    | 4170                       | 5                               | 56             | 3560                       | 11                              | 110            | 3320                       | 10                              | 90             |
| 27    | 4110                       | 3                               | 33             | 2910                       | 9                               | 71             | 3360                       | 10                              | 91             |
| 28    | 4200                       | 9                               | 100            | 2710                       | 5                               | 37             | 3210                       | 10                              | 87             |
| 29    | 4220                       | 7                               | 80             | 3070                       | 4                               | 33             | 3230                       | 28                              | 240            |
| 30    | 4320                       | 5                               | 58             | 3090                       | 5                               | 42             | 3140                       | 320                             | 2700           |
| 31    | 4040                       | 6                               | 65             | --                         | --                              | --             | 3140                       | 60                              | 510            |
| TOTAL | 139730                     | --                              | 4546           | 120620                     | --                              | 2190           | 90220                      | --                              | 4565           |

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | JANUARY                    |                                 |                | FEBRUARY                   |                                 |                | MARCH                      |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 3100                       | 6                               | 50             | 2820                       | 20                              | 150            | 3210                       | 12                              | 100            |
| 2     | 2400                       | 5                               | 32             | 3130                       | 14                              | 120            | 3140                       | 9                               | 76             |
| 3     | 2300                       | 4                               | 25             | 3500                       | 10                              | 89             | 3240                       | 8                               | 70             |
| 4     | 2400                       | 11                              | 71             | 3650                       | 24                              | 240            | 3280                       | 21                              | 150            |
| 5     | 2580                       | 8                               | 56             | 3830                       | 19                              | 200            | 3650                       | 25                              | 250            |
| 6     | 2580                       | 6                               | 42             | 3520                       | 14                              | 130            | 3810                       | 30                              | 210            |
| 7     | 2590                       | 6                               | 42             | 3210                       | 9                               | 78             | 3930                       | 32                              | 240            |
| 8     | 2620                       | 6                               | 42             | 3090                       | 8                               | 67             | 3990                       | 17                              | 180            |
| 9     | 2740                       | 7                               | 52             | 2990                       | 6                               | 48             | 3990                       | 9                               | 57             |
| 10    | 2800                       | 6                               | 45             | 2950                       | 5                               | 40             | 3720                       | 9                               | 50             |
| 11    | 2760                       | 8                               | 60             | 2860                       | 4                               | 31             | 3560                       | 7                               | 67             |
| 12    | 2900                       | 6                               | 40             | 2910                       | 7                               | 55             | 3340                       | 26                              | 230            |
| 13    | 2900                       | 7                               | 47             | 2870                       | 5                               | 39             | 3430                       | 16                              | 150            |
| 14    | 2600                       | 11                              | 77             | 2780                       | 4                               | 30             | 3390                       | 9                               | 62             |
| 15    | 2750                       | 7                               | 52             | 2790                       | 5                               | 37             | 3440                       | 19                              | 160            |
| 16    | 2900                       | 8                               | 63             | 2570                       | 7                               | 49             | 3460                       | 9                               | 64             |
| 17    | 3000                       | 7                               | 57             | 2590                       | 6                               | 42             | 3620                       | 15                              | 150            |
| 18    | 2900                       | 7                               | 55             | 2640                       | 5                               | 21             | 3590                       | 15                              | 150            |
| 19    | 3020                       | 7                               | 57             | 2710                       | 4                               | 29             | 3540                       | 7                               | 67             |
| 20    | 3070                       | 8                               | 66             | 2910                       | 6                               | 47             | 3420                       | 7                               | 65             |
| 21    | 3280                       | 12                              | 110            | 2970                       | 12                              | 96             | 3320                       | 7                               | 63             |
| 22    | 3500                       | 12                              | 110            | 3030                       | 17                              | 140            | 3230                       | 8                               | 70             |
| 23    | 3500                       | 16                              | 150            | 3030                       | 15                              | 120            | 3400                       | 30                              | 280            |
| 24    | 3570                       | 11                              | 110            | 3270                       | 51                              | 450            | 3320                       | 11                              | 100            |
| 25    | 3540                       | 10                              | 96             | 3750                       | 27                              | 270            | 3570                       | 14                              | 130            |
| 26    | 3110                       | 12                              | 100            | 3240                       | 11                              | 96             | 3570                       | 13                              | 120            |
| 27    | 2460                       | 7                               | 46             | 3210                       | 10                              | 87             | 3570                       | 7                               | 67             |
| 28    | 2000                       | 5                               | 27             | 3140                       | 9                               | 76             | 3760                       | 14                              | 140            |
| 29    | 2200                       | 9                               | 53             | 3130                       | 12                              | 100            | 3780                       | 18                              | 180            |
| 30    | 2510                       | 16                              | 110            | --                         | --                              | --             | 3950                       | 20                              | 210            |
| 31    | 2650                       | 15                              | 110            | --                         | --                              | --             | 4000                       | 27                              | 240            |
| TOTAL | 86430                      | --                              | 2053           | 88830                      | --                              | 2977           | 110500                     | --                              | 4528           |

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | APRIL                      |                                 |                | MAY                        |                                 |                | JUNE                       |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 3860                       | 11                              | 110            | 8500                       | 140                             | 3200           | 34800                      | 70                              | 6600           |
| 2     | 3860                       | 11                              | 110            | 10600                      | 130                             | 3700           | 34200                      | 80                              | 7400           |
| 3     | 3860                       | 7                               | 89             | 10000                      | 46                              | 1200           | 50000                      | 610                             | 82000          |
| 4     | 3570                       | 5                               | 48             | 10100                      | 39                              | 1100           | 62100                      | 870                             | 150000         |
| 5     | 3560                       | 8                               | 77             | 10500                      | 47                              | 1300           | 59800                      | 550                             | 89000          |
| 6     | 3590                       | 6                               | 58             | 11500                      | 15                              | 470            | 49600                      | 320                             | 43000          |
| 7     | 3570                       | 6                               | 58             | 10900                      | 31                              | 910            | 43400                      | 170                             | 20000          |
| 8     | 3480                       | 5                               | 47             | 10100                      | 22                              | 600            | 43500                      | 120                             | 14000          |
| 9     | 3390                       | 5                               | 46             | 9470                       | 20                              | 510            | 43600                      | 120                             | 14000          |
| 10    | 3380                       | 6                               | 55             | 9470                       | 18                              | 460            | 45700                      | 130                             | 16000          |
| 11    | 3450                       | 6                               | 56             | 10200                      | 25                              | 690            | 48200                      | 150                             | 20000          |
| 12    | 3800                       | 12                              | 120            | 11800                      | 43                              | 1400           | 50200                      | 160                             | 22000          |
| 13    | 3570                       | 13                              | 140            | 15000                      | 62                              | 2300           | 50400                      | 160                             | 22000          |
| 14    | 4000                       | 12                              | 130            | 19000                      | 190                             | 9700           | 45200                      | 140                             | 17000          |
| 15    | 4020                       | 11                              | 120            | 22500                      | 200                             | 12000          | 38400                      | 97                              | 16000          |
| 16    | 3880                       | 9                               | 94             | 21200                      | 100                             | 5700           | 33200                      | 88                              | 7900           |
| 17    | 3780                       | 9                               | 92             | 20200                      | 70                              | 3800           | 30900                      | 72                              | 6000           |
| 18    | 3600                       | 7                               | 68             | 21500                      | 78                              | 4500           | 31600                      | 80                              | 6800           |
| 19    | 3640                       | 4                               | 39             | 24200                      | 160                             | 10000          | 35100                      | 85                              | 7900           |
| 20    | 3780                       | 6                               | 61             | 27100                      | 180                             | 13000          | 42300                      | 150                             | 17000          |
| 21    | 3650                       | 5                               | 49             | 30400                      | 210                             | 17000          | 47600                      | 210                             | 27000          |
| 22    | 3510                       | 7                               | 66             | 34800                      | 320                             | 30000          | 42300                      | 130                             | 15000          |
| 23    | 3450                       | 6                               | 56             | 42000                      | 420                             | 48000          | 37500                      | 82                              | 8300           |
| 24    | 3510                       | 6                               | 57             | 43400                      | 340                             | 40000          | 35400                      | 70                              | 6700           |
| 25    | 3510                       | 4                               | 38             | 40900                      | 190                             | 21000          | 33800                      | 54                              | 4900           |
| 26    | 3600                       | 3                               | 29             | 35800                      | 120                             | 12000          | 34500                      | 57                              | 5300           |
| 27    | 3800                       | 7                               | 72             | 36000                      | 100                             | 9700           | 39500                      | 110                             | 12000          |
| 28    | 3800                       | 6                               | 62             | 35300                      | 92                              | 8800           | 45200                      | 200                             | 24000          |
| 29    | 3970                       | 6                               | 64             | 36400                      | 100                             | 9800           | 40900                      | 140                             | 15000          |
| 30    | 5170                       | 27                              | 380            | 37700                      | 120                             | 12000          | 33800                      | 83                              | 7600           |
| 31    | --                         | --                              | --             | 37400                      | 92                              | 9300           | --                         | --                              | --             |
| TOTAL | 111790                     | --                              | 2471           | 703940                     | --                              | 295140         | 1262700                    | --                              | 704400         |

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | JULY                       |                                 |                | AUGUST                     |                                 |                | SEPTEMBER                  |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 28400                      | 60                              | 4600           | 13000                      | 18                              | 630            | 7840                       | 8                               | 170            |
| 2     | 27900                      | 58                              | 4400           | 12200                      | 13                              | 430            | 7790                       | 10                              | 210            |
| 3     | 26500                      | 67                              | 4800           | 11800                      | 10                              | 320            | 7790                       | 8                               | 170            |
| 4     | 30100                      | 67                              | 5400           | 11800                      | 10                              | 320            | 7590                       | 9                               | 180            |
| 5     | 31900                      | 84                              | 7200           | 11700                      | 10                              | 320            | 7310                       | 11                              | 220            |
| 6     | 33500                      | 94                              | 8500           | 11700                      | 10                              | 320            | 7060                       | 8                               | 150            |
| 7     | 36200                      | 98                              | 9600           | 11700                      | 14                              | 440            | 6860                       | 9                               | 170            |
| 8     | 36700                      | 96                              | 9500           | 11200                      | 40                              | 1200           | 7090                       | 6                               | 110            |
| 9     | 34800                      | 76                              | 7100           | 10400                      | 18                              | 510            | 7420                       | 8                               | 160            |
| 10    | 32800                      | 60                              | 5300           | 9820                       | 10                              | 270            | 7200                       | 5                               | 97             |
| 11    | 31800                      | 56                              | 4800           | 9440                       | 10                              | 250            | 6840                       | 5                               | 52             |
| 12    | 29000                      | 66                              | 5200           | 9400                       | 17                              | 430            | 6840                       | 10                              | 180            |
| 13    | 28300                      | 81                              | 6200           | 9400                       | 14                              | 360            | 6750                       | 6                               | 110            |
| 14    | 27000                      | 63                              | 4600           | 9220                       | 10                              | 250            | 6570                       | 4                               | 71             |
| 15    | 23100                      | 48                              | 3000           | 9280                       | 10                              | 250            | 6890                       | 8                               | 150            |
| 16    | 20100                      | 54                              | 2900           | 10100                      | 10                              | 270            | 6780                       | 12                              | 220            |
| 17    | 18800                      | 46                              | 2300           | 10900                      | 12                              | 390            | 6700                       | 6                               | 110            |
| 18    | 17600                      | 43                              | 2000           | 9860                       | 22                              | 990            | 7000                       | 7                               | 120            |
| 19    | 16300                      | 34                              | 1500           | 9540                       | 10                              | 260            | 8230                       | 12                              | 270            |
| 20    | 16300                      | 25                              | 1100           | 9220                       | 8                               | 200            | 8680                       | 13                              | 300            |
| 21    | 17400                      | 28                              | 1300           | 9010                       | 6                               | 150            | 8440                       | 10                              | 230            |
| 22    | 18700                      | 33                              | 1700           | 9040                       | 5                               | 120            | 8080                       | 6                               | 120            |
| 23    | 17400                      | 32                              | 1500           | 8950                       | 6                               | 140            | 7870                       | 9                               | 150            |
| 24    | 16500                      | 38                              | 1700           | 8440                       | 5                               | 110            | 7590                       | 7                               | 140            |
| 25    | 16500                      | 21                              | 940            | 8260                       | 11                              | 250            | 7540                       | 6                               | 120            |
| 26    | 15400                      | 32                              | 1300           | 7930                       | 8                               | 170            | 7480                       | 15                              | 300            |
| 27    | 14700                      | 17                              | 670            | 8410                       | 7                               | 160            | 7650                       | 11                              | 230            |
| 28    | 14300                      | 20                              | 770            | 8680                       | 9                               | 210            | 8080                       | 10                              | 220            |
| 29    | 14200                      | 14                              | 540            | 8980                       | 9                               | 220            | 8470                       | 9                               | 210            |
| 30    | 14200                      | 18                              | 690            | 8650                       | 8                               | 190            | 8290                       | 6                               | 130            |
| 31    | 13800                      | 13                              | 480            | 8170                       | 7                               | 150            | --                         | --                              | --             |
| TOTAL | 720000                     | --                              | 111590         | 306200                     | --                              | 9840           | 224670                     | --                              | 5170           |

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)  
TOTAL LOAD FOR YEAR (TONS)

3945030  
1145880

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | OCTOBER                    |                                 |                | NOVEMBER                   |                                 |                | DECEMBER                   |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 7990                       | 9                               | 194            | 6470                       | 7                               | 122            | 4110                       | 4                               | 44             |
| 2     | 7760                       | 5                               | 105            | 6420                       | 5                               | 87             | 4060                       | 4                               | 44             |
| 3     | 7480                       | 5                               | 101            | 6260                       | 6                               | 101            | 4110                       | 5                               | 55             |
| 4     | 7340                       | 7                               | 139            | 6130                       | 8                               | 132            | 4220                       | 6                               | 68             |
| 5     | 7120                       | 5                               | 96             | 5950                       | 8                               | 129            | 4220                       | 5                               | 57             |
| 6     | 7090                       | 5                               | 96             | 5740                       | 6                               | 93             | 3810                       | 12                              | 123            |
| 7     | 6950                       | 5                               | 94             | 5620                       | 5                               | 76             | 3260                       | 31                              | 273            |
| 8     | 6750                       | 4                               | 73             | 5330                       | 4                               | 58             | 3420                       | 14                              | 129            |
| 9     | 6490                       | 3                               | 53             | 5130                       | 6                               | 83             | 3800                       | 8                               | 62             |
| 10    | 6310                       | 4                               | 68             | 5080                       | 6                               | 82             | 3830                       | 6                               | 62             |
| 11    | 6550                       | 4                               | 71             | 5080                       | 5                               | 69             | 4380                       | 7                               | 63             |
| 12    | 6730                       | 5                               | 91             | 5300                       | 7                               | 100            | 4360                       | 7                               | 62             |
| 13    | 6980                       | 4                               | 75             | 5520                       | 6                               | 89             | 3800                       | 12                              | 123            |
| 14    | 6920                       | 5                               | 93             | 5240                       | 6                               | 85             | 3500                       | 13                              | 123            |
| 15    | 6730                       | 12                              | 218            | 5040                       | 5                               | 68             | 3640                       | 8                               | 75             |
| 16    | 6550                       | 6                               | 106            | 5020                       | 14                              | 190            | 3880                       | 6                               | 63             |
| 17    | 6230                       | 9                               | 151            | 4690                       | 8                               | 101            | 4080                       | 7                               | 77             |
| 18    | 5980                       | 13                              | 210            | 4690                       | 4                               | 51             | 4080                       | 9                               | 59             |
| 19    | 5780                       | 6                               | 94             | 4580                       | 10                              | 124            | 4060                       | 13                              | 143            |
| 20    | 5830                       | 4                               | 63             | 4580                       | 23                              | 284            | 3400                       | 7                               | 64             |
| 21    | 5780                       | 3                               | 47             | 4710                       | 16                              | 203            | 3210                       | 6                               | 52             |
| 22    | 5640                       | 3                               | 46             | 4840                       | 5                               | 65             | 2840                       | 6                               | 46             |
| 23    | 5520                       | 4                               | 60             | 5080                       | 6                               | 82             | 2960                       | 4                               | 32             |
| 24    | 5380                       | 5                               | 73             | 4970                       | 5                               | 67             | 2840                       | 4                               | 31             |
| 25    | 5380                       | 4                               | 58             | 4930                       | 5                               | 67             | 3040                       | 5                               | 41             |
| 26    | 5840                       | 4                               | 61             | 4640                       | 5                               | 63             | 3260                       | 7                               | 62             |
| 27    | 6130                       | 5                               | 83             | 4460                       | 4                               | 48             | 2840                       | 8                               | 61             |
| 28    | 6210                       | 6                               | 101            | 4240                       | 4                               | 46             | 2600                       | 13                              | 51             |
| 29    | 6080                       | 3                               | 49             | 4240                       | 3                               | 34             | 2400                       | 23                              | 149            |
| 30    | 6130                       | 4                               | 66             | 4170                       | 4                               | 45             | 2300                       | 13                              | 61             |
| 31    | 6650                       | 6                               | 108            | --                         | --                              | --             | 2200                       | 5                               | 30             |
| TOTAL | 200100                     | --                              | 2943           | 154150                     | --                              | 2844           | 108510                     | --                              | 2540           |

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | JANUARY                    |                                 |                | FEBRUARY                   |                                 |                | MARCH                      |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 2400                       | 9                               | 58             | 2700                       | 5                               | 36             | 2750                       | 13                              | 57             |
| 2     | 2600                       | 8                               | 56             | 2700                       | 4                               | 29             | 2740                       | 9                               | 67             |
| 3     | 2800                       | 8                               | 60             | 2800                       | 5                               | 38             | 2740                       | 10                              | 74             |
| 4     | 3000                       | 13                              | 105            | 2900                       | 6                               | 47             | 2710                       | 6                               | 44             |
| 5     | 3200                       | 18                              | 156            | 3000                       | 5                               | 40             | 2730                       | 10                              | 74             |
| 6     | 3300                       | 20                              | 178            | 2900                       | 6                               | 47             | 2790                       | 7                               | 53             |
| 7     | 3400                       | 12                              | 110            | 2800                       | 9                               | 68             | 2820                       | 5                               | 38             |
| 8     | 3500                       | 10                              | 94             | 2700                       | 9                               | 66             | 2640                       | 7                               | 50             |
| 9     | 3600                       | 13                              | 126            | 2600                       | 13                              | 91             | 2640                       | 7                               | 50             |
| 10    | 3500                       | 15                              | 142            | 2500                       | 11                              | 74             | 2650                       | 5                               | 36             |
| 11    | 3400                       | 15                              | 138            | 2500                       | 15                              | 101            | 2650                       | 5                               | 36             |
| 12    | 3300                       | 13                              | 116            | 2600                       | 12                              | 91             | 2650                       | 7                               | 50             |
| 13    | 3200                       | 15                              | 130            | 2600                       | 11                              | 77             | 2660                       | 9                               | 65             |
| 14    | 3200                       | 11                              | 95             | 2600                       | 12                              | 84             | 2760                       | 17                              | 127            |
| 15    | 3300                       | 10                              | 89             | 2700                       | 16                              | 117            | 2760                       | 7                               | 52             |
| 16    | 3500                       | 9                               | 85             | 2700                       | 15                              | 109            | 2750                       | 6                               | 45             |
| 17    | 3600                       | 11                              | 107            | 2600                       | 13                              | 91             | 2990                       | 14                              | 113            |
| 18    | 3600                       | 21                              | 204            | 2600                       | 11                              | 77             | 3270                       | 16                              | 141            |
| 19    | 3500                       | 9                               | 85             | 2500                       | 10                              | 64             | 3460                       | 5                               | 47             |
| 20    | 3300                       | 3                               | 27             | 2400                       | 13                              | 84             | 3460                       | 15                              | 140            |
| 21    | 3100                       | 2                               | 17             | 2500                       | 12                              | 81             | 3360                       | 21                              | 151            |
| 22    | 3000                       | 1                               | 8.1            | 2600                       | 13                              | 91             | 3360                       | 14                              | 127            |
| 23    | 2900                       | 1                               | 7.8            | 2730                       | 10                              | 74             | 3380                       | 10                              | 51             |
| 24    | 2900                       | 1                               | 7.8            | 2730                       | 8                               | 59             | 3270                       | 21                              | 185            |
| 25    | 3000                       | 1                               | 8.1            | 2730                       | 9                               | 66             | 3260                       | 17                              | 150            |
| 26    | 3100                       | 3                               | 25             | 2760                       | 7                               | 52             | 3230                       | 18                              | 157            |
| 27    | 3200                       | 10                              | 86             | 2750                       | 9                               | 67             | 3230                       | 9                               | 78             |
| 28    | 3100                       | 2                               | 17             | 2750                       | 7                               | 52             | 3390                       | 11                              | 101            |
| 29    | 3000                       | 3                               | 24             | --                         | --                              | --             | 3640                       | 14                              | 138            |
| 30    | 2800                       | 5                               | 38             | --                         | --                              | --             | 3480                       | 18                              | 165            |
| 31    | 2700                       | 7                               | 51             | --                         | --                              | --             | 4000                       | 23                              | 248            |
| TOTAL | 98000                      | --                              | 2450.8         | 74950                      | --                              | 1977           | 94220                      | --                              | 3034           |

TABLE 17.7

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | APRIL                      |                                 |                | MAY                        |                                 |                | JUNE                       |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | PEAK<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | PEAK<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | PEAK<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 4500                       | 28                              | 346            | 19800                      | 57                              | 3050           | 46500                      | 138                             | 17300          |
| 2     | 4990                       | 34                              | 458            | 18100                      | 42                              | 2050           | 46300                      | 119                             | 14200          |
| 3     | 5190                       | 37                              | 518            | 17200                      | 31                              | 1440           | 48100                      | 156                             | 20300          |
| 4     | 5330                       | 39                              | 561            | 16700                      | 30                              | 1350           | 56100                      | 300                             | 49400          |
| 5     | 5400                       | 30                              | 437            | 16200                      | 25                              | 1090           | 63400                      | 378                             | 64700          |
| 6     | 5950                       | 42                              | 675            | 16300                      | 25                              | 1100           | 67900                      | 487                             | 89300          |
| 7     | 7120                       | 65                              | 1250           | 18400                      | 37                              | 1840           | 69200                      | 458                             | 83600          |
| 8     | 8410                       | 82                              | 1860           | 22400                      | 69                              | 4170           | 65200                      | 294                             | 51800          |
| 9     | 9290                       | 70                              | 1750           | 25300                      | 56                              | 6560           | 57300                      | 245                             | 37900          |
| 10    | 10400                      | 71                              | 1990           | 30600                      | 199                             | 16400          | 51900                      | 200                             | 28000          |
| 11    | 11000                      | 77                              | 2290           | 38500                      | 370                             | 38500          | 50900                      | 147                             | 20200          |
| 12    | 11800                      | 71                              | 2260           | 47100                      | 439                             | 55800          | 49900                      | 112                             | 15100          |
| 13    | 12800                      | 66                              | 2280           | 52700                      | 535                             | 76100          | 46700                      | 109                             | 13700          |
| 14    | 13500                      | 49                              | 1790           | 52200                      | 537                             | 75700          | 41700                      | 98                              | 11000          |
| 15    | 13500                      | 47                              | 1710           | 57800                      | 490                             | 76500          | 36100                      | 94                              | 9160           |
| 16    | 13400                      | 43                              | 1560           | 53900                      | 325                             | 47300          | 32600                      | 76                              | 6490           |
| 17    | 13600                      | 46                              | 1690           | 46700                      | 200                             | 25200          | 31500                      | 75                              | 6380           |
| 18    | 15500                      | 77                              | 3220           | 41800                      | 131                             | 14800          | 32100                      | 64                              | 5720           |
| 19    | 17700                      | 110                             | 5760           | 39000                      | 104                             | 11000          | 33900                      | 69                              | 6320           |
| 20    | 17000                      | 65                              | 2980           | 38500                      | 88                              | 9150           | 37900                      | 137                             | 14000          |
| 21    | 15000                      | 45                              | 1820           | 37600                      | 76                              | 7700           | 44200                      | 137                             | 14300          |
| 22    | 13900                      | 37                              | 1390           | 37300                      | 65                              | 6550           | 48500                      | 184                             | 24100          |
| 23    | 14800                      | 55                              | 2200           | 40000                      | 79                              | 8530           | 46200                      | 91                              | 11400          |
| 24    | 23000                      | 232                             | 14400          | 46100                      | 88                              | 11000          | 43400                      | 98                              | 11500          |
| 25    | 31300                      | 327                             | 27600          | 53100                      | 280                             | 40100          | 42600                      | 98                              | 11300          |
| 26    | 28200                      | 178                             | 13600          | 59800                      | 463                             | 74800          | 44900                      | 108                             | 13700          |
| 27    | 23300                      | 107                             | 6730           | 63400                      | 525                             | 89900          | 48100                      | 129                             | 16800          |
| 28    | 21000                      | 63                              | 3570           | 59100                      | 314                             | 50100          | 48700                      | 139                             | 18300          |
| 29    | 19400                      | 50                              | 2620           | 50900                      | 208                             | 28600          | 48600                      | 120                             | 15700          |
| 30    | 20400                      | 55                              | 3030           | 48100                      | 177                             | 23000          | 47000                      | 88                              | 11200          |
| 31    | --                         | --                              | --             | 50100                      | 218                             | 29500          | --                         | --                              | --             |
| TOTAL | 416720                     | --                              | 111845         | 1214700                    | --                              | 838880         | 1427400                    | --                              | 713070         |

TABLE 17.8

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | JULY                       |                                 |                | AUGUST                     |                                 |                | SEPTEMBER                  |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | PEAK<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | PEAK<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | PEAK<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 43200                      | 85                              | 9910           | 13200                      | 15                              | 535            | 6340                       | 5                               | 66             |
| 2     | 40500                      | 76                              | 8310           | 12700                      | 11                              | 177            | 6260                       | 5                               | 85             |
| 3     | 38900                      | 61                              | 6410           | 12300                      | 10                              | 322            | 6110                       | 6                               | 99             |
| 4     | 39200                      | 67                              | 7090           | 12000                      | 9                               | 292            | 5890                       | 8                               | 127            |
| 5     | 38400                      | 65                              | 6740           | 11400                      | 8                               | 246            | 5800                       | 7                               | 110            |
| 6     | 36700                      | 72                              | 7130           | 11400                      | 7                               | 215            | 5780                       | 5                               | 78             |
| 7     | 34000                      | 49                              | 4500           | 11500                      | 9                               | 279            | 5700                       | 8                               | 123            |
| 8     | 32800                      | 93                              | 8240           | 11000                      | 9                               | 267            | 5700                       | 7                               | 108            |
| 9     | 30600                      | 86                              | 7110           | 10600                      | 9                               | 258            | 5300                       | 8                               | 114            |
| 10    | 29700                      | 57                              | 4570           | 10300                      | 9                               | 250            | 5300                       | 5                               | 72             |
| 11    | 29100                      | 41                              | 3220           | 9920                       | 8                               | 214            | 5300                       | 3                               | 43             |
| 12    | 27900                      | 39                              | 2940           | 9800                       | 8                               | 212            | 5150                       | 5                               | 70             |
| 13    | 26800                      | 35                              | 2530           | 9650                       | 8                               | 208            | 5150                       | 7                               | 67             |
| 14    | 24900                      | 39                              | 2580           | 9230                       | 8                               | 199            | 5180                       | 5                               | 70             |
| 15    | 23000                      | 43                              | 2670           | 8970                       | 7                               | 170            | 5560                       | 4                               | 60             |
| 16    | 21300                      | 40                              | 2300           | 8680                       | 5                               | 117            | 5700                       | 5                               | 77             |
| 17    | 20000                      | 29                              | 1570           | 8680                       | 8                               | 187            | 5430                       | 4                               | 59             |
| 18    | 19200                      | 35                              | 1810           | 8680                       | 8                               | 187            | 5300                       | 4                               | 57             |
| 19    | 18400                      | 27                              | 1360           | 8390                       | 7                               | 159            | 5300                       | 5                               | 72             |
| 20    | 18200                      | 31                              | 1520           | 7980                       | 6                               | 129            | 5300                       | 6                               | 86             |
| 21    | 17900                      | 16                              | 773            | 7780                       | 7                               | 147            | 5320                       | 6                               | 53             |
| 22    | 17800                      | 10                              | 481            | 7640                       | 7                               | 144            | 5910                       | 8                               | 128            |
| 23    | 17500                      | 18                              | 850            | 7560                       | 5                               | 102            | 5910                       | 9                               | 144            |
| 24    | 17400                      | 18                              | 846            | 7580                       | 7                               | 143            | 6550                       | 11                              | 155            |
| 25    | 17200                      | 13                              | 604            | 7480                       | 9                               | 182            | 6850                       | 14                              | 229            |
| 26    | 17200                      | 15                              | 697            | 7480                       | 8                               | 162            | 6790                       | 14                              | 227            |
| 27    | 16400                      | 14                              | 627            | 7640                       | 9                               | 186            | 6700                       | 12                              | 217            |
| 28    | 15700                      | 12                              | 509            | 7480                       | 9                               | 182            | 6400                       | 8                               | 138            |
| 29    | 15000                      | 13                              | 527            | 7320                       | 5                               | 99             | 6000                       | 7                               | 113            |
| 30    | 14400                      | 13                              | 505            | 7160                       | 5                               | 97             | 6400                       | 7                               | 121            |
| 31    | 13800                      | 17                              | 633            | 6700                       | 7                               | 127            | --                         | --                              | --             |
| TOTAL | 773100                     | --                              | 99562          | 288220                     | --                              | 6394           | 174780                     | --                              | 3398           |

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)  
TOTAL LOAD FOR YEAR (TONS)

9024850  
1788986.8

TABLE 17.9

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | OCTOBER                    |                                 |                                                  | NOVEMBER                   |                                 |                                                  | DECEMBER                   |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 7880                       | 15                              | 319                                              | 3930                       | 4                               | 42                                               | 2970                       | 6                               | 48                                               |
| 2     | 8750                       | 29                              | 885                                              | 4030                       | 4                               | 45                                               | 3090                       | 10                              | 83                                               |
| 3     | 8390                       | 14                              | 317                                              | 4130                       | 4                               | 45                                               | 3180                       | 5                               | 43                                               |
| 4     | 7950                       | 7                               | 150                                              | 4190                       | 3                               | 34                                               | 3000                       | 6                               | 49                                               |
| 5     | 7130                       | 8                               | 154                                              | 4130                       | 5                               | 56                                               | 2950                       | 5                               | 40                                               |
| 6     | 4820                       | 6                               | 110                                              | 4490                       | 6                               | 73                                               | 2950                       | 5                               | 40                                               |
| 7     | 4110                       | 5                               | 82                                               | 5000                       | 5                               | 68                                               | 2950                       | 6                               | 48                                               |
| 8     | 4260                       | 4                               | 68                                               | 5080                       | 10                              | 137                                              | 2990                       | 5                               | 40                                               |
| 9     | 4880                       | 4                               | 74                                               | 4510                       | 8                               | 97                                               | 3020                       | 6                               | 49                                               |
| 10    | 4230                       | 4                               | 67                                               | 4700                       | 7                               | 89                                               | 3020                       | 4                               | 32                                               |
| 11    | 5970                       | 2                               | 32                                               | 4210                       | 10                              | 114                                              | 2960                       | 6                               | 48                                               |
| 12    | 5860                       | 8                               | 127                                              | 4340                       | 4                               | 47                                               | 2960                       | 3                               | 24                                               |
| 13    | 5400                       | 6                               | 87                                               | 4450                       | 2                               | 24                                               | 3240                       | 4                               | 35                                               |
| 14    | 5400                       | 2                               | 29                                               | 4450                       | 3                               | 36                                               | 3310                       | 6                               | 54                                               |
| 15    | 5050                       | 2                               | 27                                               | 4170                       | 6                               | 68                                               | 3310                       | 6                               | 54                                               |
| 16    | 5030                       | 2                               | 27                                               | 3950                       | 3                               | 32                                               | 3560                       | 4                               | 38                                               |
| 17    | 4910                       | 1                               | 13                                               | 4030                       | 3                               | 33                                               | 3630                       | 5                               | 49                                               |
| 18    | 4810                       | 4                               | 52                                               | 4130                       | 5                               | 56                                               | 3650                       | 5                               | 49                                               |
| 19    | 4790                       | 5                               | 65                                               | 4210                       | 3                               | 34                                               | 3390                       | 7                               | 64                                               |
| 20    | 4670                       | 18                              | 227                                              | 4130                       | 4                               | 45                                               | 3240                       | 7                               | 61                                               |
| 21    | 4400                       | 12                              | 143                                              | 4130                       | 5                               | 56                                               | 3310                       | 6                               | 54                                               |
| 22    | 4400                       | 4                               | 48                                               | 3560                       | 5                               | 48                                               | 3310                       | 8                               | 71                                               |
| 23    | 4030                       | 2                               | 22                                               | 3710                       | 3                               | 30                                               | 3310                       | 7                               | 63                                               |
| 24    | 4260                       | 2                               | 23                                               | 3910                       | 3                               | 32                                               | 3330                       | 6                               | 54                                               |
| 25    | 4810                       | 2                               | 26                                               | 4010                       | 1                               | 11                                               | 3160                       | 6                               | 51                                               |
| 26    | 4670                       | 4                               | 50                                               | 3390                       | 3                               | 27                                               | 2880                       | 4                               | 31                                               |
| 27    | 4960                       | 4                               | 49                                               | 3310                       | 4                               | 36                                               | 2880                       | 4                               | 31                                               |
| 28    | 4130                       | 2                               | 22                                               | 3240                       | 4                               | 35                                               | 1800                       | 6                               | 29                                               |
| 29    | 4150                       | 2                               | 22                                               | 3020                       | 8                               | 65                                               | 1700                       | 3                               | 14                                               |
| 30    | 4030                       | 4                               | 44                                               | 2950                       | 6                               | 48                                               | 1700                       | 3                               | 14                                               |
| 31    | 4450                       | 4                               | 48                                               | --                         | --                              | --                                               | 1700                       | 5                               | 23                                               |
| TOTAL | 172186                     | --                              | 3209                                             | 121490                     | --                              | 1583                                             | 92450                      | --                              | 1384                                             |

TABLE 17.10

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | JANUARY                    |                                 |                                                  | FEBRUARY                   |                                 |                                                  | MARCH                      |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 1700                       | 5                               | 23                                               | 2760                       | 6                               | 45                                               | 2460                       | 6                               | 40                                               |
| 2     | 1700                       | 4                               | 18                                               | 2620                       | 7                               | 50                                               | 2430                       | 5                               | 33                                               |
| 3     | 1600                       | 4                               | 17                                               | 2700                       | 11                              | 80                                               | 2400                       | 6                               | 35                                               |
| 4     | 1500                       | 4                               | 16                                               | 2640                       | 6                               | 43                                               | 2350                       | 5                               | 32                                               |
| 5     | 1300                       | 4                               | 14                                               | 2700                       | 7                               | 51                                               | 2370                       | 4                               | 26                                               |
| 6     | 1400                       | 4                               | 15                                               | 2700                       | 6                               | 44                                               | 2350                       | 5                               | 32                                               |
| 7     | 1500                       | 8                               | 32                                               | 2700                       | 8                               | 58                                               | 2620                       | 6                               | 42                                               |
| 8     | 1600                       | 5                               | 22                                               | 2700                       | 6                               | 44                                               | 2640                       | 7                               | 50                                               |
| 9     | 1700                       | 6                               | 28                                               | 2700                       | 5                               | 36                                               | 2640                       | 8                               | 57                                               |
| 10    | 1800                       | 10                              | 49                                               | 2700                       | 5                               | 36                                               | 2660                       | 11                              | 76                                               |
| 11    | 1900                       | 18                              | 92                                               | 2700                       | 5                               | 36                                               | 2660                       | 7                               | 50                                               |
| 12    | 2100                       | 13                              | 74                                               | 2700                       | 8                               | 58                                               | 2830                       | 15                              | 115                                              |
| 13    | 2200                       | 16                              | 95                                               | 2700                       | 16                              | 117                                              | 2960                       | 10                              | 80                                               |
| 14    | 2300                       | 18                              | 112                                              | 2640                       | 8                               | 57                                               | 3000                       | 5                               | 41                                               |
| 15    | 2400                       | 12                              | 78                                               | 2640                       | 11                              | 78                                               | 3000                       | 6                               | 49                                               |
| 16    | 2400                       | 12                              | 78                                               | 2830                       | 7                               | 53                                               | 3000                       | 12                              | 57                                               |
| 17    | 2300                       | 15                              | 93                                               | 2870                       | 8                               | 62                                               | 2880                       | 6                               | 47                                               |
| 18    | 2100                       | 11                              | 62                                               | 2870                       | 10                              | 77                                               | 2880                       | 6                               | 47                                               |
| 19    | 2300                       | 8                               | 50                                               | 2860                       | 11                              | 85                                               | 2910                       | 8                               | 63                                               |
| 20    | 2500                       | 5                               | 34                                               | 2860                       | 16                              | 124                                              | 2920                       | 8                               | 63                                               |
| 21    | 2700                       | 6                               | 44                                               | 2900                       | 7                               | 55                                               | 2920                       | 6                               | 47                                               |
| 22    | 2900                       | 10                              | 78                                               | 2900                       | 8                               | 63                                               | 2700                       | 3                               | 22                                               |
| 23    | 3000                       | 13                              | 105                                              | 2760                       | 7                               | 52                                               | 2640                       | 2                               | 14                                               |
| 24    | 3100                       | 13                              | 109                                              | 2640                       | 3                               | 21                                               | 2640                       | 7                               | 50                                               |
| 25    | 3200                       | 11                              | 95                                               | 2570                       | 2                               | 14                                               | 2640                       | 8                               | 57                                               |
| 26    | 3200                       | 9                               | 78                                               | 2500                       | 6                               | 41                                               | 2640                       | 12                              | 86                                               |
| 27    | 3100                       | 12                              | 100                                              | 2500                       | 9                               | 61                                               | 2640                       | 10                              | 71                                               |
| 28    | 2960                       | 8                               | 64                                               | 2500                       | 6                               | 41                                               | 2700                       | 6                               | 44                                               |
| 29    | 2760                       | 5                               | 37                                               | --                         | --                              | --                                               | 2700                       | 7                               | 51                                               |
| 30    | 2760                       | 5                               | 37                                               | --                         | --                              | --                                               | 2700                       | 4                               | 29                                               |
| 31    | 2760                       | 5                               | 37                                               | --                         | --                              | --                                               | 2700                       | 2                               | 15                                               |
| TOTAL | 70740                      | --                              | 1786                                             | 75060                      | --                              | 1582                                             | 83580                      | --                              | 1568                                             |

TABLE 17.11

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | APRIL                      |                                 |                                                  | MAY                        |                                 |                                                  | JUNE                       |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 2790                       | 2                               | 15                                               | 3360                       | 10                              | 91                                               | 23600                      | 67                              | 427C                                             |
| 2     | 2790                       | 9                               | 68                                               | 3440                       | 13                              | 121                                              | 25800                      | 87                              | 6060                                             |
| 3     | 2790                       | 5                               | 38                                               | 4090                       | 38                              | 420                                              | 31900                      | 138                             | 119CC                                            |
| 4     | 2790                       | 3                               | 23                                               | 5470                       | 50                              | 738                                              | 40200                      | 183                             | 19900                                            |
| 5     | 2790                       | 5                               | 38                                               | 7420                       | 128                             | 2560                                             | 47600                      | 222                             | 285C0                                            |
| 6     | 2910                       | 4                               | 31                                               | 1C40C                      | 130                             | 3650                                             | 49600                      | 223                             | 29900                                            |
| 7     | 3240                       | 3                               | 26                                               | 14000                      | 132                             | 4990                                             | 48800                      | 142                             | 187CC                                            |
| 8     | 3590                       | 6                               | 58                                               | 14300                      | 130                             | 5720                                             | 46800                      | 72                              | 9100                                             |
| 9     | 3510                       | 6                               | 57                                               | 16400                      | 85                              | 3760                                             | 44400                      | 56                              | 671C                                             |
| 10    | 3510                       | 6                               | 57                                               | 15500                      | 41                              | 1760                                             | 42300                      | 34                              | 388C                                             |
| 11    | 3670                       | 5                               | 50                                               | 15000                      | 24                              | 972                                              | 37100                      | 31                              | 311C                                             |
| 12    | 3670                       | 5                               | 5C                                               | 14100                      | 20                              | 761                                              | 30400                      | 29                              | 2380                                             |
| 13    | 3560                       | 6                               | 58                                               | 12600                      | 20                              | 680                                              | 26000                      | 25                              | 1760                                             |
| 14    | 3190                       | 5                               | 46                                               | 11300                      | 20                              | 610                                              | 25200                      | 22                              | 15CC                                             |
| 15    | 3240                       | 4                               | 35                                               | 1C500                      | 20                              | 567                                              | 26900                      | 28                              | 203C                                             |
| 16    | 3210                       | 6                               | 52                                               | 11000                      | 24                              | 713                                              | 29600                      | 94                              | 751C                                             |
| 17    | 3180                       | 8                               | 65                                               | 15300                      | 67                              | 2770                                             | 34300                      | 128                             | 119CC                                            |
| 18    | 3140                       | 5                               | 42                                               | 22900                      | 146                             | 9030                                             | 35900                      | 133                             | 12900                                            |
| 19    | 3170                       | 8                               | 68                                               | 24800                      | 190                             | 12700                                            | 34500                      | 97                              | 904C                                             |
| 20    | 3240                       | 6                               | 52                                               | 24700                      | 218                             | 14500                                            | 33800                      | 69                              | 63CC                                             |
| 21    | 3390                       | 4                               | 37                                               | 24500                      | 78                              | 5160                                             | 32700                      | 54                              | 477C                                             |
| 22    | 3500                       | 5                               | 47                                               | 25300                      | 148                             | 10100                                            | 31600                      | 48                              | 41CC                                             |
| 23    | 3510                       | 7                               | 66                                               | 26800                      | 167                             | 12100                                            | 30600                      | 64                              | 525C                                             |
| 24    | 3510                       | 4                               | 38                                               | 28200                      | 154                             | 11700                                            | 28400                      | 62                              | 475C                                             |
| 25    | 3540                       | 7                               | 67                                               | 29800                      | 150                             | 12100                                            | 24900                      | 40                              | 269C                                             |
| 26    | 3590                       | 12                              | 116                                              | 33500                      | 132                             | 11900                                            | 23300                      | 24                              | 151C                                             |
| 27    | 3590                       | 11                              | 107                                              | 38500                      | 89                              | 9250                                             | 21800                      | 23                              | 1350                                             |
| 28    | 3560                       | 4                               | 38                                               | 34900                      | 79                              | 7440                                             | 21700                      | 24                              | 141C                                             |
| 29    | 3400                       | 5                               | 46                                               | 29800                      | 77                              | 6200                                             | 22000                      | 22                              | 1310                                             |
| 30    | 3380                       | 8                               | 73                                               | 26300                      | 78                              | 5540                                             | 21400                      | 35                              | 202C                                             |
| 31    | --                         | --                              | --                                               | 24400                      | 68                              | 4480                                             | --                         | --                              | --                                               |
| TOTAL | 99130                      | --                              | 1568                                             | 580980                     | --                              | 163083                                           | 973100                     | --                              | 22655C                                           |

TABLE 17.12

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | JULY                       |                                 |                                                  | AUGUST                     |                                 |                                                  | SEPTEMBER                  |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 21000                      | 32                              | 181C                                             | 9100                       | 8                               | 197                                              | 4950                       | 9                               | 121                                              |
| 2     | 19700                      | 29                              | 154C                                             | 8800                       | 8                               | 190                                              | 4970                       | 17                              | 228                                              |
| 3     | 18300                      | 25                              | 1240                                             | 8380                       | 6                               | 136                                              | 5210                       | 28                              | 394                                              |
| 4     | 17400                      | 20                              | 940                                              | 8140                       | 6                               | 132                                              | 5450                       | 14                              | 206                                              |
| 5     | 17700                      | 22                              | 1050                                             | 7990                       | 8                               | 173                                              | 5400                       | 9                               | 131                                              |
| 6     | 17800                      | 23                              | 1110                                             | 8260                       | 7                               | 156                                              | 5210                       | 7                               | 98                                               |
| 7     | 17000                      | 16                              | 734                                              | 7840                       | 7                               | 148                                              | 5100                       | 10                              | 138                                              |
| 8     | 15600                      | 13                              | 548                                              | 7650                       | 9                               | 186                                              | 5190                       | 8                               | 112                                              |
| 9     | 14800                      | 11                              | 440                                              | 7650                       | 8                               | 165                                              | 5400                       | 8                               | 117                                              |
| 10    | 14800                      | 10                              | 400                                              | 7400                       | 9                               | 180                                              | 5130                       | 9                               | 125                                              |
| 11    | 14200                      | 12                              | 460                                              | 6810                       | 12                              | 221                                              | 5080                       | 7                               | 96                                               |
| 12    | 13600                      | 13                              | 477                                              | 6550                       | 11                              | 195                                              | 4880                       | 6                               | 79                                               |
| 13    | 12600                      | 14                              | 476                                              | 6420                       | 9                               | 156                                              | 4860                       | 14                              | 184                                              |
| 14    | 12200                      | 12                              | 395                                              | 6360                       | 11                              | 189                                              | 4640                       | 5                               | 63                                               |
| 15    | 11200                      | 10                              | 302                                              | 6340                       | 14                              | 240                                              | 4520                       | 6                               | 73                                               |
| 16    | 10600                      | 11                              | 315                                              | 6130                       | 16                              | 265                                              | 4480                       | 5                               | 60                                               |
| 17    | 10600                      | 13                              | 372                                              | 5780                       | 12                              | 187                                              | 4320                       | 6                               | 70                                               |
| 18    | 10500                      | 12                              | 340                                              | 5810                       | 8                               | 125                                              | 4280                       | 5                               | 58                                               |
| 19    | 10600                      | 11                              | 315                                              | 5780                       | 10                              | 156                                              | 4580                       | 5                               | 62                                               |
| 20    | 9960                       | 12                              | 323                                              | 5570                       | 8                               | 120                                              | 5950                       | 8                               | 129                                              |
| 21    | 9650                       | 10                              | 261                                              | 5350                       | 5                               | 72                                               | 6080                       | 11                              | 181                                              |
| 22    | 9680                       | 7                               | 183                                              | 5300                       | 13                              | 186                                              | 5900                       | 8                               | 127                                              |
| 23    | 9790                       | 6                               | 159                                              | 5240                       | 10                              | 141                                              | 5880                       | 10                              | 159                                              |
| 24    | 9370                       | 9                               | 228                                              | 5240                       | 4                               | 57                                               | 5880                       | 9                               | 143                                              |
| 25    | 8860                       | 9                               | 215                                              | 5300                       | 5                               | 72                                               | 5660                       | 10                              | 153                                              |
| 26    | 8710                       | 10                              | 235                                              | 5210                       | 5                               | 70                                               | 5350                       | 6                               | 87                                               |
| 27    | 8860                       | 8                               | 191                                              | 5170                       | 6                               | 84                                               | 5150                       | 14                              | 195                                              |
| 28    | 9130                       | 11                              | 271                                              | 5080                       | 6                               | 82                                               | 5080                       | 6                               | 82                                               |
| 29    | 9790                       | 9                               | 238                                              | 5130                       | 13                              | 180                                              | 4950                       | 7                               | 94                                               |
| 30    | 9790                       | 15                              | 394                                              | 5170                       | 10                              | 140                                              | 4910                       | 5                               | 66                                               |
| 31    | 9280                       | 10                              | 251                                              | 5130                       | 4                               | 55                                               | --                         | --                              | --                                               |
| TOTAL | 393070                     | --                              | 16215                                            | 200080                     | --                              | 4656                                             | 154480                     | --                              | 3831                                             |

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)  
 TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS)

301714C  
 427015

TABLE 17.13

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | OCTOBER                    |                                      |                                     | NOVEMBER                   |                                      |                                     | DECEMBER                   |                                      |                                     |
|-------|----------------------------|--------------------------------------|-------------------------------------|----------------------------|--------------------------------------|-------------------------------------|----------------------------|--------------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 4910                       | 2                                    | 27                                  | 3400                       | 2                                    | 19                                  | 2800                       | 7                                    | 53                                  |
| 2     | 4910                       | 4                                    | 53                                  | 3450                       | 4                                    | 39                                  | 2880                       | 5                                    | 35                                  |
| 3     | 4860                       | 4                                    | 52                                  | 3400                       | 2                                    | 19                                  | 2880                       | 2                                    | 16                                  |
| 4     | 4770                       | 6                                    | 77                                  | 3420                       | 2                                    | 20                                  | 2880                       | 6                                    | 47                                  |
| 5     | 4770                       | 4                                    | 52                                  | 3480                       | 2                                    | 19                                  | 2900                       | 3                                    | 23                                  |
| 6     | 4880                       | 6                                    | 79                                  | 3560                       | 2                                    | 19                                  | 2900                       | 2                                    | 16                                  |
| 7     | 5080                       | 5                                    | 64                                  | 3620                       | 2                                    | 20                                  | 3360                       | 9                                    | 82                                  |
| 8     | 5130                       | 5                                    | 69                                  | 3640                       | 2                                    | 20                                  | 3780                       | 7                                    | 71                                  |
| 9     | 5020                       | 4                                    | 54                                  | 3670                       | 2                                    | 20                                  | 3670                       | 26                                   | 256                                 |
| 10    | 4880                       | 3                                    | 40                                  | 3730                       | 4                                    | 40                                  | 3400                       | 14                                   | 129                                 |
| 11    | 4710                       | 4                                    | 51                                  | 3680                       | 2                                    | 20                                  | 3200                       | 7                                    | 60                                  |
| 12    | 4580                       | 4                                    | 49                                  | 3670                       | 2                                    | 20                                  | 3000                       | 6                                    | 49                                  |
| 13    | 4580                       | 4                                    | 45                                  | 3620                       | 2                                    | 20                                  | 2900                       | 6                                    | 45                                  |
| 14    | 4420                       | 4                                    | 48                                  | 3570                       | 5                                    | 48                                  | 2700                       | 8                                    | 58                                  |
| 15    | 4320                       | 4                                    | 47                                  | 3510                       | 7                                    | 66                                  | 2900                       | 7                                    | 55                                  |
| 16    | 4220                       | 8                                    | 91                                  | 3510                       | 8                                    | 76                                  | 3000                       | 7                                    | 57                                  |
| 17    | 4220                       | 3                                    | 34                                  | 3460                       | 3                                    | 28                                  | 3100                       | 8                                    | 67                                  |
| 18    | 4180                       | 6                                    | 68                                  | 3420                       | 5                                    | 46                                  | 3200                       | 9                                    | 78                                  |
| 19    | 4000                       | 4                                    | 43                                  | 3420                       | 7                                    | 65                                  | 3100                       | 7                                    | 59                                  |
| 20    | 4060                       | 6                                    | 66                                  | 3420                       | 5                                    | 46                                  | 3000                       | 6                                    | 49                                  |
| 21    | 4080                       | 6                                    | 66                                  | 3400                       | 45                                   | 413                                 | 2700                       | 5                                    | 36                                  |
| 22    | 4090                       | 5                                    | 55                                  | 2500                       | 23                                   | 155                                 | 2300                       | 7                                    | 43                                  |
| 23    | 3910                       | 5                                    | 53                                  | 2000                       | 23                                   | 124                                 | 1800                       | 9                                    | 44                                  |
| 24    | 4110                       | 6                                    | 67                                  | 2200                       | 24                                   | 143                                 | 1400                       | 18                                   | 68                                  |
| 25    | 4110                       | 4                                    | 44                                  | 2820                       | 7                                    | 53                                  | 1800                       | 20                                   | 97                                  |
| 26    | 4110                       | 4                                    | 44                                  | 2820                       | 5                                    | 38                                  | 2100                       | 10                                   | 57                                  |
| 27    | 4000                       | 4                                    | 43                                  | 2820                       | 4                                    | 30                                  | 2400                       | 12                                   | 78                                  |
| 28    | 3910                       | 4                                    | 42                                  | 2750                       | 8                                    | 59                                  | 2600                       | 15                                   | 105                                 |
| 29    | 3670                       | 5                                    | 50                                  | 2680                       | 10                                   | 72                                  | 2800                       | 16                                   | 121                                 |
| 30    | 3600                       | 7                                    | 68                                  | 2780                       | 9                                    | 68                                  | 3000                       | 10                                   | 81                                  |
| 31    | 3600                       | 5                                    | 49                                  | --                         | --                                   | --                                  | 3000                       | 6                                    | 45                                  |
| TOTAL | 135690                     | --                                   | 1699                                | 98220                      | --                                   | 1825                                | 87350                      | --                                   | 2090                                |

TABLE 17.14

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | JANUARY                    |                                      |                                     | FEBRUARY                   |                                      |                                     | MARCH                      |                                      |                                     |
|-------|----------------------------|--------------------------------------|-------------------------------------|----------------------------|--------------------------------------|-------------------------------------|----------------------------|--------------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 3000                       | 15                                   | 122                                 | 4100                       | 17                                   | 188                                 | 3020                       | 7                                    | 57                                  |
| 2     | 2500                       | 14                                   | 95                                  | 4600                       | 7                                    | 87                                  | 3020                       | 7                                    | 57                                  |
| 3     | 2000                       | 10                                   | 54                                  | 4620                       | 4                                    | 50                                  | 2860                       | 6                                    | 46                                  |
| 4     | 1800                       | 9                                    | 44                                  | 4620                       | 7                                    | 87                                  | 2820                       | 7                                    | 53                                  |
| 5     | 1700                       | 12                                   | 55                                  | 4500                       | 3                                    | 36                                  | 2840                       | 6                                    | 46                                  |
| 6     | 1600                       | 23                                   | 99                                  | 4000                       | 10                                   | 108                                 | 2760                       | 6                                    | 45                                  |
| 7     | 1900                       | 12                                   | 62                                  | 3500                       | 14                                   | 132                                 | 2830                       | 8                                    | 61                                  |
| 8     | 2000                       | 7                                    | 38                                  | 3000                       | 19                                   | 154                                 | 2840                       | 6                                    | 46                                  |
| 9     | 2100                       | 7                                    | 40                                  | 3200                       | 13                                   | 112                                 | 2840                       | 6                                    | 46                                  |
| 10    | 2000                       | 9                                    | 49                                  | 3400                       | 6                                    | 55                                  | 2880                       | 7                                    | 54                                  |
| 11    | 1900                       | 10                                   | 51                                  | 3600                       | 10                                   | 97                                  | 2910                       | 8                                    | 62                                  |
| 12    | 1800                       | 8                                    | 39                                  | 3800                       | 24                                   | 246                                 | 2910                       | 8                                    | 63                                  |
| 13    | 1900                       | 6                                    | 31                                  | 4000                       | 16                                   | 173                                 | 2910                       | 8                                    | 63                                  |
| 14    | 2000                       | 5                                    | 27                                  | 4200                       | 16                                   | 181                                 | 2880                       | 7                                    | 54                                  |
| 15    | 2100                       | 7                                    | 40                                  | 4060                       | 19                                   | 208                                 | 2860                       | 9                                    | 69                                  |
| 16    | 2200                       | 7                                    | 42                                  | 4020                       | 11                                   | 119                                 | 2780                       | 8                                    | 60                                  |
| 17    | 2400                       | 12                                   | 78                                  | 3900                       | 11                                   | 116                                 | 2800                       | 9                                    | 68                                  |
| 18    | 2700                       | 7                                    | 51                                  | 3720                       | 20                                   | 201                                 | 2750                       | 10                                   | 74                                  |
| 19    | 3000                       | 4                                    | 32                                  | 3420                       | 17                                   | 157                                 | 2750                       | 12                                   | 88                                  |
| 20    | 3500                       | 8                                    | 74                                  | 3380                       | 10                                   | 91                                  | 2730                       | 6                                    | 44                                  |
| 21    | 3800                       | 83                                   | 852                                 | 3380                       | 7                                    | 64                                  | 2710                       | 6                                    | 44                                  |
| 22    | 3800                       | 137                                  | 1410                                | 3380                       | 6                                    | 55                                  | 2700                       | 6                                    | 44                                  |
| 23    | 3500                       | 47                                   | 444                                 | 3300                       | 6                                    | 53                                  | 2680                       | 11                                   | 80                                  |
| 24    | 3200                       | 22                                   | 190                                 | 3240                       | 7                                    | 61                                  | 2700                       | 14                                   | 102                                 |
| 25    | 3200                       | 21                                   | 181                                 | 3300                       | 7                                    | 62                                  | 2730                       | 11                                   | 81                                  |
| 26    | 3300                       | 18                                   | 160                                 | 3210                       | 7                                    | 61                                  | 2790                       | 9                                    | 68                                  |
| 27    | 3400                       | 18                                   | 165                                 | 3110                       | 6                                    | 50                                  | 2830                       | 11                                   | 84                                  |
| 28    | 3500                       | 25                                   | 236                                 | 3020                       | 9                                    | 73                                  | 2820                       | 12                                   | 91                                  |
| 29    | 3700                       | 16                                   | 180                                 | --                         | --                                   | --                                  | 2800                       | 13                                   | 98                                  |
| 30    | 4020                       | 8                                    | 87                                  | --                         | --                                   | --                                  | 2920                       | 28                                   | 221                                 |
| 31    | 3680                       | 17                                   | 169                                 | --                         | --                                   | --                                  | 3020                       | 14                                   | 114                                 |
| TOTAL | 83200                      | --                                   | 5199                                | 103580                     | --                                   | 3077                                | 87670                      | --                                   | 2184                                |

TABLE 17.15

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | APRIL                      |                                 |                                     | MAY                        |                                 |                                     | JUNE                       |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 3040                       | 16                              | 131                                 | 13500                      | 90                              | 1820                                | 56900                      | 206                             | 31600                               |
| 2     | 3000                       | 17                              | 138                                 | 14900                      | 49                              | 1970                                | 52600                      | 183                             | 26000                               |
| 3     | 2950                       | 15                              | 119                                 | 18500                      | 128                             | 6390                                | 52600                      | 171                             | 24300                               |
| 4     | 2910                       | 59                              | 464                                 | 24800                      | 267                             | 17900                               | 54200                      | 270                             | 39500                               |
| 5     | 2960                       | 7                               | 56                                  | 31700                      | 366                             | 31300                               | 57500                      | 245                             | 38000                               |
| 6     | 3210                       | 32                              | 277                                 | 36000                      | 362                             | 39200                               | 60700                      | 256                             | 42000                               |
| 7     | 3330                       | 120                             | 1080                                | 36700                      | 239                             | 23700                               | 61400                      | 304                             | 56400                               |
| 8     | 3760                       | 24                              | 244                                 | 35600                      | 229                             | 22000                               | 62500                      | 285                             | 48100                               |
| 9     | 4150                       | 33                              | 370                                 | 37000                      | 233                             | 23300                               | 63100                      | 243                             | 41400                               |
| 10    | 4800                       | 61                              | 791                                 | 39200                      | 212                             | 22400                               | 57100                      | 218                             | 33600                               |
| 11    | 4970                       | 31                              | 416                                 | 40100                      | 213                             | 23100                               | 51100                      | 170                             | 23500                               |
| 12    | 4770                       | 36                              | 464                                 | 42900                      | 344                             | 39800                               | 45500                      | 169                             | 28800                               |
| 13    | 4500                       | 26                              | 316                                 | 50200                      | 351                             | 47600                               | 45000                      | 158                             | 19200                               |
| 14    | 4440                       | 19                              | 228                                 | 56600                      | 616                             | 94100                               | 48100                      | 169                             | 21900                               |
| 15    | 4820                       | 27                              | 351                                 | 51500                      | 338                             | 47000                               | 47300                      | 132                             | 16900                               |
| 16    | 5380                       | 35                              | 508                                 | 43600                      | 208                             | 24500                               | 42400                      | 124                             | 14200                               |
| 17    | 5500                       | 32                              | 475                                 | 36700                      | 150                             | 14900                               | 38000                      | 120                             | 12300                               |
| 18    | 5350                       | 37                              | 537                                 | 31200                      | 99                              | 8340                                | 35800                      | 104                             | 10200                               |
| 19    | 5210                       | 23                              | 324                                 | 28000                      | 65                              | 4910                                | 34300                      | 83                              | 7690                                |
| 20    | 5500                       | 25                              | 371                                 | 26700                      | 52                              | 3750                                | 34500                      | 73                              | 6800                                |
| 21    | 6420                       | 49                              | 849                                 | 26000                      | 61                              | 4280                                | 37100                      | 101                             | 18100                               |
| 22    | 7680                       | 109                             | 2260                                | 25900                      | 55                              | 3790                                | 41900                      | 180                             | 18100                               |
| 23    | 9070                       | 118                             | 2890                                | 26700                      | 86                              | 6200                                | 47000                      | 205                             | 26500                               |
| 24    | 11300                      | 89                              | 2720                                | 30100                      | 130                             | 10600                               | 52900                      | 299                             | 42700                               |
| 25    | 14400                      | 133                             | 5170                                | 36600                      | 165                             | 16300                               | 54300                      | 207                             | 39300                               |
| 26    | 16700                      | 198                             | 8930                                | 45400                      | 284                             | 34800                               | 52100                      | 212                             | 29800                               |
| 27    | 16100                      | 186                             | 8090                                | 53100                      | 422                             | 60500                               | 46100                      | 199                             | 24800                               |
| 28    | 14800                      | 73                              | 2920                                | 63100                      | 585                             | 100000                              | 39300                      | 140                             | 14900                               |
| 29    | 13800                      | 44                              | 1640                                | 65800                      | 597                             | 106000                              | 34500                      | 95                              | 28500                               |
| 30    | 13300                      | 40                              | 1440                                | 62000                      | 315                             | 52700                               | 32400                      | 92                              | 28900                               |
| 31    | —                          | —                               | —                                   | 59000                      | 257                             | 40900                               | —                          | —                               | —                                   |
| TOTAL | 208150                     | —                               | 44569                               | 1188700                    | —                               | 930050                              | 1439100                    | —                               | 742490                              |

TABLE 17.16

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | JULY                       |                                 |                                     | AUGUST                     |                                 |                                     | SEPTEMBER                  |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 31700                      | 81                              | 4930                                | 18300                      | 19                              | 939                                 | 8230                       | 16                              | 356                                 |
| 2     | 31700                      | 64                              | 5480                                | 18300                      | 19                              | 939                                 | 8620                       | 16                              | 372                                 |
| 3     | 31300                      | 58                              | 4930                                | 18300                      | 18                              | 889                                 | 8500                       | 20                              | 475                                 |
| 4     | 29700                      | 46                              | 3690                                | 18100                      | 20                              | 977                                 | 8470                       | 11                              | 252                                 |
| 5     | 28200                      | 48                              | 3650                                | 17300                      | 20                              | 934                                 | 7870                       | 10                              | 212                                 |
| 6     | 26700                      | 56                              | 4040                                | 16300                      | 27                              | 1190                                | 7510                       | 12                              | 243                                 |
| 7     | 25300                      | 58                              | 3960                                | 15700                      | 24                              | 1020                                | 7310                       | 9                               | 178                                 |
| 8     | 27100                      | 53                              | 3310                                | 15100                      | 15                              | 612                                 | 7480                       | 8                               | 162                                 |
| 9     | 21200                      | 50                              | 2860                                | 14700                      | 18                              | 714                                 | 8110                       | 9                               | 197                                 |
| 10    | 25400                      | 65                              | 4460                                | 14200                      | 15                              | 575                                 | 7680                       | 8                               | 166                                 |
| 11    | 30100                      | 101                             | 8210                                | 13900                      | 9                               | 338                                 | 7400                       | 7                               | 140                                 |
| 12    | 29100                      | 99                              | 7780                                | 13000                      | 18                              | 632                                 | 7030                       | 6                               | 114                                 |
| 13    | 28000                      | 71                              | 5370                                | 12500                      | 16                              | 540                                 | 6950                       | 7                               | 131                                 |
| 14    | 26900                      | 49                              | 3560                                | 11900                      | 16                              | 514                                 | 6950                       | 7                               | 131                                 |
| 15    | 26100                      | 29                              | 2040                                | 11500                      | 17                              | 528                                 | 6600                       | 7                               | 125                                 |
| 16    | 27200                      | 28                              | 2060                                | 10900                      | 18                              | 530                                 | 6340                       | 7                               | 120                                 |
| 17    | 26700                      | 33                              | 2560                                | 10300                      | 15                              | 417                                 | 5900                       | 7                               | 112                                 |
| 18    | 29300                      | 37                              | 2930                                | 9780                       | 14                              | 370                                 | 5830                       | 5                               | 79                                  |
| 19    | 28500                      | 35                              | 2690                                | 9240                       | 16                              | 403                                 | 5710                       | 5                               | 77                                  |
| 20    | 29500                      | 32                              | 2550                                | 8950                       | 11                              | 266                                 | 5660                       | 6                               | 92                                  |
| 21    | 30000                      | 31                              | 2510                                | 8440                       | 9                               | 205                                 | 5590                       | 6                               | 91                                  |
| 22    | 29900                      | 35                              | 2830                                | 8440                       | 12                              | 273                                 | 5470                       | 5                               | 74                                  |
| 23    | 28800                      | 38                              | 2950                                | 8560                       | 13                              | 300                                 | 5300                       | 5                               | 72                                  |
| 24    | 28200                      | 31                              | 2360                                | 8680                       | 18                              | 422                                 | 5150                       | 5                               | 70                                  |
| 25    | 25100                      | 28                              | 1900                                | 8500                       | 12                              | 275                                 | 5060                       | 5                               | 68                                  |
| 26    | 22900                      | 23                              | 1420                                | 8140                       | 10                              | 220                                 | 5060                       | 4                               | 55                                  |
| 27    | 21400                      | 20                              | 1160                                | 7930                       | 11                              | 236                                 | 4990                       | 5                               | 67                                  |
| 28    | 20400                      | 19                              | 1050                                | 7310                       | 9                               | 178                                 | 4990                       | 6                               | 81                                  |
| 29    | 20000                      | 18                              | 972                                 | 7400                       | 9                               | 180                                 | 5080                       | 5                               | 65                                  |
| 30    | 18900                      | 17                              | 868                                 | 7590                       | 10                              | 205                                 | 4930                       | 4                               | 53                                  |
| 31    | 18100                      | 14                              | 684                                 | 7790                       | 16                              | 337                                 | —                          | —                               | —                                   |
| TOTAL | 821600                     | —                               | 101764                              | 367150                     | —                               | 16158                               | 196078                     | —                               | 4424                                |

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)

TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS)

4816400

1899939

TABLE 18.1

KOOTENAI RIVER BELOW LIBBY DAM, NEAR LIBBY, MONT  
DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | OCTOBER                    |                                      |                | NOVEMBER                   |                                      |                | DECEMBER                   |                                      |                |
|-------|----------------------------|--------------------------------------|----------------|----------------------------|--------------------------------------|----------------|----------------------------|--------------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 4920                       | 15                                   | 199            | 4590                       | 12                                   | 149            | 3230                       | 43                                   | 375            |
| 2     | 4920                       | 17                                   | 224            | 5090                       | 12                                   | 165            | 3310                       | 35                                   | 313            |
| 3     | 5160                       | 23                                   | 320            | 5780                       | 20                                   | 312            | 3370                       | 22                                   | 200            |
| 4     | 5190                       | 72                                   | 1010           | 5600                       | 11                                   | 166            | 3490                       | 18                                   | 170            |
| 5     | 5160                       | 65                                   | 906            | 5120                       | 4                                    | 55             | 3600                       | 23                                   | 224            |
| 6     | 5060                       | 67                                   | 915            | 4720                       | 6                                    | 76             | 3540                       | 24                                   | 229            |
| 7     | 4920                       | 28                                   | 372            | 4330                       | 10                                   | 117            | 3490                       | 14                                   | 132            |
| 8     | 4790                       | 15                                   | 194            | 4080                       | 6                                    | 66             | 3290                       | 7                                    | 62             |
| 9     | 4720                       | 27                                   | 344            | 4210                       | 5                                    | 57             | 3010                       | 6                                    | 49             |
| 10    | 4660                       | 32                                   | 403            | 4300                       | 14                                   | 163            | 2960                       | 6                                    | 48             |
| 11    | 4790                       | 32                                   | 414            | 4460                       | 10                                   | 120            | 3200                       | 9                                    | 78             |
| 12    | 4920                       | 22                                   | 292            | 4560                       | 6                                    | 74             | 3340                       | 8                                    | 72             |
| 13    | 5260                       | 22                                   | 312            | 4430                       | 10                                   | 120            | 2650                       | 7                                    | 50             |
| 14    | 5710                       | 15                                   | 231            | 4270                       | 8                                    | 92             | 2200                       | 8                                    | 48             |
| 15    | 5600                       | 8                                    | 121            | 4180                       | 7                                    | 79             | 1950                       | 11                                   | 58             |
| 16    | 5260                       | 13                                   | 185            | 4150                       | 7                                    | 78             | 1900                       | 16                                   | 82             |
| 17    | 5020                       | 73                                   | 989            | 4210                       | 6                                    | 68             | 2000                       | 11                                   | 59             |
| 18    | 4850                       | 120                                  | 1570           | 4150                       | 8                                    | 90             | 2150                       | 6                                    | 35             |
| 19    | 4760                       | 50                                   | 643            | 4080                       | 4                                    | 44             | 2250                       | 8                                    | 49             |
| 20    | 4690                       | 42                                   | 532            | 4020                       | 4                                    | 43             | 2350                       | 8                                    | 51             |
| 21    | 4660                       | 51                                   | 642            | 3990                       | 4                                    | 43             | 2450                       | 8                                    | 53             |
| 22    | 4620                       | 23                                   | 287            | 3840                       | 6                                    | 62             | 2550                       | 10                                   | 69             |
| 23    | 4820                       | 13                                   | 169            | 3780                       | 9                                    | 92             | 2650                       | 21                                   | 150            |
| 24    | 4850                       | 11                                   | 144            | 3780                       | 9                                    | 92             | 2750                       | 19                                   | 141            |
| 25    | 4820                       | 14                                   | 182            | 3720                       | 9                                    | 90             | 2850                       | 22                                   | 169            |
| 26    | 4690                       | 18                                   | 228            | 3600                       | 9                                    | 87             | 3350                       | 20                                   | 181            |
| 27    | 4590                       | 18                                   | 223            | 3340                       | 8                                    | 72             | 3450                       | 14                                   | 130            |
| 28    | 4660                       | 21                                   | 264            | 3060                       | 36                                   | 297            | 3400                       | 17                                   | 156            |
| 29    | 4690                       | 18                                   | 228            | 2790                       | 53                                   | 399            | 3350                       | 18                                   | 163            |
| 30    | 4720                       | 7                                    | 89             | 3040                       | 41                                   | 337            | 3200                       | 48                                   | 415            |
| 31    | 4660                       | 11                                   | 138            | --                         | --                                   | --             | 3050                       | 58                                   | 478            |
| TOTAL | 152140                     | --                                   | 12772          | 125270                     | --                                   | 3705           | 90330                      | --                                   | 4489           |

TABLE 18.2

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | JANUARY                    |                                      |                | FEBRUARY                   |                                      |                | MARCH                      |                                      |                |
|-------|----------------------------|--------------------------------------|----------------|----------------------------|--------------------------------------|----------------|----------------------------|--------------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCEN-<br>TRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 2900                       | 17                                   | 133            | 3350                       | 28                                   | 253            | 3150                       | 18                                   | 153            |
| 2     | 2500                       | 6                                    | 41             | 3150                       | 32                                   | 272            | 3170                       | 16                                   | 137            |
| 3     | 2350                       | 17                                   | 108            | 3550                       | 27                                   | 259            | 3230                       | 13                                   | 113            |
| 4     | 2450                       | 19                                   | 126            | 3850                       | 37                                   | 385            | 3400                       | 16                                   | 147            |
| 5     | 2850                       | 8                                    | 62             | 4200                       | 24                                   | 272            | 3690                       | 17                                   | 169            |
| 6     | 2900                       | 11                                   | 86             | 4200                       | 27                                   | 306            | 3990                       | 19                                   | 205            |
| 7     | 2900                       | 8                                    | 63             | 3900                       | 27                                   | 284            | 4330                       | 23                                   | 269            |
| 8     | 2950                       | 7                                    | 56             | 3500                       | 16                                   | 151            | 4370                       | 33                                   | 389            |
| 9     | 2900                       | 17                                   | 133            | 3250                       | 11                                   | 97             | 4210                       | 24                                   | 273            |
| 10    | 3000                       | 21                                   | 170            | 3100                       | 9                                    | 75             | 3960                       | 12                                   | 128            |
| 11    | 2900                       | 27                                   | 211            | 2950                       | 8                                    | 64             | 3810                       | 10                                   | 103            |
| 12    | 2600                       | 13                                   | 91             | 2950                       | 8                                    | 64             | 3690                       | 11                                   | 110            |
| 13    | 2550                       | 6                                    | 41             | 2900                       | 9                                    | 70             | 3540                       | 8                                    | 76             |
| 14    | 2750                       | 12                                   | 89             | 2750                       | 7                                    | 52             | 3540                       | 10                                   | 96             |
| 15    | 2950                       | 19                                   | 151            | 2750                       | 7                                    | 52             | 3540                       | 8                                    | 76             |
| 16    | 3100                       | 24                                   | 201            | 2650                       | 7                                    | 50             | 3520                       | 8                                    | 76             |
| 17    | 3100                       | 23                                   | 193            | 2600                       | 7                                    | 49             | 3660                       | 8                                    | 79             |
| 18    | 3000                       | 11                                   | 89             | 2600                       | 8                                    | 56             | 3840                       | 6                                    | 62             |
| 19    | 3000                       | 11                                   | 89             | 2800                       | 11                                   | 83             | 3750                       | 9                                    | 91             |
| 20    | 2950                       | 10                                   | 80             | 3000                       | 13                                   | 105            | 3630                       | 9                                    | 88             |
| 21    | 3300                       | 34                                   | 303            | 3100                       | 13                                   | 109            | 3540                       | 8                                    | 76             |
| 22    | 3900                       | 35                                   | 349            | 3200                       | 17                                   | 147            | 3460                       | 8                                    | 75             |
| 23    | 4150                       | 25                                   | 280            | 3400                       | 32                                   | 294            | 3430                       | 7                                    | 65             |
| 24    | 4100                       | 28                                   | 310            | 3500                       | 36                                   | 340            | 3520                       | 8                                    | 76             |
| 25    | 4250                       | 17                                   | 195            | 3720                       | 44                                   | 442            | 3630                       | 7                                    | 69             |
| 26    | 4350                       | 110                                  | 1290           | 3430                       | 52                                   | 482            | 3840                       | 8                                    | 83             |
| 27    | 3200                       | 230                                  | 1990           | 3310                       | 33                                   | 295            | 3840                       | 11                                   | 114            |
| 28    | 2250                       | 42                                   | 255            | 3260                       | 18                                   | 158            | 3900                       | 11                                   | 116            |
| 29    | 2950                       | 13                                   | 104            | 3170                       | 15                                   | 128            | 4120                       | 10                                   | 111            |
| 30    | 3100                       | 12                                   | 100            | --                         | --                                   | --             | 4330                       | 11                                   | 129            |
| 31    | 3250                       | 14                                   | 123            | --                         | --                                   | --             | 4430                       | 11                                   | 132            |
| TOTAL | 95400                      | --                                   | 7532           | 94090                      | --                                   | 5394           | 116060                     | --                                   | 3886           |

TABLE 18.3

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | APRIL                      |                                 |                | MAY                        |                                 |                | JUNE                       |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 4270                       | 11                              | 127            | 8900                       | 150                             | 3600           | 36400                      | 480                             | 47200          |
| 2     | 4120                       | 8                               | 89             | 11700                      | 180                             | 5690           | 34800                      | 700                             | 65800          |
| 3     | 3900                       | 9                               | 95             | 11400                      | 83                              | 2530           | 45800                      | 800                             | 98900          |
| 4     | 3750                       | 8                               | 81             | 11300                      | 63                              | 1920           | 61000                      | 1100                            | 181000         |
| 5     | 3690                       | 6                               | 60             | 11900                      | 47                              | 1510           | 61900                      | 1200                            | 201000         |
| 6     | 3690                       | 7                               | 70             | 12600                      | 38                              | 1290           | 52000                      | 500                             | 76200          |
| 7     | 3660                       | 8                               | 79             | 12200                      | 37                              | 1220           | 46500                      | 170                             | 21300          |
| 8     | 3630                       | 5                               | 49             | 11400                      | 38                              | 1170           | 44500                      | 150                             | 18000          |
| 9     | 3570                       | 7                               | 67             | 10800                      | 42                              | 1220           | 44400                      | 130                             | 15400          |
| 10    | 3570                       | 7                               | 67             | 10600                      | 38                              | 1090           | 45800                      | 170                             | 21000          |
| 11    | 3630                       | 13                              | 127            | 11400                      | 34                              | 1050           | 47700                      | 240                             | 30900          |
| 12    | 3960                       | 8                               | 86             | 12900                      | 42                              | 1440           | 49500                      | 230                             | 30700          |
| 13    | 4300                       | 1                               | 12             | 15400                      | 200                             | 8320           | 50400                      | 240                             | 32700          |
| 14    | 4300                       | 8                               | 93             | 18600                      | 280                             | 14100          | 46700                      | 200                             | 25200          |
| 15    | 4300                       | 6                               | 70             | 22600                      | 320                             | 19500          | 39600                      | 120                             | 12600          |
| 16    | 4240                       | 9                               | 103            | 22400                      | 190                             | 11500          | 34200                      | 86                              | 7940           |
| 17    | 4080                       | 7                               | 77             | 20900                      | 160                             | 9030           | 31000                      | 73                              | 6110           |
| 18    | 3870                       | 7                               | 73             | 22000                      | 190                             | 11300          | 31100                      | 78                              | 6550           |
| 19    | 3870                       | 6                               | 63             | 24300                      | 260                             | 17100          | 33400                      | 100                             | 9070           |
| 20    | 3870                       | 6                               | 63             | 27200                      | 240                             | 17600          | 39200                      | 88                              | 9310           |
| 21    | 3840                       | 7                               | 73             | 30800                      | 240                             | 20000          | 45500                      | 85                              | 10400          |
| 22    | 3750                       | 7                               | 71             | 35300                      | 360                             | 34300          | 42700                      | 80                              | 9220           |
| 23    | 3720                       | 8                               | 80             | 42800                      | 560                             | 64700          | 37600                      | 75                              | 7610           |
| 24    | 3690                       | 8                               | 80             | 45200                      | 430                             | 52500          | 35100                      | 110                             | 10400          |
| 25    | 3720                       | 8                               | 80             | 41300                      | 210                             | 23400          | 33900                      | 85                              | 7780           |
| 26    | 3780                       | 9                               | 92             | 38100                      | 160                             | 16500          | 33900                      | 140                             | 12800          |
| 27    | 3870                       | 10                              | 104            | 37200                      | 120                             | 12100          | 37600                      | 73                              | 7410           |
| 28    | 3960                       | 12                              | 128            | 37200                      | 110                             | 11000          | 43700                      | 64                              | 7790           |
| 29    | 4300                       | 14                              | 163            | 37600                      | 110                             | 11200          | 42400                      | 72                              | 8240           |
| 30    | 5460                       | 33                              | 486            | 38900                      | 110                             | 11600          | 35200                      | 66                              | 6270           |
| 31    | --                         | --                              | --             | 38800                      | 110                             | 11500          | --                         | --                              | --             |
| TOTAL | 118360                     | --                              | 2908           | 733700                     | --                              | 401020         | 1263700                    | --                              | 999200         |

TABLE 18.4

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY                                 | JULY                       |                                 |                | AUGUST                     |                                 |                | SEPTEMBER                  |                                 |                |
|-------------------------------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|                                     | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1                                   | 29700                      | 62                              | 4970           | 13400                      | 11                              | 398            | 7760                       | 8                               | 168            |
| 2                                   | 26400                      | 64                              | 4560           | 12500                      | 17                              | 574            | 7640                       | 5                               | 103            |
| 3                                   | 25400                      | 110                             | 7540           | 11900                      | 26                              | 835            | 7680                       | 6                               | 124            |
| 4                                   | 27400                      | 110                             | 8140           | 11800                      | 27                              | 860            | 7600                       | 6                               | 123            |
| 5                                   | 30300                      | 110                             | 9000           | 11700                      | 25                              | 790            | 7320                       | 3                               | 59             |
| 6                                   | 32800                      | 110                             | 9740           | 11800                      | 27                              | 860            | 7080                       | 7                               | 134            |
| 7                                   | 34800                      | 100                             | 9400           | 11800                      | 28                              | 892            | 6970                       | 6                               | 113            |
| 8                                   | 36000                      | 87                              | 8460           | 11400                      | 29                              | 893            | 6780                       | 7                               | 128            |
| 9                                   | 34800                      | 91                              | 8550           | 10800                      | 21                              | 612            | 7080                       | 7                               | 134            |
| 10                                  | 32600                      | 58                              | 5110           | 10200                      | 12                              | 330            | 7400                       | 8                               | 160            |
| 11                                  | 31300                      | 40                              | 3380           | 9690                       | 9                               | 235            | 7080                       | 8                               | 153            |
| 12                                  | 29000                      | 40                              | 3130           | 9510                       | 10                              | 257            | 6850                       | 8                               | 146            |
| 13                                  | 27600                      | 40                              | 2980           | 9420                       | 9                               | 229            | 6660                       | 7                               | 126            |
| 14                                  | 27200                      | 40                              | 2940           | 9340                       | 8                               | 202            | 6780                       | 7                               | 128            |
| 15                                  | 23600                      | 39                              | 2490           | 9200                       | 10                              | 248            | 6890                       | 13                              | 242            |
| 16                                  | 20500                      | 40                              | 2210           | 9650                       | 9                               | 234            | 6890                       | 9                               | 167            |
| 17                                  | 18900                      | 78                              | 3980           | 10500                      | 9                               | 255            | 6780                       | 9                               | 165            |
| 18                                  | 17900                      | 67                              | 3240           | 10400                      | 7                               | 197            | 6970                       | 5                               | 94             |
| 19                                  | 16900                      | 34                              | 1550           | 9690                       | 8                               | 209            | 7800                       | 7                               | 147            |
| 20                                  | 16100                      | 34                              | 1480           | 9340                       | 6                               | 151            | 6590                       | 7                               | 162            |
| 21                                  | 16900                      | 32                              | 1460           | 9120                       | 9                               | 222            | 8590                       | 6                               | 139            |
| 22                                  | 18100                      | 21                              | 1030           | 9200                       | 10                              | 248            | 8380                       | 7                               | 158            |
| 23                                  | 17500                      | 16                              | 756            | 9070                       | 7                               | 171            | 8050                       | 6                               | 130            |
| 24                                  | 16700                      | 48                              | 2160           | 8720                       | 8                               | 188            | 7680                       | 7                               | 145            |
| 25                                  | 16400                      | 27                              | 1200           | 8340                       | 8                               | 180            | 7640                       | 7                               | 144            |
| 26                                  | 15700                      | 18                              | 763            | 7920                       | 10                              | 214            | 7680                       | 10                              | 207            |
| 27                                  | 15000                      | 17                              | 689            | 6090                       | 9                               | 197            | 7720                       | 11                              | 229            |
| 28                                  | 14500                      | 16                              | 626            | 8300                       | 8                               | 179            | 8050                       | 11                              | 239            |
| 29                                  | 14200                      | 16                              | 613            | 8590                       | 8                               | 186            | 8680                       | 11                              | 258            |
| 30                                  | 14100                      | 12                              | 457            | 8680                       | 5                               | 117            | 8510                       | 10                              | 230            |
| 31                                  | 14100                      | 10                              | 381            | 8170                       | 6                               | 132            | --                         | --                              | --             |
| TOTAL                               | 712400                     | --                              | 112985         | 308240                     | --                              | 11295          | 225580                     | --                              | 4657           |
| TOTAL DISCHARGE FOR YEAR (CFS-DAYS) |                            |                                 |                |                            |                                 |                |                            |                                 | 4035270        |
| TOTAL LOAD FOR YEAR (TONS)          |                            |                                 |                |                            |                                 |                |                            |                                 | 1549843        |

TABLE 18.5

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | OCTOBER              |                           |             | NOVEMBER             |                           |             | DECEMBER             |                           |             |
|-------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) |
| 1     | 8260                 | 11                        | 245         | 6430                 | 10                        | 174         | 4530                 | 4                         | 49          |
| 2     | 8090                 | 10                        | 217         | 6740                 | 10                        | 182         | 4430                 | 5                         | 60          |
| 3     | 7760                 | 9                         | 189         | 6530                 | 8                         | 141         | 4400                 | 6                         | 71          |
| 4     | 7920                 | 17                        | 345         | 6360                 | 7                         | 120         | 4430                 | 6                         | 72          |
| 5     | 7320                 | 5                         | 99          | 6180                 | 6                         | 100         | 4430                 | 4                         | 48          |
| 6     | 7200                 | 3                         | 58          | 6140                 | 6                         | 99          | 4180                 | 3                         | 34          |
| 7     | 7120                 | 4                         | 77          | 6030                 | 6                         | 98          | 3600                 | 4                         | 39          |
| 8     | 6970                 | 5                         | 94          | 5780                 | 6                         | 94          | 3600                 | 3                         | 29          |
| 9     | 6810                 | 5                         | 92          | 5600                 | 6                         | 91          | 3600                 | 16                        | 164         |
| 10    | 6620                 | 4                         | 71          | 5500                 | 7                         | 104         | 4120                 | 25                        | 278         |
| 11    | 6550                 | 7                         | 124         | 5460                 | 6                         | 88          | 4370                 | 25                        | 295         |
| 12    | 6620                 | 8                         | 143         | 5570                 | 8                         | 120         | 4620                 | 34                        | 424         |
| 13    | 6890                 | 11                        | 205         | 5890                 | 7                         | 111         | 4430                 | 36                        | 431         |
| 14    | 7080                 | 7                         | 134         | 5920                 | 6                         | 96          | 4050                 | 35                        | 383         |
| 15    | 6930                 | 6                         | 112         | 5670                 | 6                         | 92          | 4490                 | 18                        | 218         |
| 16    | 6740                 | 5                         | 91          | 5430                 | 5                         | 73          | 4180                 | 12                        | 135         |
| 17    | 6510                 | 5                         | 88          | 5260                 | 6                         | 85          | 4080                 | 11                        | 121         |
| 18    | 6320                 | 5                         | 85          | 5020                 | 7                         | 95          | 4120                 | 10                        | 111         |
| 19    | 6180                 | 4                         | 67          | 4790                 | 7                         | 91          | 4080                 | 7                         | 77          |
| 20    | 6100                 | 4                         | 66          | 4820                 | 9                         | 117         | 4000                 | 5                         | 54          |
| 21    | 6070                 | 7                         | 115         | 4950                 | 8                         | 107         | 3000                 | 7                         | 57          |
| 22    | 6000                 | 8                         | 130         | 5160                 | 8                         | 111         | 2600                 | 6                         | 42          |
| 23    | 5890                 | 7                         | 111         | 5460                 | 8                         | 118         | 2700                 | 4                         | 29          |
| 24    | 5780                 | 8                         | 125         | 5900                 | 7                         | 104         | 2900                 | 3                         | 23          |
| 25    | 5710                 | 8                         | 123         | 5290                 | 8                         | 114         | 2700                 | 4                         | 29          |
| 26    | 5850                 | 7                         | 111         | 5090                 | 9                         | 124         | 2600                 | 12                        | 84          |
| 27    | 6280                 | 7                         | 119         | 4820                 | 4                         | 52          | 2500                 | 13                        | 88          |
| 28    | 6400                 | 7                         | 121         | 4720                 | 4                         | 51          | 1900                 | 12                        | 62          |
| 29    | 6400                 | 7                         | 121         | 4550                 | 4                         | 50          | 1800                 | 6                         | 29          |
| 30    | 6400                 | 9                         | 156         | 4660                 | 4                         | 50          | 1900                 | 12                        | 62          |
| 31    | 6510                 | 10                        | 176         | --                   | --                        | --          | 2000                 | 12                        | 65          |
| TOTAL | 206840               | --                        | 4010        | 165380               | --                        | 3052        | 110540               | --                        | 3663        |

TABLE 18.6

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | JANUARY              |                           |             | FEBRUARY             |                           |             | MARCH                |                           |             |
|-------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) |
| 1     | 2100                 | --                        | --          | 2600                 | --                        | --          | 2600                 | --                        | --          |
| 2     | 2200                 | --                        | --          | 2700                 | --                        | --          | 2600                 | --                        | --          |
| 3     | 2300                 | --                        | --          | 2800                 | --                        | --          | 2700                 | --                        | --          |
| 4     | 2400                 | --                        | --          | 2900                 | --                        | --          | 2700                 | --                        | --          |
| 5     | 2500                 | --                        | --          | 3000                 | --                        | --          | 2800                 | --                        | --          |
| 6     | 2600                 | --                        | --          | 2900                 | --                        | --          | 2900                 | --                        | --          |
| 7     | 2900                 | --                        | --          | 2800                 | --                        | --          | 2800                 | --                        | --          |
| 8     | 3500                 | --                        | --          | 2700                 | --                        | --          | 2800                 | --                        | --          |
| 9     | 4200                 | --                        | --          | 2700                 | --                        | --          | 2700                 | --                        | --          |
| 10    | 4300                 | --                        | --          | 2600                 | --                        | --          | 2700                 | --                        | --          |
| 11    | 4200                 | --                        | --          | 2600                 | --                        | --          | 2700                 | --                        | --          |
| 12    | 4000                 | --                        | --          | 2600                 | --                        | --          | 2800                 | --                        | --          |
| 13    | 3800                 | --                        | --          | 2700                 | --                        | --          | 2800                 | --                        | --          |
| 14    | 3600                 | --                        | --          | 2700                 | --                        | --          | 2800                 | --                        | --          |
| 15    | 3600                 | --                        | --          | 2700                 | --                        | --          | 2900                 | --                        | --          |
| 16    | 3600                 | --                        | --          | 2800                 | --                        | --          | 3000                 | --                        | --          |
| 17    | 3700                 | --                        | --          | 2900                 | --                        | --          | 3300                 | 18                        | 160         |
| 18    | 3700                 | --                        | --          | 3000                 | --                        | --          | 3700                 | 37                        | 370         |
| 19    | 3600                 | --                        | --          | 2900                 | --                        | --          | 3900                 | 53                        | 568         |
| 20    | 3500                 | --                        | --          | 2800                 | --                        | --          | 4010                 | 60                        | 680         |
| 21    | 3500                 | --                        | --          | 2700                 | --                        | --          | 3780                 | 42                        | 429         |
| 22    | 3400                 | --                        | --          | 2700                 | --                        | --          | 3700                 | 25                        | 250         |
| 23    | 3300                 | --                        | --          | 2600                 | --                        | --          | 3700                 | 20                        | 200         |
| 24    | 3200                 | --                        | --          | 2800                 | --                        | --          | 3630                 | 19                        | 186         |
| 25    | 2900                 | --                        | --          | 2400                 | --                        | --          | 3530                 | 19                        | 181         |
| 26    | 2600                 | --                        | --          | 2400                 | --                        | --          | 3480                 | 23                        | 214         |
| 27    | 2800                 | --                        | --          | 2500                 | --                        | --          | 3530                 | 24                        | 229         |
| 28    | 3000                 | --                        | --          | 2600                 | --                        | --          | 3800                 | 35                        | 380         |
| 29    | 2700                 | --                        | --          | --                   | --                        | --          | 4190                 | 46                        | 491         |
| 30    | 2400                 | --                        | --          | --                   | --                        | --          | 4400                 | 33                        | 392         |
| 31    | 2500                 | --                        | --          | --                   | --                        | --          | 4820                 | 57                        | 742         |
| TOTAL | 98600                | --                        | 3190        | 75700                | --                        | 2480        | 101740               | --                        | 6871        |

TABLE 18.7

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | APRIL                      |                                 |                | MAY                        |                                 |                | JUNE                       |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 5340                       | 62                              | 894            | 22100                      | 64                              | 3820           | 45100                      | 229                             | 27500          |
| 2     | 5030                       | 54                              | 950            | 20900                      | 58                              | 3270           | 42400                      | 161                             | 10400          |
| 3     | 6110                       | 53                              | 874            | 19900                      | 52                              | 2790           | 45000                      | 228                             | 27700          |
| 4     | 6280                       | 56                              | 950            | 19300                      | 38                              | 1980           | 52700                      | 479                             | 68200          |
| 5     | 6350                       | 53                              | 909            | 18900                      | 35                              | 1990           | 61100                      | 767                             | 127000         |
| 6     | 6910                       | 72                              | 1340           | 19200                      | 44                              | 2280           | 65800                      | 802                             | 142000         |
| 7     | 8320                       | 125                             | 2810           | 21200                      | 54                              | 3090           | 69000                      | 851                             | 195000         |
| 8     | 9480                       | 157                             | 4020           | 24300                      | 80                              | 5250           | 66500                      | 660                             | 119000         |
| 9     | 9970                       | 133                             | 3560           | 27200                      | 148                             | 10900          | 58000                      | 258                             | 40400          |
| 10    | 10500                      | 115                             | 3380           | 31800                      | 224                             | 19200          | 50900                      | 276                             | 37500          |
| 11    | 12000                      | 123                             | 3990           | 38700                      | 263                             | 27500          | 49900                      | 264                             | 35600          |
| 12    | 12600                      | 105                             | 3570           | 46100                      | 288                             | 35800          | 48800                      | 148                             | 19500          |
| 13    | 13300                      | 112                             | 4020           | 52200                      | 530                             | 74700          | 47000                      | 178                             | 22600          |
| 14    | 14000                      | 100                             | 3780           | 55800                      | 597                             | 89900          | 42800                      | 161                             | 18600          |
| 15    | 13800                      | 107                             | 3990           | 57700                      | 639                             | 99500          | 36800                      | 177                             | 17600          |
| 16    | 13400                      | 80                              | 2890           | 54000                      | 549                             | 80000          | 33400                      | 161                             | 14500          |
| 17    | 13900                      | 77                              | 2890           | 46100                      | 352                             | 43800          | 31800                      | 140                             | 12000          |
| 18    | 15800                      | 100                             | 4270           | 41100                      | 232                             | 25700          | 31900                      | 121                             | 10400          |
| 19    | 18200                      | 180                             | 8850           | 38500                      | 205                             | 21300          | 33000                      | 170                             | 15100          |
| 20    | 18000                      | 142                             | 6900           | 37000                      | 206                             | 20600          | 36200                      | 78                              | 7620           |
| 21    | 16100                      | 77                              | 3350           | 35900                      | 166                             | 16100          | 42400                      | 252                             | 28800          |
| 22    | 14700                      | 53                              | 2100           | 35000                      | 142                             | 13400          | 48300                      | 198                             | 25800          |
| 23    | 16000                      | 70                              | 3020           | 36800                      | 148                             | 14700          | 47100                      | 322                             | 45500          |
| 24    | 24400                      | 362                             | 23000          | 41700                      | 240                             | 27000          | 44400                      | 377                             | 45200          |
| 25    | 31700                      | 596                             | 51000          | 48200                      | 414                             | 53900          | 43000                      | 168                             | 19500          |
| 26    | 29900                      | 320                             | 25800          | 56700                      | 395                             | 60500          | 47300                      | 186                             | 23800          |
| 27    | 25700                      | 236                             | 16400          | 62000                      | 570                             | 55400          | 48400                      | 218                             | 28500          |
| 28    | 22500                      | 107                             | 6500           | 59200                      | 648                             | 104000         | 50400                      | 198                             | 26500          |
| 29    | 22000                      | 72                              | 4280           | 50000                      | 364                             | 49100          | 50000                      | 181                             | 24400          |
| 30    | 22600                      | 76                              | 4640           | 45700                      | 213                             | 26300          | 48800                      | 159                             | 20500          |
| 31    | --                         | --                              | --             | 48400                      | 319                             | 41700          | --                         | --                              | --             |
| TOTAL | 446040                     | --                              | 204827         | 1211600                    | --                              | 1075470        | 1418200                    | --                              | 1225720        |

TABLE 18.8

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | JULY                       |                                 |                | AUGUST                     |                                 |                | SEPTEMBER                  |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 45400                      | 227                             | 27800          | 12900                      | 12                              | 418            | 6700                       | 5                               | 50             |
| 2     | 42600                      | 128                             | 14700          | 12300                      | 11                              | 365            | 6560                       | 7                               | 124            |
| 3     | 40000                      | 103                             | 11100          | 11900                      | 13                              | 418            | 6320                       | 7                               | 119            |
| 4     | 39600                      | 85                              | 9090           | 11700                      | 13                              | 411            | 6180                       | 5                               | 83             |
| 5     | 39200                      | 73                              | 7730           | 11200                      | 13                              | 393            | 6180                       | 7                               | 117            |
| 6     | 37600                      | 76                              | 7720           | 11000                      | 17                              | 505            | 6180                       | 6                               | 100            |
| 7     | 35700                      | 81                              | 7810           | 10800                      | 27                              | 642            | 6140                       | 7                               | 116            |
| 8     | 33500                      | 61                              | 5520           | 10500                      | 16                              | 454            | 5930                       | 4                               | 64             |
| 9     | 31500                      | 50                              | 4250           | 10100                      | 13                              | 355            | 5790                       | 6                               | 54             |
| 10    | 30000                      | 46                              | 3730           | 9840                       | 11                              | 292            | 5690                       | 4                               | 61             |
| 11    | 28500                      | 48                              | 3750           | 9640                       | 13                              | 338            | 5620                       | 5                               | 76             |
| 12    | 28400                      | 44                              | 3370           | 9480                       | 13                              | 333            | 5580                       | 6                               | 50             |
| 13    | 28000                      | 39                              | 2950           | 9360                       | 12                              | 303            | 5650                       | 6                               | 52             |
| 14    | 25900                      | 40                              | 2800           | 9200                       | 21                              | 522            | 5550                       | 5                               | 75             |
| 15    | 23300                      | 43                              | 2710           | 8920                       | 14                              | 337            | 5690                       | 7                               | 108            |
| 16    | 21700                      | 51                              | 2990           | 8640                       | 11                              | 257            | 6000                       | 9                               | 146            |
| 17    | 20300                      | 51                              | 2800           | 8480                       | 12                              | 275            | 5900                       | 8                               | 127            |
| 18    | 19100                      | 39                              | 2010           | 8560                       | 10                              | 231            | 5720                       | 6                               | 53             |
| 19    | 18300                      | 30                              | 1480           | 8400                       | 8                               | 181            | 5580                       | 7                               | 105            |
| 20    | 17700                      | 35                              | 1670           | 8080                       | 9                               | 196            | 5480                       | 4                               | 55             |
| 21    | 17300                      | 27                              | 1260           | 7880                       | 12                              | 255            | 5760                       | 7                               | 109            |
| 22    | 17200                      | 16                              | 743            | 7680                       | 9                               | 187            | 5860                       | 10                              | 158            |
| 23    | 17000                      | 18                              | 826            | 7400                       | 6                               | 120            | 6040                       | 9                               | 147            |
| 24    | 16300                      | 18                              | 792            | 7640                       | 6                               | 124            | 6210                       | 17                              | 285            |
| 25    | 15800                      | 16                              | 683            | 7440                       | 7                               | 141            | 6530                       | 15                              | 264            |
| 26    | 15500                      | 21                              | 879            | 7440                       | 15                              | 301            | 6740                       | 14                              | 255            |
| 27    | 16000                      | 17                              | 734            | 7640                       | 6                               | 124            | 6630                       | 13                              | 233            |
| 28    | 15400                      | 17                              | 707            | 7520                       | 6                               | 122            | 6530                       | 12                              | 212            |
| 29    | 14300                      | 16                              | 618            | 7300                       | 6                               | 118            | 6280                       | 13                              | 220            |
| 30    | 13800                      | 13                              | 484            | 7120                       | 6                               | 115            | 6210                       | 13                              | 218            |
| 31    | 13400                      | 11                              | 398            | 6950                       | 5                               | 94             | --                         | --                              | --             |
| TOTAL | 778700                     | --                              | 134104         | 283010                     | --                              | 8927           | 181230                     | --                              | 4040           |

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)  
 TOTAL LOAD FOR YEAR (TONS)

5677580  
 3679084

TABLE 18.9

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | OCTOBER                    |                                 |                                     | NOVEMBER                   |                                 |                                     | DECEMBER                   |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 6740                       | 13                              | 237                                 | 4400                       | 5                               | 59                                  | 3100                       | 4                               | 33                                  |
| 2     | 7300                       | 17                              | 358                                 | 4340                       | 7                               | 82                                  | 3000                       | 3                               | 24                                  |
| 3     | 8080                       | 13                              | 284                                 | 4280                       | 7                               | 81                                  | 2900                       | 2                               | 16                                  |
| 4     | 7640                       | 13                              | 270                                 | 4340                       | 8                               | 94                                  | 2900                       | 4                               | 31                                  |
| 5     | 7230                       | 9                               | 176                                 | 4280                       | 10                              | 116                                 | 2900                       | 3                               | 23                                  |
| 6     | 6700                       | 7                               | 127                                 | 4610                       | 22                              | 274                                 | 3080                       | 3                               | 25                                  |
| 7     | 6490                       | 5                               | 88                                  | 4880                       | 9                               | 119                                 | 3250                       | 2                               | 18                                  |
| 8     | 6280                       | 5                               | 85                                  | 4540                       | 7                               | 93                                  | 3370                       | 2                               | 18                                  |
| 9     | 6180                       | 5                               | 83                                  | 4790                       | 7                               | 91                                  | 3530                       | 3                               | 29                                  |
| 10    | 6140                       | 4                               | 66                                  | 4670                       | 6                               | 76                                  | 3400                       | 12                              | 110                                 |
| 11    | 6140                       | 4                               | 66                                  | 4580                       | 5                               | 62                                  | 3200                       | 11                              | 95                                  |
| 12    | 4070                       | 3                               | 49                                  | 4490                       | 12                              | 145                                 | 3150                       | 6                               | 51                                  |
| 13    | 5790                       | 3                               | 47                                  | 4460                       | 4                               | 48                                  | 3180                       | 7                               | 60                                  |
| 14    | 5620                       | 2                               | 30                                  | 4340                       | 4                               | 47                                  | 3280                       | 9                               | 80                                  |
| 15    | 5550                       | 1                               | 15                                  | 4280                       | 4                               | 46                                  | 3380                       | 10                              | 91                                  |
| 16    | 5410                       | 2                               | 29                                  | 4220                       | 5                               | 57                                  | 3480                       | 4                               | 38                                  |
| 17    | 5270                       | 2                               | 28                                  | 4280                       | 7                               | 81                                  | 3480                       | 3                               | 28                                  |
| 18    | 5150                       | 3                               | 42                                  | 4280                       | 9                               | 104                                 | 3380                       | 2                               | 18                                  |
| 19    | 5030                       | 3                               | 41                                  | 4130                       | 5                               | 56                                  | 3250                       | 2                               | 18                                  |
| 20    | 4970                       | 4                               | 54                                  | 4040                       | 4                               | 44                                  | 3230                       | 2                               | 17                                  |
| 21    | 4940                       | 5                               | 67                                  | 4100                       | 4                               | 44                                  | 3150                       | 2                               | 17                                  |
| 22    | 4850                       | 4                               | 52                                  | 4100                       | 6                               | 68                                  | 3200                       | 3                               | 26                                  |
| 23    | 4790                       | 4                               | 52                                  | 4010                       | 5                               | 54                                  | 3330                       | 4                               | 36                                  |
| 24    | 4790                       | 4                               | 52                                  | 3980                       | 5                               | 54                                  | 3280                       | 6                               | 53                                  |
| 25    | 4790                       | 2                               | 26                                  | 3550                       | 6                               | 64                                  | 3100                       | 5                               | 42                                  |
| 26    | 4700                       | 2                               | 25                                  | 3780                       | 7                               | 71                                  | 2900                       | 4                               | 31                                  |
| 27    | 4640                       | 3                               | 38                                  | 3650                       | 5                               | 49                                  | 2370                       | 3                               | 19                                  |
| 28    | 4640                       | 4                               | 50                                  | 3500                       | 4                               | 38                                  | 1800                       | 2                               | 9.7                                 |
| 29    | 4520                       | 4                               | 45                                  | 3330                       | 3                               | 27                                  | 1700                       | 2                               | 9.2                                 |
| 30    | 4490                       | 4                               | 48                                  | 3200                       | 3                               | 26                                  | 1600                       | 3                               | 13                                  |
| 31    | 4460                       | 3                               | 36                                  | --                         | --                              | --                                  | 1600                       | 4                               | 17                                  |
| TOTAL | 175860                     | --                              | 2670                                | 126200                     | --                              | 2268                                | 92430                      | --                              | 1095.9                              |

TABLE 18.10

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | JANUARY                    |                                 |                                     | FEBRUARY                   |                                 |                                     | MARCH                      |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 1600                       | 4                               | 17                                  | 2600                       | 8                               | 56                                  | 2500                       | 2                               | 14                                  |
| 2     | 1600                       | 2                               | 8.6                                 | 2700                       | 3                               | 22                                  | 2400                       | 2                               | 13                                  |
| 3     | 1500                       | 2                               | 8.1                                 | 2700                       | 4                               | 29                                  | 2400                       | 2                               | 13                                  |
| 4     | 1500                       | 2                               | 8.1                                 | 2700                       | 3                               | 22                                  | 2400                       | 4                               | 26                                  |
| 5     | 1300                       | 3                               | 11                                  | 2700                       | 9                               | 66                                  | 2400                       | 5                               | 32                                  |
| 6     | 1500                       | 6                               | 24                                  | 2700                       | 5                               | 36                                  | 2500                       | 3                               | 20                                  |
| 7     | 1600                       | 8                               | 35                                  | 2700                       | 7                               | 15                                  | 2600                       | 5                               | 35                                  |
| 8     | 1800                       | 21                              | 102                                 | 2700                       | 3                               | 22                                  | 2600                       | 12                              | 84                                  |
| 9     | 2100                       | 11                              | 55                                  | 2700                       | 2                               | 15                                  | 2700                       | 13                              | 95                                  |
| 10    | 2100                       | 12                              | 60                                  | 2700                       | 2                               | 15                                  | 2700                       | 13                              | 95                                  |
| 11    | 2200                       | 8                               | 48                                  | 2700                       | 2                               | 15                                  | 2660                       | 12                              | 86                                  |
| 12    | 2300                       | 13                              | 81                                  | 2700                       | 3                               | 22                                  | 2630                       | 7                               | 50                                  |
| 13    | 2400                       | 9                               | 58                                  | 2700                       | 2                               | 15                                  | 2580                       | 8                               | 56                                  |
| 14    | 2500                       | 6                               | 41                                  | 2700                       | 2                               | 15                                  | 2610                       | 8                               | 56                                  |
| 15    | 2600                       | 8                               | 54                                  | 2800                       | 2                               | 15                                  | 2680                       | 7                               | 51                                  |
| 16    | 2500                       | 5                               | 34                                  | 2930                       | 2                               | 16                                  | 2730                       | 9                               | 66                                  |
| 17    | 2400                       | 4                               | 26                                  | 3000                       | 2                               | 16                                  | 2850                       | 6                               | 46                                  |
| 18    | 2300                       | 4                               | 25                                  | 3100                       | 2                               | 17                                  | 2900                       | 5                               | 35                                  |
| 19    | 2300                       | 3                               | 19                                  | 3100                       | 2                               | 17                                  | 2800                       | 5                               | 38                                  |
| 20    | 2400                       | 3                               | 19                                  | 3000                       | 3                               | 24                                  | 2750                       | 7                               | 52                                  |
| 21    | 2500                       | 4                               | 27                                  | 2900                       | 3                               | 23                                  | 2730                       | 5                               | 37                                  |
| 22    | 2600                       | 4                               | 28                                  | 2900                       | 3                               | 23                                  | 2750                       | 7                               | 52                                  |
| 23    | 2700                       | 4                               | 29                                  | 2800                       | 5                               | 38                                  | 2800                       | 11                              | 83                                  |
| 24    | 2800                       | 7                               | 53                                  | 2700                       | 6                               | 44                                  | 2880                       | 11                              | 86                                  |
| 25    | 2900                       | 8                               | 47                                  | 2600                       | 5                               | 35                                  | 2930                       | 10                              | 79                                  |
| 26    | 3000                       | 4                               | 32                                  | 2600                       | 3                               | 21                                  | 2930                       | 9                               | 71                                  |
| 27    | 3000                       | 4                               | 32                                  | 2500                       | 5                               | 34                                  | 2900                       | 10                              | 78                                  |
| 28    | 2900                       | 3                               | 23                                  | 2500                       | 1                               | 20                                  | 2880                       | 11                              | 86                                  |
| 29    | 2800                       | 1                               | 23                                  | --                         | --                              | --                                  | 2900                       | 10                              | 78                                  |
| 30    | 2700                       | 3                               | 22                                  | --                         | --                              | --                                  | 2880                       | 7                               | 54                                  |
| 31    | 2600                       | 4                               | 28                                  | --                         | --                              | --                                  | 2880                       | 9                               | 70                                  |
| TOTAL | 70900                      | --                              | 1091.5                              | 77100                      | --                              | 708                                 | 89850                      | --                              | 1741                                |

TABLE 18.11

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | APRIL                      |                                 |                                                  | MAY                        |                                 |                                                  | JUNE                       |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 2880                       | 4                               | 31                                               | 3500                       | 23                              | 217                                              | 24400                      | 162                             | 10700                                            |
| 2     | 2850                       | 4                               | 31                                               | 3650                       | 26                              | 256                                              | 25600                      | 162                             | 11200                                            |
| 3     | 2880                       | 6                               | 47                                               | 4160                       | 26                              | 292                                              | 31300                      | 179                             | 15100                                            |
| 4     | 2880                       | 11                              | 86                                               | 5650                       | 26                              | 397                                              | 40700                      | 182                             | 20000                                            |
| 5     | 2880                       | 11                              | 86                                               | 7640                       | 42                              | 866                                              | 47300                      | 213                             | 27200                                            |
| 6     | 3080                       | 11                              | 91                                               | 10800                      | 116                             | 3380                                             | 50300                      | 197                             | 26800                                            |
| 7     | 3580                       | 11                              | 106                                              | 14600                      | 124                             | 4890                                             | 50100                      | 196                             | 28500                                            |
| 8     | 3980                       | 9                               | 97                                               | 17000                      | 102                             | 4680                                             | 48100                      | 144                             | 18700                                            |
| 9     | 3860                       | 8                               | 83                                               | 17100                      | 80                              | 3690                                             | 45000                      | 107                             | 13000                                            |
| 10    | 3750                       | 6                               | 61                                               | 16800                      | 61                              | 2770                                             | 42500                      | 111                             | 12700                                            |
| 11    | 3890                       | 6                               | 63                                               | 15900                      | 51                              | 2190                                             | 38400                      | 99                              | 10300                                            |
| 12    | 4010                       | 7                               | 76                                               | 14800                      | 39                              | 1560                                             | 32200                      | 46                              | 4000                                             |
| 13    | 3920                       | 6                               | 64                                               | 13400                      | 39                              | 1410                                             | 27300                      | 43                              | 2170                                             |
| 14    | 3750                       | 5                               | 51                                               | 12100                      | 44                              | 1440                                             | 25500                      | 46                              | 2170                                             |
| 15    | 3550                       | 5                               | 48                                               | 11200                      | 142                             | 4290                                             | 26200                      | 52                              | 3680                                             |
| 16    | 3450                       | 5                               | 47                                               | 11500                      | 162                             | 5030                                             | 29100                      | 137                             | 10800                                            |
| 17    | 3330                       | 5                               | 45                                               | 15100                      | 174                             | 7090                                             | 33300                      | 154                             | 13800                                            |
| 18    | 3230                       | 6                               | 52                                               | 23500                      | 158                             | 10000                                            | 36400                      | 151                             | 14800                                            |
| 19    | 3230                       | 6                               | 52                                               | 26600                      | 95                              | 6820                                             | 35200                      | 129                             | 12300                                            |
| 20    | 3350                       | 6                               | 54                                               | 26000                      | 94                              | 5900                                             | 33600                      | 36                              | 3270                                             |
| 21    | 3500                       | 9                               | 76                                               | 25900                      | 94                              | 6570                                             | 32000                      | 30                              | 2590                                             |
| 22    | 3600                       | 10                              | 97                                               | 26500                      | 121                             | 8660                                             | 30300                      | 34                              | 2780                                             |
| 23    | 3680                       | 10                              | 99                                               | 28300                      | 118                             | 9020                                             | 29600                      | 31                              | 2480                                             |
| 24    | 3750                       | 12                              | 122                                              | 30200                      | 120                             | 9780                                             | 28000                      | 37                              | 2800                                             |
| 25    | 3860                       | 7                               | 73                                               | 31400                      | 117                             | 9920                                             | 25500                      | 36                              | 2480                                             |
| 26    | 3890                       | 6                               | 63                                               | 33600                      | 112                             | 10200                                            | 24000                      | 50                              | 3240                                             |
| 27    | 3750                       | 5                               | 51                                               | 40500                      | 104                             | 11400                                            | 22400                      | 47                              | 2840                                             |
| 28    | 3630                       | 7                               | 69                                               | 41800                      | 89                              | 10000                                            | 21800                      | 21                              | 1240                                             |
| 29    | 3550                       | 7                               | 67                                               | 35200                      | 53                              | 5040                                             | 22300                      | 20                              | 1200                                             |
| 30    | 3500                       | 8                               | 76                                               | 25800                      | 48                              | 3860                                             | 21600                      | 21                              | 1220                                             |
| 31    | --                         | --                              | --                                               | 26400                      | 66                              | 4700                                             | --                         | --                              | --                                               |
| TOTAL | 105040                     | --                              | 2064                                             | 620600                     | --                              | 156318                                           | 980000                     | --                              | 284000                                           |

TABLE 18.12

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY                                                | JULY                       |                                 |                                                  | AUGUST                     |                                 |                                                  | SEPTEMBER                  |                                 |                                                  |
|----------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|                                                    | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1                                                  | 21400                      | 19                              | 1100                                             | 9600                       | 20                              | 518                                              | 9340                       | 7                               | 101                                              |
| 2                                                  | 20800                      | 9                               | 505                                              | 9300                       | 13                              | 326                                              | 9220                       | 10                              | 141                                              |
| 3                                                  | 19600                      | 9                               | 476                                              | 5000                       | 8                               | 194                                              | 5190                       | 8                               | 112                                              |
| 4                                                  | 18500                      | 9                               | 450                                              | 8650                       | 10                              | 234                                              | 5470                       | 7                               | 103                                              |
| 5                                                  | 18000                      | 9                               | 437                                              | 8460                       | 12                              | 274                                              | 5600                       | 6                               | 51                                               |
| 6                                                  | 18100                      | 10                              | 489                                              | 8280                       | 11                              | 246                                              | 5530                       | 6                               | 50                                               |
| 7                                                  | 18000                      | 5                               | 243                                              | 8160                       | 9                               | 176                                              | 5370                       | 6                               | 87                                               |
| 8                                                  | 17000                      | 6                               | 275                                              | 8090                       | 10                              | 218                                              | 5250                       | 6                               | 85                                               |
| 9                                                  | 16000                      | 9                               | 385                                              | 8020                       | 7                               | 152                                              | 5370                       | 5                               | 72                                               |
| 10                                                 | 15500                      | 5                               | 205                                              | 7870                       | 7                               | 149                                              | 5440                       | 3                               | 44                                               |
| 11                                                 | 15000                      | 12                              | 486                                              | 7540                       | 7                               | 143                                              | 5280                       | 4                               | 57                                               |
| 12                                                 | 14400                      | 17                              | 661                                              | 7120                       | 8                               | 154                                              | 5120                       | 4                               | 55                                               |
| 13                                                 | 13800                      | 6                               | 224                                              | 6910                       | 14                              | 261                                              | 4970                       | 4                               | 54                                               |
| 14                                                 | 13100                      | 9                               | 318                                              | 6770                       | 16                              | 292                                              | 4910                       | 10                              | 133                                              |
| 15                                                 | 12400                      | 9                               | 268                                              | 6700                       | 20                              | 362                                              | 4780                       | 7                               | 90                                               |
| 16                                                 | 11600                      | 13                              | 407                                              | 6560                       | 11                              | 195                                              | 4660                       | 14                              | 111                                              |
| 17                                                 | 11300                      | 13                              | 397                                              | 6250                       | 11                              | 186                                              | 4540                       | 30                              | 368                                              |
| 18                                                 | 11200                      | 4                               | 242                                              | 6120                       | 10                              | 165                                              | 4450                       | 6                               | 72                                               |
| 19                                                 | 11200                      | 6                               | 181                                              | 6060                       | 8                               | 131                                              | 4480                       | 5                               | 60                                               |
| 20                                                 | 10800                      | 6                               | 175                                              | 5920                       | 7                               | 112                                              | 5050                       | 6                               | 82                                               |
| 21                                                 | 10500                      | 7                               | 198                                              | 5730                       | 5                               | 77                                               | 6060                       | 6                               | 98                                               |
| 22                                                 | 10000                      | 7                               | 185                                              | 5600                       | 4                               | 60                                               | 6020                       | 7                               | 114                                              |
| 23                                                 | 9800                       | 13                              | 344                                              | 5530                       | 10                              | 149                                              | 5890                       | 7                               | 111                                              |
| 24                                                 | 9600                       | 15                              | 389                                              | 5500                       | 9                               | 134                                              | 5960                       | 4                               | 64                                               |
| 25                                                 | 9400                       | 19                              | 482                                              | 5500                       | 7                               | 104                                              | 5890                       | 6                               | 95                                               |
| 26                                                 | 9200                       | 22                              | 546                                              | 5500                       | 7                               | 104                                              | 5660                       | 3                               | 46                                               |
| 27                                                 | 9300                       | 16                              | 402                                              | 5440                       | 9                               | 132                                              | 5370                       | 14                              | 203                                              |
| 28                                                 | 9500                       | 6                               | 154                                              | 5370                       | 7                               | 101                                              | 5190                       | 13                              | 182                                              |
| 29                                                 | 9700                       | 10                              | 262                                              | 5340                       | 7                               | 101                                              | 5090                       | 10                              | 137                                              |
| 30                                                 | 9800                       | 13                              | 344                                              | 5310                       | 8                               | 115                                              | 5060                       | 9                               | 123                                              |
| 31                                                 | 9800                       | 13                              | 344                                              | 5440                       | 17                              | 250                                              | --                         | --                              | --                                               |
| TOTAL                                              | 414300                     | --                              | 11586                                            | 211640                     | --                              | 5815                                             | 158250                     | --                              | 3246                                             |
| TOTAL DISCHARGE FOR YEAR (CFS-DAYS)                |                            |                                 |                                                  |                            |                                 |                                                  |                            |                                 | 3116170                                          |
| TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS) |                            |                                 |                                                  |                            |                                 |                                                  |                            |                                 | 472603.7                                         |

TABLE 18.13

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | OCTOBER              |                           |                               | NOVEMBER             |                           |                               | DECEMBER             |                           |                               |
|-------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) |
| 1     | 5060                 | 8                         | 109                           | 3730                 | 4                         | 40                            | 2900                 | 17                        | 133                           |
| 2     | 5030                 | 5                         | 68                            | 3760                 | 2                         | 20                            | 3000                 | 22                        | 178                           |
| 3     | 5000                 | 8                         | 108                           | 3760                 | 2                         | 20                            | 3100                 | 28                        | 234                           |
| 4     | 4940                 | 5                         | 67                            | 3730                 | 3                         | 30                            | 3000                 | 17                        | 138                           |
| 5     | 4910                 | 5                         | 66                            | 3640                 | 2                         | 20                            | 2900                 | 22                        | 172                           |
| 6     | 4880                 | 5                         | 66                            | 3700                 | 2                         | 20                            | 2800                 | 20                        | 151                           |
| 7     | 4970                 | 5                         | 67                            | 3700                 | 3                         | 30                            | 3400                 | 18                        | 165                           |
| 8     | 5190                 | 6                         | 84                            | 3730                 | 3                         | 30                            | 3900                 | 30                        | 316                           |
| 9     | 5120                 | 6                         | 83                            | 3810                 | 4                         | 41                            | 4000                 | 10                        | 108                           |
| 10    | 5030                 | 4                         | 54                            | 3870                 | 4                         | 42                            | 3700                 | 4                         | 40                            |
| 11    | 4940                 | 4                         | 53                            | 3870                 | 4                         | 42                            | 3500                 | 9                         | 85                            |
| 12    | 4810                 | 5                         | 65                            | 3840                 | 3                         | 31                            | 3300                 | 4                         | 36                            |
| 13    | 4720                 | 11                        | 140                           | 3780                 | 4                         | 41                            | 3100                 | 4                         | 33                            |
| 14    | 4660                 | 11                        | 138                           | 3730                 | 8                         | 81                            | 3000                 | 6                         | 49                            |
| 15    | 4570                 | 10                        | 123                           | 3670                 | 3                         | 30                            | 3100                 | 6                         | 50                            |
| 16    | 4450                 | 11                        | 132                           | 3640                 | 4                         | 39                            | 3200                 | 10                        | 86                            |
| 17    | 4450                 | 7                         | 84                            | 3640                 | 5                         | 49                            | 3300                 | 10                        | 89                            |
| 18    | 4450                 | 7                         | 84                            | 3670                 | 4                         | 40                            | 3400                 | 13                        | 119                           |
| 19    | 4190                 | 7                         | 79                            | 3640                 | 4                         | 39                            | 3300                 | 5                         | 45                            |
| 20    | 4190                 | 6                         | 68                            | 3620                 | 5                         | 49                            | 3000                 | 12                        | 97                            |
| 21    | 4220                 | 6                         | 68                            | 3620                 | 3                         | 29                            | 2800                 | 17                        | 129                           |
| 22    | 4220                 | 6                         | 68                            | 3100                 | 2                         | 17                            | 2400                 | 17                        | 110                           |
| 23    | 4250                 | 4                         | 46                            | 2300                 | 3                         | 19                            | 1900                 | 21                        | 108                           |
| 24    | 4250                 | 5                         | 57                            | 1900                 | 3                         | 15                            | 1600                 | 6                         | 26                            |
| 25    | 4300                 | 4                         | 46                            | 2300                 | 5                         | 31                            | 1300                 | 4                         | 14                            |
| 26    | 4250                 | 5                         | 57                            | 3000                 | 11                        | 89                            | 1600                 | 8                         | 35                            |
| 27    | 4190                 | 4                         | 45                            | 2900                 | 8                         | 63                            | 1900                 | 5                         | 26                            |
| 28    | 4070                 | 4                         | 44                            | 2700                 | 6                         | 44                            | 2200                 | 11                        | 65                            |
| 29    | 3960                 | 4                         | 43                            | 2500                 | 2                         | 14                            | 2500                 | 10                        | 68                            |
| 30    | 3840                 | 3                         | 31                            | 2700                 | 4                         | 29                            | 2800                 | 8                         | 60                            |
| 31    | 3780                 | 3                         | 31                            | --                   | --                        | --                            | 3000                 | 30                        | 243                           |
| TOTAL | 140890               | --                        | 2274                          | 101550               | --                        | 1084                          | 88900                | --                        | 3208                          |

TABLE 18.14

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | JANUARY              |                           |                               | FEBRUARY             |                           |                               | MARCH                |                           |                               |
|-------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) |
| 1     | 2900                 | 10                        | 78                            | 7000                 | 32                        | 605                           | 3260                 | 6                         | 53                            |
| 2     | 2600                 | 5                         | 35                            | 6600                 | 17                        | 303                           | 3130                 | 8                         | 68                            |
| 3     | 2200                 | 7                         | 42                            | 6200                 | 16                        | 268                           | 3180                 | 8                         | 69                            |
| 4     | 1900                 | 7                         | 36                            | 5600                 | 21                        | 318                           | 3160                 | 6                         | 51                            |
| 5     | 1600                 | 11                        | 48                            | 5000                 | 32                        | 432                           | 3050                 | 4                         | 33                            |
| 6     | 1400                 | 8                         | 30                            | 4000                 | 14                        | 151                           | 2920                 | 5                         | 39                            |
| 7     | 1600                 | 3                         | 13                            | 3000                 | 7                         | 57                            | 2920                 | 15                        | 118                           |
| 8     | 1700                 | 4                         | 18                            | 2700                 | 6                         | 44                            | 2970                 | 8                         | 64                            |
| 9     | 1800                 | 6                         | 29                            | 2500                 | 8                         | 54                            | 2970                 | 4                         | 32                            |
| 10    | 1900                 | 12                        | 62                            | 3000                 | 6                         | 49                            | 2970                 | 6                         | 48                            |
| 11    | 1800                 | 10                        | 49                            | 3500                 | 10                        | 95                            | 2990                 | 8                         | 65                            |
| 12    | 1700                 | 6                         | 28                            | 4000                 | 16                        | 173                           | 3070                 | 7                         | 58                            |
| 13    | 1600                 | 7                         | 30                            | 4500                 | 17                        | 207                           | 3070                 | 7                         | 58                            |
| 14    | 1700                 | 12                        | 56                            | 5000                 | 22                        | 297                           | 3020                 | 4                         | 33                            |
| 15    | 1900                 | 14                        | 72                            | 5500                 | 37                        | 549                           | 2990                 | 5                         | 40                            |
| 16    | 2100                 | 11                        | 62                            | 6000                 | 33                        | 535                           | 2940                 | 5                         | 40                            |
| 17    | 2300                 | 13                        | 81                            | 5600                 | 29                        | 438                           | 2890                 | 4                         | 31                            |
| 18    | 2600                 | 20                        | 140                           | 5300                 | 34                        | 487                           | 2840                 | 3                         | 23                            |
| 19    | 2900                 | 15                        | 117                           | 5000                 | 28                        | 378                           | 2760                 | 2                         | 15                            |
| 20    | 3400                 | 8                         | 73                            | 4570                 | 26                        | 321                           | 2710                 | 4                         | 29                            |
| 21    | 3900                 | 7                         | 74                            | 4190                 | 21                        | 238                           | 2760                 | 2                         | 15                            |
| 22    | 4100                 | 7                         | 77                            | 3960                 | 17                        | 182                           | 2740                 | 2                         | 15                            |
| 23    | 4000                 | 7                         | 76                            | 3780                 | 14                        | 143                           | 2710                 | 3                         | 22                            |
| 24    | 3900                 | 9                         | 95                            | 3780                 | 13                        | 133                           | 2690                 | 4                         | 29                            |
| 25    | 3900                 | 4                         | 42                            | 3810                 | 10                        | 103                           | 2810                 | 7                         | 53                            |
| 26    | 3800                 | 6                         | 62                            | 3760                 | 11                        | 112                           | 2890                 | 7                         | 55                            |
| 27    | 3800                 | 7                         | 72                            | 3590                 | 10                        | 97                            | 2990                 | 6                         | 48                            |
| 28    | 3700                 | 14                        | 140                           | 3400                 | 7                         | 64                            | 2940                 | 5                         | 40                            |
| 29    | 3700                 | 13                        | 130                           | --                   | --                        | --                            | 2890                 | 7                         | 55                            |
| 30    | 4500                 | 16                        | 194                           | --                   | --                        | --                            | 2970                 | 5                         | 40                            |
| 31    | 6000                 | 12                        | 194                           | --                   | --                        | --                            | 3210                 | 10                        | 87                            |
| TOTAL | 86900                | --                        | 2254                          | 124840               | --                        | 6833                          | 91410                | --                        | 1426                          |

TABLE 18.15

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | APRIL                |                           |                               | MAY                  |                           |                               | JUNE                 |                           |                               |
|-------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) |
| 1     | 3320                 | 9                         | 81                            | 14700                | 37                        | 1470                          | 57000                | 193                       | 29700                         |
| 2     | 3260                 | 11                        | 97                            | 16200                | 75                        | 3280                          | 53000                | 165                       | 23600                         |
| 3     | 3240                 | 15                        | 131                           | 19600                | 136                       | 7200                          | 53000                | 146                       | 20900                         |
| 4     | 3240                 | 8                         | 70                            | 25200                | 241                       | 16400                         | 55000                | 137                       | 20300                         |
| 5     | 3290                 | 15                        | 133                           | 32100                | 329                       | 28500                         | 58000                | 169                       | 26500                         |
| 6     | 3430                 | 23                        | 213                           | 37200                | 382                       | 38400                         | 61000                | 294                       | 48400                         |
| 7     | 3810                 | 26                        | 267                           | 37600                | 260                       | 26400                         | 62000                | 257                       | 43000                         |
| 8     | 4480                 | 27                        | 327                           | 36800                | 190                       | 18900                         | 63000                | 247                       | 42000                         |
| 9     | 4910                 | 29                        | 384                           | 38000                | 171                       | 17500                         | 64000                | 241                       | 41600                         |
| 10    | 5560                 | 46                        | 691                           | 40600                | 202                       | 22100                         | 58000                | 219                       | 34300                         |
| 11    | 6120                 | 57                        | 942                           | 41800                | 211                       | 23800                         | 52000                | 165                       | 23200                         |
| 12    | 5920                 | 20                        | 320                           | 44900                | 235                       | 28500                         | 44800                | 111                       | 13400                         |
| 13    | 5500                 | 20                        | 297                           | 52000                | 390                       | 54800                         | 43400                | 95                        | 11100                         |
| 14    | 5340                 | 21                        | 303                           | 58000                | 653                       | 102000                        | 46400                | 104                       | 13080                         |
| 15    | 5600                 | 28                        | 423                           | 53000                | 444                       | 63500                         | 47800                | 118                       | 15200                         |
| 16    | 6350                 | 30                        | 514                           | 45000                | 232                       | 28200                         | 42400                | 96                        | 11000                         |
| 17    | 6590                 | 28                        | 498                           | 37200                | 128                       | 12900                         | 36800                | 88                        | 8740                          |
| 18    | 6490                 | 30                        | 526                           | 31600                | 108                       | 9210                          | 33600                | 71                        | 6440                          |
| 19    | 6250                 | 19                        | 321                           | 27900                | 73                        | 5500                          | 32300                | 57                        | 4970                          |
| 20    | 6390                 | 34                        | 587                           | 25800                | 61                        | 4250                          | 32400                | 51                        | 4460                          |
| 21    | 7500                 | 47                        | 952                           | 25200                | 54                        | 3670                          | 34600                | 60                        | 5610                          |
| 22    | 9030                 | 77                        | 1880                          | 24500                | 53                        | 3510                          | 38800                | 83                        | 8700                          |
| 23    | 10500                | 113                       | 3200                          | 25100                | 64                        | 4340                          | 44600                | 116                       | 14000                         |
| 24    | 12600                | 142                       | 4830                          | 28200                | 88                        | 6700                          | 50000                | 152                       | 20500                         |
| 25    | 15500                | 196                       | 8200                          | 34800                | 165                       | 15500                         | 53000                | 197                       | 28200                         |
| 26    | 17900                | 264                       | 12800                         | 45000                | 307                       | 37300                         | 52000                | 243                       | 34100                         |
| 27    | 17200                | 101                       | 4690                          | 54000                | 326                       | 47500                         | 47100                | 168                       | 21400                         |
| 28    | 16300                | 53                        | 2330                          | 64000                | 373                       | 64500                         | 39200                | 103                       | 10900                         |
| 29    | 15200                | 52                        | 2130                          | 67000                | 692                       | 125000                        | 33500                | 72                        | 6510                          |
| 30    | 14600                | 32                        | 1260                          | 63000                | 446                       | 75900                         | 30300                | 60                        | 4910                          |
| 31    | --                   | --                        | --                            | 60000                | 290                       | 47000                         | --                   | --                        | --                            |
| TOTAL | 235420               | --                        | 49397                         | 1206000              | --                        | 943730                        | 1419000              | --                        | 596640                        |

TABLE 18.16

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY                                                | JULY                 |                           |                               | AUGUST               |                           |                               | SEPTEMBER            |                           |                               |
|----------------------------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|
|                                                    | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) |
| 1                                                  | 29900                | 55                        | 4440                          | 17300                | 48                        | 2240                          | 8100                 | 17                        | 372                           |
| 2                                                  | 30000                | 59                        | 4780                          | 17400                | 35                        | 1640                          | 8500                 | 12                        | 275                           |
| 3                                                  | 29800                | 51                        | 4100                          | 18000                | 15                        | 729                           | 8570                 | 12                        | 278                           |
| 4                                                  | 28900                | 48                        | 3750                          | 17500                | 11                        | 520                           | 8350                 | 16                        | 361                           |
| 5                                                  | 27000                | 60                        | 4370                          | 17000                | 14                        | 643                           | 7940                 | 14                        | 300                           |
| 6                                                  | 25300                | 54                        | 3690                          | 16500                | 12                        | 535                           | 7610                 | 23                        | 473                           |
| 7                                                  | 24400                | 52                        | 3430                          | 16000                | 12                        | 518                           | 7400                 | 7                         | 140                           |
| 8                                                  | 22700                | 43                        | 2640                          | 15500                | 8                         | 335                           | 7500                 | 10                        | 203                           |
| 9                                                  | 21000                | 81                        | 4590                          | 15000                | 12                        | 486                           | 7830                 | 15                        | 317                           |
| 10                                                 | 20800                | 43                        | 2410                          | 14500                | 8                         | 313                           | 7500                 | 17                        | 344                           |
| 11                                                 | 24900                | 36                        | 2420                          | 14000                | 11                        | 416                           | 7120                 | 18                        | 346                           |
| 12                                                 | 28500                | 61                        | 4690                          | 12900                | 8                         | 279                           | 7080                 | 10                        | 191                           |
| 13                                                 | 27700                | 43                        | 3220                          | 12100                | 5                         | 163                           | 6910                 | 10                        | 187                           |
| 14                                                 | 25300                | 38                        | 2600                          | 11600                | 7                         | 219                           | 6940                 | 11                        | 206                           |
| 15                                                 | 24300                | 40                        | 2620                          | 11100                | 8                         | 240                           | 6630                 | 9                         | 161                           |
| 16                                                 | 24600                | 41                        | 2770                          | 10600                | 8                         | 229                           | 6350                 | 7                         | 120                           |
| 17                                                 | 25800                | 55                        | 3830                          | 10100                | 6                         | 164                           | 6090                 | 5                         | 82                            |
| 18                                                 | 27200                | 67                        | 4920                          | 9610                 | 7                         | 182                           | 5960                 | 10                        | 161                           |
| 19                                                 | 26800                | 48                        | 3470                          | 9220                 | 7                         | 174                           | 5830                 | 10                        | 157                           |
| 20                                                 | 26800                | 48                        | 3470                          | 9200                 | 8                         | 199                           | 5730                 | 8                         | 124                           |
| 21                                                 | 27700                | 44                        | 3290                          | 8800                 | 14                        | 333                           | 5660                 | 7                         | 107                           |
| 22                                                 | 27800                | 40                        | 3000                          | 8600                 | 13                        | 302                           | 5530                 | 10                        | 149                           |
| 23                                                 | 27300                | 40                        | 2950                          | 8600                 | 9                         | 209                           | 5440                 | 12                        | 176                           |
| 24                                                 | 26500                | 36                        | 2580                          | 8800                 | 10                        | 238                           | 5280                 | 15                        | 214                           |
| 25                                                 | 25800                | 32                        | 2230                          | 8700                 | 8                         | 188                           | 5120                 | 11                        | 152                           |
| 26                                                 | 23700                | 25                        | 1600                          | 8300                 | 10                        | 224                           | 5060                 | 10                        | 137                           |
| 27                                                 | 20900                | 26                        | 1470                          | 8000                 | 12                        | 239                           | 5000                 | 9                         | 122                           |
| 28                                                 | 19500                | 29                        | 1530                          | 7600                 | 9                         | 185                           | 4970                 | 8                         | 107                           |
| 29                                                 | 19000                | 33                        | 1690                          | 7400                 | 13                        | 260                           | 5060                 | 13                        | 178                           |
| 30                                                 | 18600                | 28                        | 1410                          | 7500                 | 22                        | 446                           | 5060                 | 10                        | 137                           |
| 31                                                 | 17700                | 26                        | 1240                          | 7700                 | 20                        | 416                           | --                   | --                        | --                            |
| TOTAL                                              | 776200               | --                        | 95150                         | 365130               | --                        | 13284                         | 196120               | --                        | 6277                          |
| TOTAL DISCHARGE FOR YEAR (CFS-DAYS)                |                      |                           |                               |                      |                           |                               |                      |                           | 4832360                       |
| TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS) |                      |                           |                               |                      |                           |                               |                      |                           | 1721557                       |

TABLE 18.17

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

| DAY   | OCTOBER                    |                                 |                                                  | NOVEMBER                   |                                 |                                                  | DECEMBER                   |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 4900                       | 12                              | 159                                              | 3900                       | 5                               | 53                                               | 3400                       | 10                              | 92                                               |
| 2     | 4900                       | 9                               | 119                                              | 4000                       | 3                               | 32                                               | 3300                       | 8                               | 71                                               |
| 3     | 4800                       | 11                              | 143                                              | 4000                       | 7                               | 76                                               | 3200                       | 7                               | 60                                               |
| 4     | 4700                       | 8                               | 102                                              | 4100                       | 11                              | 122                                              | 3000                       | 9                               | 73                                               |
| 5     | 4600                       | 8                               | 99                                               | 4400                       | 7                               | 83                                               | 2900                       | 4                               | 31                                               |
| 6     | 4700                       | 8                               | 102                                              | 4300                       | 6                               | 70                                               | 2800                       | 7                               | 53                                               |
| 7     | 4900                       | 8                               | 106                                              | 4000                       | 4                               | 43                                               | 2800                       | 11                              | 83                                               |
| 8     | 5100                       | 8                               | 110                                              | 3800                       | 7                               | 72                                               | 2700                       | 15                              | 109                                              |
| 9     | 5200                       | 10                              | 140                                              | 3700                       | 5                               | 50                                               | 2300                       | 26                              | 161                                              |
| 10    | 5200                       | 9                               | 126                                              | 3900                       | 5                               | 53                                               | 2400                       | 11                              | 71                                               |
| 11    | 5100                       | 7                               | 96                                               | 4100                       | 11                              | 122                                              | 2500                       | 8                               | 54                                               |
| 12    | 5000                       | 9                               | 122                                              | 4400                       | 5                               | 59                                               | 2300                       | 7                               | 43                                               |
| 13    | 4900                       | 6                               | 79                                               | 4400                       | 7                               | 83                                               | 2200                       | 12                              | 71                                               |
| 14    | 4900                       | 4                               | 53                                               | 4400                       | 6                               | 71                                               | 2200                       | 10                              | 59                                               |
| 15    | 5100                       | 7                               | 96                                               | 4400                       | 6                               | 71                                               | 2800                       | 7                               | 53                                               |
| 16    | 5200                       | 6                               | 84                                               | 4300                       | 6                               | 70                                               | 2700                       | 7                               | 51                                               |
| 17    | 5100                       | 5                               | 69                                               | 4200                       | 4                               | 45                                               | 2600                       | 13                              | 91                                               |
| 18    | 4900                       | 3                               | 40                                               | 4100                       | 5                               | 55                                               | 3000                       | 6                               | 49                                               |
| 19    | 4700                       | 4                               | 51                                               | 4000                       | 6                               | 65                                               | 2800                       | 4                               | 30                                               |
| 20    | 4600                       | 3                               | 37                                               | 3900                       | 10                              | 105                                              | 3000                       | 8                               | 65                                               |
| 21    | 4700                       | 4                               | 51                                               | 3900                       | 7                               | 74                                               | 3000                       | 7                               | 57                                               |
| 22    | 4700                       | 7                               | 89                                               | 3900                       | 5                               | 53                                               | 3000                       | 7                               | 57                                               |
| 23    | 4600                       | 6                               | 75                                               | 3900                       | 5                               | 53                                               | 3200                       | 7                               | 60                                               |
| 24    | 4500                       | 5                               | 61                                               | 3800                       | 14                              | 144                                              | 3200                       | 4                               | 35                                               |
| 25    | 4500                       | 3                               | 36                                               | 3800                       | 17                              | 174                                              | 3000                       | 4                               | 32                                               |
| 26    | 4500                       | 5                               | 61                                               | 3700                       | 7                               | 70                                               | 3000                       | 5                               | 41                                               |
| 27    | 4500                       | 5                               | 61                                               | 3600                       | 7                               | 68                                               | 2700                       | 4                               | 29                                               |
| 28    | 4600                       | 4                               | 50                                               | 3600                       | 5                               | 49                                               | 2600                       | 5                               | 35                                               |
| 29    | 4400                       | 7                               | 83                                               | 3500                       | 5                               | 47                                               | 2500                       | 8                               | 54                                               |
| 30    | 4100                       | 5                               | 55                                               | 3500                       | 6                               | 57                                               | 2400                       | 7                               | 45                                               |
| 31    | 4000                       | 6                               | 65                                               | --                         | --                              | --                                               | 2500                       | 5                               | 34                                               |
| TOTAL | 147600                     | --                              | 2620                                             | 119500                     | --                              | 2189                                             | 86000                      | --                              | 1849                                             |

TABLE 18.18

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

| DAY   | JANUARY                    |                                 |                                                  | FEBRUARY                   |                                 |                                                  | MARCH                      |                                 |                                                  |
|-------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|----------------------------|---------------------------------|--------------------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) <sup>1</sup> |
| 1     | 2500                       | 2                               | 14                                               | 2400                       | 3                               | 19                                               | 4400                       | 16                              | 190                                              |
| 2     | 2600                       | 2                               | 14                                               | 2600                       | 2                               | 14                                               | 4500                       | 12                              | 146                                              |
| 3     | 2800                       | 3                               | 23                                               | 2800                       | 3                               | 23                                               | 4400                       | 8                               | 95                                               |
| 4     | 3000                       | 5                               | 41                                               | 3000                       | 2                               | 16                                               | 4200                       | 6                               | 68                                               |
| 5     | 2900                       | 7                               | 55                                               | 3100                       | 3                               | 25                                               | 4000                       | 8                               | 86                                               |
| 6     | 2700                       | 5                               | 36                                               | 3000                       | 2                               | 16                                               | 4200                       | 8                               | 91                                               |
| 7     | 2600                       | 3                               | 21                                               | 2900                       | 4                               | 31                                               | 4200                       | 7                               | 79                                               |
| 8     | 2600                       | 1                               | 7.0                                              | 2800                       | 4                               | 30                                               | 4200                       | 11                              | 125                                              |
| 9     | 2600                       | 5                               | 35                                               | 2700                       | 3                               | 22                                               | 4200                       | 8                               | 91                                               |
| 10    | 2600                       | 5                               | 35                                               | 2600                       | 4                               | 28                                               | 4100                       | 10                              | 111                                              |
| 11    | 2500                       | 4                               | 27                                               | 2500                       | 4                               | 27                                               | 4200                       | 18                              | 204                                              |
| 12    | 2300                       | 3                               | 19                                               | 2500                       | 4                               | 27                                               | 4400                       | 21                              | 249                                              |
| 13    | 2200                       | 3                               | 18                                               | 2700                       | 4                               | 29                                               | 4600                       | 15                              | 186                                              |
| 14    | 2100                       | 2                               | 11                                               | 2900                       | 5                               | 39                                               | 4700                       | 19                              | 241                                              |
| 15    | 2100                       | 2                               | 11                                               | 3000                       | 4                               | 32                                               | 5200                       | 21                              | 295                                              |
| 16    | 2100                       | 3                               | 17                                               | 3200                       | 5                               | 43                                               | 5300                       | 27                              | 386                                              |
| 17    | 2200                       | 4                               | 24                                               | 3500                       | 6                               | 57                                               | 5800                       | 26                              | 407                                              |
| 18    | 2300                       | 2                               | 12                                               | 3500                       | 4                               | 38                                               | 6000                       | 33                              | 535                                              |
| 19    | 2300                       | 5                               | 31                                               | 3300                       | 6                               | 53                                               | 6300                       | 31                              | 527                                              |
| 20    | 2400                       | 2                               | 13                                               | 3000                       | 5                               | 41                                               | 6600                       | 29                              | 517                                              |
| 21    | 2900                       | 4                               | 31                                               | 3400                       | 5                               | 46                                               | 4700                       | 32                              | 406                                              |
| 22    | 3500                       | 5                               | 47                                               | 3500                       | 5                               | 47                                               | 2000                       | 33                              | 178                                              |
| 23    | 3400                       | 3                               | 28                                               | 3500                       | 4                               | 38                                               | 2100                       | 30                              | 170                                              |
| 24    | 3100                       | 3                               | 25                                               | 3300                       | 3                               | 27                                               | 2100                       | 25                              | 142                                              |
| 25    | 2600                       | 2                               | 14                                               | 3100                       | 4                               | 33                                               | 2200                       | 24                              | 143                                              |
| 26    | 2500                       | 4                               | 27                                               | 3100                       | 3                               | 25                                               | 2200                       | 19                              | 113                                              |
| 27    | 2300                       | 2                               | 12                                               | 3100                       | 4                               | 33                                               | 2200                       | 17                              | 101                                              |
| 28    | 2000                       | 1                               | 5.4                                              | 3700                       | 8                               | 80                                               | 2200                       | 19                              | 113                                              |
| 29    | 1900                       | 5                               | 26                                               | 3900                       | 18                              | 190                                              | 2200                       | 20                              | 119                                              |
| 30    | 2000                       | 2                               | 11                                               | --                         | --                              | --                                               | 2600                       | 30                              | 211                                              |
| 31    | 2200                       | 3                               | 18                                               | --                         | --                              | --                                               | 2600                       | 33                              | 232                                              |
| TOTAL | 77800                      | --                              | 708.4                                            | 88600                      | --                              | 1129                                             | 122600                     | --                              | 6557                                             |

TABLE 19.1

KOTTENAI RIVER AT COPELAND, IDAHO  
DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | OCTOBER                    |                                 |                | NOVEMBER                   |                                 |                | DECEMBER                   |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 5300                       | 12                              | 172            | 6550                       | 2                               | 36             | 4480                       | 4                               | 48             |
| 2     | 5280                       | --                              | 100            | 6670                       | 1                               | 18             | 4610                       | 4                               | 50             |
| 3     | 5350                       | --                              | 87             | 6650                       | 1                               | 18             | 4660                       | 4                               | 50             |
| 4     | 5510                       | --                              | 74             | 6810                       | 1                               | 18             | 4740                       | 6                               | 77             |
| 5     | 5580                       | --                              | 75             | 6620                       | 1                               | 18             | 5260                       | 4                               | 57             |
| 6     | 5740                       | --                              | 93             | 6240                       | 1                               | 17             | 5060                       | 6                               | 82             |
| 7     | 5410                       | 4                               | 58             | 5850                       | 1                               | 16             | 5070                       | 5                               | 68             |
| 8     | 5350                       | 4                               | 58             | 5550                       | 1                               | 15             | 5040                       | 5                               | 68             |
| 9     | 5350                       | 5                               | 72             | 5360                       | 1                               | 14             | 4640                       | 4                               | 50             |
| 10    | 5150                       | 4                               | 56             | 5300                       | 1                               | 14             | 4640                       | 3                               | 38             |
| 11    | 5230                       | 4                               | 56             | 6180                       | 1                               | 17             | 4690                       | 12                              | 150            |
| 12    | 5510                       | 8                               | 119            | 6260                       | 2                               | 34             | 4940                       | 8                               | 107            |
| 13    | 5870                       | 7                               | 111            | 6220                       | 2                               | 34             | 4590                       | 18                              | 223            |
| 14    | 6110                       | 8                               | 132            | 6050                       | 3                               | 49             | 3870                       | 6                               | 63             |
| 15    | 6490                       | 6                               | 105            | 5860                       | ?                               | 47             | 3550                       | 4                               | 38             |
| 16    | 6260                       | 8                               | 135            | 6010                       | 2                               | 32             | 3050                       | 4                               | 33             |
| 17    | 5850                       | 8                               | 127            | 6300                       | 2                               | 34             | 3000                       | 2                               | 16             |
| 18    | 5540                       | 6                               | 90             | 6280                       | 4                               | 68             | 3050                       | 4                               | 33             |
| 19    | 5450                       | 7                               | 104            | 6280                       | 5                               | 85             | 3120                       | 5                               | 42             |
| 20    | 5490                       | 4                               | 59             | 5900                       | 3                               | 48             | 3250                       | 6                               | 53             |
| 21    | 5250                       | 6                               | 85             | 5820                       | 8                               | 126            | 3450                       | 6                               | 56             |
| 22    | 5580                       | 7                               | 105            | 5740                       | 6                               | 93             | 3700                       | 4                               | 40             |
| 23    | 5580                       | 5                               | 75             | 5520                       | 4                               | 60             | 4500                       | 4                               | 49             |
| 24    | 5970                       | 1                               | 16             | 5150                       | 4                               | 56             | 4680                       | 4                               | 51             |
| 25    | 5770                       | 1                               | 16             | 5120                       | 5                               | 69             | 5580                       | 2                               | 30             |
| 26    | 5840                       | 1                               | 16             | 5040                       | 4                               | 54             | 6360                       | 4                               | 69             |
| 27    | 5560                       | 1                               | 15             | 4820                       | 2                               | 26             | 6320                       | 2                               | 34             |
| 28    | 6410                       | 1                               | 17             | 4670                       | 4                               | 50             | 6000                       | 4                               | 63             |
| 29    | 7300                       | 1                               | 20             | 4550                       | 4                               | 50             | 5730                       | 9                               | 139            |
| 30    | 6530                       | 4                               | 71             | 4570                       | 6                               | 74             | 5460                       | 4                               | 59             |
| 31    | 6150                       | 2                               | 33             | --                         | --                              | --             | 5500                       | 4                               | 59             |
| TOTAL | 177820                     | --                              | 2352           | 174100                     | --                              | 1290           | 142590                     | --                              | 1997           |

TABLE 19.2

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | JANUARY                    |                                 |                | FEBRUARY                   |                                 |                | MARCH                      |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 5420                       | 4                               | 59             | 4850                       | 2                               | 26             | 7400                       | 10                              | 200            |
| 2     | 4540                       | 6                               | 74             | 5200                       | 5                               | 70             | 7400                       | 8                               | 160            |
| 3     | 4150                       | 7                               | 23             | 5600                       | 6                               | 91             | 7500                       | 8                               | 162            |
| 4     | 3700                       | 2                               | 20             | 6200                       | 4                               | 67             | 7900                       | 6                               | 128            |
| 5     | 3700                       | 3                               | 30             | 7300                       | 5                               | 99             | 8600                       | 15                              | 348            |
| 6     | 3800                       | 2                               | 21             | 7060                       | 8                               | 152            | 9400                       | 10                              | 254            |
| 7     | 3940                       | 2                               | 21             | 6500                       | 8                               | 140            | 10200                      | 10                              | 275            |
| 8     | 4010                       | 1                               | 11             | 6200                       | 7                               | 117            | 10100                      | 16                              | 436            |
| 9     | 4050                       | 1                               | 11             | 6000                       | 3                               | 49             | 9600                       | 9                               | 233            |
| 10    | 4080                       | 2                               | 22             | 5800                       | 2                               | 31             | 9130                       | 10                              | 247            |
| 11    | 4040                       | 2                               | 22             | 5600                       | 4                               | 60             | 8470                       | 8                               | 183            |
| 12    | 3580                       | 2                               | 21             | 5500                       | 3                               | 45             | 7920                       | 12                              | 257            |
| 13    | 3880                       | 1                               | 10             | 5300                       | 4                               | 57             | 7570                       | 10                              | 204            |
| 14    | 4000                       | 1                               | 11             | 5200                       | 2                               | 28             | 7330                       | 7                               | 135            |
| 15    | 4300                       | 1                               | 12             | 5080                       | 2                               | 27             | 7270                       | 8                               | 157            |
| 16    | 4500                       | 1                               | 12             | 5060                       | 1                               | 14             | 7120                       | 8                               | 154            |
| 17    | 4700                       | 2                               | 25             | 5060                       | 4                               | 55             | 7430                       | 12                              | 241            |
| 18    | 4650                       | 2                               | 25             | 5100                       | 3                               | 41             | 7720                       | --                              | 250            |
| 19    | 4600                       | 3                               | 37             | 5200                       | 10                              | 140            | 7710                       | --                              | 210            |
| 20    | 4600                       | 3                               | 37             | 5400                       | 4                               | 58             | 7500                       | --                              | 160            |
| 21    | 4800                       | 2                               | 26             | 5600                       | 10                              | 151            | 7310                       | --                              | 140            |
| 22    | 5170                       | 2                               | 28             | 6100                       | 4                               | 66             | 7100                       | --                              | 120            |
| 23    | 5500                       | 4                               | 59             | 6600                       | 12                              | 214            | 6970                       | --                              | 54             |
| 24    | 5600                       | 6                               | 91             | 7200                       | 11                              | 214            | 7060                       | --                              | 110            |
| 25    | 5600                       | 6                               | 91             | 8200                       | 14                              | 310            | 7220                       | --                              | 140            |
| 26    | 5500                       | 5                               | 74             | 8000                       | 20                              | 432            | 7500                       | 9                               | 182            |
| 27    | 4630                       | 5                               | 63             | 7600                       | 19                              | 390            | 7750                       | 12                              | 251            |
| 28    | 4200                       | 6                               | 68             | 7600                       | 22                              | 451            | 7920                       | 14                              | 299            |
| 29    | 4140                       | 12                              | 134            | 7500                       | 12                              | 243            | 9170                       | 15                              | 371            |
| 30    | 4300                       | 1                               | 12             | --                         | --                              | --             | 10600                      | 23                              | 660            |
| 31    | 4600                       | 1                               | 12             | --                         | --                              | --             | 11400                      | 13                              | 400            |
| TOTAL | 138720                     | --                              | 1162           | 177610                     | --                              | 3838           | 253270                     | --                              | 7165           |

TABLE 19.3

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY   | APRIL                      |                                 |                | MAY                        |                                 |                | JUNE                       |                                 |                |
|-------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1     | 11000                      | 13                              | 386            | 15900                      | 41                              | 1760           | 40300                      | 85                              | 11500          |
| 2     | 10400                      | 15                              | 421            | 14800                      | 40                              | 2140           | 48900                      | 87                              | 11500          |
| 3     | 9610                       | 12                              | 311            | 21200                      | 40                              | 2860           | 53400                      | 140                             | 20000          |
| 4     | 9090                       | 12                              | 294            | 21700                      | 40                              | 3520           | 65900                      | 304                             | 94100          |
| 5     | 8720                       | 4                               | 188            | 22400                      | 44                              | 2660           | 74200                      | 583                             | 117000         |
| 6     | 8560                       | 10                              | 231            | 22600                      | 34                              | 2070           | 72100                      | 561                             | 109000         |
| 7     | 8270                       | 12                              | 268            | 22100                      | 29                              | 1730           | 63400                      | 270                             | 46200          |
| 8     | 8010                       | 5                               | 195            | 21000                      | 18                              | 1070           | 58300                      | 138                             | 21700          |
| 9     | 7990                       | 6                               | 123            | 20600                      | 17                              | 667            | 55900                      | 128                             | 19300          |
| 10    | 7410                       | 4                               | 160            | 21000                      | 13                              | 737            | 55500                      | 115                             | 17200          |
| 11    | 7620                       | 4                               | 165            | 21900                      | 24                              | 1420           | 57100                      | 132                             | 20400          |
| 12    | 8360                       | 10                              | 276            | 23900                      | 28                              | 1910           | 59000                      | 148                             | 23600          |
| 13    | 8690                       | 5                               | 117            | 26800                      | 41                              | 2470           | 59900                      | 177                             | 28600          |
| 14    | 9760                       | 7                               | 166            | 31500                      | 48                              | 4350           | 59100                      | 209                             | 33400          |
| 15    | 8590                       | 12                              | 279            | 35500                      | 120                             | 9580           | 53300                      | 126                             | 18100          |
| 16    | 8820                       | 12                              | 246            | 36500                      | 110                             | 10400          | 46000                      | 98                              | 12200          |
| 17    | 8580                       | 5                               | 116            | 36000                      | 126                             | 12700          | 40900                      | 85                              | 9350           |
| 18    | 8440                       | 6                               | 137            | 36100                      | 51                              | 8870           | 38500                      | 67                              | 6580           |
| 19    | 8050                       | 6                               | 131            | 38400                      | 107                             | 10600          | 38800                      | 78                              | 8170           |
| 20    | 8030                       | 4                               | 87             | 41100                      | 117                             | 12400          | 41900                      | 104                             | 11800          |
| 21    | 8030                       | 6                               | 130            | 43500                      | 258                             | 30300          | 48200                      | 115                             | 15000          |
| 22    | 7920                       | 5                               | 107            | 47000                      | 210                             | 26600          | 51300                      | 136                             | 18800          |
| 23    | 7530                       | 7                               | 142            | 53500                      | 107                             | 15700          | 48100                      | 119                             | 15500          |
| 24    | 7490                       | 6                               | 121            | 56700                      | 143                             | 23100          | 44100                      | 90                              | 10700          |
| 25    | 7580                       | 4                               | 82             | 59600                      | 125                             | 20100          | 41200                      | 70                              | 7750           |
| 26    | 7650                       | 7                               | 145            | 55200                      | 134                             | 20000          | 39100                      | 58                              | 6120           |
| 27    | 7950                       | 10                              | 216            | 52300                      | 147                             | 20800          | 39500                      | 42                              | 4610           |
| 28    | 8240                       | 14                              | 311            | 51600                      | 123                             | 17100          | 44000                      | 70                              | 8220           |
| 29    | 8960                       | 11                              | 263            | 51400                      | 43                              | 12900          | 48300                      | 120                             | 14000          |
| 30    | 11400                      | 34                              | 1050           | 52400                      | 113                             | 16000          | 45100                      | 101                             | 12300          |
| 31    | --                         | --                              | --             | 52400                      | 107                             | 15100          | --                         | --                              | --             |
| TOTAL | 255220                     | --                              | 6854           | 1114600                    | --                              | 315844         | 1541300                    | --                              | 717260         |

TABLE 19.4

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

| DAY                                 | JULY                       |                                 |                | AUGUST                     |                                 |                | SEPTEMBER                  |                                 |                |
|-------------------------------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|----------------------------|---------------------------------|----------------|
|                                     | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | LOAD<br>(TONS) |
| 1                                   | 39000                      | 80                              | 8400           | 15500                      | --                              | 330            | 9180                       | 7                               | 174            |
| 2                                   | 31700                      | 72                              | 6550           | 14900                      | --                              | 320            | 8670                       | 7                               | 164            |
| 3                                   | 30900                      | 54                              | 4450           | 13900                      | --                              | 300            | 8500                       | 5                               | 115            |
| 4                                   | 29800                      | 42                              | 3380           | 13300                      | --                              | 290            | 8510                       | 4                               | 92             |
| 5                                   | 31400                      | 39                              | 3310           | 13100                      | --                              | 280            | 8370                       | 4                               | 50             |
| 6                                   | 33900                      | 45                              | 4120           | 12900                      | 8                               | 279            | 8050                       | 5                               | 109            |
| 7                                   | 35500                      | 49                              | 4750           | 13000                      | 6                               | 211            | 7720                       | 6                               | 125            |
| 8                                   | 37400                      | 59                              | 5960           | 13000                      | 10                              | 351            | 7470                       | 6                               | 121            |
| 9                                   | 38200                      | 67                              | 6910           | 12600                      | 8                               | 272            | 7590                       | 4                               | 82             |
| 10                                  | 36700                      | 70                              | 6940           | 12000                      | 12                              | 389            | 7720                       | 4                               | 83             |
| 11                                  | 34800                      | 63                              | 5920           | 11300                      | --                              | 270            | 7970                       | 4                               | 86             |
| 12                                  | 33400                      | 53                              | 4780           | 11000                      | 7                               | 208            | 7740                       | 4                               | 84             |
| 13                                  | 31600                      | 44                              | 3750           | 10500                      | 8                               | 235            | 7620                       | 7                               | 144            |
| 14                                  | 30700                      | 33                              | 2740           | 10600                      | 8                               | 229            | 7670                       | 11                              | 228            |
| 15                                  | 29200                      | 30                              | 2370           | 10700                      | 7                               | 202            | 7570                       | 4                               | 82             |
| 16                                  | 25700                      | 20                              | 1390           | 11000                      | 13                              | 386            | 7820                       | 6                               | 127            |
| 17                                  | 23100                      | 17                              | 1060           | 11500                      | 7                               | 217            | 7750                       | 4                               | 84             |
| 18                                  | 21700                      | 16                              | 937            | 12100                      | 4                               | 131            | 8570                       | 6                               | 139            |
| 19                                  | 20500                      | 16                              | 886            | 11900                      | 6                               | 193            | 11300                      | 5                               | 153            |
| 20                                  | 19400                      | 12                              | 629            | 11200                      | 6                               | 191            | 11500                      | 4                               | 124            |
| 21                                  | 18800                      | 11                              | 558            | 10900                      | 7                               | 206            | 11400                      | 6                               | 185            |
| 22                                  | 19700                      | 16                              | 851            | 10700                      | --                              | 170            | 11100                      | 6                               | 180            |
| 23                                  | 20400                      | 10                              | 551            | 10800                      | --                              | 170            | 11000                      | 4                               | 119            |
| 24                                  | 19600                      | 8                               | 423            | 10500                      | --                              | 140            | 10500                      | 6                               | 170            |
| 25                                  | 18900                      | --                              | 410            | 10000                      | --                              | 110            | 10200                      | 6                               | 165            |
| 26                                  | 18300                      | --                              | 400            | 9490                       | --                              | 77             | 10100                      | 4                               | 109            |
| 27                                  | 17400                      | --                              | 380            | 9050                       | --                              | 49             | 9740                       | 4                               | 105            |
| 28                                  | 16500                      | --                              | 360            | 9480                       | 2                               | 51             | 9740                       | 4                               | 105            |
| 29                                  | 16000                      | --                              | 350            | 9700                       | 1                               | 26             | 9880                       | 2                               | 53             |
| 30                                  | 15900                      | --                              | 340            | 10000                      | 1                               | 27             | 9990                       | 3                               | 81             |
| 31                                  | 15900                      | --                              | 340            | 10000                      | 2                               | 54             | --                         | --                              | --             |
| TOTAL                               | 813800                     | --                              | 84195          | 357020                     | --                              | 6354           | 270940                     | --                              | 2678           |
| TOTAL DISCHARGE FOR YEAR (CFS-DAYS) |                            |                                 |                |                            |                                 |                |                            |                                 | 5417090        |
| TOTAL LOAD FOR YEAR (TONS)          |                            |                                 |                |                            |                                 |                |                            |                                 | 1151589        |

TABLE 19.5

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | OCTOBER              |                           |             | NOVEMBER             |                           |             | DECEMBER             |                           |             |
|-------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) |
| 1     | 9550                 | 2                         | 54          | 9350                 | 4                         | 100         | 7520                 | 2                         | 41          |
| 2     | 9850                 | 1                         | 27          | 9550                 | 4                         | 100         | 7300                 | 2                         | 36          |
| 3     | 9530                 | 2                         | 51          | 9450                 | 3                         | 77          | 6880                 | 2                         | 37          |
| 4     | 9030                 | 4                         | 98          | 9350                 | 3                         | 76          | 7800                 | 6                         | 130         |
| 5     | 9870                 | 2                         | 48          | 9150                 | 3                         | 74          | 8130                 | 9                         | 168         |
| 6     | 8680                 | 2                         | 47          | 8860                 | 3                         | 72          | 7820                 | 2                         | 42          |
| 7     | 8580                 | 2                         | 46          | 8530                 | 3                         | 69          | 7030                 | 5                         | 55          |
| 8     | 8580                 | 4                         | 93          | 8240                 | 3                         | 67          | 6590                 | 2                         | 36          |
| 9     | 8460                 | 4                         | 91          | 7940                 | 3                         | 64          | 6700                 | 8                         | 145         |
| 10    | 8170                 | 5                         | 110         | 7950                 | 3                         | 64          | 7000                 | 4                         | 76          |
| 11    | 7890                 | 2                         | 43          | 7620                 | 3                         | 62          | 7970                 | 2                         | 43          |
| 12    | 8270                 | 6                         | 134         | 8450                 | 5                         | 110         | 8650                 | 6                         | 140         |
| 13    | 8590                 | 3                         | 73          | 9550                 | 9                         | 230         | 8560                 | 12                        | 280         |
| 14    | 9320                 | 4                         | 100         | 9660                 | 6                         | 160         | 9040                 | 14                        | 300         |
| 15    | 9420                 | 4                         | 100         | 9060                 | 4                         | 98          | 7180                 | 12                        | 230         |
| 16    | 9280                 | 3                         | 75          | 8690                 | 3                         | 70          | 7260                 | 2                         | 35          |
| 17    | 9230                 | 3                         | 75          | 8400                 | 3                         | 69          | 7380                 | 3                         | 40          |
| 18    | 8760                 | 3                         | 71          | 8080                 | 2                         | 44          | 8080                 | 2                         | 44          |
| 19    | 8600                 | 3                         | 70          | 7730                 | 2                         | 42          | 7000                 | 2                         | 36          |
| 20    | 8270                 | 3                         | 67          | 7600                 | 2                         | 41          | 7030                 | 2                         | 38          |
| 21    | 8440                 | 4                         | 91          | 7160                 | 2                         | 39          | 6490                 | 2                         | 35          |
| 22    | 8240                 | 3                         | 67          | 7560                 | 3                         | 61          | 6310                 | 2                         | 34          |
| 23    | 8110                 | 2                         | 44          | 8970                 | 10                        | 240         | 6250                 | 2                         | 34          |
| 24    | 7940                 | 2                         | 43          | 9640                 | 9                         | 230         | 5940                 | 2                         | 22          |
| 25    | 7840                 | 2                         | 42          | 9340                 | 4                         | 100         | 6120                 | 4                         | 66          |
| 26    | 8060                 | 3                         | 65          | 8750                 | 3                         | 71          | 6190                 | 4                         | 67          |
| 27    | 8650                 | 5                         | 120         | 8300                 | 3                         | 67          | 5850                 | 3                         | 47          |
| 28    | 8750                 | 4                         | 94          | 8040                 | 1                         | 65          | 5960                 | 3                         | 48          |
| 29    | 8920                 | 4                         | 96          | 7720                 | 2                         | 42          | 4890                 | 3                         | 40          |
| 30    | 8810                 | 3                         | 71          | 7450                 | 2                         | 40          | 4220                 | 3                         | 34          |
| 31    | 9250                 | 5                         | 120         | --                   | --                        | --          | 3150                 | 2                         | 17          |
| TOTAL | 270920               | --                        | 2326        | 256220               | --                        | 2643        | 211280               | --                        | 2505        |

TABLE 19.6

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | JANUARY              |                           |             | FEBRUARY             |                           |             | MARCH                |                           |             |
|-------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) |
| 1     | 2770                 | 1                         | 15          | 4100                 | 2                         | 22          | 4600                 | 4                         | 50          |
| 2     | 3200                 | 5                         | 43          | 4300                 | 3                         | 35          | 4700                 | 4                         | 51          |
| 3     | 3700                 | 6                         | 60          | 4500                 | 3                         | 36          | 4800                 | 4                         | 52          |
| 4     | 4100                 | 5                         | 55          | 4700                 | 4                         | 51          | 4900                 | 4                         | 53          |
| 5     | 4800                 | 5                         | 65          | 4800                 | 4                         | 52          | 5000                 | 4                         | 54          |
| 6     | 5400                 | 5                         | 73          | 4900                 | 4                         | 53          | 5000                 | 4                         | 54          |
| 7     | 6000                 | 5                         | 81          | 5000                 | 4                         | 54          | 5000                 | 4                         | 54          |
| 8     | 6300                 | 5                         | 85          | 5000                 | 4                         | 54          | 5000                 | 4                         | 54          |
| 9     | 6500                 | 5                         | 88          | 5000                 | 4                         | 54          | 5000                 | 4                         | 54          |
| 10    | 6700                 | 5                         | 90          | 5000                 | 4                         | 54          | 4900                 | 4                         | 53          |
| 11    | 6700                 | 5                         | 90          | 4900                 | 4                         | 53          | 4900                 | 4                         | 53          |
| 12    | 6700                 | 4                         | 72          | 4900                 | 4                         | 53          | 4900                 | 4                         | 53          |
| 13    | 6600                 | 3                         | 53          | 4800                 | 4                         | 52          | 4900                 | 4                         | 53          |
| 14    | 6600                 | 3                         | 53          | 4800                 | 4                         | 52          | 4900                 | 4                         | 53          |
| 15    | 6400                 | 3                         | 52          | 4800                 | 4                         | 52          | 4900                 | 4                         | 53          |
| 16    | 6300                 | 3                         | 51          | 4800                 | 4                         | 52          | 5000                 | 5                         | 68          |
| 17    | 6100                 | 3                         | 49          | 4900                 | 4                         | 53          | 5100                 | 7                         | 56          |
| 18    | 6000                 | 3                         | 49          | 4900                 | 4                         | 53          | 5180                 | 8                         | 110         |
| 19    | 5700                 | 3                         | 46          | 4900                 | 4                         | 53          | 6000                 | 19                        | 308         |
| 20    | 5300                 | 1                         | 43          | 4900                 | 4                         | 53          | 7000                 | 20                        | 378         |
| 21    | 4900                 | 3                         | 40          | 4800                 | 4                         | 52          | 7300                 | 21                        | 414         |
| 22    | 4600                 | 2                         | 25          | 4800                 | 4                         | 52          | 7300                 | 18                        | 355         |
| 23    | 4300                 | 2                         | 23          | 4700                 | 4                         | 51          | 7200                 | 16                        | 311         |
| 24    | 4190                 | 2                         | 23          | 4700                 | 4                         | 51          | 7200                 | 13                        | 253         |
| 25    | 4100                 | 2                         | 22          | 4700                 | 4                         | 51          | 7200                 | 12                        | 233         |
| 26    | 4000                 | 2                         | 22          | 4600                 | 4                         | 50          | 7270                 | 10                        | 166         |
| 27    | 4000                 | 2                         | 22          | 4600                 | 4                         | 50          | 7360                 | 12                        | 238         |
| 28    | 4000                 | 2                         | 22          | 4600                 | 4                         | 50          | 8360                 | 6                         | 125         |
| 29    | 4000                 | 2                         | 22          | --                   | --                        | --          | 9690                 | 4                         | 105         |
| 30    | 4000                 | 2                         | 22          | --                   | --                        | --          | 10800                | 6                         | 175         |
| 31    | 4000                 | 2                         | 22          | --                   | --                        | --          | 12400                | 14                        | 465         |
| TOTAL | 157960               | --                        | 1478        | 133400               | --                        | 1398        | 193760               | --                        | 4638        |

TABLE 19.7

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY   | APRIL                |                           |             | MAY                  |                           |             | JUNE                 |                           |             |
|-------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) |
| 1     | 15800                | 30                        | 1280        | 39600                | 60                        | 6420        | 74100                | 130                       | 26000       |
| 2     | 17400                | 28                        | 1320        | 37400                | 44                        | 4440        | 67500                | 150                       | 27300       |
| 3     | 17900                | 22                        | 1060        | 34900                | 46                        | 4330        | 64800                | 128                       | 24100       |
| 4     | 19200                | 14                        | 688         | 33300                | 37                        | 3330        | 68600                | 161                       | 25000       |
| 5     | 18000                | 14                        | 680         | 32300                | 35                        | 3050        | 74800                | 173                       | 34900       |
| 6     | 19400                | 24                        | 1260        | 33200                | 29                        | 2600        | 80400                | 250                       | 54200       |
| 7     | 22100                | 34                        | 2030        | 36800                | 40                        | 3970        | 85500                | 345                       | 75600       |
| 8     | 24300                | 84                        | 5510        | 41600                | 52                        | 5840        | 86500                | 364                       | 85000       |
| 9     | 24300                | 82                        | 5380        | 46300                | 70                        | 8750        | 81000                | 360                       | 78700       |
| 10    | 24700                | 66                        | 4400        | 52800                | 78                        | 11100       | 71900                | 221                       | 42500       |
| 11    | 25700                | 74                        | 5130        | 62100                | 170                       | 29000       | 64700                | 204                       | 35600       |
| 12    | 26400                | 84                        | 6030        | 71500                | 250                       | 48000       | 62800                | 156                       | 26500       |
| 13    | 26500                | 82                        | 5960        | 79700                | 350                       | 75000       | 61400                | 176                       | 29200       |
| 14    | 27500                | 91                        | 6760        | 85400                | 400                       | 92000       | 57200                | 136                       | 21000       |
| 15    | 28100                | 75                        | 4690        | 88300                | 530                       | 130000      | 50100                | 140                       | 18900       |
| 16    | 27900                | 52                        | 3920        | 88000                | 530                       | 130000      | 44400                | 93                        | 11100       |
| 17    | 28200                | 30                        | 2280        | 80800                | 530                       | 120000      | 41000                | 85                        | 9410        |
| 18    | 29600                | 78                        | 6230        | 71100                | 255                       | 56600       | 39500                | 76                        | 8110        |
| 19    | 32300                | 90                        | 7850        | 64800                | 150                       | 26200       | 39400                | 75                        | 7560        |
| 20    | 32800                | 88                        | 7790        | 61300                | 162                       | 26800       | 40800                | 82                        | 9030        |
| 21    | 31900                | 90                        | 7750        | 58100                | 174                       | 27300       | 44500                | 75                        | 9010        |
| 22    | 32000                | 85                        | 7340        | 56000                | 130                       | 19700       | 51100                | 120                       | 17000       |
| 23    | 32300                | 110                       | 9600        | 56400                | 88                        | 13400       | 54600                | 140                       | 21000       |
| 24    | 39800                | 300                       | 32000       | 40900                | 130                       | 21400       | 52600                | 180                       | 25600       |
| 25    | 52800                | 580                       | 43000       | 46900                | 161                       | 29100       | 52100                | 122                       | 17200       |
| 26    | 52300                | 340                       | 48000       | 74500                | 248                       | 53900       | 54000                | 125                       | 18200       |
| 27    | 46600                | 200                       | 29200       | 81700                | 247                       | 54500       | 60200                | 137                       | 22300       |
| 28    | 41300                | 112                       | 12500       | 83600                | 301                       | 67900       | 63300                | 200                       | 34000       |
| 29    | 40500                | 72                        | 7870        | 78000                | 280                       | 59000       | 63200                | 150                       | 25600       |
| 30    | 41000                | 79                        | 8750        | 77100                | 268                       | 55800       | 62100                | 182                       | 30500       |
| 31    | --                   | --                        | --          | 79100                | 157                       | 33500       | --                   | --                        | --          |
| TOTAL | 898200               | --                        | 323250      | 1913500              | --                        | 1222930     | 1813900              | --                        | 875840      |

TABLE 19.8

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DAY                                 | JULY                 |                           |             | AUGUST               |                           |             | SEPTEMBER            |                           |             |
|-------------------------------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|----------------------|---------------------------|-------------|
|                                     | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | LOAD (TONS) |
| 1                                   | 58600                | 122                       | 19300       | 16500                | 22                        | 980         | 7950                 | 8                         | 172         |
| 2                                   | 53500                | 92                        | 13300       | 15400                | 18                        | 748         | 7620                 | 6                         | 123         |
| 3                                   | 51000                | 90                        | 12400       | 14800                | 27                        | 879         | 7140                 | 8                         | 154         |
| 4                                   | 49400                | 90                        | 12000       | 14400                | 16                        | 622         | 7070                 | 10                        | 151         |
| 5                                   | 49400                | 84                        | 11200       | 13800                | 14                        | 522         | 6920                 | 8                         | 149         |
| 6                                   | 48300                | 96                        | 12500       | 13400                | 10                        | 362         | 6990                 | 6                         | 113         |
| 7                                   | 45700                | 78                        | 9620        | 13000                | 13                        | 456         | 6990                 | 7                         | 132         |
| 8                                   | 43000                | 58                        | 6730        | 12600                | 10                        | 140         | 7010                 | 8                         | 151         |
| 9                                   | 40200                | 49                        | 7490        | 12600                | 10                        | 140         | 6620                 | 14                        | 250         |
| 10                                  | 37600                | 82                        | 8320        | 11900                | 9                         | 289         | 6540                 | 21                        | 371         |
| 11                                  | 35900                | 62                        | 6010        | 11500                | 13                        | 404         | 6200                 | 22                        | 368         |
| 12                                  | 35000                | 36                        | 3400        | 10900                | 12                        | 353         | 6200                 | 18                        | 301         |
| 13                                  | 34300                | 28                        | 2590        | 10800                | 12                        | 350         | 5920                 | 12                        | 192         |
| 14                                  | 33200                | 21                        | 1880        | 10900                | 12                        | 353         | 6140                 | 10                        | 166         |
| 15                                  | 30500                | 21                        | 1730        | 10700                | 12                        | 347         | 6330                 | 8                         | 127         |
| 16                                  | 28300                | 20                        | 1500        | 10000                | 12                        | 324         | 6390                 | 7                         | 121         |
| 17                                  | 26400                | 20                        | 1400        | 10000                | 8                         | 216         | 6770                 | 7                         | 128         |
| 18                                  | 24800                | 19                        | 1300        | 9830                 | 11                        | 292         | 6790                 | 2                         | 37          |
| 19                                  | 23500                | 20                        | 1300        | 9980                 | 12                        | 323         | 6720                 | 2                         | 34          |
| 20                                  | 22500                | 20                        | 1200        | 9520                 | 10                        | 257         | 6650                 | 1                         | 18          |
| 21                                  | 21800                | 20                        | 1200        | 9030                 | 12                        | 293         | 6830                 | 3                         | 55          |
| 22                                  | 21300                | 22                        | 1270        | 9030                 | 8                         | 195         | 7220                 | 5                         | 67          |
| 23                                  | 21200                | 22                        | 1260        | 8840                 | 10                        | 239         | 7310                 | 5                         | 59          |
| 24                                  | 20600                | 24                        | 1330        | 8760                 | 8                         | 189         | 7830                 | 6                         | 120         |
| 25                                  | 19800                | 20                        | 1070        | 8760                 | 8                         | 189         | 8040                 | 6                         | 130         |
| 26                                  | 19400                | 13                        | 681         | 8550                 | 7                         | 167         | 7990                 | 6                         | 130         |
| 27                                  | 19400                | 17                        | 900         | 8760                 | 8                         | 189         | 8250                 | 8                         | 140         |
| 28                                  | 19400                | 13                        | 688         | 8760                 | 10                        | 237         | 8150                 | 8                         | 180         |
| 29                                  | 18500                | 14                        | 699         | 8940                 | 12                        | 290         | 7900                 | 8                         | 171         |
| 30                                  | 17400                | 14                        | 698         | 8920                 | 6                         | 138         | 7900                 | 10                        | 213         |
| 31                                  | 17000                | 22                        | 1010        | 8340                 | 6                         | 135         | --                   | --                        | --          |
| TOTAL                               | 987300               | --                        | 149936      | 338820               | --                        | 11013       | 712300               | --                        | 4655        |
| TOTAL DISCHARGE FOR YEAR (CFS-DAYS) |                      |                           |             |                      |                           |             |                      |                           | 7387540     |
| TOTAL LOAD FOR YEAR (TONS)          |                      |                           |             |                      |                           |             |                      |                           | 2402660     |

TABLE 19.9

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | OCTOBER                    |                                 |                                     | NOVEMBER                   |                                 |                                     | DECEMBER                   |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 8250                       | 10                              | 223                                 | 5140                       | 4                               | 56                                  | 4170                       | 3                               | 34                                  |
| 2     | 9300                       | 5                               | 124                                 | 5020                       | 2                               | 27                                  | 4440                       | 4                               | 48                                  |
| 3     | 9850                       | 4                               | 213                                 | 5090                       | 2                               | 27                                  | 4560                       | 4                               | 49                                  |
| 4     | 9950                       | 6                               | 160                                 | 4840                       | 6                               | 78                                  | 4730                       | 4                               | 51                                  |
| 5     | 9260                       | 10                              | 250                                 | 5080                       | 7                               | 56                                  | 4780                       | 4                               | 52                                  |
| 6     | 8740                       | 8                               | 189                                 | 5390                       | 3                               | 44                                  | 4440                       | 4                               | 50                                  |
| 7     | 8400                       | 4                               | 91                                  | 5480                       | 4                               | 59                                  | 4480                       | 4                               | 51                                  |
| 8     | 7940                       | 2                               | 43                                  | 5740                       | 4                               | 62                                  | 4520                       | 4                               | 45                                  |
| 9     | 7790                       | 3                               | 63                                  | 5630                       | 5                               | 76                                  | 4420                       | 4                               | 48                                  |
| 10    | 7670                       | 1                               | 21                                  | 5530                       | 5                               | 75                                  | 4330                       | 4                               | 47                                  |
| 11    | 7720                       | 1                               | 21                                  | 5490                       | 4                               | 59                                  | 4250                       | 4                               | 46                                  |
| 12    | 7460                       | 2                               | 40                                  | 5400                       | 4                               | 58                                  | 4130                       | 4                               | 45                                  |
| 13    | 7200                       | 1                               | 15                                  | 5310                       | 3                               | 43                                  | 4320                       | 4                               | 47                                  |
| 14    | 6870                       | 5                               | 92                                  | 5250                       | 4                               | 58                                  | 4460                       | 4                               | 48                                  |
| 15    | 6720                       | 3                               | 54                                  | 5310                       | 8                               | 115                                 | 4330                       | 4                               | 47                                  |
| 16    | 6600                       | 2                               | 36                                  | 5200                       | 7                               | 98                                  | 4370                       | 4                               | 47                                  |
| 17    | 6130                       | 1                               | 17                                  | 5250                       | 5                               | 71                                  | 4510                       | 4                               | 45                                  |
| 18    | 6270                       | 2                               | 34                                  | 5250                       | 4                               | 57                                  | 4540                       | 4                               | 49                                  |
| 19    | 6230                       | 3                               | 50                                  | 5190                       | 4                               | 56                                  | 4350                       | 4                               | 47                                  |
| 20    | 6130                       | 4                               | 66                                  | 5150                       | 3                               | 42                                  | 4220                       | 4                               | 46                                  |
| 21    | 5870                       | 1                               | 16                                  | 5140                       | 3                               | 42                                  | 4160                       | 4                               | 45                                  |
| 22    | 5830                       | 1                               | 16                                  | 5380                       | 4                               | 58                                  | 3980                       | 4                               | 43                                  |
| 23    | 5790                       | 1                               | 16                                  | 5240                       | 4                               | 57                                  | 4000                       | 3                               | 32                                  |
| 24    | 5630                       | 2                               | 30                                  | 5070                       | 4                               | 55                                  | 4010                       | 4                               | 43                                  |
| 25    | 5650                       | 1                               | 15                                  | 5230                       | 5                               | 71                                  | 3970                       | 4                               | 43                                  |
| 26    | 5870                       | 1                               | 16                                  | 5270                       | 2                               | 28                                  | 3800                       | 3                               | 31                                  |
| 27    | 5710                       | 1                               | 15                                  | 4900                       | 4                               | 53                                  | 3470                       | 6                               | 59                                  |
| 28    | 5580                       | 4                               | 60                                  | 4800                       | 4                               | 52                                  | 3470                       | 2                               | 19                                  |
| 29    | 5410                       | 2                               | 29                                  | 4650                       | 6                               | 75                                  | 3430                       | 4                               | 37                                  |
| 30    | 5200                       | 2                               | 28                                  | 4320                       | 5                               | 58                                  | 3270                       | 3                               | 26                                  |
| 31    | 5080                       | 2                               | 27                                  | --                         | --                              | --                                  | 3150                       | 3                               | 26                                  |
| TOTAL | 216160                     | --                              | 2076                                | 155840                     | --                              | 1806                                | 129660                     | --                              | 1394                                |

TABLE 19.10

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | JANUARY                    |                                 |                                     | FEBRUARY                   |                                 |                                     | MARCH                      |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 3760                       | 4                               | 33                                  | 4100                       | 4                               | 44                                  | 3780                       | 4                               | 41                                  |
| 2     | 2990                       | 2                               | 16                                  | 4140                       | 4                               | 45                                  | 3700                       | 4                               | 40                                  |
| 3     | 2900                       | 2                               | 16                                  | 4200                       | 4                               | 45                                  | 3950                       | 7                               | 67                                  |
| 4     | 2470                       | 4                               | 31                                  | 4160                       | 4                               | 45                                  | 3620                       | 6                               | 59                                  |
| 5     | 2730                       | 2                               | 15                                  | 4180                       | 4                               | 45                                  | 3400                       | 6                               | 55                                  |
| 6     | 2630                       | 3                               | 21                                  | 4180                       | 4                               | 45                                  | 3650                       | 4                               | 39                                  |
| 7     | 2690                       | 2                               | 15                                  | 4280                       | 4                               | 46                                  | 3760                       | 6                               | 61                                  |
| 8     | 2630                       | 2                               | 14                                  | 4220                       | 4                               | 46                                  | 4040                       | 7                               | 76                                  |
| 9     | 2560                       | 3                               | 21                                  | 4240                       | 4                               | 46                                  | 3920                       | 6                               | 64                                  |
| 10    | 2580                       | 2                               | 14                                  | 4300                       | 4                               | 46                                  | 3810                       | 6                               | 62                                  |
| 11    | 2650                       | 4                               | 29                                  | 4260                       | 4                               | 46                                  | 3750                       | 7                               | 71                                  |
| 12    | 2760                       | 4                               | 30                                  | 4320                       | 4                               | 47                                  | 3850                       | 10                              | 104                                 |
| 13    | 2940                       | 4                               | 32                                  | 4320                       | 4                               | 47                                  | 3860                       | 6                               | 63                                  |
| 14    | 3320                       | 2                               | 18                                  | 4500                       | 4                               | 49                                  | 3920                       | 6                               | 64                                  |
| 15    | 3170                       | 2                               | 18                                  | 4490                       | 4                               | 48                                  | 4140                       | 8                               | 89                                  |
| 16    | 3600                       | 4                               | 39                                  | 4650                       | 7                               | 88                                  | 4390                       | 10                              | 117                                 |
| 17    | 3390                       | 4                               | 37                                  | 4710                       | 6                               | 76                                  | 4590                       | 10                              | 124                                 |
| 18    | 3490                       | 4                               | 38                                  | 4810                       | 7                               | 91                                  | 4560                       | 8                               | 98                                  |
| 19    | 3390                       | 6                               | 37                                  | 4730                       | 7                               | 89                                  | 4480                       | 10                              | 121                                 |
| 20    | 3510                       | 4                               | 38                                  | 4610                       | 6                               | 75                                  | 4370                       | 8                               | 94                                  |
| 21    | 3560                       | 4                               | 38                                  | 4540                       | 9                               | 110                                 | 4330                       | 10                              | 117                                 |
| 22    | 3680                       | 4                               | 40                                  | 4540                       | 9                               | 110                                 | 4430                       | 12                              | 144                                 |
| 23    | 3740                       | 4                               | 40                                  | 4440                       | 10                              | 120                                 | 4500                       | 11                              | 134                                 |
| 24    | 3880                       | 2                               | 21                                  | 4230                       | 5                               | 57                                  | 4670                       | 19                              | 240                                 |
| 25    | 4000                       | 4                               | 43                                  | 4170                       | 6                               | 68                                  | 5150                       | 12                              | 167                                 |
| 26    | 4040                       | 4                               | 44                                  | 3900                       | 6                               | 63                                  | 5080                       | 14                              | 192                                 |
| 27    | 4080                       | 4                               | 44                                  | 3920                       | 6                               | 64                                  | 5010                       | 11                              | 149                                 |
| 28    | 4260                       | 4                               | 46                                  | 3820                       | 6                               | 62                                  | 4970                       | 14                              | 180                                 |
| 29    | 4190                       | 4                               | 45                                  | --                         | --                              | --                                  | 5170                       | 14                              | 193                                 |
| 30    | 4140                       | 4                               | 45                                  | --                         | --                              | --                                  | 5230                       | 12                              | 169                                 |
| 31    | 4020                       | 4                               | 43                                  | --                         | --                              | --                                  | 5140                       | 10                              | 139                                 |
| TOTAL | 103640                     | --                              | 961                                 | 120560                     | --                              | 1763                                | 132760                     | --                              | 3343                                |

TABLE 19.11

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY   | APRIL                      |                                 |                                     | MAY                        |                                 |                                     | JUNE                       |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 4930                       | 8                               | 102                                 | 7070                       | 6                               | 115                                 | 38100                      | 63                              | 4420                                |
| 2     | 4980                       | 8                               | 108                                 | 7290                       | 6                               | 118                                 | 37500                      | 49                              | 4930                                |
| 3     | 5140                       | 8                               | 111                                 | 9020                       | 6                               | 146                                 | 40400                      | 40                              | 4520                                |
| 4     | 4900                       | 8                               | 106                                 | 12400                      | 8                               | 268                                 | 48600                      | 85                              | 11200                               |
| 5     | 5010                       | 7                               | 95                                  | 18200                      | 26                              | 1280                                | 57400                      | 173                             | 26800                               |
| 6     | 5170                       | 9                               | 124                                 | 26100                      | 83                              | 9850                                | 62300                      | 217                             | 36500                               |
| 7     | 6100                       | 17                              | 200                                 | 31900                      | 140                             | 12100                               | 64000                      | 288                             | 49800                               |
| 8     | 7240                       | 12                              | 235                                 | 34200                      | 151                             | 13900                               | 62200                      | 288                             | 48400                               |
| 9     | 7420                       | 11                              | 220                                 | 34600                      | 139                             | 13000                               | 58500                      | 202                             | 32100                               |
| 10    | 7650                       | 12                              | 240                                 | 34000                      | 99                              | 9090                                | 59400                      | 165                             | 24700                               |
| 11    | 8650                       | 14                              | 327                                 | 32600                      | 69                              | 6070                                | 50700                      | 142                             | 15400                               |
| 12    | 8500                       | 10                              | 229                                 | 30300                      | 54                              | 4420                                | 44800                      | 92                              | 11100                               |
| 13    | 9300                       | 8                               | 179                                 | 27300                      | 39                              | 2870                                | 38200                      | 83                              | 8560                                |
| 14    | 8070                       | 6                               | 131                                 | 24900                      | 27                              | 1790                                | 33600                      | 50                              | 4540                                |
| 15    | 7550                       | 6                               | 122                                 | 22600                      | 24                              | 1460                                | 32200                      | 50                              | 4350                                |
| 16    | 7040                       | 3                               | 57                                  | 22400                      | 20                              | 1220                                | 35100                      | 50                              | 4740                                |
| 17    | 6440                       | 3                               | 54                                  | 27900                      | 35                              | 2640                                | 39400                      | 43                              | 4570                                |
| 18    | 6360                       | 4                               | 65                                  | 38100                      | 110                             | 11300                               | 42500                      | 85                              | 9750                                |
| 19    | 6200                       | 3                               | 50                                  | 44100                      | 140                             | 16700                               | 43300                      | 92                              | 10800                               |
| 20    | 6470                       | 3                               | 87                                  | 45200                      | 188                             | 22900                               | 41600                      | 100                             | 11200                               |
| 21    | 6630                       | 4                               | 72                                  | 45200                      | 135                             | 16500                               | 39600                      | 96                              | 10300                               |
| 22    | 7060                       | 7                               | 133                                 | 45600                      | 112                             | 13800                               | 37500                      | 54                              | 5670                                |
| 23    | 7310                       | 8                               | 158                                 | 44500                      | 112                             | 14100                               | 35600                      | 36                              | 3660                                |
| 24    | 7330                       | 7                               | 139                                 | 48900                      | 112                             | 14800                               | 34100                      | 25                              | 2300                                |
| 25    | 7710                       | 8                               | 167                                 | 50100                      | 143                             | 19300                               | 31800                      | 15                              | 1250                                |
| 26    | 8000                       | 8                               | 173                                 | 53200                      | 148                             | 21300                               | 29200                      | 18                              | 1420                                |
| 27    | 7870                       | 8                               | 170                                 | 57000                      | 150                             | 23100                               | 27300                      | 16                              | 1180                                |
| 28    | 7670                       | 8                               | 166                                 | 60400                      | 211                             | 34400                               | 25900                      | 20                              | 1400                                |
| 29    | 7260                       | 6                               | 118                                 | 56200                      | 189                             | 28700                               | 25500                      | 18                              | 1240                                |
| 30    | 6990                       | 6                               | 112                                 | 47800                      | 135                             | 17400                               | 25300                      | 12                              | 820                                 |
| 31    | --                         | --                              | --                                  | 41700                      | 87                              | 9800                                | --                         | --                              | --                                  |
| TOTAL | 206170                     | --                              | 4345                                | 1082570                    | --                              | 340437                              | 1237800                    | --                              | 263160                              |

TABLE 19.12

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY                                                | JULY                       |                                 |                                     | AUGUST                     |                                 |                                     | SEPTEMBER                  |                                 |                                     |
|----------------------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|                                                    | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1                                                  | 24700                      | 13                              | 867                                 | 10500                      | 8                               | 235                                 | 5820                       | 2                               | 31                                  |
| 2                                                  | 24200                      | 12                              | 784                                 | 10500                      | 10                              | 294                                 | 5710                       | 2                               | 31                                  |
| 3                                                  | 23200                      | 14                              | 877                                 | 10700                      | 7                               | 202                                 | 5630                       | 3                               | 46                                  |
| 4                                                  | 21900                      | 10                              | 591                                 | 10100                      | 7                               | 191                                 | 5810                       | 1                               | 16                                  |
| 5                                                  | 20700                      | 10                              | 559                                 | 9730                       | 6                               | 158                                 | 6000                       | 1                               | 16                                  |
| 6                                                  | 20200                      | 10                              | 545                                 | 5270                       | 7                               | 175                                 | 5830                       | 2                               | 31                                  |
| 7                                                  | 20400                      | 9                               | 496                                 | 9000                       | 7                               | 170                                 | 6120                       | 1                               | 17                                  |
| 8                                                  | 19800                      | 9                               | 428                                 | 8600                       | 10                              | 232                                 | 5980                       | 1                               | 16                                  |
| 9                                                  | 18600                      | 8                               | 402                                 | 8720                       | 9                               | 212                                 | 5890                       | 7                               | 111                                 |
| 10                                                 | 17600                      | 6                               | 285                                 | 8660                       | 4                               | 94                                  | 5960                       | 11                              | 177                                 |
| 11                                                 | 17100                      | 8                               | 369                                 | 8520                       | 7                               | 161                                 | 6260                       | 2                               | 34                                  |
| 12                                                 | 16600                      | 12                              | 532                                 | 8220                       | 4                               | 89                                  | 6030                       | 4                               | 65                                  |
| 13                                                 | 16000                      | 10                              | 432                                 | 7490                       | 5                               | 101                                 | 5770                       | 1                               | 16                                  |
| 14                                                 | 15300                      | 6                               | 240                                 | 7310                       | 6                               | 118                                 | 5410                       | 1                               | 15                                  |
| 15                                                 | 14600                      | 10                              | 394                                 | 7260                       | 5                               | 98                                  | 5420                       | 1                               | 15                                  |
| 16                                                 | 14000                      | 14                              | 524                                 | 7110                       | 6                               | 115                                 | 5240                       | 2                               | 28                                  |
| 17                                                 | 13300                      | 10                              | 359                                 | 6830                       | 4                               | 74                                  | 5040                       | 1                               | 14                                  |
| 18                                                 | 13000                      | 10                              | 351                                 | 6660                       | 4                               | 72                                  | 4890                       | 1                               | 12                                  |
| 19                                                 | 12600                      | 16                              | 544                                 | 6610                       | 2                               | 36                                  | 4870                       | 1                               | 13                                  |
| 20                                                 | 12400                      | 8                               | 268                                 | 6410                       | 4                               | 69                                  | 4880                       | 1                               | 13                                  |
| 21                                                 | 12000                      | 10                              | 324                                 | 6380                       | 2                               | 34                                  | 5540                       | 1                               | 15                                  |
| 22                                                 | 11700                      | 16                              | 505                                 | 6130                       | 2                               | 33                                  | 6290                       | 1                               | 17                                  |
| 23                                                 | 11400                      | 9                               | 277                                 | 5580                       | 4                               | 65                                  | 6570                       | 3                               | 23                                  |
| 24                                                 | 11200                      | 7                               | 212                                 | 5870                       | 3                               | 49                                  | 6490                       | 2                               | 35                                  |
| 25                                                 | 11200                      | 6                               | 181                                 | 6040                       | 4                               | 65                                  | 6510                       | 4                               | 70                                  |
| 26                                                 | 10800                      | 6                               | 175                                 | 5790                       | 3                               | 47                                  | 6310                       | 3                               | 51                                  |
| 27                                                 | 10400                      | 6                               | 168                                 | 5500                       | 2                               | 32                                  | 6030                       | 3                               | 46                                  |
| 28                                                 | 10300                      | 6                               | 167                                 | 5400                       | 1                               | 15                                  | 5780                       | 2                               | 31                                  |
| 29                                                 | 10300                      | 6                               | 167                                 | 6210                       | 11                              | 184                                 | 5580                       | 1                               | 15                                  |
| 30                                                 | 10400                      | 6                               | 172                                 | 5770                       | 10                              | 156                                 | 5520                       | 1                               | 15                                  |
| 31                                                 | 11000                      | 6                               | 178                                 | 5670                       | 4                               | 61                                  | --                         | --                              | --                                  |
| TOTAL                                              | 477100                     | --                              | 12392                               | 234340                     | --                              | 3634                                | 173170                     | --                              | 1049                                |
| TOTAL DISCHARGE FOR YEAR (CFS-DAYS)                |                            |                                 |                                     |                            |                                 |                                     |                            |                                 | 4270170                             |
| TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS) |                            |                                 |                                     |                            |                                 |                                     |                            |                                 | 726346                              |

TABLE 19.13

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | OCTOBER              |                           |                               | NOVEMBER             |                           |                               | DECEMBER             |                           |                               |
|-------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) |
| 1     | 5360                 | 2                         | 25                            | 4890                 | 2                         | 26                            | 3450                 | 2                         | 19                            |
| 2     | 5470                 | 2                         | 25                            | 4850                 | 3                         | 39                            | 3540                 | 2                         | 19                            |
| 3     | 5410                 | 4                         | 58                            | 4820                 | 6                         | 78                            | 3730                 | 3                         | 30                            |
| 4     | 5370                 | 5                         | 72                            | 4740                 | 3                         | 38                            | 3670                 | 4                         | 40                            |
| 5     | 5720                 | 8                         | 124                           | 4750                 | 3                         | 38                            | 3580                 | 4                         | 39                            |
| 6     | 5590                 | 7                         | 106                           | 4650                 | 3                         | 38                            | 3700                 | 4                         | 40                            |
| 7     | 5490                 | 5                         | 74                            | 4610                 | 3                         | 37                            | 4720                 | 4                         | 51                            |
| 8     | 5620                 | 4                         | 61                            | 4520                 | 3                         | 37                            | 5690                 | 5                         | 77                            |
| 9     | 5870                 | 3                         | 48                            | 4530                 | 3                         | 40                            | 5330                 | 5                         | 72                            |
| 10    | 5770                 | 4                         | 62                            | 5170                 | 3                         | 42                            | 4970                 | 5                         | 67                            |
| 11    | 5680                 | 2                         | 31                            | 5040                 | 3                         | 41                            | 4900                 | 4                         | 53                            |
| 12    | 5760                 | 3                         | 47                            | 4960                 | 3                         | 40                            | 4500                 | 4                         | 49                            |
| 13    | 5720                 | 2                         | 31                            | 4880                 | 3                         | 40                            | 3780                 | 3                         | 31                            |
| 14    | 5640                 | 2                         | 30                            | 4760                 | 3                         | 39                            | 3780                 | 3                         | 31                            |
| 15    | 5460                 | 3                         | 44                            | 4750                 | 3                         | 38                            | 4100                 | 2                         | 22                            |
| 16    | 5300                 | 3                         | 43                            | 4620                 | 3                         | 37                            | 4330                 | 2                         | 23                            |
| 17    | 5500                 | 3                         | 45                            | 4740                 | 3                         | 38                            | 4470                 | 2                         | 24                            |
| 18    | 5220                 | 4                         | 56                            | 4880                 | 3                         | 40                            | 4430                 | 2                         | 24                            |
| 19    | 5110                 | 3                         | 41                            | 5010                 | 3                         | 41                            | 4280                 | 2                         | 23                            |
| 20    | 5050                 | 8                         | 109                           | 5420                 | 3                         | 44                            | 4220                 | 2                         | 23                            |
| 21    | 4860                 | 11                        | 144                           | 5400                 | 3                         | 44                            | 3750                 | 3                         | 30                            |
| 22    | 5110                 | 4                         | 55                            | 5290                 | 3                         | 43                            | 3430                 | 2                         | 19                            |
| 23    | 5140                 | 4                         | 56                            | 4020                 | 3                         | 33                            | 3150                 | 2                         | 17                            |
| 24    | 5250                 | 3                         | 43                            | 3630                 | 3                         | 29                            | 2820                 | 1                         | 7.4                           |
| 25    | 5560                 | 4                         | 60                            | 3800                 | 3                         | 31                            | 2890                 | 1                         | 7.8                           |
| 26    | 5410                 | 4                         | 58                            | 3900                 | 2                         | 21                            | 2980                 | 2                         | 14                            |
| 27    | 5320                 | 4                         | 57                            | 3850                 | 2                         | 21                            | 3130                 | 2                         | 17                            |
| 28    | 5140                 | 6                         | 83                            | 3600                 | 2                         | 19                            | 3510                 | 1                         | 9.5                           |
| 29    | 5020                 | 4                         | 54                            | 3420                 | 2                         | 18                            | 3700                 | 2                         | 20                            |
| 30    | 4970                 | 5                         | 67                            | 3440                 | 2                         | 19                            | 3940                 | 3                         | 32                            |
| 31    | 4870                 | 4                         | 53                            | --                   | --                        | --                            | 4240                 | 3                         | 34                            |
| TOTAL | 166710               | --                        | 1870                          | 137340               | --                        | 1089                          | 122710               | --                        | 986.9                         |

TABLE 19.14

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | JANUARY              |                           |                               | FEBRUARY             |                           |                               | MARCH                |                           |                               |
|-------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|----------------------|---------------------------|-------------------------------|
|       | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) | MEAN DISCHARGE (CFS) | MEAN CONCENTRATION (MG/L) | SEDIMENT DISCHARGE (TONS/DAY) |
| 1     | 4050                 | 3                         | 33                            | 18000                | 12                        | 583                           | 5760                 | 6                         | 93                            |
| 2     | 3610                 | 5                         | 49                            | 19300                | 52                        | 2710                          | 5460                 | 4                         | 59                            |
| 3     | 3340                 | 5                         | 45                            | 18200                | 70                        | 3440                          | 5280                 | 3                         | 43                            |
| 4     | 3070                 | 2                         | 16                            | 15100                | 57                        | 2320                          | 5480                 | 3                         | 44                            |
| 5     | 2790                 | 1                         | 7.5                           | 12500                | 37                        | 1250                          | 5280                 | 2                         | 29                            |
| 6     | 2640                 | 1                         | 7.1                           | 10100                | 16                        | 436                           | 5160                 | 2                         | 28                            |
| 7     | 2750                 | 1                         | 7.4                           | 8710                 | 14                        | 329                           | 5020                 | 1                         | 14                            |
| 8     | 2980                 | 1                         | 8.0                           | 7900                 | 14                        | 299                           | 4930                 | 2                         | 27                            |
| 9     | 3240                 | 1                         | 8.7                           | 7160                 | 9                         | 174                           | 4900                 | 4                         | 53                            |
| 10    | 3520                 | 1                         | 9.5                           | 7490                 | 10                        | 202                           | 4910                 | 5                         | 66                            |
| 11    | 3610                 | 1                         | 9.7                           | 7680                 | 12                        | 249                           | 5100                 | 8                         | 110                           |
| 12    | 3220                 | 1                         | 8.7                           | 8030                 | 12                        | 260                           | 5350                 | 7                         | 101                           |
| 13    | 2900                 | 1                         | 7.8                           | 8150                 | 12                        | 264                           | 5630                 | 6                         | 91                            |
| 14    | 3080                 | 2                         | 17                            | 8330                 | 11                        | 247                           | 5550                 | 4                         | 60                            |
| 15    | 3780                 | 6                         | 53                            | 8950                 | 11                        | 266                           | 5330                 | 4                         | 58                            |
| 16    | 3530                 | 4                         | 38                            | 9950                 | 11                        | 296                           | 5190                 | 5                         | 70                            |
| 17    | 3910                 | 4                         | 42                            | 10100                | 11                        | 300                           | 5200                 | 3                         | 42                            |
| 18    | 4210                 | 3                         | 34                            | 9570                 | 11                        | 284                           | 4990                 | 5                         | 67                            |
| 19    | 4910                 | 3                         | 40                            | 8900                 | 11                        | 264                           | 4890                 | 6                         | 79                            |
| 20    | 6250                 | 1                         | 17                            | 8220                 | 10                        | 222                           | 4810                 | 4                         | 52                            |
| 21    | 7290                 | 2                         | 39                            | 7360                 | 10                        | 199                           | 4870                 | 5                         | 66                            |
| 22    | 7090                 | 4                         | 77                            | 7180                 | 10                        | 194                           | 4770                 | 5                         | 64                            |
| 23    | 7100                 | 3                         | 58                            | 6870                 | 10                        | 185                           | 4710                 | 3                         | 38                            |
| 24    | 6870                 | 8                         | 148                           | 6540                 | 10                        | 177                           | 4580                 | 7                         | 87                            |
| 25    | 6950                 | 7                         | 129                           | 6560                 | 10                        | 177                           | 4710                 | 7                         | 89                            |
| 26    | 6620                 | 5                         | 89                            | 6460                 | 6                         | 105                           | 5020                 | 7                         | 99                            |
| 27    | 6380                 | 5                         | 86                            | 6240                 | 3                         | 51                            | 5420                 | 9                         | 132                           |
| 28    | 6260                 | 5                         | 85                            | 6040                 | 3                         | 49                            | 5570                 | 5                         | 75                            |
| 29    | 6310                 | 3                         | 51                            | --                   | --                        | --                            | 5480                 | 8                         | 110                           |
| 30    | 7070                 | 2                         | 78                            | --                   | --                        | --                            | 5670                 | 14                        | 214                           |
| 31    | 11400                | 4                         | 123                           | --                   | --                        | --                            | 6220                 | 9                         | 151                           |
| TOTAL | 150080               | --                        | 1381.4                        | 269590               | --                        | 15532                         | 161240               | --                        | 2315                          |

TABLE 19.15

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | APRIL                      |                                 |                                     | MAY                        |                                 |                                     | JUNE                       |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 6460                       | 8                               | 140                                 | 30300                      | 94                              | 4420                                | 81300                      | 333                             | 73100                               |
| 2     | 6340                       | 8                               | 137                                 | 31700                      | 92                              | 4450                                | 77600                      | 272                             | 57000                               |
| 3     | 6290                       | 8                               | 136                                 | 36800                      | 86                              | 8540                                | 73300                      | 213                             | 42600                               |
| 4     | 6270                       | 7                               | 119                                 | 45400                      | 153                             | 18800                               | 70400                      | 196                             | 37300                               |
| 5     | 6370                       | 8                               | 138                                 | 55900                      | 269                             | 40600                               | 70300                      | 168                             | 31900                               |
| 6     | 6730                       | 8                               | 145                                 | 62400                      | 368                             | 62000                               | 73100                      | 207                             | 40900                               |
| 7     | 7440                       | 8                               | 161                                 | 64300                      | 333                             | 57800                               | 75400                      | 277                             | 54400                               |
| 8     | 9430                       | 15                              | 382                                 | 64600                      | 239                             | 41700                               | 76200                      | 347                             | 71400                               |
| 9     | 11100                      | 39                              | 1170                                | 66300                      | 265                             | 47400                               | 75900                      | 278                             | 57000                               |
| 10    | 14500                      | 46                              | 1800                                | 69600                      | 298                             | 56000                               | 75400                      | 236                             | 48000                               |
| 11    | 16500                      | 29                              | 1290                                | 71500                      | 315                             | 60800                               | 70300                      | 208                             | 39500                               |
| 12    | 15600                      | 25                              | 1050                                | 74100                      | 320                             | 64000                               | 61500                      | 167                             | 27700                               |
| 13    | 14100                      | 18                              | 685                                 | 80000                      | 347                             | 75000                               | 57000                      | 137                             | 21100                               |
| 14    | 13000                      | 14                              | 491                                 | 85300                      | 350                             | 80600                               | 57400                      | 131                             | 20300                               |
| 15    | 12700                      | 15                              | 514                                 | 62300                      | 515                             | 95000                               | 58400                      | 122                             | 19200                               |
| 16    | 13500                      | 15                              | 547                                 | 79100                      | 409                             | 87400                               | 56900                      | 135                             | 20700                               |
| 17    | 14300                      | 16                              | 618                                 | 64400                      | 149                             | 62600                               | 51700                      | 107                             | 14900                               |
| 18    | 14100                      | 14                              | 533                                 | 55200                      | 252                             | 37600                               | 48800                      | 105                             | 13300                               |
| 19    | 13400                      | 13                              | 470                                 | 47700                      | 126                             | 16200                               | 43900                      | 70                              | 8300                                |
| 20    | 13400                      | 14                              | 507                                 | 42900                      | 89                              | 10300                               | 42800                      | 41                              | 4740                                |
| 21    | 14900                      | 14                              | 563                                 | 40000                      | 60                              | 6480                                | 43200                      | 55                              | 6420                                |
| 22    | 19100                      | 23                              | 1190                                | 38000                      | 94                              | 9640                                | 47200                      | 79                              | 10100                               |
| 23    | 23200                      | 41                              | 2570                                | 38100                      | 60                              | 6170                                | 51400                      | 83                              | 11500                               |
| 24    | 28500                      | 76                              | 5850                                | 41500                      | 63                              | 7060                                | 56000                      | 134                             | 20300                               |
| 25    | 31900                      | 116                             | 9990                                | 49200                      | 86                              | 11400                               | 60500                      | 139                             | 22700                               |
| 26    | 35900                      | 137                             | 13300                               | 58000                      | 146                             | 22900                               | 61500                      | 177                             | 29400                               |
| 27    | 34600                      | 143                             | 14100                               | 48600                      | 264                             | 48900                               | 51300                      | 175                             | 24200                               |
| 28    | 34800                      | 130                             | 12200                               | 77500                      | 324                             | 67800                               | 51800                      | 122                             | 17100                               |
| 29    | 32900                      | 90                              | 7990                                | 84100                      | 362                             | 82200                               | 45600                      | 72                              | 8840                                |
| 30    | 31200                      | 60                              | 5050                                | 87200                      | 432                             | 102000                              | 40300                      | 61                              | 6640                                |
| 31    | --                         | --                              | --                                  | 85400                      | 410                             | 94500                               | --                         | --                              | --                                  |
| TOTAL | 510530                     | --                              | 83834                               | 1865400                    | --                              | 1390260                             | 1804400                    | --                              | 862560                              |

TABLE 19.16

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY   | JULY                       |                                 |                                     | AUGUST                     |                                 |                                     | SEPTEMBER                  |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 37500                      | 62                              | 6280                                | 15500                      | 11                              | 579                                 | 8750                       | 6                               | 135                                 |
| 2     | 36900                      | 61                              | 6080                                | 19100                      | 10                              | 516                                 | 8730                       | 5                               | 118                                 |
| 3     | 36700                      | 54                              | 5350                                | 14700                      | 17                              | 675                                 | 9100                       | 5                               | 123                                 |
| 4     | 35900                      | 51                              | 4940                                | 17200                      | 15                              | 697                                 | 9300                       | 5                               | 126                                 |
| 5     | 34400                      | 55                              | 5110                                | 17900                      | 12                              | 580                                 | 9090                       | 6                               | 147                                 |
| 6     | 32300                      | 41                              | 3580                                | 18000                      | 16                              | 778                                 | 8720                       | 7                               | 165                                 |
| 7     | 30700                      | 39                              | 3230                                | 17700                      | 11                              | 526                                 | 8120                       | 6                               | 132                                 |
| 8     | 29200                      | 36                              | 2840                                | 17000                      | 9                               | 413                                 | 7830                       | 5                               | 106                                 |
| 9     | 26900                      | 39                              | 2830                                | 16400                      | 9                               | 399                                 | 7760                       | 3                               | 63                                  |
| 10    | 28000                      | 52                              | 3930                                | 15700                      | 7                               | 297                                 | 8260                       | 4                               | 89                                  |
| 11    | 27900                      | 38                              | 2860                                | 15000                      | 11                              | 446                                 | 8100                       | 5                               | 105                                 |
| 12    | 32500                      | 40                              | 3510                                | 14300                      | 8                               | 309                                 | 7710                       | 7                               | 146                                 |
| 13    | 34600                      | 40                              | 3740                                | 15600                      | 8                               | 294                                 | 7560                       | 6                               | 122                                 |
| 14    | 32500                      | 36                              | 3160                                | 12900                      | 8                               | 279                                 | 7380                       | 6                               | 120                                 |
| 15    | 29700                      | 25                              | 2000                                | 12500                      | 10                              | 338                                 | 7410                       | 2                               | 40                                  |
| 16    | 29000                      | 22                              | 1720                                | 12000                      | 11                              | 396                                 | 7210                       | 1                               | 15                                  |
| 17    | 29700                      | 18                              | 1440                                | 11500                      | 9                               | 279                                 | 6780                       | 3                               | 55                                  |
| 18    | 31200                      | 14                              | 1180                                | 10800                      | 8                               | 233                                 | 6510                       | 4                               | 70                                  |
| 19    | 32000                      | 16                              | 1380                                | 11300                      | 9                               | 275                                 | 6290                       | 6                               | 102                                 |
| 20    | 31300                      | 17                              | 1440                                | 9800                       | 12                              | 318                                 | 6370                       | 5                               | 86                                  |
| 21    | 31500                      | 19                              | 1620                                | 9400                       | 9                               | 228                                 | 6090                       | 4                               | 66                                  |
| 22    | 32100                      | 19                              | 1650                                | 9080                       | 8                               | 196                                 | 5950                       | 3                               | 48                                  |
| 23    | 31900                      | 19                              | 1640                                | 8940                       | 7                               | 169                                 | 5880                       | 2                               | 32                                  |
| 24    | 31200                      | 19                              | 1600                                | 8940                       | 6                               | 145                                 | 5750                       | 4                               | 62                                  |
| 25    | 29900                      | 19                              | 1530                                | 9020                       | 5                               | 122                                 | 5620                       | 7                               | 106                                 |
| 26    | 28800                      | 14                              | 1090                                | 8940                       | 6                               | 145                                 | 5470                       | 4                               | 59                                  |
| 27    | 25500                      | 13                              | 895                                 | 8520                       | 9                               | 207                                 | 5570                       | 2                               | 30                                  |
| 28    | 23000                      | 12                              | 745                                 | 8210                       | 7                               | 155                                 | 5580                       | 2                               | 30                                  |
| 29    | 21600                      | 12                              | 700                                 | 7980                       | 5                               | 108                                 | 5700                       | 3                               | 46                                  |
| 30    | 21300                      | 12                              | 690                                 | 7810                       | 5                               | 105                                 | 6020                       | 4                               | 65                                  |
| 31    | 20600                      | 11                              | 612                                 | 8000                       | 6                               | 170                                 | --                         | --                              | --                                  |
| TOTAL | 936300                     | --                              | 79372                               | 391740                     | --                              | 10297                               | 214210                     | --                              | 2617                                |

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)

TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS)

6726250  
2452056.3

TABLE 19.17

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

| DAY   | OCTOBER                    |                                 |                                     | NOVEMBER                   |                                 |                                     | DECEMBER                   |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 5990                       | 10                              | 162                                 | 4800                       | 2                               | 26                                  | 4490                       | 3                               | 36                                  |
| 2     | 5840                       | 9                               | 142                                 | 4610                       | 2                               | 25                                  | 4130                       | 2                               | 22                                  |
| 3     | 5830                       | 7                               | 110                                 | 4950                       | 3                               | 40                                  | 4230                       | 2                               | 23                                  |
| 4     | 5820                       | 5                               | 79                                  | 5620                       | 3                               | 46                                  | 3970                       | 2                               | 21                                  |
| 5     | 5670                       | 4                               | 61                                  | 5380                       | 4                               | 58                                  | 4100                       | 2                               | 22                                  |
| 6     | 5590                       | 3                               | 45                                  | 5440                       | 2                               | 29                                  | 3900                       | 4                               | 42                                  |
| 7     | 5670                       | 3                               | 46                                  | 4990                       | 3                               | 40                                  | 3700                       | 3                               | 30                                  |
| 8     | 5830                       | 3                               | 47                                  | 4700                       | 3                               | 38                                  | 3400                       | 2                               | 18                                  |
| 9     | 5960                       | 3                               | 48                                  | 4340                       | 3                               | 35                                  | 3350                       | 2                               | 18                                  |
| 10    | 6020                       | 3                               | 49                                  | 4670                       | 3                               | 38                                  | 3300                       | 2                               | 18                                  |
| 11    | 6140                       | 3                               | 50                                  | 5350                       | 3                               | 43                                  | 3400                       | 2                               | 18                                  |
| 12    | 5830                       | 4                               | 63                                  | 5610                       | 5                               | 76                                  | 3200                       | 2                               | 17                                  |
| 13    | 5820                       | 4                               | 63                                  | 5870                       | 4                               | 63                                  | 3100                       | 2                               | 17                                  |
| 14    | 6030                       | 4                               | 98                                  | 5730                       | 2                               | 31                                  | 3150                       | 2                               | 17                                  |
| 15    | 6220                       | 8                               | 134                                 | 5710                       | 2                               | 31                                  | 3200                       | 2                               | 17                                  |
| 16    | 6300                       | 8                               | 136                                 | 5560                       | 3                               | 45                                  | 3500                       | 2                               | 19                                  |
| 17    | 5980                       | 7                               | 113                                 | 5220                       | 2                               | 28                                  | 3700                       | 1                               | 10                                  |
| 18    | 5790                       | 6                               | 94                                  | 5050                       | 1                               | 14                                  | 3800                       | 4                               | 41                                  |
| 19    | 5560                       | 5                               | 75                                  | 4880                       | 2                               | 26                                  | 3850                       | 3                               | 37                                  |
| 20    | 5770                       | 5                               | 78                                  | 4920                       | 4                               | 53                                  | 3800                       | 2                               | 21                                  |
| 21    | 5760                       | 5                               | 78                                  | 4600                       | 4                               | 50                                  | 3850                       | 2                               | 21                                  |
| 22    | 5690                       | 4                               | 61                                  | 4850                       | 2                               | 26                                  | 3850                       | 2                               | 21                                  |
| 23    | 5620                       | 4                               | 61                                  | 4970                       | 2                               | 27                                  | 3900                       | 1                               | 11                                  |
| 24    | 5530                       | 4                               | 60                                  | 5070                       | 3                               | 41                                  | 4000                       | 2                               | 22                                  |
| 25    | 5220                       | 4                               | 56                                  | 4980                       | 3                               | 40                                  | 4000                       | 2                               | 22                                  |
| 26    | 5670                       | 4                               | 61                                  | 4830                       | 2                               | 26                                  | 3700                       | 1                               | 10                                  |
| 27    | 5860                       | 4                               | 63                                  | 4980                       | 3                               | 40                                  | 3000                       | 2                               | 16                                  |
| 28    | 5570                       | 2                               | 30                                  | 4870                       | 2                               | 26                                  | 2700                       | 2                               | 15                                  |
| 29    | 5300                       | 2                               | 29                                  | 4760                       | 2                               | 26                                  | 2600                       | 3                               | 21                                  |
| 30    | 5110                       | 4                               | 55                                  | 4660                       | 2                               | 25                                  | 2500                       | 3                               | 20                                  |
| 31    | 4740                       | 3                               | 38                                  | --                         | --                              | --                                  | 2600                       | 3                               | 21                                  |
| TOTAL | 177730                     | --                              | 2285                                | 151970                     | --                              | 1112                                | 109970                     | --                              | 688                                 |

TABLE 19.18

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

| DAY   | JANUARY                    |                                 |                                     | FEBRUARY                   |                                 |                                     | MARCH                      |                                 |                                     |
|-------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|---------------------------------|-------------------------------------|
|       | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) | MEAN<br>DISCHARGE<br>(CFS) | MEAN<br>CONCENTRATION<br>(MG/L) | SEDIMENT<br>DISCHARGE<br>(TONS/DAY) |
| 1     | 2800                       | 1                               | 7.6                                 | 3100                       | 1                               | 8.4                                 | 17300                      | 60                              | 2000                                |
| 2     | 2900                       | 4                               | 31                                  | 3000                       | 1                               | 8.1                                 | 19500                      | 31                              | 1130                                |
| 3     | 2950                       | 2                               | 16                                  | 2900                       | 5                               | 39                                  | 11000                      | 33                              | 900                                 |
| 4     | 3100                       | 2                               | 17                                  | 3200                       | 8                               | 69                                  | 9430                       | 27                              | 687                                 |
| 5     | 3200                       | 2                               | 17                                  | 3520                       | 2                               | 19                                  | 8610                       | 29                              | 674                                 |
| 6     | 3400                       | 2                               | 18                                  | 3670                       | 2                               | 20                                  | 9090                       | 24                              | 989                                 |
| 7     | 3500                       | 2                               | 19                                  | 3290                       | 4                               | 36                                  | 10200                      | 22                              | 604                                 |
| 8     | 3500                       | 1                               | 9.4                                 | 3230                       | 7                               | 61                                  | 9520                       | 19                              | 488                                 |
| 9     | 3450                       | 2                               | 19                                  | 3410                       | 9                               | 83                                  | 9040                       | 20                              | 489                                 |
| 10    | 3380                       | 2                               | 18                                  | 3480                       | 6                               | 56                                  | 8890                       | 26                              | 624                                 |
| 11    | 3300                       | 2                               | 18                                  | 3620                       | 8                               | 78                                  | 10300                      | 22                              | 612                                 |
| 12    | 3200                       | 1                               | 8.6                                 | 3730                       | 6                               | 60                                  | 12300                      | 16                              | 590                                 |
| 13    | 3050                       | 2                               | 16                                  | 3890                       | 8                               | 84                                  | 13500                      | 22                              | 802                                 |
| 14    | 2800                       | 2                               | 15                                  | 4000                       | 7                               | 76                                  | 14400                      | 35                              | 1570                                |
| 15    | 2650                       | 1                               | 7.2                                 | 4050                       | 5                               | 55                                  | 17500                      | 40                              | 1690                                |
| 16    | 2700                       | 1                               | 7.3                                 | 4450                       | 7                               | 84                                  | 17800                      | 40                              | 1920                                |
| 17    | 2750                       | 1                               | 7.4                                 | 4970                       | 5                               | 67                                  | 22100                      | 51                              | 3040                                |
| 18    | 2900                       | 2                               | 16                                  | 5400                       | 2                               | 29                                  | 26000                      | 82                              | 5930                                |
| 19    | 3000                       | 2                               | 16                                  | 5410                       | 7                               | 102                                 | 27300                      | 133                             | 9600                                |
| 20    | 3200                       | 2                               | 17                                  | 5270                       | 8                               | 114                                 | 25700                      | 160                             | 6940                                |
| 21    | 3700                       | 3                               | 30                                  | 4930                       | 5                               | 67                                  | 23500                      | 77                              | 4890                                |
| 22    | 4300                       | 3                               | 35                                  | 5330                       | 5                               | 72                                  | 18200                      | 52                              | 2540                                |
| 23    | 4900                       | 4                               | 53                                  | 5300                       | 7                               | 100                                 | 16300                      | 95                              | 2420                                |
| 24    | 4800                       | 4                               | 52                                  | 5220                       | 6                               | 85                                  | 16300                      | 36                              | 1500                                |
| 25    | 4400                       | 2                               | 24                                  | 4980                       | 8                               | 108                                 | 13200                      | 23                              | 944                                 |
| 26    | 3800                       | 2                               | 21                                  | 4810                       | 4                               | 52                                  | 13700                      | 21                              | 777                                 |
| 27    | 3200                       | 2                               | 17                                  | 4990                       | 3                               | 40                                  | 12400                      | 18                              | 603                                 |
| 28    | 2800                       | 3                               | 23                                  | 7370                       | 4                               | 80                                  | 11800                      | 21                              | 641                                 |
| 29    | 2600                       | 2                               | 14                                  | 14500                      | --                              | --                                  | 10500                      | 13                              | 362                                 |
| 30    | 2700                       | 3                               | 22                                  | --                         | --                              | --                                  | 9870                       | 12                              | 320                                 |
| 31    | 2900                       | 1                               | 7.8                                 | --                         | --                              | --                                  | 9700                       | 19                              | 502                                 |
| TOTAL | 101630                     | --                              | 599.3                               | 135020                     | --                              | 1782.5                              | 453390                     | --                              | 57768                               |

TABLE 20. INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE ANALYSES, KOOTENAI R. NR. REEFORD, MONT., 1963 - 1971

| DATE         | T °C | TEMPERATURE | DISEASE | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED | SUSPENDED |
|--------------|------|-------------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|              |      |             |         |           |           |           |           |           |           |           |           |           |           |
|              |      |             |         |           |           |           |           |           |           |           |           |           |           |
| Jun 07, 1968 | 1300 | 9.0         | 42700   | 169       | 19500     | 11        | 48        | 87        | 92        | 98        | 100       | --        | --        |
| Apr 25, 1969 | 0750 | 11.0        | 34500   | 366       | 34100     | 21        | 46        | 79        | 91        | 100       | --        | --        | --        |
| May 12, 1969 | 1320 | 11.0        | 47100   | 485       | 31200     | 14        | 38        | 76        | 88        | 98        | 100       | --        | --        |
| Jun 09, 1969 | 1300 | 12.0        | 56300   | 225       | 34200     | 21        | 40        | 76        | 88        | 99        | 100       | --        | --        |
| Jun 03, 1970 | 1345 | 13.0        | 34500   | 141       | 13200     | 14        | 34        | 79        | 92        | 100       | --        | --        | --        |
| May 14, 1971 | 1300 | 7.0         | 40100   | 824       | 134000    | 13        | 34        | 76        | 91        | 98        | 100       | --        | --        |
| Jun 02, 1971 | 1200 | 8.5         | 53100   | 173       | 24800     | --        | --        | 77        | 98        | 100       | 100       | --        | --        |

TABLE 21. INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE ANALYSES, KOOTENAI R. BELOW LIBBY DAM NO. LIBBY, MONT. 1968 - 1971

| DATE           | TIME | TEMPERATURE<br>°C | DISEASE-<br>CAUSING<br>CPV | SUS-<br>PENDED<br>SEDIMENTATION<br>(Mg/L) | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>.004 MM<br>70338 | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>.016 MM<br>70340 | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>.062 MM<br>70342 | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>.125 MM<br>70343 | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>.250 MM<br>70344 | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>.500 MM<br>70345 | SUS.<br>FALL<br>DIAM.<br>% FINDER<br>1.00 MM<br>70346 |
|----------------|------|-------------------|----------------------------|-------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| May 27, 1968   | 1450 | 10.0              | 37100                      | 10400                                     | 15                                                    | 39                                                    | 80                                                    | 89                                                    | 99                                                    | 100                                                   | --                                                    |
| June 06, 1968  | 1230 | 9.0               | 53100                      | 53200                                     | 14                                                    | 44                                                    | 79                                                    | 88                                                    | 97                                                    | 99                                                    | 100                                                   |
| April 25, 1969 | 1320 | 7.0               | 31900                      | 615                                       | 53000                                                 | 20                                                    | 42                                                    | 70                                                    | 84                                                    | 100                                                   | --                                                    |
| May 14, 1969   | 1115 | 11.0              | 53700                      | 516                                       | 74800                                                 | 15                                                    | 39                                                    | 72                                                    | 86                                                    | 99                                                    | --                                                    |
| May 21, 1969   | 1400 | 10.0              | 35800                      | 76                                        | 7350                                                  | 15                                                    | 40                                                    | 71                                                    | 83                                                    | 98                                                    | 100                                                   |
| June 04, 1970  | 1830 | 10.5              | 41000                      | 302                                       | 39900                                                 | 11                                                    | 30                                                    | 70                                                    | 86                                                    | 99                                                    | 100                                                   |
| May 14, 1971   | 1800 | 7.0               | 58000                      | 683                                       | 107000                                                | 18                                                    | 47                                                    | 87                                                    | 94                                                    | 99                                                    | 100                                                   |
| June 01, 1971  | 1330 | 9.0               | 59000                      | 199                                       | 30600                                                 | 19                                                    | 46                                                    | 85                                                    | 99                                                    | 100                                                   | --                                                    |

TABLE 22. INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE ANALYSES, KOOTENAI R. NR. COPELAND, ID., 1967 - 1971

| DATE         | TIME | TEMPERATURE<br>°C | DIS-<br>CHARGE<br>CPS | SUS-<br>PENDED<br>SEDI-<br>MENT | SUS-<br>PENDED<br>SEDI-<br>MENT<br>(7/T/AT) | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>0.064 MM<br>70338 | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>0.16 MM<br>70340 | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>0.62 MM<br>70342 | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>1.25 MM<br>70343 | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>250 MM<br>70344 | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>500 MM<br>70345 | SUS.<br>SED.<br>FALL<br>DIAM.<br>% FINDER<br>1.00 MM<br>70346 |
|--------------|------|-------------------|-----------------------|---------------------------------|---------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|
| May 30, 1967 | 1120 | 10.0              | 70400                 | 192                             | 34500                                       | 17                                                             | 41                                                            | 66                                                            | 82                                                            | 97                                                           | 100                                                          | —                                                             |
| Jun 05, 1968 | 1100 | 10.0              | 75300                 | 660                             | 134000                                      | 18                                                             | 48                                                            | 86                                                            | 97                                                            | 100                                                          | —                                                            | —                                                             |
| Jun 08, 1969 | 1100 | 12.0              | 82500                 | 496                             | 110000                                      | 16                                                             | 43                                                            | 72                                                            | 91                                                            | 99                                                           | 100                                                          | —                                                             |
| Jun 05, 1970 | 1150 | 14.0              | 59500                 | 179                             | 28000                                       | 18                                                             | 45                                                            | 80                                                            | 96                                                            | 100                                                          | —                                                            | —                                                             |

Table 24. Turbidity Determinations For The Kootenai River Below Libby Dam, 1968

|      |  | Formazin Turbidity Units (00076) |     |     |     |     |      |     |     |     |     |     |     |
|------|--|----------------------------------|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
|      |  | JAN                              | FEB | MAR | APR | MAY | JUN  | JUL | AUG | SEP | OCT | NOV | DEC |
| DATE |  |                                  |     |     |     |     |      |     |     |     |     |     |     |
| 1    |  |                                  |     | 5   | 6   | 38  | 175  | 27  | 3   | 3   | 5   | 3   | 2   |
| 2    |  |                                  |     | 7   | 5   | 37  | 170  | 26  | 6   | 3   | 5   | 4   | 3   |
| 3    |  |                                  |     | 5   | 5   | 20  | 172* | 33  | 18  | 3   | 4   | 3   | 3   |
| 4    |  |                                  |     | 5   | 4   | 17  | 174* | 38  | 17  | 3   | 3   | 4   | 4   |
| 5    |  |                                  |     | 6   | 4   | 14  | 175  | 36  | 17  | 3   | 3   | 3   | 3   |
| 6    |  |                                  |     | 7   | 4   | 12  | 84   | 37  | 19  | 3   | 3   | 3   | 3   |
| 7    |  |                                  |     | 11  | 3   | 13  | 51   | 38  | 20  | 3   | 2   | 4   | 3   |
| 8    |  |                                  |     | 12  | 3   | 16  | 51   | 37  | 18  | 3   | 3   | 3   | 3   |
| 9    |  |                                  |     | 11  | 3   | 13  | 52   | 38  | 14  | 3   | 3   | 3   | 13  |
| 10   |  |                                  |     | 5   | 4   | 13  | 49   | 17  | 4   | 4   | 4   | 3   | 17  |
| 11   |  |                                  |     | 5   | 4   | 12  | 59   | 20  | 3   | 4   | 3   | 3   | 15  |
| 12   |  |                                  |     | 5   | 4   | 12  | 58   | 20  | 3   | 4   | 4   | 3   | 15  |
| 13   |  |                                  |     | 4   | 4   | 47  | 60   | 19  | 2   | 3   | 3   | 3   | 15  |
| 14   |  |                                  |     | 4   | 4   | 47  | 57   | 20  | 3   | 4   | 3   | 2   | 16  |
| 15   |  |                                  |     | 4   | 4   | 63  | 34   | 22  | 3   | 3   | 4   | 3   | 6   |
| 16   |  |                                  |     | 4   | 4   | 38  | 33   | 12  | 3   | 4   | 3   | 3   | 6   |
| 17   |  |                                  |     | 4   | 4   | 38  | 26   | 12  | 3   | 4   | 3   | 3   | 6   |
| 18   |  |                                  |     | 5   | 3   | 57  | 28   | 12  | 3   | 4   | 3   | 2   | 6   |
| 19   |  |                                  |     | 5   | 3   | 63  | 33   | 12  | 3   | 4   | 3   | 3   | 6   |
| 20   |  |                                  |     | 5   | 4   | 61  | 33   | 9   | 3   | 4   | 3   | 3   | 5   |
| 21   |  |                                  |     | 3   | 4   | 73  | 32   | 13  | 4   | 4   | 4   | 4   | 6   |
| 22   |  |                                  |     | 3   | 4   | 80  | 34   | 6   | 4   | 5   | 4   | 3   | 6   |
| 23   |  |                                  |     | 4   | 4   | 120 | 32   | 6   | 4   | 4   | 4   | 3   | 4   |
| 24   |  |                                  |     | 4   | 4   | 74  | 36   | 4   | 3   | 4   | 3   | 3   | 4   |
| 25   |  |                                  |     | 3   | 4   | 72  | 26   | 6   | 3   | 4   | 3   | 4   | 4   |
| 26   |  |                                  |     | 4   | 4   | 44  | 37   | 5   | 4   | 4   | 3   | 4   | 7   |
| 27   |  |                                  |     | 5   | 4   | 43  | 26   | 4   | 4   | 4   | 2   | 2   | 7   |
| 28   |  |                                  |     | 5   | 5   | 36  | 35   | 5   | 4   | 4   | 4   | 2   | 7   |
| 29   |  |                                  |     | 5   | 5   | 37  | 34   | 5   | 3   | 4   | 3   | 3   | 5   |
| 30   |  |                                  |     | 5   | 9   | 48  | 24   | 5   | 3   | 5*  | 3   | 2   | 5*  |
| 31   |  |                                  |     | 5   |     | 38  |      | 4   | 3   |     | 4   |     | 5*  |
| Mean |  |                                  |     | 5   | 4   | 42  | 63*  | 18  | 7   | 4*  | 3   | 3   | 7*  |

\*Estimated

Table 23 Suspended Sediment Concentrations, Time-Weighted Means, Oct 67 - Mar 72

|      |       | Below Dam (Sta. 3) |                    |                   | Copeland (Sta. 9) |                    |                   |
|------|-------|--------------------|--------------------|-------------------|-------------------|--------------------|-------------------|
|      |       | mg/l               |                    |                   | mg/l              |                    |                   |
| Year | Month | Roxford (Sta. 1)   | Below Dam (Sta. 3) | Copeland (Sta. 9) | Roxford (Sta. 1)  | Below Dam (Sta. 3) | Copeland (Sta. 9) |
| 1967 | Oct   | 12                 | 31                 | -                 | 12                | 3                  | -                 |
|      | Nov   | 7                  | 12                 | 5                 | 7                 | 5                  | 5                 |
|      | Dec   | 19                 | 18                 | 3                 | 27                | 7                  | 3                 |
|      | Jan   | 9                  | 20                 | 7                 | 12                | 7                  | 7                 |
| 1968 | Feb   | 15                 | 12                 | -                 | 9                 | -                  | -                 |
|      | Mar   | 8                  | 9                  | 9                 | 88                | 9                  | 9                 |
|      | Apr   | 121                | 166                | 88                | 153               | 88                 | 88                |
|      | May   | 179                | 257                | 153               |                   |                    |                   |
| 1969 | Jun   | 50                 | 51                 | -                 |                   |                    |                   |
|      | Jul   | 12                 | 13                 | -                 |                   |                    |                   |
|      | Aug   | 9                  | 8                  | 5                 |                   |                    |                   |
|      | Sep   | 5                  | 7                  | 3                 |                   |                    |                   |
|      | Oct   | 9                  | 7                  | 4                 |                   |                    |                   |
|      | Nov   | 9                  | 12                 | 4                 |                   |                    |                   |
|      | Dec   | 9                  | 12                 | 3                 |                   |                    |                   |
|      | Jan   | 9                  | -                  | 4                 |                   |                    |                   |
|      | Feb   | 10                 | -                  | 4                 |                   |                    |                   |
|      | Mar   | 12                 | -                  | 8                 |                   |                    |                   |
|      | Apr   | 77                 | 132                | 104               |                   |                    |                   |
|      | May   | 204                | 267                | 196               |                   |                    |                   |
| 1970 | Jun   | 165                | 286                | 165               |                   |                    |                   |
|      | Jul   | 40                 | 50                 | 43                |                   |                    |                   |
|      | Aug   | 8                  | 11                 | 11                |                   |                    |                   |
|      | Sep   | 7                  | 8                  | 3                 |                   |                    |                   |
|      | Oct   | 6                  | 5                  | 3                 |                   |                    |                   |
|      | Nov   | 5                  | 6                  | 4                 |                   |                    |                   |
|      | Dec   | 6                  | 6                  | 4                 |                   |                    |                   |
|      | Jan   | 9                  | 6                  | 3                 |                   |                    |                   |
|      | Feb   | 8                  | 3                  | 5                 |                   |                    |                   |
|      | Mar   | 7                  | 8                  | 9                 |                   |                    |                   |
|      | Apr   | 6                  | 7                  | 8                 |                   |                    |                   |
|      | May   | 88                 | 86                 | 94                |                   |                    |                   |
| 1971 | Jun   | 76                 | 96                 | 89                |                   |                    |                   |
|      | Jul   | 14                 | 11                 | 9                 |                   |                    |                   |
|      | Aug   | 9                  | 10                 | 5                 |                   |                    |                   |
|      | Sep   | 9                  | 8                  | 2                 |                   |                    |                   |
|      | Oct   | 5                  | 6                  | 4                 |                   |                    |                   |
|      | Nov   | 8                  | 4                  | 3                 |                   |                    |                   |
|      | Dec   | 9                  | 13                 | 3                 |                   |                    |                   |
|      | Jan   | 20                 | 9                  | 3                 |                   |                    |                   |
|      | Feb   | 11                 | 18                 | 17                |                   |                    |                   |
|      | Mar   | 9                  | 6                  | 5                 |                   |                    |                   |
|      | Apr   | 57                 | 52                 | 39                |                   |                    |                   |
|      | May   | 263                | 239                | 242               |                   |                    |                   |
| 1972 | Jun   | 180                | 143                | 162               |                   |                    |                   |
|      | Jul   | 44                 | 45                 | 30                |                   |                    |                   |
|      | Aug   | 15                 | 13                 | 9                 |                   |                    |                   |
|      | Sep   | 8                  | 12                 | 4                 |                   |                    |                   |
|      | Oct   | -                  | 7                  | 5                 |                   |                    |                   |
|      | Nov   | -                  | 7                  | 3                 |                   |                    |                   |
|      | Dec   | -                  | 8                  | 2                 |                   |                    |                   |
|      | Jan   | -                  | 3                  | 2                 |                   |                    |                   |
|      | Feb   | -                  | 5                  | 5                 |                   |                    |                   |
|      | Mar   | -                  | 20                 | 38                |                   |                    |                   |

Table 25. Turbidity Determinations For The Kootenai River Below Libby Dam, 1969

Formazin Turbidity Units (00076)

| DATE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1    | 21  | 31  | 54  | 93  | 2   | 2   | 2   | 2   | 2   | 6   | 2   | 2   |
| 2    | 18  | 24  | 42  | 36  | 2   | 2   | 2   | 2   | 2   | 12  | 2   | 2   |
| 3    | 23  | 23  | 45  | 33  | 2   | 2   | 2   | 2   | 2   | 10  | 4   | 2   |
| 4    | 19  | 18  | 75  | 35  | 4   | 2   | 2   | 2   | 2   | 11  | 3   | 1   |
| 5    | 18  | 17  | 115 | 29  | 6   | 2   | 2   | 2   | 2   | 4   | 5   | 2   |
| 6    | 21  | 16  | 130 | 35  | 4   | 2   | 2   | 2   | 2   | 4   | 5   | 1   |
| 7    | 33  | 17  | 130 | 37  | 4   | 2   | 2   | 2   | 2   | 4   | 4   | 2   |
| 8    | 44  | 32  | 110 | 36  | 4   | 2   | 2   | 2   | 2   | 4   | 3   | 1   |
| 9    | 33  | 36  | 74  | 27  | 4   | 2   | 2   | 2   | 2   | 4   | 3   | 1   |
| 10   | 32  | 53  | 71  | 27  | 4   | 2   | 2   | 2   | 2   | 4   | 3   | 11  |
| 11   | 36  | 98  | 68  | 22  | 4   | 2   | 2   | 2   | 2   | 4   | 2   | 8   |
| 12   | 33  | 120 | 50  | 22  | 4   | 2   | 2   | 2   | 2   | 2   | 2   | 2   |
| 13   | 33  | 130 | 46  | 22  | 3   | 2   | 2   | 2   | 2   | 2   | 2   | 3   |
| 14   | 33  | 135 | 39  | 18  | 4   | 2   | 2   | 2   | 2   | 3   | 2   | 3   |
| 15   | 33  | 150 | 35  | 19  | 4   | 2   | 2   | 2   | 2   | 3   | 2   | 3   |
| 16   | 24  | 130 | 32  | 18  | 4   | 2   | 2   | 2   | 2   | 3   | 2   | 2   |
| 17   | 24  | 77  | 27  | 19  | 5   | 2   | 2   | 2   | 2   | 3   | 2   | 3   |
| 18   | 35  | 63  | 26  | 16  | 4   | 2   | 2   | 2   | 2   | 3   | 2   | 2   |
| 19   | 20  | 52  | 31  | 14  | 4   | 2   | 2   | 2   | 2   | 3   | 2   | 2   |
| 20   | 18  | 42  | 47  | 24  | 15  | 4   | 2   | 2   | 2   | 4   | 2   | 2   |
| 21   | 17  | 29  | 42  | 75  | 6   | 4   | 2   | 2   | 2   | 3   | 2   | 2   |
| 22   | 12  | 21  | 37  | 69  | 5   | 3   | 3   | 3   | 3   | 3   | 2   | 2   |
| 23   | 10  | 20  | 33  | 64  | 5   | 4   | 2   | 2   | 2   | 2   | 2   | 2   |
| 24   | 12  | 67  | 43  | 81  | 5   | 2   | 2   | 2   | 2   | 3   | 2   | 3   |
| 25   | 7   | 155 | 80  | 58  | 4   | 2   | 2   | 2   | 2   | 2   | 2   | 2   |
| 26   | 15  | 64  | 110 | 52  | 4   | 3   | 12  | 3   | 2   | 3   | 2   | 3   |
| 27   | 12  | 75  | 130 | 53  | 4   | 2   | 10  | 2   | 2   | 2   | 2   | 2   |
| 28   | 20  | 39  | 115 | 48  | 5   | 4   | 11  | 2   | 2   | 2   | 2   | 2   |
| 29   | 15  | 27  | 83  | 48  | 5   | 4   | 11  | 3   | 2   | 2   | 2   | 2   |
| 30   | 13  | 29  | 59  | 47  | 4   | 3   | 12  | 3   | 2   | 2   | 2   | 2   |
| 31   | 23  |     | 82  |     | 4   | 2   |     |     |     | 3   |     | 2*  |
| Mean | 38  | 67  | 61  | 20  | 4   | 4   | 4   | 4   | 4   | 4   | 2   | 3   |

\*Estimated

Table 26. Turbidity Determinations For The Kootenai River Below Libby Dam, 1970

Formazin Turbidity Units (00076)

| DATE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1    | 2   | 2   | 2   | 2   | 2   | 13  | 53  | 7   | 7   | 4   | 4   | 4   |
| 2    | 1   | 2   | 2   | 3   | 11  | 57  | 5   | 5   | 5   | 4   | 3   | 3   |
| 3    | 1   | 1   | 2   | 3   | 17  | 63  | 4   | 5   | 4   | 4   | 2   | 4   |
| 4    | 1   | 1   | 1   | 5   | 26  | 57  | 4   | 5   | 4   | 3   | 3   | 3   |
| 5    | 1   | 2   | 2   | 4   | 18  | 83  | 5   | 4   | 3   | 3   | 2   | 4   |
| 6    | 2   | 1   | 2   | 4   | 30  | 80  | 5   | 5   | 3   | 3   | 2   | 4   |
| 7    | 1   | 1   | 1   | 5   | 31  | 80  | 4   | 5   | 3   | 4   | 3   | 3   |
| 8    | 4   | 1   | 4   | 2   | 28  | 80  | 3   | 3   | 3   | 4   | 3   | 6   |
| 9    | 3   | 1   | 4   | 3   | 27  | 54  | 4   | 4   | 3   | 3   | 2   | 3   |
| 10   | 4   | 1   | 2*  | 2   | 27  | 51  | 3   | 4   | 2   | 3   | 3   | 3   |
| 11   | 2   | 2   | 5   | 3   | 13  | 47  | 5   | 4   | 2   | 3   | 2   | 4   |
| 12   | 2   | 2   | 2   | 2   | 15  | 28  | 5   | 5   | 2   | 3   | 2   | 3   |
| 13   | 2   | 2   | 2   | 3   | 17  | 25  | 4   | 5   | 2   | 4   | 2   | 3   |
| 14   | 2   | 2   | 2   | 2   | 15  | 27  | 3   | 4   | 3   | 4   | 2   | 3   |
| 15   | 1   | 2   | 2   | 1   | 59  | 26  | 3   | 5   | 2   | 4   | 2   | 2   |
| 16   | 1   | 2   | 2   | 2   | 64  | 68  | 3   | 3   | 3   | 4   | 2   | 4   |
| 17   | 1   | 2   | 2   | 2   | 62  | 73  | 4   | 4   | 4   | 3   | 4   | 4   |
| 18   | 1   | 2   | 2   | 2   | 64  | 74  | 3   | 4   | 4   | 4   | 3   | 3   |
| 19   | 1   | 2   | 2   | 3   | 38  | 68  | 3   | 5   | 5   | 4   | 3   | 3   |
| 20   | 1   | 3   | 2   | 3   | 39  | 27  | 3   | 4   | 4   | 3   | 3   | 6   |
| 21   | 2   | 3   | 2   | 3   | 35  | 23  | 3   | 3   | 3   | 4   | 3   | 7   |
| 22   | 1   | 3   | 2*  | 4   | 39  | 22  | 3   | 3   | 3   | 4   | 2   | 5   |
| 23   | 1   | 3   | 2   | 4   | 44  | 23  | 3   | 2   | 3   | 3   | 2   | 5   |
| 24   | 5   | 3   | 2   | 2   | 41  | 20  | 4   | 3   | 2   | 3   | 2   | 3   |
| 25   | 2   | 4   | 2   | 3   | 43  | 17  | 4   | 4   | 3   | 3   | 3   | 3   |
| 26   | 1   | 2   | 2   | 2   | 52  | 19  | 4   | 5   | 3   | 3   | 4   | 2   |
| 27   | 2   | 2   | 3   | 2   | 63  | 19  | 7   | 4   | 4   | 3   | 4   | 2   |
| 28   | 1   | 2   | 3*  | 3   | 63  | 16  | 4   | 4   | 6   | 3   | 2   | 3   |
| 29   | 1   | 3   | 3   | 3   | 1   | 27  | 16  | 4   | 4   | 4   | 3   | 3   |
| 30   | 1   | 1   | 2   | 3   | 24  | 17  | 4   | 3   | 3   | 3   | 2   | 3   |
| 31   | 1   | 1   | 2   | 2   | 25  | 5   | 5   | 3   | 3   | 3   | 3   | 4   |
| Mean | 2   | 2   | 2   | 3   | 35  | 44  | 4   | 4   | 4   | 3   | 2   | 4   |

\*Estimated

Table 27. Turbidity Determinations For The Kootenai River Below Libby Dam, 1971

Formazin Turbidity Units (00076)

| DATE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | DATE | JAN | FEB | MAR |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| 1    | 2   | 24  | 5   | 5   | 25  | 83  | 28  | 8   | 4   | 5   | 3   | 4   | 1    | 2   | 1   | 17  |
| 2    | 2   | 22  | 6   | 6   | 20  | 77  | 29  | 7   | 5   | 5   | 4   | 2   | 2    | 2   | 2   | 17  |
| 3    | 2   | 11  | 4   | 5   | 39* | 67  | 27  | 3   | 6   | 4   | 4   | 3   | 3    | 2*  | 2   | 11  |
| 4    | 2   | 11  | 3   | 4   | 50* | 62  | 23  | 4   | 8   | 3   | 5   | 8   | 4    | 2*  | 2   | 8   |
| 5    | 3   | 8   | 3   | 8   | 64* | 68  | 23  | 4   | 5   | 3   | 4   | 3   | 5    | 2*  | 2   | 8   |
| 6    | 4   | 9   | 3   | 8   | 70* | 98  | 22  | 3   | 7   | 3   | 5   | 2   | 6    | 2*  | 2   | 9   |
| 7    | 3   | 3   | 4   | 9   | 72* | 105 | 24  | 3   | 3   | 2   | 3   | 3   | 7    | 2*  | 2   | 10  |
| 8    | 3   | 4   | 3   | 13  | 69  | 103 | 22  | 3   | 5   | 3   | 3   | 5   | 8    | 2   | 2   | 9   |
| 9    | 3   | 6   | 3   | 21  | 59  | 100 | 22  | 3   | 7   | 4   | 4   | 8   | 9    | 3   | 2   | 9   |
| 10   | 3   | 4   | 2   | 22  | 64  | 97  | 22  | 5   | 7   | 3   | 3   | 4   | 10   | 3*  | 1   | 9   |
| 11   | 3   | 10  | 4   | 16  | 60  | 86  | 21  | 4   | 6   | 3   | 2   | 4   | 11   | 3*  | 2   | 13  |
| 12   | 3   | 10  | 4   | 15  | 64  | 66  | 28  | 3   | 4   | 3   | 2   | 3   | 12   | 2*  | 2   | 20  |
| 13   | 2   | 10  | 4   | 12  | 86  | 50  | 27  | 2   | 4   | 3   | 4   | 4   | 13   | 2*  | 2   | 15  |
| 14   | 3   | 10  | 3   | 12  | 140 | 49  | 24  | 3   | 3   | 3   | 3   | 2   | 14   | 2*  | 2   | 18  |
| 15   | 5   | 17  | 3   | 13  | 135 | 55  | 18  | 4   | 5   | 2   | 4*  | 2*  | 15   | 2   | 2   | 16  |
| 16   | 3   | 18  | 2   | 11  | 94  | 52  | 19  | 3   | 4   | 3   | 4   | 2   | 16   | 2   | 2   | 20  |
| 17   | 3   | 12  | 3   | 15  | 53  | 44  | 16  | 3   | 3   | 3   | 4   | 3   | 17   | 2   | 3   | 20  |
| 18   | 5   | 14  | 3   | 16  | 45  | 40  | 21  | 4   | 5   | 3   | 4   | 3   | 18   | 2   | 3   | 25  |
| 19   | 5   | 13  | 3   | 11  | 32  | 37  | 17  | 3   | 4   | 3   | 3   | 2   | 19   | 2   | 3   | 25  |
| 20   | 5   | 11  | 3   | 13  | 27  | 35  | 18  | 3   | 3   | 3   | 5   | 3   | 20   | 1   | 5   | 27  |
| 21   | 4*  | 6   | 3   | 24  | 23  | 32  | 19  | 2   | 3   | 3   | 3   | 3   | 21   | 3   | 3   | 29  |
| 22   | 3*  | 7   | 3   | 28  | 21  | 37  | 22  | 4   | 5   | 4   | 4   | 3   | 22   | 2   | 3   | 30  |
| 23   | 3   | 6   | 3   | 43  | 27  | 46  | 22  | 4   | 6   | 3   | 4   | 3   | 23   | 3   | 2   | 31  |
| 24   | 4   | 7   | 3   | 40  | 29  | 63  | 21  | 3   | 5   | 4   | 5   | 2   | 24   | 2   | 3   | 33  |
| 25   | 4   | 8   | 4   | 71  | 47  | 73  | 22  | 4   | 5   | 3   | 4   | 2   | 25   | 2   | 3   | 30  |
| 26   | 3   | 7   | 4   | 76  | 67  | 84  | 18  | 3   | 4   | 3   | 4   | 2   | 26   | 3   | 3   | 25  |
| 27   | 3   | 6   | 4   | 33  | 74  | 72  | 18  | 2   | 3   | 3   | 3   | 2   | 27   | 3   | 3   | 22  |
| 28   | 4   | 4   | 4   | 33  | 100 | 47  | 15  | 3   | 3   | 4   | 3   | 3   | 28   | 3   | 4   | 23  |
| 29   | 6   | 3   | 3   | 23  | 160 | 51  | 15  | 3   | 4   | 8   | 3   | 1   | 29   | 3   | 17  | 22  |
| 30   | 7   | 5   | 5   | 23  | 125 | 37  | 14  | 5   | 4   | 4   | 3   | 3   | 30   | 3   | 3   | 27  |
| 31   | 4   |     | 5   | 98  |     | 7   | 7   |     |     | 4   |     | 3   | 31   | 3   |     | 29  |
| Mean | 4*  | 10  | 4   | 21  | 66* | 64  | 21  | 4   | 5   | 3   | 4*  | 3*  | Mean | 2*  | 3   | 20  |

\*Estimated

\*Estimated

Table 28. Turbidity Determinations For The Kootenai River Below Libby Dam, 1972

Formazin Turbidity Units (00076)

| DATE | JAN | FEB | MAR |
|------|-----|-----|-----|
| 1    | 2   | 1   | 17  |
| 2    | 2   | 2   | 2   |
| 3    | 2*  | 2   | 11  |
| 4    | 2*  | 2   | 8   |
| 5    | 2*  | 2   | 8   |
| 6    | 2*  | 2   | 9   |
| 7    | 2*  | 2   | 10  |
| 8    | 2   | 2   | 9   |
| 9    | 3   | 2   | 9   |
| 10   | 3*  | 1   | 9   |
| 11   | 3*  | 2   | 13  |
| 12   | 2*  | 2   | 20  |
| 13   | 2*  | 2   | 15  |
| 14   | 2*  | 2   | 18  |
| 15   | 2   | 2   | 16  |
| 16   | 2   | 2   | 20  |
| 17   | 2   | 3   | 20  |
| 18   | 2   | 3   | 25  |
| 19   | 2   | 3   | 25  |
| 20   | 1   | 5   | 27  |
| 21   | 3   | 3   | 29  |
| 22   | 2   | 3   | 30  |
| 23   | 3   | 2   | 31  |
| 24   | 2   | 3   | 33  |
| 25   | 2   | 3   | 30  |
| 26   | 3   | 3   | 25  |
| 27   | 3   | 3   | 22  |
| 28   | 3   | 4   | 23  |
| 29   | 3   | 17  | 22  |
| 30   | 3   | 3   | 27  |
| 31   | 3   |     | 29  |

Table 29. Miscellaneous Turbidity Determinations for the Kootenai River  
Near Rexford, 1968

| Date | Formazin Turbidity Units (00076) |     |     |     |     |     |     |     |     |     |  |  | Nov | Dec |
|------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|-----|-----|
|      | Jan                              | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct |  |  |     |     |
| 1    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 2    |                                  |     |     |     |     |     |     |     |     |     |  |  | 4   |     |
| 3    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 4    |                                  |     |     |     | 16  |     |     |     |     |     |  |  |     |     |
| 5    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 6    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 7    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 8    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 9    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 10   |                                  |     |     | 3   |     |     |     |     |     |     |  |  |     |     |
| 11   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 12   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 13   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 14   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 15   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 16   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 17   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 18   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 19   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 20   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 21   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 22   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 23   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 24   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 25   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 26   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 27   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 28   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 29   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 30   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 31   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |

Table 30. Miscellaneous Turbidity Determinations for the Kootenai River at  
Warland, 1968.

| Date | Formazin Turbidity Units (00076) |     |     |     |     |     |     |     |     |     |  |  | Nov | Dec |
|------|----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|-----|-----|
|      | Jan                              | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct |  |  |     |     |
| 1    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 2    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 3    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 4    |                                  |     |     | 9   | 26  |     |     |     |     |     |  |  |     |     |
| 5    |                                  |     |     | 4   |     |     |     |     | 3   |     |  |  |     |     |
| 6    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 7    |                                  |     |     |     |     | 57  |     |     |     |     |  |  |     |     |
| 8    |                                  |     |     | 6   |     |     |     |     |     |     |  |  |     |     |
| 9    |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 10   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 11   |                                  |     |     |     |     | 51  |     |     | 3   |     |  |  |     |     |
| 12   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 13   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 14   |                                  |     |     |     |     | 48  |     |     |     |     |  |  |     |     |
| 15   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 16   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 17   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 18   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 19   |                                  |     |     |     |     | 26  |     |     |     |     |  |  |     |     |
| 20   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 21   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 22   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 23   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 24   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 25   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 26   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 27   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 28   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 29   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 30   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |
| 31   |                                  |     |     |     |     |     |     |     |     |     |  |  |     |     |

Table 31. Miscellaneous Turbidity Determinations for the Kootenai River Below Libby Dam, 1968.

| Date | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec  |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 1    |     |     |     |     |     | 27  |     |     |     |     |     |      |
| 2    |     |     |     |     |     |     |     | 5   |     |     |     |      |
| 3    |     |     |     |     |     |     |     |     | 3   |     |     |      |
| 4    |     |     |     | 11  |     |     |     |     |     |     |     |      |
| 5    |     |     |     |     |     |     |     |     |     |     |     |      |
| 6    |     |     | 4   |     |     |     |     |     |     |     |     |      |
| 7    |     |     |     |     |     |     |     |     |     |     |     |      |
| 8    |     |     |     |     |     | 52  |     |     |     |     |     | 4    |
| 9    |     |     |     | 5   |     |     |     |     |     |     |     |      |
| 10   |     |     |     |     | 11  |     |     | 14  |     |     |     | 4*   |
| 11   |     |     |     |     |     | 48  |     |     |     |     |     | 23*  |
| 12   |     |     | 3   | 12  |     |     |     |     | 2   |     |     | 225* |
| 13   |     |     |     |     |     |     |     |     |     |     |     | 25*  |
| 14   |     |     |     |     | 20  |     |     |     |     |     |     | 20*  |
| 15   |     |     |     |     |     |     |     |     |     |     |     |      |
| 16   |     |     |     |     | 48  |     |     |     |     |     |     |      |
| 17   |     |     |     |     |     |     |     | 3   |     |     |     | 8    |
| 18   |     |     | 3   | 3   |     | 25  |     |     |     |     |     | 4    |
| 19   |     |     |     | 3   |     |     |     |     |     |     |     | 5    |
| 20   |     |     |     |     |     |     |     |     |     |     |     |      |
| 21   |     |     |     |     | 49  |     |     |     |     |     |     |      |
| 22   |     |     | 5   |     |     |     |     | 12  |     |     |     |      |
| 23   |     |     |     |     |     |     |     |     |     |     |     |      |
| 24   |     |     |     |     | 94  | 28  |     |     |     |     |     |      |
| 25   |     |     |     |     |     |     |     |     |     |     |     |      |
| 26   |     |     |     | 4   | 34  |     | 6   |     |     |     |     |      |
| 27   |     |     |     |     |     |     |     |     |     |     |     |      |
| 28   |     |     |     |     |     | 43  |     |     |     |     |     |      |
| 29   |     |     |     |     |     |     | 6   |     |     |     |     |      |
| 30   |     |     |     | 4   |     |     |     |     |     |     |     |      |
| 31   |     |     |     |     | 40  |     |     |     |     |     |     |      |

\*Maximum

Table 32. Miscellaneous Turbidity Determinations for the Kootenai River at Libby, 1968.

| Date | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec  |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 1    |     |     |     |     |     |     |     |     |     |     |     |      |
| 2    |     |     |     | 10  | 28  |     | 26  |     |     |     |     |      |
| 3    |     |     |     |     |     |     |     | 6   |     | 6   |     |      |
| 4    |     |     |     |     | 37  |     |     |     | 3   |     |     |      |
| 5    |     |     |     |     |     |     |     |     |     |     |     |      |
| 6    |     |     |     | 8   |     |     |     |     |     |     |     |      |
| 7    |     |     | 13  |     |     |     |     |     |     |     |     |      |
| 8    |     |     |     |     |     | 68  |     |     |     |     |     | 9    |
| 9    |     |     |     | 10  |     |     | 35  |     |     |     |     |      |
| 10   |     |     |     |     | 14  | 43  |     | 16  |     |     |     | 7*   |
| 11   |     |     |     | 6   |     |     |     |     | 5   |     |     | 16*  |
| 12   |     |     |     |     |     |     | 25  |     |     |     |     | 125* |
| 13   |     |     |     |     | 25  |     |     |     |     |     |     | 55*  |
| 14   |     |     |     |     |     |     |     |     |     |     |     | 24*  |
| 15   |     |     |     |     |     |     | 17  |     |     |     |     |      |
| 16   |     |     |     |     | 47  |     |     | 6   |     | 6   |     |      |
| 17   |     |     |     |     |     |     |     |     |     |     |     |      |
| 18   |     |     | 3   | 6   |     | 25  |     |     |     |     |     |      |
| 19   |     |     |     |     |     |     | 13  |     |     |     |     | 10   |
| 20   |     |     |     |     |     |     |     |     |     |     |     |      |
| 21   |     |     |     |     | 45  |     |     |     |     |     |     |      |
| 22   |     |     |     |     |     |     | 8   |     |     |     |     |      |
| 23   |     |     |     |     |     |     |     |     |     |     |     |      |
| 24   |     |     |     |     | 97  | 31  |     |     |     |     |     |      |
| 25   |     |     |     |     |     |     |     |     |     |     |     |      |
| 26   |     |     |     | 4   |     |     | 6   | 5   |     |     |     |      |
| 27   |     |     |     |     | 34  |     |     |     |     |     |     |      |
| 28   |     |     |     |     |     | 42  |     |     |     |     |     |      |
| 29   |     |     |     |     |     |     | 5   |     |     | 8   |     |      |
| 30   |     |     |     | 12  |     |     |     |     |     |     |     |      |
| 31   |     |     |     |     | 43  |     |     |     |     |     |     |      |

\*Maximum

Table 33. Turbidity Determinations for the Kootenai River During Second-stage Diversion, 7-19 December 1968.

| Date  | Norman Turbidity Units (00076) |                            |                        |                       |
|-------|--------------------------------|----------------------------|------------------------|-----------------------|
|       | Warland (Sta. 2)<br>Time       | Below Dam (Sta. 3)<br>Time | Libby (Sta. 7)<br>Time | Libby (Sta. 7)<br>FTU |
| Dec 7 | 1015                           | 4 0945                     | 4 0645                 | 9                     |
| 9     | 1515                           | 5 0845                     | 3 0720                 | 4                     |
| 10    | 1205                           | 4 1305                     | 4 0730                 | 9                     |
|       |                                | 4 1400                     | 4 1335                 | 8                     |
|       |                                | 4 1545                     | 4 1605                 | 8                     |
|       |                                | 4 1830                     | 4 1800                 | 6                     |
|       |                                | 4 2045                     | 4 2000                 | 9                     |
|       |                                | 4 2240                     | 4 2205                 | 16                    |
|       |                                | 4 2335                     | 4 2300                 | 13                    |
| 11    |                                | 4 2430                     | 4 2400                 | 13                    |
|       |                                | 4 2535                     | 4 2500                 | 13                    |
|       |                                | 4 2645                     | 4 2615                 | 17                    |
|       |                                | 4 2745                     | 4 2715                 | 25                    |
|       |                                | 4 2845                     | 4 2815                 | 38                    |
|       |                                | 4 2945                     | 4 2915                 | 43                    |
|       |                                | 4 3045                     | 4 3015                 | 34                    |
|       |                                | 4 3145                     | 4 3115                 | 43                    |
|       |                                | 4 3245                     | 4 3215                 | 115                   |
|       |                                | 4 3345                     | 4 3315                 | 125                   |
|       |                                | 4 3445                     | 4 3415                 | 91                    |
| 12    |                                | 4 3545                     | 4 3515                 | 55                    |
|       |                                | 4 3645                     | 4 3615                 | 24                    |
|       |                                | 4 3745                     | 4 3715                 | 22                    |
|       |                                | 4 3845                     | 4 3815                 | 22                    |
|       |                                | 4 3945                     | 4 3915                 | 28                    |
|       |                                | 4 4045                     | 4 4015                 | 15                    |
|       |                                | 4 4145                     | 4 4115                 | 25                    |
| 13    | 1420                           | 5 0040                     | 5 0005                 | 24                    |
|       |                                | 5 0140                     | 5 0105                 | 16                    |
| 16    | 1030                           | 4 0930                     | 4 0900                 | 13                    |
| 17    | 0935                           | 4 0905                     | 4 0830                 | 8                     |
| 18    |                                | 4 0845                     | 4 0815                 | 5                     |
| 19    |                                | 4 0745                     | 4 0715                 | 10                    |

Table 34. Turbidity Determination for the Kootenai River During Drainage of Contractor's Settling Pond, 25 - 26 November 1969.

| Date   | Norman Turbidity Units (00076) |                            |                        |                       |
|--------|--------------------------------|----------------------------|------------------------|-----------------------|
|        | Warland (Sta. 2)<br>Time       | Below Dam (Sta. 3)<br>Time | Libby (Sta. 7)<br>Time | Libby (Sta. 7)<br>FTU |
| Nov 25 | 1555                           | 2                          | 2                      | 14                    |
|        | 1700                           | 47                         | 47                     | 16                    |
|        | 1750                           | 61                         | 61                     | 16                    |
|        | 1810                           | 25                         | 25                     | 12                    |
|        | 1915                           | 2                          | 2                      | 11                    |
|        | 2000                           | 10                         | 10                     | 41                    |
|        | 2030                           | 11                         | 11                     | 43                    |
|        | 2115                           | 17                         | 17                     | 36                    |
|        | 2200                           | 4                          | 4                      | 20                    |
|        | 2230                           | 2                          | 2                      | 17                    |
|        | 2315                           | 2                          | 2                      | 14                    |
|        | 2400                           | 2                          | 2                      | 14                    |
|        | 0100                           | 2                          | 2                      | 14                    |
|        | 0130                           | 2                          | 2                      | 14                    |
|        | 0205                           | 2                          | 2                      | 14                    |
|        | 0310                           | 2                          | 2                      | 14                    |
|        | 0335                           | 2                          | 2                      | 14                    |
|        | 0435                           | 2                          | 2                      | 14                    |
|        | 0545                           | 2                          | 2                      | 14                    |
|        | 0635                           | 2                          | 2                      | 14                    |
|        | 0900                           | 2                          | 2                      | 14                    |
|        | 1100                           | 2                          | 2                      | 14                    |
|        | 1300                           | 2                          | 2                      | 14                    |
|        | 1430                           | 2                          | 2                      | 14                    |
|        | 1500                           | 2                          | 2                      | 14                    |
|        | 1540                           | 2                          | 2                      | 14                    |

TABLE 35.1  
 12301933 - Kootenai River Below Libby Dam, Near Libby, MT  
 UNITED STATES DEPARTMENT OF INTERIOR  
 GEOLOGICAL SURVEY - WATER RESOURCES DIVISION  
 WATER YEAR ENDING SEPT. 30, 1968

| CONDUCTIVITY (MICROMHOS AT 25 DEG. C) , RANDOM (INSTANTANEOUS) |      |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| DAY                                                            | 1967 |     |     |     |     |     |     |     |     |     |     |
|                                                                | OCT  | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
| 1                                                              | ---  | 410 | 446 | 471 | 485 | 448 | 428 | 331 | 216 | 197 | 237 |
| 2                                                              | ---  | 399 | 436 | 477 | 480 | 457 | 405 | 327 | 203 | 199 | 243 |
| 3                                                              | 399  | 389 | 456 | 483 | 481 | 454 | 404 | 278 | 202 | 197 | 245 |
| 4                                                              | 396  | 297 | 458 | 492 | 482 | 457 | 437 | 278 | 202 | 197 | 245 |
| 5                                                              | 402  | 296 | 437 | 486 | 482 | 441 | 435 | 277 | 214 | 198 | 251 |
| 6                                                              | 368  | 290 | 452 | 485 | 482 | 431 | 437 | 272 | 203 | 199 | 258 |
| 7                                                              | 372  | 293 | 436 | 486 | 479 | 419 | 416 | 275 | 207 | 195 | 260 |
| 8                                                              | 391  | 301 | 437 | 477 | 477 | 422 | 368 | 273 | 213 | 199 | 256 |
| 9                                                              | 391  | 302 | 441 | 474 | 463 | 424 | 448 | 297 | 212 | 196 | 258 |
| 10                                                             | 397  | 305 | 423 | 469 | 460 | 442 | 445 | 300 | 209 | 210 | 263 |
| 11                                                             | 398  | 409 | 442 | 483 | 463 | 440 | 445 | 300 | 205 | 210 | 245 |
| 12                                                             | 405  | 407 | 440 | 485 | 482 | 440 | 416 | 296 | 203 | 209 | 245 |
| 13                                                             | 394  | 396 | 447 | 486 | 485 | 434 | 415 | 229 | 202 | 209 | 289 |
| 14                                                             | 385  | 416 | 487 | 488 | 484 | 435 | 418 | 231 | 203 | 210 | 289 |
| 15                                                             | 389  | 415 | 497 | 459 | 487 | 444 | 401 | 235 | 200 | 222 | 289 |
| 16                                                             | 375  | 414 | 486 | 463 | 504 | 446 | 401 | 228 | 225 | 249 | 289 |
| 17                                                             | 368  | 416 | 490 | 461 | 505 | 445 | 431 | 228 | 225 | 249 | 289 |
| 18                                                             | 377  | 409 | 510 | 486 | 479 | 435 | 435 | 218 | 209 | 248 | 289 |
| 19                                                             | 378  | 414 | 511 | 485 | 479 | 429 | 430 | 223 | 206 | 247 | 323 |
| 20                                                             | 372  | 415 | 509 | 484 | 488 | 430 | 429 | 225 | 207 | 249 | 323 |
| 21                                                             | 372  | 399 | 507 | 440 | 483 | 439 | 429 | 215 | 207 | 248 | 323 |
| 22                                                             | 381  | 401 | 505 | 441 | 475 | 449 | 430 | 210 | 207 | 231 | 323 |
| 23                                                             | 385  | 404 | 523 | 483 | 458 | 439 | 458 | 202 | 207 | 231 | 325 |
| 24                                                             | 405  | 403 | 525 | 486 | 461 | 439 | 464 | 208 | 204 | 230 | 325 |
| 25                                                             | 348  | 405 | 485 | 477 | 460 | 444 | 466 | 213 | 203 | 230 | 325 |
| 26                                                             | 350  | 407 | 474 | 477 | 461 | 428 | 458 | 216 | 204 | 230 | 332 |
| 27                                                             | 350  | 432 | 474 | 445 | 460 | 413 | 456 | 225 | 204 | 232 | 332 |
| 28                                                             | 349  | 445 | 484 | 473 | 450 | 414 | 415 | 216 | 212 | 244 | 332 |
| 29                                                             | 393  | 442 | 465 | 475 | 452 | 408 | 414 | 214 | 207 | 243 | 340 |
| 30                                                             | 390  | 445 | 461 | 475 | --- | 410 | 391 | 207 | 205 | 243 | 340 |
| 31                                                             | 398  | --- | 467 | 484 | --- | 412 | --- | 213 | --- | 241 | 340 |
| MONTH                                                          | 382  | 386 | 471 | 475 | 475 | 434 | 427 | 247 | 208 | 222 | 291 |
| YEAR                                                           | 361  |     |     |     |     |     |     |     |     |     |     |

TABLE 35.2  
12301933 - Kootenai River Below Libby Dam, Near Libby, MT

UNITED STATES DEPARTMENT OF INTERIOR  
GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

WATER YEAR ENDING SEPT. 30, 1969

CONDUCTIVITY (MICROMHOS AT 25 DEG. C) - RANDOM (INSTANTANEOUS)

| DAY   | 1968 | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|-------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1     | 270  | 271 | 306 | --- | --- | --- | --- | 301 | 228 | 204 | 215 | 261 | 311 |
| 2     | 270  | 269 | 303 | --- | --- | --- | --- | 303 | 227 | 204 | 227 | 261 | 293 |
| 3     | 277  | 271 | 303 | --- | --- | --- | --- | 289 | 232 | 204 | 227 | 264 | 299 |
| 4     | 269  | 269 | 303 | --- | --- | --- | --- | 289 | 238 | 192 | 248 | 269 | 299 |
| 5     | 269  | 269 | 306 | --- | --- | --- | --- | 289 | 242 | 191 | 210 | 269 | 311 |
| 6     | 270  | 276 | 306 | --- | --- | --- | --- | 273 | 240 | 188 | 225 | 269 | 311 |
| 7     | 269  | 274 | 309 | --- | --- | --- | --- | 259 | 227 | 186 | 217 | 269 | 308 |
| 8     | 271  | 269 | 312 | --- | --- | --- | --- | 255 | 227 | 179 | 224 | 274 | 304 |
| 9     | 271  | 283 | 309 | --- | --- | --- | --- | 255 | 225 | 188 | 233 | 279 | 301 |
| 10    | 270  | 283 | 306 | --- | --- | --- | --- | 257 | 210 | 192 | 231 | 279 | 305 |
| 11    | 270  | 271 | 306 | --- | --- | --- | --- | 253 | 203 | 190 | 231 | 284 | 308 |
| 12    | 270  | 286 | 303 | --- | --- | --- | --- | 248 | 207 | 194 | 229 | 282 | 310 |
| 13    | 270  | 274 | 306 | --- | --- | --- | --- | 244 | 184 | 204 | 227 | 282 | 313 |
| 14    | 270  | 271 | 306 | --- | --- | --- | --- | 248 | 184 | 200 | 229 | 282 | 315 |
| 15    | 270  | 271 | 306 | --- | --- | --- | --- | 248 | 203 | 205 | 231 | 282 | 317 |
| 16    | 270  | 278 | 303 | --- | --- | --- | --- | 244 | 203 | 215 | 233 | 282 | 314 |
| 17    | 270  | 286 | 306 | --- | --- | --- | 323 | 240 | 204 | 214 | 246 | 282 | 311 |
| 18    | 270  | 288 | 306 | --- | --- | --- | 320 | 236 | 206 | 215 | 240 | 284 | 307 |
| 19    | 280  | 291 | 318 | --- | --- | --- | 317 | 248 | 207 | 203 | 250 | 284 | 300 |
| 20    | 280  | 291 | 315 | --- | --- | --- | 319 | 238 | 206 | 204 | 255 | 284 | 306 |
| 21    | 280  | 291 | 309 | --- | --- | --- | 317 | 236 | 204 | 194 | 255 | 282 | 308 |
| 22    | 280  | 291 | 312 | --- | --- | --- | 317 | 236 | 204 | 181 | 267 | 282 | 311 |
| 23    | 283  | 291 | 312 | --- | --- | --- | 322 | 226 | 196 | 186 | 252 | 284 | 311 |
| 24    | 280  | 291 | 312 | --- | --- | --- | 326 | 204 | 190 | 188 | 255 | 287 | 307 |
| 25    | 280  | 291 | 322 | --- | --- | --- | 329 | 216 | 179 | 190 | 250 | 290 | 301 |
| 26    | 281  | 286 | 339 | --- | --- | --- | 330 | 213 | 174 | 186 | 252 | 290 | 298 |
| 27    | 280  | 291 | 339 | --- | --- | --- | 330 | 221 | 179 | 186 | 252 | 284 | 298 |
| 28    | 280  | 288 | 339 | --- | --- | --- | 314 | 224 | 179 | 189 | 246 | 282 | 298 |
| 29    | 277  | 291 | --- | --- | --- | --- | 310 | 221 | 182 | 189 | 252 | 284 | 298 |
| 30    | 277  | 291 | --- | --- | --- | --- | 310 | 226 | 182 | 188 | 250 | 284 | 298 |
| 31    | 273  | --- | --- | --- | --- | --- | 299 | --- | 184 | --- | 262 | 290 | --- |
| MONTH | 274  | 281 | 312 | --- | --- | --- | --- | 248 | 205 | 195 | 239 | 279 | 306 |
| YEAR  | 263  |     |     |     |     |     |     |     |     |     |     |     |     |

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

TABLE 36.1

## KOOTENAI RIVER NEAR REEFORD, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00010<br>WATER<br>TEMP<br>C/°F | 00060<br>STREAM<br>FLOW<br>CFS | 00070<br>TURB<br>IDEN<br>JTU | 00080<br>COLOR<br>PT-00<br>UNITS | 00095<br>CONDUCTV<br>AT 25 C<br>MICROMHO | 00300<br>DO<br>MG/L | 00301<br>DO<br>SATUR<br>PERCENT | 00310<br>BOD<br>5 DAY<br>MG/L | 00400<br>PH<br>SU | 00405<br>CO2<br>MG/L |
|--------------------|-------------------|--------------------------------|--------------------------------|------------------------------|----------------------------------|------------------------------------------|---------------------|---------------------------------|-------------------------------|-------------------|----------------------|
| 67/06/29           | 18 00             | 12.2                           | 56200                          |                              | 5                                | 210                                      |                     |                                 |                               | 7.70              |                      |
| 67/07/27           | 11 30             | 16.1                           | 17500                          |                              |                                  | 254                                      |                     |                                 |                               | 7.60              |                      |
| 67/09/08           | 12 00             | 15.0                           | 6680                           |                              | 3                                | 354                                      | 10.0                |                                 |                               | 7.30              |                      |
| 67/10/11           | 12 00             |                                | 4540                           |                              | 3                                | 421                                      |                     |                                 |                               | 7.70              |                      |
| 67/11/07           | 14 00             |                                | 3830                           |                              | 4                                | 308                                      |                     |                                 |                               | 7.70              |                      |
| 67/12/19           | 12 30             |                                | 2200                           |                              | 3                                | 522                                      |                     |                                 |                               | 8.00              |                      |
| 68/01/29           | 17 30             | 0.0                            |                                |                              |                                  |                                          |                     |                                 |                               |                   |                      |
| 68/03/19           | 15 15             | 6.0                            | 3540                           |                              | 3                                | 469                                      |                     |                                 |                               | 7.90              |                      |
| 68/04/22           | 17 15             | 10.0                           | 3410                           |                              | 3                                | 489                                      |                     |                                 |                               | 7.70              |                      |
| 68/05/22           | 17 30             | 10.0                           | 35800                          |                              | 12                               | 216                                      |                     |                                 |                               | 7.60              |                      |
| 68/06/17           | 12 00             | 12.0                           | 29600                          |                              | 2                                | 242                                      |                     |                                 |                               | 7.30              |                      |
| 68/07/24           | 14 15             | 15.0                           | 15900                          |                              | 5                                | 226                                      |                     |                                 |                               | 7.50              |                      |
| 68/08/29           | 12 00             | 14.0                           | 9220                           |                              | 1                                | 325                                      | 9.0                 |                                 |                               | 7.70              |                      |
| 68/10/04           | 16 15             | 9.0                            | 7320                           |                              | 3                                | 281                                      |                     |                                 |                               | 7.70              |                      |
| 68/11/06           | 15 30             | 4.0                            | 5580                           |                              | 1                                | 285                                      |                     |                                 |                               | 7.50              |                      |
| 68/12/02           | 16 00             | 2.0                            | 4090                           |                              | 3                                | 313                                      |                     |                                 |                               | 7.60              |                      |
| 69/01/06           | 13 30             | 0.0                            | 3300                           |                              | 1                                | 340                                      | 12.0                |                                 |                               | 7.60              |                      |
| 69/02/07           | 15 00             | 0.0                            | 2800                           |                              | 1                                | 341                                      | 11.0                |                                 |                               | 8.00              |                      |
| 69/03/06           | 13 45             | 2.0                            | 2620                           |                              | 2                                | 341                                      |                     |                                 |                               | 7.90              |                      |
| 69/04/01           | 13 15             | 8.0                            | 4500                           |                              | 4                                | 353                                      |                     |                                 |                               | 7.70              |                      |
| 69/05/02           | 11 45             | 8.0                            | 17900                          |                              | 4                                | 248                                      |                     |                                 |                               | 8.00              |                      |
| 69/06/09           | 13 00             | 12.0                           | 56300                          | 93.0                         | 4                                | 218                                      |                     |                                 |                               | 7.70              |                      |
| 69/07/09           | 14 00             | 14.0                           | 30700                          | 32.0                         | 4                                | 227                                      |                     |                                 |                               | 7.60              |                      |
| 69/08/07           | 15 00             | 15.0                           | 11400                          | 2.0                          | 3                                | 268                                      |                     |                                 |                               | 7.40              |                      |
| 69/09/04           | 12 30             | 15.0                           | 6130                           | 4.0                          | 5                                | 314                                      |                     |                                 |                               | 7.90              |                      |
| 69/10/16           | 09 30             | 4.0                            | 5230                           | 2.0                          | 3                                | 303                                      | 11.2                | 93                              |                               | 8.20              |                      |
| 69/11/05           | 14 15             | 6.0                            | 4030                           | 1.0                          | 1                                | 325                                      | 11.6                | 102                             |                               | 7.90              |                      |
| 69/12/01           | 13 00             | 0.0                            | 2930                           | 1.0                          | 2                                | 348                                      | 12.8                | 96                              |                               | 7.20              |                      |
| 70/01/05           | 15 00             | 0.0                            | 1300                           | 1.0                          | 7                                | 411                                      | 12.6                | 94                              |                               | 7.80              |                      |
| 70/02/02           | 10 30             | 0.0                            | 2370                           | 1.0                          | 2                                | 367                                      | 12.8                | 96                              |                               | 7.80              |                      |
| 70/03/05           | 13 40             | 0.5                            | 2390                           | 3.0                          | 2                                | 373                                      | 13.0                | 98                              |                               | 7.80              |                      |
| 70/04/08           | 12 30             | 6.0                            | 3680                           | 5.0                          | 5                                | 354                                      | 11.4                | 100                             |                               | 8.30              |                      |
| 70/05/08           | 12 30             | 8.5                            | 16000                          | 43.0                         | 14                               | 233                                      | 10.3                | 96                              |                               | 7.70              |                      |
| 70/06/03           | 12 30             | 13.0                           | 31800                          | 30.0                         | 15                               |                                          | 8.8                 | 101                             |                               | 7.40              |                      |
| 70/07/07           | 10 00             | 16.5                           | 17200                          | 3.0                          | 6                                | 224                                      | 8.4                 | 94                              |                               | 8.30              |                      |
| 70/08/05           | 13 30             | 18.0                           | 7990                           | 1.0                          | 2                                | 260                                      | 8.8                 | 101                             |                               | 8.20              |                      |
| 70/09/02           | 11 15             | 16.5                           | 4910                           | 1.0                          | 3                                | 266                                      | 9.4                 | 105                             |                               | 8.00              |                      |
| 70/10/22           | 17 15             | 5.5                            | 4000                           | 2.0                          | 3                                | 345                                      | 11.6                | 100                             |                               | 7.80              |                      |
| 70/11/13           | 14 00             | 4.0                            | 3310                           | 2.0                          | 3                                | 335                                      | 11.9                | 99                              |                               | 7.80              | 3.4                  |
| 70/12/08           | 11 00             | 0.0                            | 3800                           | 1.0                          | 5                                |                                          | 12.5                | 93                              |                               | 7.40              | 3.8                  |
| 71/01/18           | 11 30             | 0.0                            | 2500                           | 0.0                          | 4                                | 380                                      | 11.7                | 87                              |                               | 7.30              | 10.0                 |
| 71/02/18           | 12 00             | 0.5                            | 3740                           | 3.0                          | 0                                | 329                                      | 12.9                | 96                              |                               | 7.40              | 13.0                 |
| 71/03/17           | 10 30             | 2.0                            | 2700                           | 3.0                          | 5                                | 370                                      | 12.5                | 99                              |                               | 8.20              | 8.6                  |
| 71/04/14           | 09 00             | 6.0                            | 4450                           | 4.0                          | 5                                | 340                                      | 12.0                | 105                             |                               | 8.00              | 1.5                  |
| 71/05/20           | 13 00             | 7.0                            | 25800                          | 20.0                         | 10                               | 245                                      | 12.0                | 108                             |                               | 7.70              | 2.4                  |
| 71/06/09           | 10 30             | 8.0                            | 63900                          | 20.0                         | 10                               | 195                                      | 11.4                | 105                             |                               | 7.70              | 3.7                  |
| 71/07/15           | 10 30             | 12.0                           | 25200                          | 7.0                          | 5                                | 215                                      | 11.4                | 105                             |                               | 7.90              | 2.7                  |
| 71/08/10           | 10 30             | 17.5                           | 13900                          | 3.0                          | 8                                | 215                                      | 9.4                 | 107                             |                               | 8.10              | 2.1                  |
| 71/09/02           | 08 00             | 12.5                           | 7550                           | 4.0                          | 10                               | 280                                      | 10.0                | 100                             |                               | 8.10              | 1.5                  |
| 71/10/14           | 12 00             | 7.0                            | 5280                           | 4.0                          | 5                                | 315                                      | 11.6                | 104                             |                               | 7.00              | 20.3                 |
| 71/11/11           | 10 00             | 1.5                            | 4640                           | 3.0                          | 5                                | 340                                      | 12.8                | 100                             |                               | 8.10              | 1.9                  |
| 71/12/16           | 12 30             | 0.0                            | 2500                           | 2.0                          | 7                                | 360                                      | 13.4                | 100                             |                               | 8.20              | 1.6                  |
| 72/01/10           | 10 30             | 0.0                            | 2500                           | 2.0                          | 5                                | 360                                      | 13.0                | 97                              |                               | 8.10              | 2.1                  |
| 72/02/07           | 10 30             | 0.0                            | 2500                           | 2.0                          | 3                                | 375                                      | 11.8                | 88                              |                               | 7.80              | 4.0                  |
| 72/03/14           | 09 00             | 3.0                            | 5100                           | 15.0                         | 0                                | 335                                      | 12.0                | 97                              |                               | 8.30              | 1.2                  |

TABLE 36.2 CHEMICAL DATA

KOOTENAI RIVER NEAR REEFORD, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 70300<br>RESIDUE<br>DIBS-180<br>C MG/L | 70301<br>DISS SOL<br>SOL<br>MG/L | 00410<br>T ALK<br>CAC03<br>MG/L | 00440<br>HC03 ION<br>MG/L | 00445<br>CO3 ION<br>MG/L | 00900<br>TOT HARD<br>CA CO3<br>MG/L | 00902<br>HC HARD<br>CA CO3<br>MG/L |
|--------------------|-------------------|----------------------------------------|----------------------------------|---------------------------------|---------------------------|--------------------------|-------------------------------------|------------------------------------|
| 67/06/29           | 18 00             | 123                                    | 117                              | 89                              | 109                       | 0                        | 111                                 | 22                                 |
| 67/07/27           | 11 30             | 147                                    | 144                              | 92                              | 112                       | 0                        | 128                                 | 36                                 |
| 67/09/08           | 12 00             | 219                                    | 212                              | 108                             | 132                       | 0                        | 174                                 | 66                                 |
| 67/10/11           | 12 00             | 263                                    | 259                              | 118                             | 144                       | 0                        | 220                                 | 102                                |
| 67/11/07           | 14 00             | 188                                    | 176                              | 119                             | 145                       | 0                        | 156                                 | 37                                 |
| 67/12/19           | 12 50             | 349                                    | 336                              | 135                             | 165                       | 0                        | 273                                 | 137                                |
| 68/03/19           | 13 15             | 303                                    | 295                              | 123                             | 150                       | 0                        | 243                                 | 120                                |
| 68/04/22           | 17 15             | 336                                    | 305                              | 125                             | 152                       | 0                        | 246                                 | 122                                |
| 68/05/22           | 17 50             | 125                                    | 126                              | 80                              | 98                        | 0                        | 106                                 | 25                                 |
| 68/06/17           | 12 00             | 152                                    | 137                              | 95                              | 116                       | 0                        | 117                                 | 22                                 |
| 68/07/24           | 14 15             | 208                                    | 128                              | 93                              | 114                       | 0                        | 110                                 | 17                                 |
| 68/08/29           | 12 00             | 208                                    | 190                              | 100                             | 122                       | 0                        | 158                                 | 58                                 |
| 68/10/04           | 16 15             | 163                                    | 162                              | 104                             | 127                       | 0                        | 144                                 | 39                                 |
| 68/11/06           | 15 30             | 178                                    | 163                              | 113                             | 127                       | 0                        | 142                                 | 28                                 |
| 68/12/02           | 16 00             | 161                                    | 175                              | 122                             | 149                       | 0                        | 145                                 | 23                                 |
| 69/01/06           | 13 30             | 217                                    | 198                              | 134                             | 164                       | 0                        | 170                                 | 36                                 |
| 69/02/07           | 13 00             | 212                                    | 196                              | 130                             | 158                       | 0                        | 167                                 | 37                                 |
| 69/03/06           | 13 45             | 215                                    | 202                              | 131                             | 160                       | 0                        | 172                                 | 41                                 |
| 69/04/01           | 13 15             | 207                                    | 199                              | 130                             | 158                       | 0                        | 174                                 | 45                                 |
| 69/05/02           | 11 45             | 153                                    | 139                              | 105                             | 128                       | 0                        | 123                                 | 18                                 |
| 69/06/09           | 13 00             | 122                                    | 118                              | 102                             | 125                       | 0                        | 103                                 | 1                                  |
| 69/07/09           | 14 00             | 131                                    | 129                              | 102                             | 124                       | 0                        | 113                                 | 11                                 |
| 69/08/07           | 15 00             | 155                                    | 152                              | 115                             | 140                       | 0                        | 131                                 | 16                                 |
| 69/09/04           | 12 30             | 183                                    | 174                              | 130                             | 158                       | 0                        | 151                                 | 21                                 |
| 69/10/16           | 09 30             | 189                                    | 177                              | 126                             | 153                       | 0                        | 152                                 | 26                                 |
| 69/11/05           | 14 15             | 205                                    | 188                              | 128                             | 156                       | 0                        | 159                                 | 32                                 |
| 69/12/01           | 13 00             | 212                                    | 205                              | 139                             | 170                       | 0                        | 175                                 | 35                                 |
| 70/01/05           | 15 00             | 252                                    | 229                              | 158                             | 193                       | 0                        | 194                                 | 35                                 |
| 70/02/02           | 10 30             | 223                                    | 212                              | 137                             | 167                       | 0                        | 177                                 | 40                                 |
| 70/03/05           | 13 40             | 224                                    | 216                              | 137                             | 168                       | 0                        | 182                                 | 45                                 |
| 70/04/08           | 12 30             | 218                                    | 204                              | 134                             | 163                       | 0                        | 172                                 | 38                                 |
| 70/05/08           | 12 30             | 151                                    | 131                              | 95                              | 116                       | 0                        | 116                                 | 20                                 |
| 70/06/03           | 12 30             | 118                                    | 111                              | 86                              | 105                       | 0                        | 97                                  | 10                                 |
| 70/07/07           | 10 00             | 130                                    | 124                              | 95                              | 116                       | 0                        | 108                                 | 13                                 |
| 70/08/05           | 13 30             | 158                                    | 145                              | 109                             | 133                       | 0                        | 132                                 | 23                                 |
| 70/09/02           | 11 15             | 183                                    | 157                              | 110                             | 134                       | 0                        | 142                                 | 32                                 |
| 70/10/22           | 17 15             | 190                                    |                                  | 111                             | 135                       |                          | 160                                 |                                    |
| 70/11/13           | 14 00             | 194                                    |                                  | 125                             | 152                       |                          | 160                                 |                                    |
| 70/12/08           | 11 00             | 210                                    |                                  | 130                             | 158                       |                          | 170                                 |                                    |
| 71/01/18           | 11 30             | 200                                    | 210                              | 133                             | 162                       | 0                        | 180                                 | 50                                 |
| 71/02/18           | 12 00             | 200                                    |                                  | 112                             | 137                       |                          | 160                                 |                                    |
| 71/03/17           | 10 30             | 228                                    | 140                              | 125                             | 152                       |                          | 180                                 |                                    |
| 71/04/14           | 09 01             | 112                                    |                                  | 122                             | 149                       |                          | 160                                 |                                    |
| 71/05/20           | 12 00             | 112                                    |                                  | 95                              | 116                       |                          | 110                                 |                                    |
| 71/06/09           | 10 30             | 120                                    |                                  | 88                              | 107                       |                          | 91                                  |                                    |
| 71/07/15           | 10 30             | 116                                    |                                  | 85                              | 104                       |                          | 100                                 |                                    |
| 71/08/10           | 10 30             | 116                                    | 129                              | 93                              | 113                       |                          | 110                                 | 9                                  |
| 71/09/07           | 08 00             | 150                                    | 158                              | 104                             | 127                       |                          | 130                                 |                                    |
| 71/10/14           | 12 00             | 182                                    |                                  | 118                             | 144                       |                          | 150                                 |                                    |
| 71/11/11           | 10 00             | 226                                    | 201                              | 134                             | 163                       |                          | 160                                 | 34                                 |
| 71/12/16           | 12 30             | 238                                    |                                  | 152                             | 185                       |                          | 180                                 |                                    |
| 72/01/10           | 10 30             | 212                                    | 206                              | 132                             | 161                       |                          | 170                                 | 38                                 |
| 72/02/07           | 10 30             | 224                                    | 188                              | 130                             | 158                       |                          | 170                                 | 36                                 |
| 72/03/14           | 09 00             | 170                                    |                                  | 125                             | 152                       |                          | 160                                 | 32                                 |

TABLE 36.3 CHEMICAL DATA

KOOTENAI RIVER NEAR REEFORD, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00600<br>TOTAL N<br>N<br>MG/L | 00605<br>ORG N<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00613<br>NO2-N<br>DISS<br>MG/L | 00618<br>NO3-N<br>DISS<br>MG/L | 00630<br>N-TOTAL<br>N-TOTAL<br>MG/L | 00665<br>PHOS-TOT<br>MG/L P | 00666<br>PHOS-DIS<br>MG/L P | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00680<br>T ORG C<br>C<br>MG/L |
|--------------------|-------------------|-------------------------------|-----------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------------|-----------------------------|-----------------------------|--------------------------------------|-------------------------------|
| 67/10/11           | 12 00             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.630                       | 0.570                                |                               |
| 67/11/07           | 14 00             |                               |                             |                                 |                                | 0.02                           |                                     |                             | 0.090                       | 0.070                                |                               |
| 67/12/19           | 12 30             |                               |                             |                                 |                                | 0.02                           |                                     |                             | 0.940                       | 0.920                                |                               |
| 68/01/29           | 17 30             |                               |                             |                                 |                                |                                |                                     |                             | 1.090                       | 0.970                                |                               |
| 68/03/19           | 15 15             |                               |                             |                                 |                                | 0.05                           |                                     |                             | 0.580                       | 0.560                                |                               |
| 68/04/22           | 17 15             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.710                       | 0.750                                |                               |
| 68/05/22           | 17 50             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.450                       | 0.390                                |                               |
| 68/06/17           | 12 00             |                               |                             |                                 |                                | 0.05                           |                                     |                             | 0.230                       | 0.140                                |                               |
| 68/07/24           | 14 15             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.380                       | 0.340                                |                               |
| 68/08/29           | 12 00             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.370                       | 0.340                                |                               |
| 68/10/04           | 16 15             |                               |                             |                                 |                                | 0.02                           |                                     |                             | 0.170                       | 0.160                                |                               |
| 68/11/06           | 15 30             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.440                       | 0.410                                |                               |
| 68/12/02           | 16 00             |                               |                             |                                 |                                | 0.02                           |                                     |                             |                             | 0.190                                |                               |
| 69/01/06           | 13 30             |                               |                             |                                 |                                | 0.01                           |                                     |                             |                             |                                      |                               |
| 69/02/07           | 15 00             |                               |                             |                                 |                                | 0.00                           |                                     |                             |                             |                                      |                               |
| 69/03/06           | 13 45             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.180                       | 0.160                                |                               |
| 69/04/01           | 13 15             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.270                       | 0.260                                |                               |
| 69/05/02           | 11 45             |                               |                             |                                 |                                | 0.00                           |                                     |                             | 0.030                       | 0.010                                |                               |
| 69/06/09           | 14 15             |                               |                             |                                 |                                | 0.07                           |                                     |                             | 0.090                       | 0.090                                |                               |
| 69/07/09           | 14 00             | 0.67                          | 0.380                       | 0.080                           |                                | 0.06                           |                                     |                             | 0.220                       | 0.050                                |                               |
| 69/08/07           | 15 00             | 0.81                          | 0.040                       | 0.560                           | 0.000                          | 0.07                           |                                     |                             | 0.340                       | 0.050                                |                               |
| 69/09/04           | 12 30             | 0.36                          | 0.040                       | 0.280                           | 0.010                          | 0.00                           |                                     |                             | 0.070                       | 0.030                                |                               |
| 69/10/16           | 09 30             | 0.19                          | 0.080                       | 0.000                           | 0.010                          | 0.11                           |                                     | 0.150                       | 0.080                       | 0.050                                |                               |
| 69/11/05           | 14 15             | 0.38                          | 0.230                       | 0.040                           | 0.000                          | 0.11                           |                                     | 0.330                       | 0.230                       | 0.060                                |                               |
| 69/12/01           | 13 00             | 0.32                          | 0.090                       | 0.050                           | 0.000                          | 0.18                           |                                     | 0.140                       | 0.130                       | 0.080                                |                               |
| 70/01/05           | 15 00             | 0.64                          | 0.140                       | 0.270                           | 0.000                          | 0.23                           |                                     | 0.140                       | 0.150                       | 0.140                                |                               |
| 70/02/02           | 10 30             | 0.42                          | 0.070                       | 0.100                           | 0.000                          | 0.25                           |                                     | 0.050                       | 0.040                       | 0.040                                |                               |
| 70/03/05           | 13 40             | 0.44                          | 0.120                       | 0.140                           | 0.000                          | 0.18                           |                                     | 0.180                       | 0.120                       | 0.090                                |                               |
| 70/04/08           | 12 30             | 0.33                          | 0.120                       | 0.020                           | 0.020                          | 0.17                           |                                     | 0.150                       | 0.110                       | 0.090                                |                               |
| 70/05/08           | 12 30             | 0.57                          | 0.300                       | 0.040                           | 0.050                          | 0.18                           |                                     | 0.380                       | 0.060                       | 0.060                                |                               |
| 70/06/03           | 12 30             | 0.35                          | 0.160                       | 0.050                           | 0.000                          | 0.12                           |                                     | 0.410                       | 0.070                       | 0.050                                |                               |
| 70/07/07           | 10 00             | 0.19                          | 0.100                       | 0.030                           | 0.000                          | 0.06                           |                                     | 0.100                       | 0.080                       | 0.070                                |                               |
| 70/08/05           | 13 30             | 0.14                          | 0.080                       | 0.040                           | 0.020                          | 0.00                           |                                     | 0.100                       | 0.070                       | 0.060                                |                               |
| 70/09/02           | 11 15             | 0.09                          | 0.020                       | 0.020                           | 0.020                          | 0.03                           |                                     | 0.120                       | 0.100                       | 0.100                                |                               |
| 70/10/22           | 17 15             | 0.47                          | 0.160                       | 0.070                           | 0.020                          | 0.22                           |                                     | 0.190                       | 0.190                       | 0.190                                | 2.0                           |
| 70/11/13           | 14 00             | 0.43                          | 0.110                       | 0.090                           | 0.020                          | 0.20                           |                                     | 0.380                       | 0.350                       | 0.350                                | 9.0                           |
| 70/12/08           | 11 00             | 0.58                          | 0.180                       | 0.130                           | 0.010                          | 0.28                           |                                     | 0.280                       | 0.200                       | 0.200                                | 4.0                           |
| 71/01/18           | 11 30             | 0.09                          | 0.000                       | 0.000                           | 0.000                          | 0.09                           | 0.1                                 |                             | 0.010                       | 0.010                                | 3.3                           |
| 71/02/18           | 12 00             | 0.41                          | 0.020                       | 0.190                           | 0.000                          | 0.20                           | 0.2                                 | 0.200                       | 0.100                       | 0.100                                | 1.0                           |
| 71/03/17           | 10 30             | 0.61                          | 0.140                       | 0.370                           | 0.000                          | 0.10                           | 0.1                                 | 0.260                       | 0.160                       | 0.160                                | 6.0                           |
| 71/04/14           | 09 00             | 0.52                          | 0.160                       | 0.260                           | 0.000                          | 0.10                           | 0.1                                 | 0.150                       | 0.030                       | 0.030                                | 5.0                           |
| 71/05/20           | 12 00             | 0.37                          | 0.220                       | 0.050                           | 0.000                          | 0.10                           | 0.1                                 | 0.200                       | 0.080                       | 0.080                                | 2.0                           |
| 71/06/09           | 10 30             | 0.36                          | 0.010                       | 0.240                           | 0.000                          | 0.11                           | 0.1                                 | 0.300                       | 0.060                       | 0.060                                | 4.0                           |
| 71/07/15           | 10 30             | 0.24                          | 0.140                       | 0.070                           | 0.000                          | 0.03                           | 0.03                                | 0.040                       | 0.010                       | 0.010                                | 10.0                          |
| 71/08/10           | 10 30             | 0.25                          | 0.090                       | 0.110                           | 0.000                          | 0.05                           | 0.05                                | 0.050                       | 0.010                       | 0.010                                | 14.0                          |
| 71/09/07           | 08 00             | 0.26                          | 0.090                       | 0.080                           | 0.000                          | 0.09                           | 0.1                                 | 0.110                       | 0.030                       | 0.030                                | 1.0                           |
| 71/10/14           | 12 00             | 0.29                          | 0.130                       | 0.030                           | 0.000                          | 0.10                           | 0.1                                 | 0.180                       | 0.010                       | 0.010                                | 5.0                           |
| 71/11/11           | 10 00             | 0.46                          | 0.000                       | 0.360                           | 0.000                          | 0.17                           | 0.2                                 |                             | 0.080                       | 0.080                                | 0.0                           |
| 71/12/16           | 12 30             | 0.45                          | 0.120                       | 0.140                           | 0.000                          | 0.19                           | 0.2                                 | 0.220                       | 0.170                       | 0.170                                |                               |
| 72/01/10           | 10 30             | 0.41                          | 0.170                       | 0.080                           | 0.000                          | 0.16                           | 0.2                                 | 0.220                       | 0.150                       | 0.150                                | 1.0                           |
| 72/02/07           | 10 30             | 0.69                          | 0.410                       | 0.060                           | 0.000                          | 0.22                           | 0.2                                 | 0.190                       | 0.120                       | 0.120                                |                               |
| 72/03/14           | 09 00             | 0.59                          | 0.240                       | 0.149                           | 0.000                          | 0.20                           | 0.2                                 | 0.159                       | 0.060                       | 0.060                                | 0.5                           |

TABLE 36.4 CHEMICAL DATA

## KOOTENAI RIVER NEAR REEFORD, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00915<br>CALCIUM<br>CA, DISS<br>MG/L | 00925<br>MAGNESIUM<br>MG, DISS<br>MG/L | 00930<br>SODIUM<br>NA, DISS<br>MG/L | 00935<br>PTISSIUM<br>K, DISS<br>MG/L | 00940<br>CHLORIDE<br>CL<br>MG/L | 00945<br>SULFATE<br>SO4-TOT<br>MG/L | 00950<br>FLUORIDE<br>F, DISS<br>MG/L | 00955<br>SILICA<br>DISSOLVED<br>MG/L |
|--------------------|-------------------|--------------------------------------|----------------------------------------|-------------------------------------|--------------------------------------|---------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 67/06/29           | 18 00             | 34.0                                 | 6.4                                    | 1.10                                | 0.60                                 | 0.4                             | 16                                  | 0.30                                 | 4.6                                  |
| 67/07/27           | 11 30             | 37.0                                 | 8.6                                    | 1.80                                | 0.40                                 | 2                               | 34                                  | 0.50                                 | 5.0                                  |
| 67/09/08           | 12 00             | 52.0                                 | 11.0                                   | 2.80                                | 1.30                                 | 1                               | 71                                  | 1.30                                 | 6.1                                  |
| 67/10/11           | 12 00             | 67.0                                 | 13.0                                   | 3.10                                | 1.00                                 | 2                               | 94                                  | 0.50                                 | 6.2                                  |
| 67/11/07           | 14 00             | 43.0                                 | 12.0                                   | 2.80                                | 0.80                                 | 2                               | 38                                  | 0.20                                 | 5.9                                  |
| 67/12/19           | 12 50             | 85.0                                 | 15.0                                   | 3.60                                | 1.20                                 | 2                               | 138                                 | 0.20                                 | 8.5                                  |
| 68/03/19           | 15 15             | 76.0                                 | 13.0                                   | 4.40                                | 0.80                                 | 2                               | 115                                 | 3.40                                 | 6.6                                  |
| 68/04/22           | 17 15             | 76.0                                 | 14.0                                   | 3.40                                | 1.00                                 | 2                               | 125                                 | 2.30                                 | 6.3                                  |
| 68/05/22           | 17 50             | 32.0                                 | 6.4                                    | 1.60                                | 0.60                                 | 1                               | 28                                  | 0.60                                 | 7.4                                  |
| 68/06/17           | 12 00             | 34.0                                 | 7.5                                    | 1.40                                | 0.80                                 | 1                               | 29                                  | 0.60                                 | 5.3                                  |
| 68/07/24           | 14 15             | 31.0                                 | 7.9                                    | 1.70                                | 0.40                                 | 2                               | 23                                  | 0.30                                 | 5.3                                  |
| 68/08/29           | 12 00             | 47.0                                 | 9.9                                    | 2.50                                | 0.40                                 | 2                               | 62                                  | 0.90                                 | 5.0                                  |
| 68/10/04           | 16 15             | 41.0                                 | 10.0                                   | 2.40                                | 0.40                                 | 2                               | 37                                  | 1.10                                 | 6.0                                  |
| 68/11/06           | 15 30             | 39.0                                 | 11.0                                   | 2.60                                | 1.00                                 | 2                               | 32                                  | 0.90                                 | 5.4                                  |
| 68/12/02           | 16 00             | 38.0                                 | 12.0                                   | 3.20                                | 0.60                                 | 2                               | 38                                  | 0.90                                 | 6.5                                  |
| 69/01/06           | 13 30             | 46.0                                 | 14.0                                   | 3.40                                | 0.80                                 | 3                               | 43                                  | 0.90                                 | 7.7                                  |
| 69/02/07           | 15 00             | 45.0                                 | 13.0                                   | 3.60                                | 0.80                                 | 3                               | 45                                  | 0.90                                 | 7.1                                  |
| 69/03/06           | 13 45             | 46.0                                 | 14.0                                   | 3.80                                | 1.00                                 | 2                               | 45                                  | 1.20                                 | 6.9                                  |
| 69/04/01           | 13 15             | 48.0                                 | 13.0                                   | 4.20                                | 1.10                                 | 3                               | 47                                  | 1.10                                 | 6.6                                  |
| 69/05/02           | 11 45             | 34.0                                 | 9.2                                    | 2.10                                | 0.60                                 | 1                               | 23                                  | 0.30                                 | 5.8                                  |
| 69/06/09           | 13 00             | 31.0                                 | 6.3                                    | 1.10                                | 0.90                                 | 1                               | 12                                  | 0.30                                 | 4.1                                  |
| 69/07/09           | 14 00             | 31.0                                 | 8.6                                    | 1.60                                | 0.50                                 | 2                               | 20                                  | 0.30                                 | 4.5                                  |
| 69/08/07           | 15 00             | 35.0                                 | 11.0                                   | 2.90                                | 1.10                                 | 2                               | 26                                  | 0.00                                 | 4.9                                  |
| 69/09/04           | 12 30             | 40.0                                 | 13.0                                   | 4.20                                | 0.90                                 | 3                               | 31                                  | 0.20                                 | 5.0                                  |
| 69/10/16           | 09 30             | 41.0                                 | 12.0                                   | 3.70                                | 1.00                                 | 3                               | 34                                  | 0.60                                 | 5.8                                  |
| 69/11/05           | 14 15             | 42.0                                 | 13.0                                   | 4.20                                | 1.00                                 | 3                               | 39                                  | 0.60                                 | 7.2                                  |
| 69/12/01           | 13 00             | 47.0                                 | 14.0                                   | 4.40                                | 1.40                                 | 3                               | 43                                  | 0.80                                 | 6.7                                  |
| 70/01/05           | 15 00             | 51.0                                 | 16.0                                   | 5.80                                | 0.90                                 | 4                               | 46                                  | 0.70                                 | 7.0                                  |
| 70/02/02           | 10 30             | 48.0                                 | 14.0                                   | 5.60                                | 0.90                                 | 5                               | 48                                  | 0.70                                 | 6.8                                  |
| 70/03/05           | 13 40             | 49.0                                 | 15.0                                   | 5.50                                | 1.10                                 | 4                               | 49                                  | 1.00                                 | 7.7                                  |
| 70/04/08           | 12 30             | 47.0                                 | 13.0                                   | 4.40                                | 0.90                                 | 3                               | 47                                  | 0.70                                 | 5.8                                  |
| 70/05/08           | 12 30             | 32.0                                 | 8.5                                    | 2.50                                | 1.00                                 | 2                               | 22                                  | 0.50                                 | 4.0                                  |
| 70/06/03           | 12 30             | 27.0                                 | 7.1                                    | 2.00                                | 0.60                                 | 2                               | 16                                  | 0.30                                 | 3.3                                  |
| 70/07/07           | 10 00             | 30.0                                 | 8.0                                    | 2.10                                | 0.60                                 | 2                               | 19                                  | 0.20                                 | 4.1                                  |
| 70/08/05           | 13 30             | 36.0                                 | 10.0                                   | 3.20                                | 0.60                                 | 2                               | 25                                  | 0.40                                 | 1.3                                  |
| 70/09/02           | 11 15             | 39.0                                 | 11.0                                   | 3.00                                | 0.70                                 | 2                               | 30                                  | 0.90                                 | 3.3                                  |
| 70/10/22           | 17 15             | 44.0                                 | 12.0                                   | 4.40                                | 0.80                                 | 4                               | 42                                  | 0.80                                 | 6.6                                  |
| 70/11/13           | 14 00             | 42.0                                 | 12.0                                   | 4.30                                | 0.80                                 | 5                               | 42                                  | 1.00                                 | 5.7                                  |
| 70/12/08           | 11 00             | 45.0                                 | 13.0                                   | 6.00                                | 0.90                                 | 4                               | 43                                  | 0.90                                 | 7.4                                  |
| 71/01/18           | 11 30             | 50.0                                 | 14.0                                   | 5.20                                | 0.70                                 | 5                               | 47                                  | 1.00                                 | 6.2                                  |
| 71/02/18           | 12 00             | 44.0                                 | 13.0                                   | 4.10                                | 0.70                                 | 3                               | 38                                  | 1.20                                 | 7.0                                  |
| 71/03/17           | 10 30             | 48.0                                 | 14.0                                   | 6.30                                | 1.20                                 | 6                               | 46                                  | 1.60                                 | 6.1                                  |
| 71/04/14           | 09 00             | 44.0                                 | 13.0                                   | 4.00                                | 0.90                                 | 3                               | 39                                  | 1.20                                 | 5.9                                  |
| 71/05/20           | 12 00             | 31.0                                 | 8.6                                    | 1.90                                | 0.50                                 | 2                               | 17                                  | 0.30                                 | 6.1                                  |
| 71/06/09           | 10 30             | 28.0                                 | 6.3                                    | 1.10                                | 0.20                                 | 1                               | 12                                  | 0.20                                 | 4.8                                  |
| 71/07/15           | 10 30             | 28.0                                 | 7.4                                    | 1.90                                | 0.40                                 | 3                               | 15                                  | 0.10                                 | 4.4                                  |
| 71/08/10           | 10 30             | 29.0                                 | 6.6                                    | 3.50                                | 0.50                                 | 2                               | 19                                  | 0.40                                 | 3.6                                  |
| 71/09/07           | 08 00             | 35.0                                 | 10.0                                   | 3.10                                | 0.70                                 | 3                               | 28                                  | 0.60                                 | 4.8                                  |
| 71/10/14           | 12 00             | 40.0                                 | 12.0                                   | 4.10                                | 0.50                                 | 4                               | 37                                  | 0.90                                 | 5.8                                  |
| 71/11/11           | 10 00             | 43.0                                 | 13.0                                   | 4.50                                | 0.80                                 | 4                               | 51                                  | 1.00                                 | 6.0                                  |
| 71/12/16           | 12 30             | 49.0                                 | 14.0                                   | 5.20                                | 1.10                                 | 7                               | 42                                  | 1.00                                 | 6.9                                  |
| 72/01/10           | 10 30             | 47.0                                 | 14.0                                   | 5.20                                | 0.70                                 | 4                               | 43                                  | 1.20                                 | 7.0                                  |
| 72/02/07           | 10 30             | 47.0                                 | 14.0                                   | 5.40                                | 0.70                                 | 6                               | 50                                  | 1.10                                 | 7.2                                  |
| 72/03/14           | 09 00             | 44.0                                 | 12.0                                   | 4.20                                | 0.80                                 | 4                               | 36                                  | 1.20                                 | 7.7                                  |

TABLE 36.5 CHEMICAL DATA

KOOTENAI RIVER NEAR REEFORD, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01000<br>ARSENIC<br>AS, DISS<br>UG/L | 01002<br>ARSENIC<br>AS, TOT<br>UG/L | 01005<br>MARIUM<br>MA, DISS<br>UG/L | 01010<br>BERYLLIUM<br>BE, DISS<br>UG | 01020<br>BORON<br>B, DISS<br>UG/L | 01022<br>BORON<br>B, TOT<br>UG/L | 01025<br>CADMIUM<br>CD, DISS<br>UG/L | 01027<br>CADMIUM<br>CD, TOT<br>UG/L | 01030<br>CHROMIUM<br>CR, DISS<br>UG/L | 01032<br>CHROMIUM<br>CR, VAL<br>UG/L |
|--------------------|-------------------|--------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|--------------------------------------|
| 69/06/29           | 18 00             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 67/07/27           | 11 30             |                                      |                                     |                                     |                                      | 20                                |                                  |                                      |                                     |                                       |                                      |
| 67/09/08           | 12 00             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 67/10/11           | 12 00             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 67/11/07           | 14 00             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 67/12/19           | 12 50             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 68/03/19           | 15 15             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 68/04/22           | 17 15             |                                      |                                     |                                     |                                      | 40                                |                                  |                                      |                                     |                                       |                                      |
| 68/05/22           | 17 50             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 68/06/17           | 12 00             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 68/07/24           | 14 15             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 68/08/29           | 12 00             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 68/10/04           | 16 15             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 68/11/06           | 15 30             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 68/12/02           | 16 00             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 69/01/06           | 13 30             |                                      |                                     |                                     |                                      | 60                                |                                  |                                      |                                     |                                       |                                      |
| 69/02/07           | 15 00             |                                      |                                     |                                     |                                      | 50                                |                                  |                                      |                                     |                                       |                                      |
| 69/03/06           | 13 45             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 69/04/01           | 13 15             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 69/05/02           | 11 45             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 69/06/09           | 14 15             |                                      |                                     |                                     |                                      | 20                                |                                  |                                      |                                     |                                       |                                      |
| 69/07/09           | 14 00             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 69/08/07           | 15 00             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 69/09/04           | 12 30             |                                      |                                     |                                     |                                      | 0                                 |                                  |                                      |                                     |                                       |                                      |
| 69/10/16           | 09 30             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 69/11/05           | 14 15             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 69/12/01           | 13 00             |                                      |                                     |                                     |                                      | 31                                |                                  |                                      |                                     |                                       |                                      |
| 70/01/05           | 15 00             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 70/02/02           | 10 30             |                                      |                                     |                                     |                                      | 17                                |                                  |                                      |                                     |                                       |                                      |
| 70/03/05           | 13 40             |                                      |                                     |                                     |                                      | 16                                |                                  |                                      |                                     |                                       |                                      |
| 70/04/08           | 12 30             |                                      |                                     |                                     |                                      | 11                                |                                  |                                      |                                     |                                       |                                      |
| 70/05/08           | 12 30             |                                      |                                     |                                     |                                      | 10                                |                                  |                                      |                                     |                                       |                                      |
| 70/06/03           | 12 30             |                                      |                                     |                                     |                                      | 45                                |                                  |                                      |                                     |                                       |                                      |
| 70/07/07           | 10 00             |                                      |                                     |                                     |                                      | 21                                |                                  |                                      |                                     |                                       |                                      |
| 70/08/05           | 13 30             |                                      |                                     |                                     |                                      | 40                                |                                  |                                      |                                     |                                       |                                      |
| 70/09/02           | 11 15             | 10                                   |                                     | 0                                   | 0.00                                 | 102                               |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 70/10/22           | 17 15             | 0                                    |                                     | 0                                   | 0.00                                 | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 70/11/13           | 14 00             | 10                                   |                                     | 0                                   | 0.00                                 | 50                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 70/12/08           | 11 00             | 10                                   |                                     | 0                                   | 0.00                                 | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/01/18           | 11 30             | 10                                   |                                     | 0                                   | 0.00                                 | 20                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/02/18           | 12 00             | 10                                   |                                     | 320                                 | 10.00                                | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/03/17           | 10 30             | 10                                   |                                     | 130                                 | 2.00                                 | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/04/14           | 09 00             | 0                                    |                                     | 300                                 | 2.00                                 | 10                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/05/20           | 12 00             | 0                                    |                                     | 100                                 | 0.00                                 | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/06/09           | 10 30             | 0                                    |                                     | 0                                   | 0.00                                 | 30                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/07/15           | 10 30             | 0                                    |                                     | 100                                 | 0.00                                 | 10                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/08/10           | 10 30             | 0                                    |                                     | 100                                 | 0.00                                 | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/09/07           | 08 00             | 0                                    |                                     | 50                                  | 0.00                                 | 10                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/10/14           | 12 00             | 0                                    |                                     | 300                                 | 10.00                                | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/11/11           | 10 00             | 1                                    |                                     | 100                                 | 0.00                                 | 0                                 |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 71/12/16           | 12 30             | 8                                    |                                     | 0                                   | 0.00                                 | 20                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 72/01/10           | 10 30             | 5                                    |                                     | 0                                   | 0.00                                 | 18                                |                                  | 1                                    |                                     | 0                                     | 0                                    |
| 72/02/07           | 10 30             | 0                                    |                                     | 0                                   | 0.00                                 | 20                                |                                  | 0                                    |                                     | 0                                     | 0                                    |
| 72/03/14           | 09 00             | 2                                    |                                     | 0                                   | 0.00                                 | 20                                |                                  | 0                                    |                                     | 0                                     | 0                                    |

**MOOTILAI RIVER NEAR REXFORD, MONT.**

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TABLE 36.7 CHEMICAL DATA

KOOTENAI RIVER NEAR REXFORD, MONTANA

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01060<br>MOLY<br>MO, DISS<br>UG/L | 01065<br>NICKEL<br>NI, DISS<br>UG/L | 01075<br>SILVER<br>AG, DISS<br>UG/L | 01080<br>STRONTIUM<br>SR, DISS<br>UG/L | 01082<br>STRONTIUM<br>SR, TOT<br>UG/L | 01085<br>VANADIUM<br>V, DISS<br>UG/L | 01090<br>ZINC<br>ZN, DISS<br>UG/L | 01092<br>ZINC<br>ZN, TOT<br>UG/L |
|--------------------|-------------------|-----------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|
| 70/10/22           | 17 15             | 0                                 | 1                                   | 0.0                                 | 220                                    |                                       | 0.2                                  | 40                                |                                  |
| 70/11/13           | 14 00             | 1                                 | 1                                   | 1.0                                 | 220                                    |                                       | 0                                    | 40                                |                                  |
| 70/12/08           | 11 00             | 2                                 | 0                                   | 1.0                                 | 230                                    |                                       | 0                                    | 60                                |                                  |
| 71/01/18           | 11 30             | 0                                 | 1                                   | 0.0                                 | 180                                    |                                       | 0                                    | 60                                |                                  |
| 71/02/18           | 12 00             | 0                                 | 0                                   | 1.0                                 | 240                                    |                                       | 1                                    | 73                                |                                  |
| 71/03/17           | 10 30             | 12                                | 3                                   | 1.0                                 | 300                                    |                                       | 1                                    | 78                                |                                  |
| 71/04/14           | 09 00             | 0                                 | 0                                   | 1.0                                 | 270                                    |                                       | 0                                    | 30                                |                                  |
| 71/05/20           | 12 00             | 0                                 | 0                                   | 0.0                                 | 160                                    |                                       | 0                                    | 20                                | 30                               |
| 71/06/09           | 10 30             | 0                                 | 0                                   | 0.0                                 | 30                                     |                                       | 0                                    | 0                                 | < 10                             |
| 71/07/15           | 10 30             | 4                                 | 3                                   | 0.0                                 | 140                                    |                                       | 0                                    | 8                                 | < 10                             |
| 71/08/10           | 10 30             | 0                                 | 14                                  | 0.0                                 | 110                                    |                                       | 0                                    | 10                                |                                  |
| 71/09/07           | 08 00             | 3                                 | 2                                   | 0.0                                 | 180                                    |                                       | 0.3                                  | 30                                |                                  |
| 71/10/14           | 12 00             | 6                                 | 3                                   | 0.0                                 | 220                                    |                                       | 0                                    | 10                                |                                  |
| 71/11/11           | 10 00             | 0                                 | 0                                   | 0.0                                 | 190                                    |                                       | 0                                    | 50                                |                                  |
| 71/12/16           | 12 30             | 2                                 | 15                                  | 0.0                                 | 280                                    |                                       | 0.4                                  | 20                                |                                  |
| 72/01/10           | 10 30             | 0                                 | 5                                   | 0.0                                 | 280                                    |                                       | 0.5                                  | 30                                |                                  |
| 72/02/07           | 10 30             | 2                                 | 4                                   | 0.0                                 | 240                                    |                                       | 0                                    | 30                                |                                  |
| 72/03/14           | 09 00             | 0                                 | 3                                   | 1.0                                 | 50                                     |                                       | 1                                    | 20                                |                                  |

TABLE 36.8 CHEMICAL DATA

KOOTENAI RIVER NEAR REXFORD, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01106<br>ALUMINUM<br>AL, DISS<br>UG/L | 01130<br>LITHIUM<br>LI, DISS<br>UG/L | 01145<br>SELENIUM<br>SE, DISS<br>UG/L | 31501<br>TOT COLI<br>MPN/100 ML | 31503<br>TOT COLI<br>MPN/100 ML | 71890<br>MERCURY<br>HG, DISS<br>UG/L | 71900<br>MERCURY<br>HG, TOTAL<br>UG/L | 31503<br>TOT COLI<br>MPN/100 ML | 31616<br>FEC COLI<br>MPN-FCB<br>/100 ML | 38260<br>NRAS<br>MG/L |
|--------------------|-------------------|---------------------------------------|--------------------------------------|---------------------------------------|---------------------------------|---------------------------------|--------------------------------------|---------------------------------------|---------------------------------|-----------------------------------------|-----------------------|
| 70/10/22           | 17 15             | 100                                   | 0                                    |                                       |                                 |                                 | 0.0                                  |                                       |                                 |                                         | 0.00                  |
| 70/11/13           | 14 00             | 100                                   | 0                                    |                                       |                                 |                                 | 0.0                                  |                                       |                                 |                                         | 0.01                  |
| 70/12/08           | 11 00             | 100                                   | 0                                    |                                       |                                 |                                 | 0.0                                  | 0.0                                   |                                 |                                         | 0.01                  |
| 71/01/18           | 11 30             | 200                                   | 0                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                         | 0.07                  |
| 71/02/18           | 12 00             | 400                                   | 10                                   |                                       |                                 |                                 | 0.0                                  |                                       |                                 |                                         | 0.00                  |
| 71/03/17           | 10 30             | 100                                   | 0                                    |                                       |                                 |                                 | 0.1                                  |                                       |                                 |                                         | 0.00                  |
| 71/04/14           | 09 00             | 300                                   | 13                                   |                                       |                                 |                                 | 0.1                                  |                                       |                                 |                                         | 0.00                  |
| 71/05/20           | 12 00             | 300                                   | 16                                   |                                       |                                 |                                 | 0.3                                  | < 0.5                                 |                                 |                                         | 0.00                  |
| 71/06/09           | 10 30             | 400                                   | 0                                    |                                       |                                 |                                 | 0.0                                  |                                       |                                 |                                         | 0.00                  |
| 71/07/15           | 10 30             | 300                                   | 25                                   |                                       |                                 |                                 | 0.3                                  | < 0.5                                 |                                 |                                         | 0.00                  |
| 71/08/10           | 10 30             | 100                                   | 0                                    |                                       |                                 |                                 | 0.0                                  |                                       |                                 |                                         | 0.00                  |
| 71/09/07           | 08 00             | 200                                   | 10                                   |                                       |                                 |                                 | 0.0                                  |                                       |                                 |                                         | 0.00                  |
| 71/10/14           | 12 00             | 100                                   | 10                                   |                                       |                                 |                                 | 0.1                                  |                                       |                                 |                                         | 0.00                  |
| 71/11/11           | 10 00             | 0                                     | 0                                    |                                       |                                 |                                 | 0.2                                  |                                       |                                 |                                         | 0.00                  |
| 71/12/16           | 12 30             | 0                                     | 0                                    |                                       |                                 |                                 | 0.2                                  |                                       |                                 |                                         | 0.00                  |
| 72/01/10           | 10 30             | 100                                   | 0                                    |                                       |                                 |                                 | 0.2                                  |                                       |                                 |                                         | 0.00                  |
| 72/02/07           | 10 30             | 0                                     | 0                                    |                                       |                                 |                                 | 0.3                                  |                                       |                                 |                                         | 0.00                  |
| 72/03/14           | 09 00             | 0                                     | 10                                   |                                       |                                 |                                 | 0.3                                  |                                       |                                 |                                         | 0.00                  |

TABLE 37.1 CHEMICAL DATA

## KOOTENAI RIVER BELOW LIBBY DAM

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00010<br>WATER<br>TEMP<br>CENT | 00060<br>STREAM<br>FLOW<br>CFS | 00070<br>TURB<br>JESN<br>JTU | 00080<br>COLOR<br>PT-CO<br>UNITS | 00095<br>CONDUCTIVITY<br>AT 25C<br>MICROHMO | 00300<br>DO<br>MG/L | 00301<br>DO<br>SATUR<br>PERCENT | 00310<br>BOD<br>5 DAY<br>MG/L | 00400<br>PH<br>SU | 00405<br>CO2<br>MG/L |
|--------------------|-------------------|--------------------------------|--------------------------------|------------------------------|----------------------------------|---------------------------------------------|---------------------|---------------------------------|-------------------------------|-------------------|----------------------|
| 67/06/29           | 09 15             | 12.2                           | 56800                          |                              | 5                                | 208                                         |                     |                                 |                               | 7.70              |                      |
| 67/07/26           | 16 30             |                                | 18200                          |                              | 3                                | 266                                         |                     |                                 |                               | 7.10              |                      |
| 67/09/07           | 14 30             | 16.1                           | 6930                           |                              | 2                                | 356                                         | 11.0                |                                 |                               | 7.20              |                      |
| 67/10/11           | 08 00             | 11.0                           | 4790                           |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 67/11/07           | 10 30             | 1.0                            | 4330                           |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 67/12/15           | 15 00             |                                | 1950                           |                              | 6                                | 511                                         |                     |                                 |                               | 7.60              |                      |
| 68/01/24           | 13 05             | 0.0                            | 4100                           |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 68/03/07           | 17 30             | 4.0                            | 4330                           |                              | 4                                | 448                                         |                     |                                 |                               | 7.80              |                      |
| 68/04/24           | 18 40             | 8.0                            | 3690                           |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 68/05/27           | 15 30             | 10.0                           | 37200                          |                              | 10                               | 230                                         |                     |                                 |                               | 7.60              |                      |
| 68/06/17           | 18 15             | 12.0                           | 31000                          |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 68/07/23           | 15 30             |                                | 17500                          |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 68/08/28           | 16 00             | 15.0                           | 8300                           |                              | 1                                | 339                                         |                     |                                 |                               | 7.80              |                      |
| 68/10/01           | 18 15             | 12.0                           | 8260                           |                              |                                  |                                             |                     |                                 |                               |                   |                      |
| 68/12/05           | 14 15             | 1.0                            | 4650                           |                              | 3                                | 309                                         |                     |                                 |                               | 7.60              |                      |
| 69/02/04           | 15 30             | 0.0                            | 2900                           |                              | 1                                | 331                                         |                     |                                 |                               | 8.00              |                      |
| 69/03/04           | 16 00             | 0.0                            | 2700                           |                              | 2                                | 335                                         |                     |                                 |                               | 7.90              |                      |
| 69/04/03           | 13 15             | 7.0                            | 7500                           |                              | 3                                | 297                                         | 11.0                |                                 |                               | 7.70              |                      |
| 69/05/07           | 18 00             | 9.0                            | 20900                          |                              | 7                                | 232                                         |                     |                                 |                               | 8.20              |                      |
| 69/06/05           | 11 15             | 12.0                           | 61000                          |                              | 3                                | 199                                         |                     |                                 |                               | 7.80              |                      |
| 69/07/08           | 09 30             | 12.0                           | 33500                          |                              | 3                                | 233                                         |                     |                                 |                               | 7.40              |                      |
| 69/08/04           | 18 45             | 18.0                           | 11800                          |                              | 4                                | 269                                         |                     |                                 |                               | 7.70              |                      |
| 69/09/02           | 17 15             | 16.0                           | 6400                           |                              | 5                                | 303                                         |                     |                                 |                               | 8.00              |                      |
| 69/10/15           | 10 00             | 5.0                            | 5550                           | 1.0                          | 5                                | 303                                         | 11.6                | 98                              |                               | 8.20              |                      |
| 69/11/04           | 16 30             | 5.5                            | 4340                           | 2.0                          | 1                                | 321                                         | 11.6                | 100                             |                               | 8.10              |                      |
| 69/12/02           | 14 30             | 0.0                            | 3000                           | 2.0                          | 4                                | 351                                         | 13.6                | 101                             |                               | 7.40              |                      |
| 70/01/12           | 15 00             | 0.0                            | 2300                           | 2.0                          | 5                                | 373                                         | 12.6                | 93                              |                               | 8.00              |                      |
| 70/02/04           | 14 30             | 0.0                            | 2700                           | 1.0                          | 3                                | 340                                         | 12.8                | 95                              |                               | 7.40              |                      |
| 70/03/04           | 14 15             | 0.0                            | 2400                           | 1.0                          | 2                                | 372                                         | 13.4                | 99                              |                               | 8.00              |                      |
| 70/04/06           | 14 00             | 8.0                            | 3080                           | 2.0                          | 10                               | 362                                         | 11.4                | 104                             |                               | 8.30              |                      |
| 70/05/06           | 14 30             | 12.0                           | 10800                          | 32.0                         | 15                               | 245                                         | 9.3                 | 94                              |                               | 7.70              |                      |
| 70/06/04           | 18 00             | 10.5                           | 40700                          | 58.0                         | 10                               | 190                                         | 9.2                 | 89                              |                               | 7.40              |                      |
| 70/07/06           | 13 00             | 18.0                           | 18100                          | 3.0                          | 10                               | 224                                         | 8.4                 | 96                              |                               | 8.00              |                      |
| 70/08/04           | 14 15             | 18.0                           | 8650                           | 2.0                          | 2                                | 262                                         | 9.4                 | 108                             |                               | 8.10              |                      |
| 70/09/01           | 13 30             | 18.0                           | 5340                           | 2.0                          | 2                                | 277                                         | 9.0                 | 103                             |                               | 8.00              |                      |
| 70/10/22           | 14 30             | 6.0                            | 4220                           | 2.0                          | 2                                | 345                                         | 11.2                | 97                              |                               | 7.50              | 6.9                  |
| 70/11/16           | 12 45             | 3.5                            | 3470                           | 2.0                          | 2                                | 355                                         | 12.3                | 99                              |                               | 7.60              | 5.6                  |
| 70/12/07           | 15 30             | 0.0                            | 2950                           | 1.0                          | 3                                |                                             | 13.7                | 102                             |                               | 7.20              | 16.0                 |
| 71/01/19           | 09 30             | 0.0                            | 2700                           | 1.0                          | 3                                |                                             | 11.7                | 87                              |                               | 7.20              | 15.0                 |
| 71/02/19           | 13 00             | 0.5                            | 4900                           | 15.0                         | 1                                | 290                                         | 12.7                | 95                              |                               | 7.90              | 2.7                  |
| 71/03/18           | 10 00             | 2.0                            | 3100                           | 2.0                          | 0                                | 360                                         | 12.5                | 98                              |                               | 8.20              | 1.4                  |
| 71/04/15           | 13 00             | 8.0                            | 6000                           | 5.0                          | 5                                | 315                                         | 11.8                | 108                             |                               | 8.10              | 1.8                  |
| 71/05/19           | 12 00             | 7.5                            | 31000                          | 25.0                         | 10                               | 230                                         | 12.6                | 114                             |                               | 7.70              | 3.6                  |
| 71/06/10           | 10 30             | 8.5                            | 62000                          | 75.0                         | 20                               | 210                                         | 12.4                | 115                             |                               | 7.80              | 2.7                  |
| 71/07/14           | 12 00             | 12.5                           | 26800                          | 15.0                         | 4                                | 210                                         | 10.8                | 109                             |                               | 8.00              | 1.6                  |
| 71/08/11           | 11 00             | 19.0                           | 14300                          | 2.0                          | 5                                | 240                                         | 10.2                | 119                             |                               | 8.20              | 1.1                  |
| 71/09/08           | 12 30             | 12.5                           | 7100                           | 10.0                         | 10                               | 290                                         | 10.8                | 110                             |                               | 8.20              | 1.4                  |
| 71/10/15           | 11 00             | 7.0                            | 5580                           | 3.0                          | 5                                | 315                                         | 12.0                | 107                             |                               | 7.80              | 3.5                  |
| 71/11/12           | 12 00             | 2.5                            | 4600                           | 2.0                          | 5                                | 340                                         | 14.0                | 111                             |                               | 7.70              | 4.5                  |
| 71/12/17           | 10 30             | 0.0                            | 2600                           | 3.0                          | 5                                | 360                                         | 14.6                | 108                             |                               | 7.90              | 3.5                  |
| 72/01/05           | 12 00             | 0.0                            | 2900                           | 2.0                          | 0                                | 355                                         | 14.4                | 107                             |                               | 7.90              | 3.3                  |
| 72/02/08           | 16 00             | 0.0                            | 3000                           | 2.0                          | 3                                | 370                                         | 13.8                | 102                             |                               | 7.90              | 3.3                  |
| 72/03/13           | 12 00             | 3.5                            | 4510                           | 10.0                         | 5                                | 305                                         | 14.0                | 114                             |                               | 8.10              | 1.8                  |
| 72/03/20           | 13 30             | 5.0                            | 6740                           | 25.0                         | 40                               | 265                                         | 13.8                | 117                             |                               | 7.90              | 2.4                  |
| 72/03/27           | 10 30             | 5.0                            | 2060                           | 15.0                         | 40                               | 240                                         | 13.2                | 112                             |                               | 7.90              | 2.6                  |

TABLE 37.2 CHEMICAL DATA

## KOOTENAI RIVER BELOW LIBBY DAM

| DATE FROM TO | TIME OF DAY | 70300<br>RESIDUE<br>DISS-180<br>C MG/L | 70301<br>DISS SOL<br>SUM<br>MG/L | 00410<br>T A.L.F.<br>CACO3<br>MG/L | 00440<br>HCO3 ION<br>MG/L | 00445<br>CO3 ION<br>MG/L | 00900<br>TOT HARD<br>CACO3<br>MG/L | 00902<br>NC HARD<br>CACO3<br>MG/L |
|--------------|-------------|----------------------------------------|----------------------------------|------------------------------------|---------------------------|--------------------------|------------------------------------|-----------------------------------|
| 67/06/29     | 09 15       | 122                                    | 116                              |                                    | 108                       | 0                        | 107                                | 18                                |
| 67/07/26     | 16 30       | 158                                    | 150                              |                                    | 114                       | 0                        | 128                                | 34                                |
| 67/09/07     | 14 30       | 216                                    | 213                              |                                    | 136                       | 0                        | 177                                | 65                                |
| 67/12/15     | 15 00       | 338                                    | 327                              |                                    | 164                       | 0                        | 263                                | 128                               |
| 68/03/07     | 17 30       | 308                                    | 283                              |                                    | 138                       | 0                        | 228                                | 114                               |
| 68/05/27     | 15 30       | 132                                    | 131                              |                                    | 110                       | 0                        | 112                                | 22                                |
| 68/08/28     | 16 00       | 220                                    | 197                              |                                    | 127                       | 0                        | 165                                | 61                                |
| 68/12/05     | 14 15       | 171                                    | 176                              |                                    | 148                       | 0                        | 155                                | 33                                |
| 69/02/04     | 15 30       | 208                                    | 197                              |                                    | 158                       | 0                        | 169                                | 40                                |
| 69/03/04     | 16 00       | 211                                    | 198                              |                                    | 160                       | 0                        | 169                                | 38                                |
| 69/04/03     | 13 15       | 183                                    | 173                              |                                    | 139                       | 0                        | 144                                | 30                                |
| 69/05/07     | 18 00       | 149                                    | 132                              |                                    | 119                       | 0                        | 121                                | 23                                |
| 69/06/05     | 11 15       | 151                                    | 113                              |                                    | 119                       | 0                        | 101                                | 3                                 |
| 69/07/08     | 09 30       | 133                                    | 135                              |                                    | 132                       | 0                        | 124                                | 16                                |
| 69/08/04     | 18 45       | 161                                    | 152                              |                                    | 138                       | 0                        | 131                                | 17                                |
| 69/09/02     | 17 15       | 174                                    | 167                              |                                    | 153                       | 0                        | 145                                | 19                                |
| 69/10/15     | 10 00       | 178                                    | 173                              |                                    | 150                       | 0                        | 154                                | 31                                |
| 69/11/04     | 16 30       | 200                                    | 181                              |                                    | 148                       | 0                        | 154                                | 32                                |
| 69/12/02     | 14 30       | 208                                    | 205                              |                                    | 170                       | 0                        | 175                                | 36                                |
| 70/01/12     | 15 00       | 226                                    | 219                              |                                    | 182                       | 0                        | 184                                | 35                                |
| 70/02/04     | 14 30       | 209                                    | 209                              |                                    | 165                       | 0                        | 176                                | 41                                |
| 70/03/04     | 14 15       | 222                                    | 219                              |                                    | 165                       | 0                        | 184                                | 49                                |
| 70/04/06     | 14 00       | 222                                    | 203                              |                                    | 160                       | 0                        | 168                                | 37                                |
| 70/05/06     | 14 30       | 152                                    | 140                              |                                    | 120                       | 0                        | 122                                | 23                                |
| 70/06/04     | 18 00       | 118                                    | 97                               |                                    | 94                        | 0                        | 82                                 | 5                                 |
| 70/07/06     | 13 00       | 139                                    | 130                              |                                    | 117                       | 0                        | 116                                | 20                                |
| 70/08/04     | 14 15       | 156                                    | 144                              |                                    | 133                       | 0                        | 130                                | 21                                |
| 70/09/01     | 13 30       | 177                                    | 156                              |                                    | 136                       | 0                        | 141                                | 30                                |
| 70/10/22     | 14 30       | 187                                    |                                  | 113                                | 138                       |                          | 160                                |                                   |
| 70/11/16     | 12 45       | 212                                    |                                  | 116                                | 141                       |                          | 160                                |                                   |
| 70/12/07     | 16 30       | 214                                    |                                  | 128                                | 156                       |                          | 170                                |                                   |
| 71/01/19     | 09 30       | 196                                    | 210                              | 121                                | 148                       | 0                        | 180                                | 50                                |
| 71/02/19     | 13 00       | 198                                    |                                  | 112                                | 137                       |                          | 150                                |                                   |
| 71/03/18     | 10 00       | 226                                    |                                  | 116                                | 141                       |                          | 170                                |                                   |
| 71/04/15     | 13 00       | 188                                    |                                  | 115                                | 140                       |                          | 150                                |                                   |
| 71/05/19     | 12 00       | 120                                    |                                  | 92                                 | 112                       | 0                        | 100                                |                                   |
| 71/06/10     | 10 30       | 122                                    |                                  | 84                                 | 109                       |                          | 91                                 |                                   |
| 71/07/14     | 12 00       | 118                                    |                                  | 84                                 | 102                       |                          | 97                                 |                                   |
| 71/08/11     | 11 00       | 132                                    |                                  | 94                                 | 115                       |                          | 110                                | 13                                |
| 71/09/08     | 12 30       | 150                                    | 156                              | 106                                | 129                       |                          | 130                                |                                   |
| 71/10/15     | 11 00       | 192                                    |                                  | 116                                | 141                       |                          | 160                                |                                   |
| 71/11/12     | 12 00       | 202                                    |                                  | 116                                | 141                       |                          | 160                                |                                   |
| 71/12/17     | 10 30       | 224                                    |                                  | 142                                | 173                       |                          | 180                                |                                   |
| 72/01/05     | 12 00       | 216                                    |                                  | 134                                | 163                       |                          | 170                                |                                   |
| 72/02/08     | 16 00       | 220                                    | 212                              | 135                                | 163                       |                          | 180                                | 45                                |
| 72/03/13     | 12 00       | 178                                    | 176                              | 115                                | 140                       |                          | 140                                | 25                                |
| 72/03/20     | 13 30       | 152                                    |                                  | 99                                 | 121                       |                          | 120                                |                                   |
| 72/03/27     | 10 30       | 158                                    | 152                              | 106                                | 129                       |                          | 130                                | 21                                |

TABLE 37.3 CHEMICAL DATA

KOOTENAI RIVER BELOW LIBBY DAM

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00600<br>TOTAL N<br>M<br>MG/L | 00605<br>ORG N<br>M<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00613<br>NO2-N<br>DISS<br>MG/L | 00618<br>NO3-N<br>DISS<br>MG/L | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00665<br>PHOS-TOT<br>MG/L P | 00666<br>PHOS-DIS<br>MG/L P | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00680<br>T ORG C<br>C<br>MG/L |
|--------------------|-------------------|-------------------------------|-----------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------------|-----------------------------|-----------------------------|--------------------------------------|-------------------------------|
| 67/09/07           | 14 30             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 67/10/11           | 08 00             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 67/11/07           | 10 30             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 67/12/15           | 15 00             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/01/24           | 13 05             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/03/07           | 17 30             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/04/24           | 18 40             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/05/21           | 21 45             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/06/17           | 18 15             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/07/23           | 15 30             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/08/28           | 16 00             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/10/01           | 18 15             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 68/12/05           | 14 15             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 69/02/04           | 15 30             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 69/03/04           | 16 00             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 69/04/03           | 13 15             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 69/05/07           | 18 00             |                               |                             |                                 |                                |                                |                                     |                             |                             |                                      |                               |
| 69/06/05           | 11 15             | 0.85                          | 0.660                       | 0.100                           |                                | 0.09                           |                                     |                             |                             | 0.390                                |                               |
| 69/07/08           | 09 30             | 0.85                          | 0.080                       | 0.760                           | 0.010                          | 0.00                           |                                     |                             |                             | 0.530                                |                               |
| 69/08/04           | 18 45             | 0.73                          | 0.360                       | 0.360                           | 0.010                          | 0.00                           |                                     |                             |                             | 0.080                                |                               |
| 69/09/02           | 17 15             | 0.49                          | 0.080                       | 0.400                           | 0.010                          | 0.00                           |                                     |                             |                             | 0.080                                |                               |
| 69/10/15           | 10 00             | 0.24                          | 0.160                       | 0.030                           | 0.000                          | 0.05                           |                                     |                             |                             | 0.490                                |                               |
| 69/11/04           | 16 30             | 0.21                          | 0.100                       | 0.050                           | 0.000                          | 0.06                           |                                     | 0.190                       | 0.090                       | 0.030                                |                               |
| 69/12/02           | 14 30             | 0.35                          | 0.110                       | 0.060                           | 0.000                          | 0.18                           |                                     | 0.550                       | 0.220                       | 0.120                                |                               |
| 70/01/12           | 15 00             | 0.47                          | 0.080                       | 0.110                           | 0.000                          | 0.28                           |                                     | 0.270                       | 0.250                       | 0.160                                |                               |
| 70/02/04           | 14 30             | 0.39                          | 0.080                       | 0.060                           | 0.000                          | 0.25                           |                                     | 0.080                       | 0.040                       | 0.070                                |                               |
| 70/03/04           | 14 15             | 0.41                          | 0.070                       | 0.090                           | 0.010                          | 0.24                           |                                     | 0.180                       | 0.140                       | 0.130                                |                               |
| 70/04/06           | 14 30             | 0.29                          | 0.120                       | 0.020                           | 0.020                          | 0.13                           |                                     | 0.130                       | 0.100                       | 0.010                                |                               |
| 70/05/06           | 14 30             | 0.62                          | 0.310                       | 0.030                           | 0.110                          | 0.17                           |                                     | 0.240                       | 0.100                       | 0.090                                |                               |
| 70/06/04           | 18 00             | 0.51                          | 0.180                       | 0.080                           | 0.010                          | 0.24                           |                                     | 0.430                       | 0.040                       | 0.040                                |                               |
| 70/07/06           | 13 00             | 0.18                          | 0.120                       | 0.020                           | 0.000                          | 0.04                           |                                     | 0.130                       | 0.130                       | 0.100                                |                               |
| 70/08/04           | 14 15             | 0.10                          | 0.040                       | 0.030                           | 0.030                          | 0.00                           |                                     | 0.180                       | 0.150                       | 0.150                                |                               |
| 70/09/01           | 13 30             | 0.08                          | 0.060                       | 0.010                           | 0.000                          | 0.01                           |                                     | 0.100                       | 0.080                       | 0.080                                |                               |
| 70/10/22           | 14 30             | 0.42                          | 0.180                       | 0.060                           | 0.020                          | 0.16                           |                                     | 0.210                       | 0.160                       | 0.160                                |                               |
| 70/11/15           | 12 45             | 0.49                          | 0.150                       | 0.070                           | 0.020                          | 0.25                           |                                     | 0.270                       | 0.250                       | 0.250                                |                               |
| 70/12/07           | 15 30             | 0.65                          | 0.110                       | 0.200                           | 0.020                          | 0.32                           |                                     | 0.350                       | 0.370                       | 0.370                                |                               |
| 71/01/19           | 09 30             | 0.09                          | 0.000                       | 0.000                           | 0.000                          | 0.09                           | 0.1                                 |                             | 0.000                       | 0.000                                | 3.0                           |
| 71/02/19           | 13 00             | 0.12                          | 0.000                       | 0.010                           | 0.010                          | 0.10                           | 0.1                                 | 0.230                       | 0.100                       | 0.100                                | 16.0                          |
| 71/03/18           | 10 00             | 0.53                          | 0.070                       | 0.360                           | 0.000                          | 0.10                           | 0.1                                 | 0.260                       | 0.160                       | 0.160                                | 2.0                           |
| 71/04/15           | 13 00             | 0.57                          | 0.240                       | 0.230                           | 0.000                          | 0.10                           |                                     | 0.100                       | 0.050                       | 0.050                                | 5.0                           |
| 71/05/19           | 12 00             | 0.32                          | 0.180                       | 0.040                           | 0.000                          | 0.10                           | 0.1                                 | 0.230                       | 0.140                       | 0.140                                | 7.0                           |
| 71/06/10           | 10 30             | 0.37                          | 0.230                       | 0.060                           | 0.000                          | 0.08                           | 0.1                                 | 0.200                       | 0.040                       | 0.040                                | 18.0                          |
| 71/07/14           | 12 00             | 0.25                          | 0.180                       | 0.070                           | 0.000                          | 0.00                           | 0.0                                 | 0.050                       | 0.010                       | 0.010                                | 6.0                           |
| 71/08/11           | 11 00             | 0.37                          | 0.090                       | 0.250                           | 0.000                          | 0.03                           | 0.03                                | 0.080                       | 0.010                       | 0.010                                | 5.0                           |
| 71/09/08           | 12 30             | 0.27                          | 0.160                       | 0.080                           | 0.000                          | 0.03                           | 0.03                                | 0.030                       | 0.030                       | 0.030                                | 0.0                           |
| 71/10/15           | 11 00             | 0.24                          | 0.150                       | 0.000                           | 0.000                          | 0.09                           | 0.1                                 | 0.160                       | 0.010                       | 0.010                                | 3.0                           |
| 71/11/12           | 12 00             | 0.57                          | 0.230                       | 0.150                           | 0.000                          | 0.19                           | 0.2                                 | 0.040                       | 0.080                       | 0.080                                | 1.0                           |
| 71/12/17           | 10 30             | 0.47                          | 0.120                       | 0.270                           | 0.000                          | 0.22                           | 0.2                                 | 0.270                       | 0.200                       | 0.200                                |                               |
| 72/01/05           | 12 00             | 0.51                          | 0.160                       | 0.110                           | 0.000                          | 0.24                           | 0.2                                 | 0.160                       | 0.130                       | 0.130                                | 1.0                           |
| 72/02/08           | 15 00             | 0.92                          | 0.280                       | 0.050                           | 0.000                          | 0.59                           | 0.6                                 | 0.180                       | 0.120                       | 0.120                                | 3.0                           |
| 72/03/15           | 12 00             | 0.76                          | 0.210                       | 0.070                           | 0.000                          | 0.48                           | 0.5                                 | 0.140                       | 0.110                       | 0.110                                | 2.0                           |
| 72/03/20           | 13 30             | 1.10                          | 0.240                       | 0.070                           | 0.000                          | 0.79                           | 0.8                                 | 0.110                       | 0.010                       | 0.010                                | 1.0                           |
| 72/03/27           | 10 30             | 0.46                          | 0.210                       | 0.080                           | 0.000                          | 0.17                           | 0.2                                 | 0.120                       | 0.010                       | 0.010                                | 2.5                           |

TABLE 37.4 CHEMICAL DATA

## KOOTENAI RIVER BELOW LIBBY DAM

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00915<br>CALCIUM<br>CA, DISS<br>MG/L | 00925<br>MAGNESIUM<br>MG, DISS<br>MG/L | 00930<br>SODIUM<br>NA, DISS<br>MG/L | 00935<br>POTASSIUM<br>K, DISS<br>MG/L | 00940<br>CHLORIDE<br>CL<br>MG/L | 00945<br>SULFATE<br>SO4-TOT<br>MG/L | 00950<br>FLUORIDE<br>F, DISS<br>MG/L | 00955<br>SILICA<br>DISSOLVED<br>MG/L |
|--------------------|-------------------|--------------------------------------|----------------------------------------|-------------------------------------|---------------------------------------|---------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 67/06/29           | 09 15             | 32.0                                 | 6.6                                    | 1.40                                | 0.50                                  | 1                               | 17                                  | 0.50                                 | 4.3                                  |
| 67/07/26           | 16 30             | 37.0                                 | 8.7                                    | 1.60                                | 1.60                                  | 1                               | 38                                  | 0.70                                 | 5.2                                  |
| 67/09/07           | 14 30             | 53.0                                 | 11.0                                   | 2.80                                | 0.70                                  | 2                               | 68                                  | 1.30                                 | 5.8                                  |
| 67/12/15           | 15 00             | 81.0                                 | 15.0                                   | 3.80                                | 2.00                                  | 3                               | 133                                 | 2.00                                 | 7.4                                  |
| 68/03/07           | 17 30             | 71.0                                 | 12.0                                   | 3.50                                | 0.80                                  | 2                               | 114                                 | 0.90                                 | 7.8                                  |
| 68/05/27           | 15 30             | 33.0                                 | 7.1                                    | 1.50                                | 0.60                                  | 2                               | 26                                  | 0.40                                 | 6.3                                  |
| 68/08/28           | 16 00             | 49.0                                 | 10.0                                   | 2.40                                | 0.80                                  | 2                               | 64                                  | 1.20                                 | 5.1                                  |
| 68/12/05           | 14 15             | 42.0                                 | 12.0                                   | 3.00                                | 0.80                                  | 2                               | 36                                  | 0.90                                 | 6.3                                  |
| 69/02/04           | 15 30             | 46.0                                 | 13.0                                   | 3.40                                | 0.80                                  | 3                               | 44                                  | 0.90                                 | 7.5                                  |
| 69/03/04           | 16 00             | 46.0                                 | 13.0                                   | 3.50                                | 0.80                                  | 2                               | 44                                  | 1.10                                 | 7.2                                  |
| 69/04/03           | 13 15             | 40.0                                 | 11.0                                   | 3.30                                | 1.00                                  | 2                               | 38                                  | 0.80                                 | 8.3                                  |
| 69/05/07           | 18 00             | 34.0                                 | 8.8                                    | 2.50                                | 0.60                                  | 1                               | 19                                  | 0.30                                 | 7.3                                  |
| 69/06/05           | 11 15             | 30.0                                 | 6.3                                    | 1.00                                | 0.60                                  | 1                               | 12                                  | 0.20                                 | 2.8                                  |
| 69/07/08           | 09 30             | 36.0                                 | 8.4                                    | 2.10                                | 0.50                                  | 2                               | 17                                  | 0.30                                 | 4.5                                  |
| 69/08/04           | 18 45             | 35.0                                 | 11.0                                   | 2.60                                | 0.90                                  | 2                               | 27                                  | 0.20                                 | 4.8                                  |
| 69/09/02           | 17 15             | 38.0                                 | 12.0                                   | 3.30                                | 2.60                                  | 2                               | 28                                  | 0.20                                 | 5.2                                  |
| 69/10/15           | 10 00             | 39.0                                 | 14.0                                   | 3.60                                | 0.80                                  | 2                               | 34                                  | 0.70                                 | 5.2                                  |
| 69/11/04           | 16 30             | 41.0                                 | 13.0                                   | 4.50                                | 1.00                                  | 3                               | 38                                  | 0.50                                 | 6.8                                  |
| 69/12/02           | 14 30             | 47.0                                 | 14.0                                   | 4.10                                | 2.20                                  | 5                               | 41                                  | 0.70                                 | 6.7                                  |
| 70/01/12           | 15 00             | 48.0                                 | 16.0                                   | 5.90                                | 0.80                                  | 4                               | 47                                  | 0.60                                 | 7.2                                  |
| 70/02/04           | 14 30             | 48.0                                 | 14.0                                   | 5.40                                | 1.00                                  | 5                               | 46                                  | 0.80                                 | 6.7                                  |
| 70/03/04           | 14 15             | 50.0                                 | 14.0                                   | 5.40                                | 1.20                                  | 5                               | 51                                  | 1.10                                 | 7.7                                  |
| 70/04/06           | 14 00             | 45.0                                 | 14.0                                   | 6.00                                | 1.00                                  | 3                               | 48                                  | 0.90                                 | 6.0                                  |
| 70/05/06           | 14 30             | 33.0                                 | 8.7                                    | 2.90                                | 0.20                                  | 2                               | 25                                  | 0.60                                 | 5.9                                  |
| 70/06/04           | 18 00             | 23.0                                 | 6.0                                    | 1.90                                | 0.50                                  | 1                               | 13                                  | 0.20                                 | 3.0                                  |
| 70/07/06           | 13 00             | 32.0                                 | 8.8                                    | 2.40                                | 0.60                                  | 2                               | 20                                  | 0.20                                 | 4.5                                  |
| 70/08/04           | 14 15             | 36.0                                 | 9.7                                    | 2.40                                | 0.50                                  | 2                               | 26                                  | 0.50                                 | 0.8                                  |
| 70/09/01           | 13 30             | 38.0                                 | 11.0                                   | 3.00                                | 0.60                                  | 2                               | 31                                  | 0.60                                 | 2.6                                  |
| 70/10/22           | 14 30             | 43.0                                 | 12.0                                   | 4.30                                | 0.80                                  | 5                               | 41                                  | 0.90                                 | 5.1                                  |
| 70/11/16           | 12 45             | 43.0                                 | 12.0                                   | 6.90                                | 0.80                                  | 4                               | 43                                  | 0.60                                 | 5.0                                  |
| 70/12/07           | 15 30             | 46.0                                 | 13.0                                   | 5.70                                | 1.10                                  | 5                               | 46                                  | 1.10                                 | 7.5                                  |
| 71/01/19           | 09 30             | 49.0                                 | 14.0                                   | 5.20                                | 0.70                                  | 13                              | 42                                  | 0.90                                 | 6.6                                  |
| 71/02/19           | 13 00             | 42.0                                 | 12.0                                   | 4.10                                | 0.90                                  | 3                               | 35                                  | 1.10                                 | 7.0                                  |
| 71/03/18           | 10 00             | 47.0                                 | 13.0                                   | 5.90                                | 1.00                                  | 5                               | 44                                  | 1.50                                 | 5.5                                  |
| 71/04/15           | 13 00             | 40.0                                 | 12.0                                   | 3.90                                | 0.60                                  | 2                               | 34                                  | 1.10                                 | 7.1                                  |
| 71/05/19           | 12 00             | 29.0                                 | 7.9                                    | 1.80                                | 0.60                                  | 2                               | 15                                  | 0.30                                 | 6.5                                  |
| 71/06/10           | 10 30             | 26.0                                 | 6.4                                    | 0.80                                | 0.50                                  | 1                               | 11                                  | 0.20                                 | 5.0                                  |
| 71/07/14           | 12 00             | 27.0                                 | 7.2                                    | 1.50                                | 0.40                                  | 1                               | 25                                  | 0.20                                 | 4.4                                  |
| 71/08/11           | 11 00             | 31.0                                 | 8.7                                    | 2.30                                | 0.80                                  | 4                               | 21                                  | 0.50                                 | 3.4                                  |
| 71/09/08           | 12 30             | 36.0                                 | 10.0                                   | 3.20                                | 0.60                                  | 3                               | 28                                  | 0.70                                 | 4.9                                  |
| 71/10/15           | 11 00             | 41.0                                 | 13.0                                   | 4.20                                | 0.40                                  | 4                               | 35                                  | 0.90                                 | 5.5                                  |
| 71/11/12           | 12 00             | 44.0                                 | 13.0                                   | 4.40                                | 0.90                                  | 5                               | 33                                  | 0.90                                 | 5.7                                  |
| 71/12/17           | 10 30             | 49.0                                 | 14.0                                   | 5.10                                | 2.80                                  | 5                               | 42                                  | 1.00                                 | 7.0                                  |
| 72/01/05           | 12 00             | 45.0                                 | 14.0                                   | 4.40                                | 0.90                                  | 5                               | 41                                  | 1.00                                 | 7.0                                  |
| 72/02/08           | 16 00             | 48.0                                 | 15.0                                   | 5.30                                | 0.70                                  | 6                               | 43                                  | 1.10                                 | 7.3                                  |
| 72/03/13           | 12 00             | 38.0                                 | 11.0                                   | 4.60                                | 0.90                                  | 5                               | 33                                  | 0.90                                 | 8.9                                  |
| 72/03/20           | 13 30             | 34.0                                 | 9.5                                    | 3.30                                | 1.00                                  | 2                               | 25                                  | 0.60                                 | 8.4                                  |
| 72/03/27           | 10 30             | 35.0                                 | 9.5                                    | 3.10                                | 0.80                                  | 3                               | 26                                  | 0.50                                 | 9.0                                  |

TABLE 37-5 CHEMICAL DATA

## KOOTENAI RIVER BELOW LIBBY DAM

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01000<br>ARSENIC<br>AS, DISS<br>UG/L | 01002<br>ARSENIC<br>AS, TOT<br>UG/L | 01005<br>BARIUM<br>BA, DISS<br>UG/L | 01010<br>BERYLLIUM<br>BE, DISS<br>UG/L | 01020<br>BORON<br>B, DISS<br>UG/L | 01022<br>BORON<br>B, TOT<br>UG/L | 01025<br>Cadmium<br>Cd, DISS<br>UG/L | 01027<br>Cadmium<br>Cd, TOT<br>UG/L | 01030<br>Cadmium<br>Cd, DISS<br>UG/L | 01032<br>Cadmium<br>Cd, TOT<br>UG/L | 01034<br>Cadmium<br>Cd, TOT<br>UG/L |
|--------------------|-------------------|--------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|-----------------------------------|----------------------------------|--------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|
| 67/06/29           | 09 15             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 67/07/26           | 16 30             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 67/09/07           | 14 30             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 67/12/15           | 15 00             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 68/03/07           | 17 30             |                                      |                                     |                                     |                                        | 100                               |                                  |                                      |                                     |                                      |                                     |                                     |
| 68/05/27           | 15 30             |                                      |                                     |                                     |                                        | 20                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 68/08/28           | 16 00             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 68/12/05           | 14 15             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/02/04           | 15 30             |                                      |                                     |                                     |                                        | 40                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/03/04           | 16 00             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/04/03           | 13 15             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/05/07           | 18 00             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/06/05           | 11 15             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/07/08           | 09 30             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/08/04           | 18 45             |                                      |                                     |                                     |                                        | 20                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/09/02           | 17 15             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/10/15           | 10 00             |                                      |                                     |                                     |                                        | 5                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/11/04           | 16 30             |                                      |                                     |                                     |                                        | 1                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 69/12/02           | 14 30             |                                      |                                     |                                     |                                        | 41                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/01/12           | 15 00             |                                      |                                     |                                     |                                        | 9                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/02/04           | 14 30             |                                      |                                     |                                     |                                        | 23                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/03/04           | 14 15             |                                      |                                     |                                     |                                        | 4                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/04/06           | 14 00             |                                      |                                     |                                     |                                        | 6                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/05/06           | 14 30             |                                      |                                     |                                     |                                        | 2                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/06/04           | 18 00             |                                      |                                     |                                     |                                        | 4                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/07/06           | 13 00             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/08/04           | 14 15             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/09/01           | 13 30             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/10/22           | 14 30             |                                      |                                     |                                     |                                        | 0                                 |                                  |                                      |                                     |                                      |                                     |                                     |
| 70/11/16           | 12 45             | 10                                   |                                     | 0                                   | 0.00                                   | 20                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 70/12/07           | 15 30             | 0                                    |                                     | 0                                   | 0.00                                   | 10                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/01/19           | 09 30             | 40                                   |                                     | 0                                   | 0.00                                   | 10                                |                                  | 0                                    |                                     | 2                                    | 0                                   | 0                                   |
| 71/02/19           | 13 00             | 10                                   |                                     | 220                                 | 5.00                                   | 0                                 |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/03/18           | 10 00             | 10                                   |                                     | 220                                 | 0.00                                   | 0                                 |                                  | 1                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/04/15           | 13 00             | 0                                    |                                     | 100                                 | 0.00                                   | 20                                |                                  | 0                                    |                                     | 0                                    | 1                                   | 0                                   |
| 71/05/19           | 12 00             | 0                                    |                                     | 0                                   | 0.00                                   | 0                                 |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/06/10           | 10 30             | 3                                    |                                     | 0                                   | 0.00                                   | 20                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/07/14           | 12 00             | 0                                    |                                     | 0                                   | 0.00                                   | 10                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/08/11           | 11 00             | 0                                    |                                     | 600                                 | 0.00                                   | 0                                 |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/09/08           | 12 30             | 0                                    |                                     | 0                                   | 0.00                                   | 10                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/10/15           | 11 00             | 0                                    |                                     | 400                                 | 0.00                                   | 10                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/11/12           | 12 00             | 0                                    |                                     | 100                                 | 0.00                                   | 10                                |                                  | 1                                    |                                     | 0                                    | 0                                   | 0                                   |
| 71/12/17           | 10 30             | 7                                    |                                     | 0                                   | 0.00                                   | 20                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 72/01/05           | 12 00             | 1                                    |                                     | 0                                   | 0.00                                   | 10                                |                                  | 0                                    |                                     | 2                                    | 0                                   | 0                                   |
| 72/02/08           | 16 00             | 9                                    |                                     | 0                                   | 0.00                                   | 10                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 72/03/13           | 12 00             | 8                                    |                                     | 0                                   | 0.00                                   | 8                                 |                                  | 1                                    |                                     | 0                                    | 0                                   | 0                                   |
| 72/03/20           | 13 30             | 1                                    |                                     | 0                                   | 0.00                                   | 0                                 |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |
| 72/03/27           | 10 30             | 6                                    |                                     | 0                                   | 0.00                                   | 20                                |                                  | 0                                    |                                     | 0                                    | 0                                   | 0                                   |



APPENDIX

TABLE 37.7 CHEMICAL DATA

KOOTENAI RIVER BELOW LIBBY DAM

| DATE FROM TO | TIME OF DAY | 01060<br>MOLY<br>MO, DISS<br>UG/L | 01065<br>NICKEL<br>NI, DISS<br>UG/L | 01075<br>SILVER<br>AG, DISS<br>UG/L | 01080<br>STRONTIUM<br>SR, DISS<br>UG/L | 01082<br>STRONTIUM<br>SR, TOT<br>UG/L | 01085<br>VANADIUM<br>V, DISS<br>UG/L | 01090<br>ZINC<br>ZN, DISS<br>UG/L | 01092<br>ZINC<br>ZN, TOT<br>UG/L |
|--------------|-------------|-----------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|
| 70/10/22     | 14 30       | 3                                 | 0                                   | 1.0                                 | 220                                    |                                       | 0.1                                  | 30                                |                                  |
| 70/11/16     | 12 45       | 0                                 | 2                                   | 1.0                                 | 220                                    |                                       | 0.0                                  | 30                                |                                  |
| 70/12/07     | 15 30       | 2                                 | 0                                   | 1.0                                 | 170                                    |                                       | 0.5                                  | 40                                |                                  |
| 71/01/19     | 09 30       | 0                                 | 3                                   | 0.0                                 | 180                                    |                                       | 0.0                                  | 60                                |                                  |
| 71/02/19     | 13 00       | 0                                 | 3                                   | 1.0                                 | 210                                    |                                       | 0.7                                  | 30                                |                                  |
| 71/03/18     | 10 00       | 0                                 | 2                                   | 0.0                                 | 290                                    |                                       | 0.7                                  | 28                                |                                  |
| 71/04/15     | 13 00       | 3                                 | 0                                   | 1.0                                 | 280                                    |                                       | 0.0                                  | 30                                |                                  |
| 71/05/19     | 12 00       | 1                                 | 0                                   | 0.0                                 | 80                                     |                                       | 0.6                                  | 40                                | 30                               |
| 71/06/10     | 10 30       | 1                                 | 0                                   | 0.0                                 | 160                                    |                                       | 0.0                                  | 0                                 | <10                              |
| 71/07/14     | 12 00       | 0                                 | 2                                   | 0.0                                 | 40                                     |                                       | 0.0                                  | 7                                 | 10                               |
| 71/08/11     | 11 00       | 0                                 | 1                                   | 0.0                                 | 90                                     |                                       | 0.7                                  | 0                                 | <10                              |
| 71/09/08     | 12 30       | 3                                 | 4                                   | 0.0                                 | 210                                    |                                       | 0.0                                  | 30                                | 10                               |
| 71/10/15     | 11 00       | 8                                 | 4                                   | 0.0                                 | 210                                    |                                       | 0.0                                  | 20                                | 30                               |
| 71/11/12     | 12 00       | 0                                 | 0                                   | 0.0                                 | 190                                    |                                       | 0.0                                  | 40                                | 40                               |
| 71/12/17     | 10 30       | 1                                 | 0                                   | 0.0                                 | 360                                    |                                       | 0.8                                  | 10                                | 20                               |
| 72/01/05     | 12 00       | 0                                 | 1                                   | 0.0                                 | 220                                    |                                       | 0.1                                  | 20                                | 20                               |
| 72/02/08     | 16 00       | 5                                 | 2                                   | 1.0                                 | 290                                    |                                       | 0.0                                  | 20                                | 20                               |
| 72/03/13     | 12 00       | 2                                 | 4                                   | 0.0                                 | 180                                    |                                       | 0.2                                  | 20                                | 50                               |
| 72/03/20     | 13 30       | 0                                 | 5                                   | 0.0                                 | 160                                    |                                       | 0.6                                  | 20                                | 40                               |
| 72/03/27     | 10 30       | 0                                 | 4                                   | 0.0                                 | 120                                    |                                       | 1.0                                  | 20                                | 60                               |

TABLE 37.8 CHEMICAL DATA

KOOTENAI RIVER BELOW LIBBY DAM

| DATE FROM TO | TIME OF DAY | 01106<br>ALUMINUM<br>AL, DISS<br>UG/L | 01130<br>LITHIUM<br>LI, DISS<br>UG/L | 01145<br>SELENIUM<br>SE, DISS<br>UG/L | 31501<br>TOT COLI<br>MPN/100 ML | 31503<br>TOT COLI<br>MPN/100 ML | 71990<br>MERCURY<br>HG, DISS<br>UG/L | 71900<br>MERCURY<br>HG, TOTAL<br>UG/L | 31503<br>TOT COLI<br>MPN/100 ML | 31616<br>FEC COLI<br>MPN/100 ML | 38260<br>NRAS<br>MG/L |
|--------------|-------------|---------------------------------------|--------------------------------------|---------------------------------------|---------------------------------|---------------------------------|--------------------------------------|---------------------------------------|---------------------------------|---------------------------------|-----------------------|
| 70/10/22     | 14 30       | 100                                   | 10                                   |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.02                  |
| 70/11/16     | 12 45       | 100                                   | 0                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 70/12/07     | 15 30       | 100                                   | 10                                   |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 71/01/19     | 09 30       | 200                                   | 0                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 71/02/19     | 13 00       | 300                                   | 0                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 71/03/18     | 10 00       | 100                                   | 0                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 71/04/15     | 13 00       | 300                                   | 4                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 71/05/19     | 12 00       | 400                                   | 2                                    |                                       |                                 |                                 |                                      |                                       |                                 |                                 | 0.00                  |
| 71/06/10     | 10 30       | 300                                   | 0                                    |                                       |                                 |                                 |                                      | 0.5                                   |                                 |                                 | 0.00                  |
| 71/07/14     | 12 00       | 200                                   | 22                                   |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 71/08/11     | 11 00       | 100                                   | 11                                   |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 71/09/08     | 12 30       | 200                                   | 5                                    |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 71/10/15     | 11 00       | 200                                   | 10                                   |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 71/11/12     | 12 00       | 0                                     | 0                                    |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 71/12/17     | 10 30       | 0                                     | 0                                    |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 72/01/05     | 12 00       | 0                                     | 10                                   |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 72/02/08     | 16 00       | 100                                   | 0                                    |                                       |                                 |                                 |                                      | < 0.5                                 |                                 |                                 | 0.00                  |
| 72/03/13     | 12 00       | 100                                   | 17                                   |                                       |                                 |                                 |                                      | 1.2                                   |                                 |                                 | 0.00                  |
| 72/03/20     | 13 30       | 100                                   | 0                                    |                                       |                                 |                                 |                                      | 0.1                                   |                                 |                                 | 0.00                  |
| 72/03/27     | 10 30       | 0                                     | 0                                    |                                       |                                 |                                 |                                      | 0.1                                   |                                 |                                 | 0.00                  |

TABLE 38.1 CHEMICAL DATA

KOOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | WATER<br>TEMP<br>CENT | 00060<br>STREAM<br>FLOW<br>CFS | 00070<br>TURB<br>JKN<br>JTU | 00080<br>COLOR<br>PT-CO<br>UNITS | 00095<br>CONDUCTIV<br>AT 25C<br>MICROMHO | 00300<br>DO<br>MG/L | 00301<br>DO<br>SATUR<br>PERCENT | 00310<br>BOD<br>5 DAY<br>MG/L | 00400<br>PH<br>SU | 00405<br>CO2<br>MG/L |
|--------------------|-------------------|---------------|-----------------------|--------------------------------|-----------------------------|----------------------------------|------------------------------------------|---------------------|---------------------------------|-------------------------------|-------------------|----------------------|
| 68/03/13           | 13 15             |               | 6.5                   |                                |                             |                                  | 450                                      | 12.5                | 109.0                           |                               | 8.30              |                      |
| 68/04/03           | 12 35             |               | 6.0                   |                                | 2.0                         | 10                               | 390                                      | 12.7                | 110.0                           |                               | 8.50              |                      |
| 68/05/08           | 12 15             |               | 10.5                  |                                | 6.0                         | 10                               | 280                                      | 10.8                | 103.0                           |                               | 7.70              |                      |
| 68/06/04           | 12 25             |               | 13.0                  |                                | 66.0                        | 20                               | 150                                      | 10.3                | 104.0                           |                               | 7.60              |                      |
| 68/07/10           | 06 45             |               | 16.0                  |                                | 3.0                         | 6                                | 165                                      | 8.9                 | 95.0                            |                               | 8.00              |                      |
| 68/08/06           | 16 00             |               | 18.6                  |                                | 1.0                         | 2                                | 245                                      | 8.7                 | 99.0                            |                               | 8.30              |                      |
| 68/08/20           | 11 15             |               | 15.0                  |                                | 1.0                         | < 5                              | 290                                      | 9.8                 | 103.0                           |                               | 8.00              |                      |
| 68/09/24           | 18 15             |               | 11.2                  |                                | 3.0                         | 5                                | 250                                      | 11.0                | 107.0                           |                               | 8.50              |                      |
| 68/11/12           | 18 00             |               | 4.0                   |                                | < 1.0                       | 5                                | 250                                      | 11.9                | 97.0                            |                               | 7.60              |                      |
| 68/12/17           | 07 15             |               | 1.5                   |                                | 4.0                         | 5                                | 300                                      | 13.1                | 100.0                           |                               | 7.80              |                      |
| 69/01/21           | 12 00             |               | 0.1                   |                                | 6.0                         | 5                                | 350                                      | 11.7                | 86.0                            |                               | 7.60              |                      |
| 69/02/19           | 18 30             |               | 0.1                   |                                | 10.0                        | 10                               | 350                                      | 11.8                | 87.0                            |                               | 8.10              |                      |
| 69/03/18           | 17 45             |               | 1.5                   |                                | 16.0                        | 7                                | 320                                      | 12.1                | 93.0                            |                               | 7.50              |                      |
| 69/04/22           | 10 00             |               | 7.5                   |                                | 12.0                        | 15                               | 230                                      | 10.5                | 93.0                            |                               | 8.00              |                      |
| 69/05/14           | 09 00             |               | 9.5                   |                                | 88.0                        | 20                               | 170                                      | 10.5                | 99.0                            |                               | 7.40              |                      |
| 69/06/09           | 11 00             |               | 10.8                  |                                | 50.0                        | 10                               | 180                                      | 10.0                | 98.0                            |                               | 7.90              |                      |
| 69/07/09           | 08 10             |               | 13.0                  | 32700                          | 22.0                        | 7                                | 240                                      | 9.4                 | 97.0                            | 1.9                           | 7.20              |                      |
|                    | 14 00             |               | 15.0                  |                                | 12.0                        | 5                                | 225                                      | 9.2                 | 97.0                            |                               | 8.00              |                      |
| 69/08/12           | 15 40             |               | 17.0                  | 9450                           | 4.0                         | 2                                | 255                                      | 8.6                 | 96.0                            | 0.9                           | 8.20              |                      |
| 69/09/16           | 17 00             |               | 13.5                  | 5980                           | 8.0                         | 1                                | 300                                      | 10.4                | 108.0                           | 1.3                           | 8.80              |                      |
| 69/10/15           | 08 30             |               | 5.0                   | 5800                           | 7.0                         | 2                                | 280                                      | 11.1                | 94.0                            | 0.9                           | 8.30              |                      |
| 69/11/11           | 13 30             |               | 5.0                   | 4600                           | 4.0                         | 2                                | 300                                      | 11.8                | 100.0                           | 0.8                           | 8.10              |                      |
| 69/12/16           | 15 45             |               | 0.5                   | 3720                           | 5.0                         | 3                                | 320                                      | 12.9                | 97.0                            | 1.1                           | 7.40              |                      |
| 70/01/13           | 16 00             |               | 0.0                   | 3020                           | 10.0                        | 3                                | 350                                      | 12.3                | 91.0                            | 0.7                           | 7.70              |                      |
| 70/02/10           | 09 15             |               | 0.0                   | 2860                           | 7.0                         | 6                                | 305                                      | 12.2                | 90.0                            | 1.0                           | 8.00              |                      |
| 70/03/17           | 06 45             |               | 3.0                   | 3240                           | 20.0                        | 6                                | 330                                      | 12.5                | 101.0                           | 0.9                           | 8.30              |                      |
| 70/04/14           | 15 30             |               | 7.0                   | 4660                           | 25.0                        | 8                                | 300                                      | 11.8                | 105.0                           | 0.8                           | 8.50              |                      |
| 70/05/12           | 14 15             |               | 8.0                   | 18200                          | 20.0                        | 16                               | 205                                      | 10.0                | 91.0                            | 1.0                           | 7.70              |                      |
| 70/06/09           | 06 40             |               | 12.0                  | 50600                          | 95.0                        | 15                               | 185                                      | 11.8                | 119.0                           | 0.3                           | 7.90              |                      |
| 70/07/22           | 15 00             |               | 19.0                  | 9380                           | 4.0                         |                                  | 260                                      | 8.4                 | 98.0                            | 0.9                           | 8.40              |                      |
| 70/08/19           | 09 00             |               | 16.5                  | 8840                           | 4.0                         |                                  | 300                                      | 8.4                 | 93.0                            | 1.0                           | 8.30              |                      |
| 70/09/15           | 13 30             |               | 9.5                   | 4800                           |                             |                                  | 305                                      | 11.5                | 109.0                           | 3.0                           | 8.10              |                      |
| 70/10/13           | 12 00             |               | 7.5                   | 4960                           | 5.0                         | 2                                | 300                                      | 11.3                | 102.0                           | 1.1                           | 7.70              |                      |
| 70/11/16           | 15 00             |               | 3.5                   | 3610                           |                             |                                  | 340                                      | 12.5                | 102.0                           | 1.1                           | 7.90              |                      |
| 70/12/09           | 11 45             |               | 0.0                   | 4300                           |                             |                                  | 170                                      | 13.3                | 99.0                            | 0.8                           | 7.30              |                      |
| 71/01/20           | 13 30             |               | 0.0                   | 4500                           |                             | 5                                | 320                                      | 11.7                | 87.0                            | 1.4                           | 6.80              |                      |
| 71/02/16           | 13 15             |               | 2.5                   | 6370                           |                             |                                  | 275                                      | 12.5                | 99.0                            | 4.8                           | 7.50              |                      |
| 71/03/16           | 13 00             |               | 4.0                   | 3500                           |                             |                                  | 340                                      | 12.9                | 107.0                           | 0.7                           | 8.40              |                      |
| 71/04/13           | 12 00             |               | 6.0                   | 7700                           | 3.0                         | 5                                | 290                                      | 11.6                | 101.0                           | 1.9                           | 8.10              |                      |
| 71/05/18           | 11 45             |               | 7.5                   | 36300                          |                             |                                  | 215                                      | 12.6                | 114.0                           | 0.7                           | 8.10              |                      |
| 71/06/08           | 12 00             |               | 9.0                   | 62500                          |                             |                                  | 195                                      | 12.0                | 112.0                           | 0.5                           | 7.80              |                      |
| 71/07/28           | 11 00             |               | 17.0                  | 20800                          | 1.0                         | 7                                | 225                                      | 9.8                 | 110.0                           | 1.1                           | 8.00              |                      |
| 71/08/16           | 10 30             |               | 17.0                  | 11700                          | 3.0                         | 6                                | 225                                      | 10.0                | 112.0                           | 0.7                           | 8.20              |                      |
| 71/09/15           | 09 30             |               | 11.5                  | 7120                           | 1.0                         | 5                                | 300                                      | 11.2                | 111.0                           | 1.7                           | 8.30              |                      |
| 71/10/12           | 10 15             |               | 9.0                   | 5200                           | 60.0                        | 5                                | 320                                      | 11.6                | 109.0                           | 2.0                           | 8.10              |                      |
| 71/11/09           | 10 00             |               | 0.5                   | 3800                           | 2.0                         | 5                                | 325                                      | 14.5                | 109.0                           | 1.7                           | 7.60              |                      |
| 71/12/14           | 10 30             |               | 0.0                   | 2600                           | 2.0                         | 5                                | 280                                      | 14.0                | 104.0                           | 1.3                           | 7.40              |                      |
| 72/01/06           | 10 30             |               | 0.0                   | 3040                           | 1.0                         | 0                                | 360                                      | 14.0                | 104.0                           | 1.3                           | 8.10              |                      |
| 72/02/09           | 09 00             |               | 0.0                   | 3080                           | 2.0                         | 3                                | 345                                      | 13.6                | 101.0                           | 1.2                           | 7.80              |                      |
| 72/03/16           | 10 00             |               | 4.5                   | 10100                          | 30.0                        | 20                               | 235                                      | 13.0                | 109.0                           | 1.5                           | 8.10              |                      |

KOOTENAI RIVER AT LIRBY, MONT.

TABLE 38.2 CHEMICAL DATA

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 70300<br>RESIDUE<br>DISS-180<br>C MG/L | 70301<br>DISS SOL<br>SUM<br>MG/L | 00410<br>T ALK<br>CACO3<br>MG/L | 00440<br>HCO3 ION<br>HCO3<br>MG/L | 00445<br>CO3 ION<br>CO3<br>MG/L | 00900<br>TOT HARD<br>CACO3<br>MG/L | 00902<br>MC HARD<br>CACO3<br>MG/L |
|--------------------|-------------------|----------------------------------------|----------------------------------|---------------------------------|-----------------------------------|---------------------------------|------------------------------------|-----------------------------------|
| 68/03/13           | 13 15             |                                        |                                  | 104                             |                                   |                                 |                                    |                                   |
| 68/04/03           | 12 35             |                                        |                                  | 99                              |                                   |                                 | 174                                |                                   |
| 68/05/08           | 12 15             |                                        |                                  | 86                              |                                   |                                 | 144                                |                                   |
| 68/06/04           | 12 25             |                                        |                                  | 64                              |                                   |                                 | 114                                |                                   |
| 68/07/10           | 06 45             |                                        |                                  | 71                              |                                   |                                 | 140                                |                                   |
| 68/08/06           | 16 00             |                                        |                                  | 95                              |                                   |                                 | 243                                |                                   |
| 68/08/20           | 11 15             |                                        |                                  | 96                              |                                   |                                 | 552                                |                                   |
| 68/09/24           | 18 15             |                                        |                                  | 90                              |                                   |                                 | 131                                |                                   |
| 68/11/12           | 18 00             |                                        |                                  | 87                              |                                   |                                 | 115                                |                                   |
| 68/12/17           | 07 15             |                                        |                                  | 105                             |                                   |                                 | 147                                |                                   |
| 69/01/21           | 12 00             |                                        |                                  | 114                             |                                   |                                 | 152                                |                                   |
| 69/02/19           | 18 30             |                                        |                                  | 87                              |                                   |                                 | 121                                |                                   |
| 69/03/18           | 17 45             |                                        |                                  | 110                             |                                   |                                 | 142                                |                                   |
| 69/04/22           | 10 00             |                                        |                                  | 77                              |                                   |                                 | 111                                |                                   |
| 69/05/14           | 09 00             |                                        |                                  | 86                              |                                   |                                 | 91                                 |                                   |
| 68/06/09           | 11 00             |                                        |                                  | 84                              |                                   |                                 | 91                                 |                                   |
| 69/07/09           | 08 10             | 134                                    |                                  | 110                             |                                   |                                 | 119                                |                                   |
|                    | 14 00             |                                        |                                  | 194                             |                                   |                                 | 114                                |                                   |
| 69/08/12           | 15 40             | 168                                    |                                  | 126                             |                                   |                                 | 141                                |                                   |
| 69/09/16           | 17 00             | 171                                    |                                  | 186                             |                                   |                                 | 162                                |                                   |
| 69/10/15           | 08 30             | 179                                    |                                  | 125                             |                                   |                                 | 154                                |                                   |
| 69/11/11           | 13 30             | 179                                    |                                  | 121                             |                                   |                                 | 156                                |                                   |
| 69/12/16           | 15 45             | 210                                    |                                  | 135                             |                                   |                                 | 180                                |                                   |
| 70/01/13           | 16 00             | 259                                    |                                  | 148                             |                                   |                                 | 189                                |                                   |
| 70/02/10           | 09 15             | 205                                    |                                  | 133                             |                                   |                                 | 179                                |                                   |
| 70/03/17           | 06 45             | 213                                    |                                  | 130                             |                                   |                                 | 172                                |                                   |
| 70/04/14           | 15 30             | 189                                    |                                  | 121                             |                                   |                                 | 158                                |                                   |
| 70/05/12           | 14 15             | 124                                    |                                  | 92                              |                                   |                                 | 99                                 |                                   |
| 70/06/09           | 06 40             | 93                                     |                                  | 77                              |                                   |                                 | 86                                 |                                   |
| 70/07/22           | 15 00             | 148                                    |                                  | 110                             |                                   |                                 | 126                                |                                   |
| 70/08/19           | 09 00             |                                        |                                  | 117                             |                                   |                                 |                                    |                                   |
| 70/09/15           | 13 30             |                                        |                                  | 124                             |                                   |                                 |                                    |                                   |
| 70/10/13           | 12 00             | 183                                    |                                  | 116                             |                                   |                                 | 150                                |                                   |
| 70/11/16           | 15 00             |                                        |                                  | 122                             |                                   |                                 |                                    |                                   |
| 70/12/09           | 11 45             |                                        |                                  | 122                             |                                   |                                 |                                    |                                   |
| 70/01/20           | 13 30             | 180                                    |                                  | 120                             |                                   |                                 | 160                                |                                   |
| 71/02/16           | 13 15             |                                        |                                  | 98                              |                                   |                                 |                                    |                                   |
| 71/03/16           | 13 00             |                                        |                                  | 120                             |                                   |                                 |                                    |                                   |
| 71/04/13           | 12 00             | 156                                    |                                  | 100                             |                                   |                                 | 140                                |                                   |
| 71/05/18           | 11 45             |                                        |                                  | 68                              |                                   |                                 |                                    |                                   |
| 71/06/08           | 12 00             |                                        |                                  | 93                              |                                   |                                 |                                    |                                   |
| 71/07/28           | 11 00             |                                        |                                  | 84                              |                                   |                                 | 100                                |                                   |
| 71/08/16           | 10 30             |                                        |                                  | 97                              |                                   |                                 |                                    |                                   |
| 71/09/15           | 09 30             |                                        |                                  | 117                             |                                   |                                 |                                    |                                   |
| 71/10/12           | 10 15             |                                        |                                  | 115                             |                                   |                                 | 150                                |                                   |
| 71/11/09           | 10 00             |                                        |                                  | 119                             |                                   |                                 |                                    |                                   |
| 71/12/14           | 10 30             |                                        |                                  | 140                             |                                   |                                 |                                    |                                   |
| 72/01/06           | 10 30             |                                        |                                  | 137                             |                                   |                                 | 160                                |                                   |
| 72/02/09           | 09 00             |                                        |                                  | 129                             |                                   |                                 |                                    |                                   |
| 72/03/16           | 10 00             |                                        |                                  | 90                              |                                   |                                 |                                    |                                   |

TABLE 38.3 CHEMICAL DATA

KOOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00600<br>TOTAL N<br>MG/L | 00605<br>ORG N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00613<br>NO2-N<br>DISS<br>MG/L | 00618<br>NO3-N<br>DISS<br>MG/L | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00665<br>PHOS-TOT<br>MG/L P | 00666<br>PHOS-DIS<br>MG/L P | 00671<br>PHOS-DIS<br>ONTRP<br>MG/L P | 00680<br>T ORG C<br>C<br>MG/L |
|--------------------|-------------------|---------------|--------------------------|------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------------|-----------------------------|-----------------------------|--------------------------------------|-------------------------------|
| 68/03/13           | 13 15             |               |                          |                        |                                 | < 0.010                        | 0.03                           |                                     | 0.930                       |                             | 0.840                                |                               |
| 68/04/03           | 12 35             |               | 0.35                     | 0.200                  | 0.100                           | 0.004                          | 0.05                           |                                     | 0.410                       |                             | 0.350                                |                               |
| 68/05/08           | 12 15             |               | 0.41                     | 0.200                  | < 0.010                         | < 0.010                        | 0.11                           |                                     | 0.240                       |                             | 0.170                                |                               |
| 68/06/04           | 12 25             |               | 0.80                     | 0.210                  | 0.490                           | 0.009                          | 0.09                           |                                     | 0.130                       |                             | 0.087                                | 9.0                           |
| 68/07/10           | 06 45             |               | 0.36                     | 0.250                  | < 0.050                         | < 0.005                        | 0.06                           |                                     | 0.190                       |                             | 0.110                                | 2.0                           |
| 68/08/06           | 16 00             |               | 0.20                     | 0.190                  | < 0.010                         | < 0.005                        | < 0.005                        |                                     | 0.069                       |                             | 0.050                                | 2.0                           |
| 68/08/20           | 11 15             |               | 0.21                     | 0.190                  | < 0.010                         | < 0.005                        | 0.01                           |                                     | 0.780                       |                             | 0.770                                | 1.0                           |
| 68/09/24           | 18 15             |               | 0.26                     | 0.190                  | < 0.005                         | < 0.005                        | 0.06                           |                                     | 0.200                       |                             | 0.170                                | 1.0                           |
| 68/11/12           | 18 00             |               | 1.00                     | 0.890                  | < 0.010                         | < 0.010                        | 0.10                           |                                     | 0.120                       |                             | 0.069                                | 1.0                           |
| 68/12/17           | 07 15             |               | 0.60                     | 0.390                  | 0.010                           | < 0.020                        | 0.20                           |                                     | 0.190                       |                             | 0.160                                | 1.0                           |
| 69/01/21           | 12 00             |               | 0.50                     | 0.270                  | 0.030                           | < 0.020                        | 0.20                           |                                     | 0.170                       |                             | 0.170                                | < 1.0                         |
| 69/02/19           | 18 30             |               |                          | 0.060                  | 0.140                           | 0.015                          |                                |                                     | 0.190                       |                             | 0.180                                | 4.0                           |
| 69/03/18           | 17 45             |               | 0.21                     | 0.090                  | < 0.010                         | < 0.005                        | 0.11                           |                                     | 0.140                       |                             | 0.096                                | < 1.0                         |
| 69/04/22           | 10 00             |               | 0.43                     | 0.230                  | 0.070                           | 0.005                          | 0.13                           |                                     | 0.140                       |                             | 0.027                                | 2.0                           |
| 69/05/14           | 09 00             |               | 0.69                     | 0.270                  | 0.230                           | 0.030                          | 0.16                           |                                     | 0.380                       |                             | 0.026                                | 6.0                           |
| 69/06/09           | 11 00             |               |                          |                        | 0.030                           | 0.010                          | 0.08                           |                                     | 0.180                       |                             | 0.028                                | 2.0                           |
| 69/07/09           | 08 10             |               | 0.30                     | 0.100                  | 0.160                           | 0.000                          | 0.04                           |                                     | 0.270                       | 0.060                       |                                      |                               |
| 69/08/12           | 15 40             |               | 0.53                     | 0.520                  | < 0.050                         | 0.000                          | 0.01                           |                                     | 0.100                       | 0.130                       | 0.039                                | 2.0                           |
| 69/09/16           | 17 00             |               | 0.07                     | 0.000                  | 0.030                           | 0.000                          | 0.04                           |                                     | 0.190                       | 0.060                       |                                      | 15.0                          |
| 69/10/15           | 08 30             |               | 0.08                     | 0.040                  | 0.000                           | 0.000                          | 0.04                           |                                     | 0.220                       | 0.050                       |                                      | 5.5                           |
| 69/11/11           | 13 30             |               | 1.33                     | 1.200                  | 0.030                           | 0.000                          | 0.10                           |                                     | 0.170                       | 0.110                       |                                      | 5.0                           |
| 69/12/16           | 15 45             |               | 0.32                     | 0.100                  | 0.020                           | 0.010                          | 0.19                           |                                     | 0.210                       | 0.200                       |                                      | 1.0                           |
| 70/01/13           | 16 00             |               | 0.54                     | 0.270                  | 0.060                           | 0.010                          | 0.20                           |                                     | 0.100                       | 0.080                       |                                      | 2.0                           |
| 70/02/10           | 09 15             |               | 0.35                     | 0.060                  | 0.060                           | 0.030                          | 0.20                           |                                     | 0.180                       | 0.100                       |                                      | 2.0                           |
| 70/03/17           | 06 45             |               | 0.37                     | 0.110                  | 0.040                           | 0.020                          | 0.20                           |                                     | 0.360                       | 0.040                       |                                      | 0.0                           |
| 70/04/14           | 15 30             |               | 0.35                     | 0.220                  | 0.000                           | 0.030                          | 0.10                           |                                     | 0.170                       | 0.130                       |                                      | 4.0                           |
| 70/05/12           | 14 15             |               | 0.40                     | 0.220                  | 0.010                           | 0.060                          | 0.11                           |                                     | 0.150                       | 0.120                       |                                      | 3.0                           |
| 70/06/09           | 06 40             |               | 0.37                     | 0.220                  | 0.010                           | 0.040                          | 0.10                           |                                     | 0.310                       | 0.020                       |                                      | 3.0                           |
| 70/07/22           | 15 00             |               |                          | 0.270                  | 0.020                           |                                | 0.01                           |                                     | 0.250                       | 0.230                       | 0.210                                | 3.0                           |
| 70/08/19           | 09 00             |               |                          | 0.060                  | 0.020                           |                                | 0.00                           |                                     | 0.240                       | 0.230                       | 0.210                                | 3.0                           |
| 70/09/15           | 13 30             |               | 0.38                     | 0.300                  | 0.050                           | 0.000                          | 0.03                           |                                     | 0.260                       | 0.100                       | 0.080                                | 2.0                           |
| 70/10/13           | 12 00             |               | 0.28                     | 0.200                  | 0.000                           | 0.010                          | 0.07                           |                                     | 0.130                       | 0.140                       | 0.140                                | 58.0                          |
| 70/11/16           | 15 00             |               | 0.50                     | 0.130                  | 0.090                           | 0.010                          | 0.27                           |                                     | 0.280                       | 0.240                       | 0.240                                | 5.0                           |
| 70/12/09           | 11 45             |               | 0.95                     | 0.560                  | 0.130                           | 0.010                          | 0.25                           |                                     | 0.310                       | 0.210                       | 0.200                                | 36.0                          |
| 71/01/20           | 13 30             |               |                          | 0.000                  |                                 | 0.030                          | 0.02                           |                                     | 0.210                       | 0.210                       | 0.200                                | 4.0                           |
| 71/02/16           | 13 15             |               | 0.38                     | 0.060                  | 0.020                           | 0.000                          | 0.30                           | 0.0                                 | 0.160                       | 0.130                       | 0.120                                | 2.0                           |
| 71/03/16           | 13 00             |               | 0.33                     | 0.020                  | 0.310                           | 0.000                          | 0.00                           | 0.3                                 | 0.200                       | 0.200                       | 0.200                                | 7.0                           |
| 71/04/13           | 12 00             |               | 0.23                     | 0.080                  | 0.050                           | 0.000                          | 0.10                           | 0.0                                 | 0.050                       | 0.050                       | 0.050                                | 7.0                           |
| 71/05/18           | 11 45             |               | 0.35                     | 0.180                  | 0.070                           | 0.000                          | 0.10                           | 0.1                                 | 0.199                       | 0.060                       | 0.070                                | 5.0                           |
| 71/06/08           | 12 00             |               | 0.37                     | 0.180                  | 0.090                           | 0.010                          | 0.09                           | 0.1                                 | 0.320                       | 0.050                       | 0.060                                | 0.0                           |
| 71/07/28           | 11 00             |               |                          |                        | 0.100                           | 0.000                          | 0.02                           | 0.02                                | 0.050                       | 0.030                       | 0.010                                | 6.0                           |
| 71/10/12           | 10 15             |               | 0.22                     | 0.090                  | 0.080                           | 0.000                          | 0.05                           | 0.05                                | 0.160                       | 0.100                       | 0.040                                | 5.0                           |
| 72/01/06           | 10 30             |               | 0.33                     | 0.170                  | 0.110                           | 0.000                          | 0.05                           | 0.05                                | 0.170                       | 0.140                       | 0.140                                | 1.0                           |

TABLE 38.4 CHEMICAL DATA

ROOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00915<br>CALCIUM<br>CA, DISS<br>MG/L | 00925<br>MAGNESIUM<br>MG, DISS<br>MG/L | 00930<br>SODIUM<br>NA, DISS<br>MG/L | 00935<br>POTASSIUM<br>K, DISS<br>MG/L | 00940<br>CHLORIDE<br>CL<br>MG/L | 00945<br>SULFATE<br>SO4-TOT<br>MG/L | 00950<br>FLUORIDE<br>F, DISS<br>MG/L | 00955<br>SILICA<br>DISSOLVED<br>MG/L |
|--------------------|-------------------|---------------|--------------------------------------|----------------------------------------|-------------------------------------|---------------------------------------|---------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 68/03/13           | 13 15             |               |                                      |                                        |                                     | 1.00                                  |                                 |                                     |                                      | 6.9                                  |
| 68/04/03           | 12 35             |               |                                      |                                        | 2.50                                | 0.90                                  | 2                               | 30                                  |                                      | 7.3                                  |
| 68/05/08           | 12 15             |               |                                      |                                        | 2.50                                | 0.90                                  | 1                               | 40                                  |                                      | 6.4                                  |
| 68/06/04           | 12 25             |               |                                      |                                        | 1.20                                | 0.70                                  | 1                               | 28                                  |                                      | 4.6                                  |
| 68/07/10           | 06 45             |               |                                      |                                        | 1.00                                | 0.60                                  | 1                               | 28                                  |                                      | 4.6                                  |
| 68/08/06           | 16 00             |               |                                      |                                        | 2.20                                | 1.00                                  | 2                               | 27                                  |                                      | 2.9                                  |
| 68/08/20           | 11 15             |               |                                      |                                        | 2.10                                | 0.60                                  | 2                               | 48                                  |                                      | 5.5                                  |
| 68/09/24           | 18 15             |               |                                      |                                        |                                     |                                       | 2                               | 32                                  |                                      |                                      |
| 68/11/12           | 18 00             |               |                                      |                                        | 2.20                                | 0.70                                  | 2                               | 28                                  |                                      | 6.0                                  |
| 68/12/17           | 07 15             |               |                                      |                                        | 2.70                                | 0.67                                  | 1                               | 33                                  |                                      | 5.7                                  |
| 69/01/21           | 12 00             |               |                                      |                                        | 3.20                                | 0.84                                  | 2                               | 30                                  |                                      | 6.4                                  |
| 69/02/19           | 18 30             |               |                                      |                                        | 3.30                                | 0.73                                  | 2                               | 42                                  |                                      | 6.9                                  |
| 69/03/18           | 17 45             |               |                                      |                                        | 3.20                                | 1.20                                  | 2                               | 41                                  |                                      | 7.0                                  |
| 69/04/22           | 10 00             |               |                                      |                                        | 2.30                                | 0.85                                  | 1                               | 22                                  |                                      | 9.0                                  |
| 69/05/14           | 09 00             |               |                                      |                                        | 1.20                                | 0.94                                  | <1                              | 30                                  |                                      | 6.0                                  |
| 69/06/09           | 11 00             |               |                                      |                                        |                                     |                                       | 1                               | <10                                 |                                      | 4.5                                  |
| 69/07/09           | 08 10             |               |                                      |                                        | 1.70                                | 0.50                                  | 1                               |                                     |                                      |                                      |
| 69/08/12           | 15 40             |               |                                      |                                        |                                     | 0.60                                  | 1                               | 21                                  |                                      |                                      |
| 69/09/16           | 17 00             |               |                                      |                                        |                                     | 0.80                                  | 1                               |                                     | 0.70                                 |                                      |
| 69/10/15           | 08 30             |               |                                      |                                        |                                     |                                       | 2                               |                                     |                                      |                                      |
| 69/11/11           | 13 30             |               |                                      |                                        |                                     |                                       | 3                               |                                     |                                      |                                      |
| 69/12/16           | 15 45             |               |                                      |                                        |                                     |                                       | 6                               |                                     |                                      |                                      |
| 70/01/13           | 16 00             |               |                                      |                                        |                                     |                                       | 4                               |                                     |                                      |                                      |
| 70/02/10           | 09 15             |               |                                      |                                        |                                     |                                       | 1                               |                                     |                                      |                                      |
| 70/03/17           | 06 45             |               |                                      |                                        |                                     | 1.00                                  | 3                               |                                     |                                      |                                      |
| 70/04/14           | 15 30             |               |                                      |                                        |                                     |                                       | 2                               |                                     |                                      |                                      |
| 70/05/12           | 14 15             |               |                                      |                                        |                                     |                                       | 2                               |                                     |                                      |                                      |
| 70/06/09           | 06 40             |               |                                      |                                        |                                     |                                       | 1                               |                                     |                                      |                                      |
| 70/07/22           | 15 00             |               |                                      |                                        |                                     |                                       | 3                               |                                     |                                      |                                      |
| 70/08/19           | 09 00             |               |                                      |                                        |                                     |                                       |                                 | 26                                  | 0.30                                 |                                      |
| 70/10/13           | 12 00             |               |                                      |                                        |                                     |                                       |                                 | 28                                  |                                      |                                      |
| 71/01/20           | 13 30             |               | 45.0                                 | 12.0                                   |                                     |                                       |                                 | 35                                  |                                      | 6.5                                  |
| 71/02/16           | 13 15             |               |                                      |                                        |                                     |                                       |                                 |                                     |                                      | 8.2                                  |
| 71/04/13           | 12 00             |               |                                      | 11.0                                   |                                     |                                       |                                 |                                     | 0.70                                 |                                      |
| 71/07/28           | 11 00             |               | 29.0                                 | 7.4                                    |                                     |                                       |                                 |                                     | 0.90                                 |                                      |
| 71/08/16           | 10 30             |               |                                      |                                        |                                     |                                       | 3                               |                                     | 1.00                                 |                                      |
| 71/09/15           | 09 30             |               |                                      |                                        |                                     | 0.30                                  | 2                               | 31                                  | 0.90                                 |                                      |
| 71/10/12           | 10 15             |               | 41.0                                 | 12.0                                   |                                     |                                       |                                 |                                     | 0.20                                 |                                      |
| 71/11/09           | 10 00             |               |                                      |                                        |                                     | 0.90                                  |                                 |                                     | 0.30                                 |                                      |
| 71/12/14           | 10 30             |               |                                      |                                        |                                     |                                       |                                 |                                     | 0.50                                 |                                      |
| 72/01/06           | 10 30             |               |                                      |                                        |                                     |                                       |                                 |                                     | 0.60                                 |                                      |
| 72/02/09           | 09 00             |               | 43.0                                 | 14.0                                   |                                     | 0.90                                  |                                 |                                     | 0.90                                 |                                      |
| 72/03/16           | 10 00             |               |                                      |                                        |                                     |                                       |                                 |                                     | 0.80                                 |                                      |
|                    |                   |               |                                      |                                        |                                     |                                       |                                 |                                     | 1.00                                 |                                      |
|                    |                   |               |                                      |                                        |                                     |                                       |                                 |                                     | 1.00                                 |                                      |
|                    |                   |               |                                      |                                        |                                     |                                       |                                 |                                     | 0.70                                 |                                      |

TABLE 38.5 CHEMICAL DATA

KOOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01000<br>ARSENIC<br>AS, DISS<br>UG/L | 01002<br>ARSENIC<br>AS, TOT<br>UG/L | 01005<br>BARIUM<br>BA, DISS<br>UG/L | 01010<br>BERYLLIUM<br>BE, DISS<br>UG/L | 01020<br>BORON<br>B, DISS<br>UG/L | 01022<br>BORON<br>B, TOT<br>UG/L | 01025<br>CADMIUM<br>CD, DISS<br>UG/L | 01027<br>CADMIUM<br>CD, TOT<br>UG/L | 01030<br>CHROMIUM<br>CR, DISS<br>UG/L | 01032<br>CHROMIUM<br>HEX-VAL<br>UG/L | 01034<br>CHROMIUM<br>CR, TOT<br>UG/L |
|--------------------|-------------------|--------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|-----------------------------------|----------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|
| 69/07/09           | 08 10             |                                      |                                     |                                     |                                        | 10                                |                                  |                                      |                                     |                                       |                                      |                                      |
| 69/08/12           | 15 40             |                                      |                                     |                                     |                                        | 3                                 |                                  |                                      |                                     |                                       |                                      |                                      |
| 69/09/16           | 17 00             | 4                                    |                                     | 0                                   |                                        | 8                                 |                                  | 0                                    |                                     | 0                                     |                                      | 0                                    |
| 70/03/17           | 06 45             |                                      |                                     |                                     |                                        | 15                                |                                  | 0                                    | < 1                                 | 0                                     |                                      | 0                                    |
| 71/07/28           | 11 00             | 0                                    | 0                                   |                                     |                                        |                                   |                                  | 0                                    |                                     | 0                                     |                                      | 0                                    |
| 71/10/12           | 10 15             | 1                                    | 10                                  |                                     |                                        |                                   |                                  | 0                                    | 1                                   | 0                                     |                                      | 4                                    |
| 72/01/06           | 10 30             | 8                                    | 8                                   |                                     |                                        |                                   |                                  | 0                                    | < 1                                 | 2                                     |                                      | 3                                    |

TABLE 38.6 CHEMICAL DATA

KOOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01035<br>COBALT<br>CO, DISS<br>UG/L | 01037<br>COBALT<br>CO, TOTAL<br>UG/L | 01040<br>COPPER<br>CU, DISS<br>UG/L | 01042<br>COPPER<br>CU, TOT<br>UG/L | 01045<br>IRON<br>FE, TOT<br>UG/L | 01046<br>IRON<br>FE, DISS<br>UG/L | 01049<br>LEAD<br>PB, DISS<br>UG/L | 01051<br>LEAD<br>PB, TOT<br>UG/L | 01055<br>MANGANESE<br>MN<br>UG/L | 01056<br>MANGANESE<br>MN, DISS<br>UG/L |
|--------------------|-------------------|-------------------------------------|--------------------------------------|-------------------------------------|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|----------------------------------|----------------------------------------|
| 69/02/19           | 18 30             |                                     |                                      | 5                                   |                                    | 1450                             |                                   | 15                                |                                  |                                  |                                        |
| 69/09/16           | 17 00             | 1                                   |                                      | 3                                   |                                    |                                  | 36                                | 0                                 |                                  |                                  |                                        |
| 71/01/20           | 13 30             |                                     |                                      |                                     |                                    |                                  | 70                                |                                   |                                  |                                  |                                        |
| 71/07/28           | 11 00             |                                     |                                      | 1                                   | 10                                 | 140                              | 20                                | 0                                 | 5                                |                                  |                                        |
| 71/08/16           | 10 30             |                                     |                                      |                                     |                                    |                                  | 20                                |                                   |                                  |                                  |                                        |
| 71/09/15           | 09 30             |                                     |                                      |                                     |                                    |                                  | 20                                |                                   |                                  |                                  |                                        |
| 71/10/12           | 10 15             |                                     |                                      | 0                                   | 1                                  | 170                              | 20                                | 1                                 | 4                                |                                  |                                        |
| 71/11/09           | 10 00             |                                     |                                      |                                     |                                    |                                  | 10                                |                                   |                                  |                                  |                                        |
| 71/12/14           | 10 30             |                                     |                                      |                                     |                                    |                                  | 20                                |                                   |                                  |                                  |                                        |
| 72/01/06           | 10 30             |                                     |                                      | 1                                   | 1                                  | 40                               | 10                                | 0                                 | 4                                |                                  |                                        |
| 72/02/09           | 09 00             |                                     |                                      |                                     |                                    |                                  | 10                                |                                   |                                  |                                  |                                        |
| 72/03/16           | 10 00             |                                     |                                      |                                     |                                    |                                  | 50                                |                                   |                                  |                                  |                                        |

TABLE 38.7 CHEMICAL DATA

KOOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01060<br>MOLY<br>MO, DISS<br>UG/L | 01065<br>NICKEL<br>NI, DISS<br>UG/L | 01075<br>SILVER<br>AG, DISS<br>UG/L | 01080<br>STRONTIUM<br>SR, DISS<br>UG/L | 01082<br>STRONTIUM<br>SR, TOT<br>UG/L | 01085<br>VANADIUM<br>V, DISS<br>UG/L | 01090<br>ZINC<br>ZN, DISS<br>UG/L | 01092<br>ZINC<br>ZN, TOT<br>UG/L |
|--------------------|-------------------|-----------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|
| 69/02/19           | 18 30             |                                   |                                     |                                     |                                        |                                       |                                      |                                   |                                  |
| 69/09/16           | 17 00             | 0                                 | 0                                   | 0.0                                 | 260                                    |                                       | 1                                    | 39                                |                                  |
| 71/07/28           | 11 00             |                                   |                                     |                                     |                                        |                                       |                                      | 8                                 |                                  |
| 71/08/16           | 10 30             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                | 30                               |
| 71/09/15           | 09 30             |                                   |                                     |                                     |                                        |                                       |                                      | 10                                |                                  |
| 71/10/12           | 10 15             |                                   |                                     |                                     |                                        |                                       |                                      | 10                                |                                  |
| 71/11/09           | 10 00             |                                   |                                     |                                     |                                        |                                       |                                      | 0                                 | 10                               |
| 71/12/14           | 10 30             |                                   |                                     |                                     |                                        |                                       |                                      | 40                                |                                  |
| 72/01/06           | 10 30             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                |                                  |
| 72/02/09           | 09 00             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                | 20                               |
| 72/03/16           | 10 00             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                |                                  |

TABLE 38.8 CHEMICAL DATA

KOOTENAI RIVER AT LIBBY, MONT.

| DATE<br>FROM | TIME<br>OF<br>DAY | 01106<br>ALUMINUM<br>AL, DISS<br>UG/L | 01130<br>LITHIUM<br>LI, DISS<br>UG/L | 01145<br>SELENIUM<br>SE, DISS<br>UG/L | 31501<br>TOT COLI<br>MPN/100 ML | 31503<br>TOT COLI<br>MPN/100 ML | 71890<br>MERCURY<br>HG, DISS<br>UG/L | 71900<br>MERCURY<br>HG, TOTAL<br>UG/L | 31503<br>TOT COLI<br>MPN/100 ML | 31616<br>FEC COLI<br>MPN-FCRM<br>/100 ML | 38260<br>NDAAS<br>MG/L |
|--------------|-------------------|---------------------------------------|--------------------------------------|---------------------------------------|---------------------------------|---------------------------------|--------------------------------------|---------------------------------------|---------------------------------|------------------------------------------|------------------------|
| 68/03/13     | 13 15             |                                       |                                      |                                       |                                 | 10                              |                                      |                                       | 10                              |                                          |                        |
| 68/04/03     | 12 35             |                                       |                                      |                                       |                                 | 240                             |                                      |                                       | 240                             |                                          |                        |
| 68/05/08     | 12 15             |                                       |                                      |                                       |                                 | 980                             |                                      |                                       | 980                             |                                          |                        |
| 68/06/04     | 12 25             |                                       |                                      |                                       |                                 | 3600                            |                                      |                                       | 3600                            |                                          |                        |
| 68/07/10     | 06 45             |                                       |                                      |                                       |                                 | 420                             |                                      |                                       | 420                             |                                          |                        |
| 68/08/06     | 16 00             |                                       |                                      |                                       |                                 | 95                              |                                      |                                       | 95                              |                                          |                        |
| 68/08/20     | 11 15             |                                       |                                      |                                       |                                 | 40                              |                                      |                                       | 40                              |                                          |                        |
| 68/09/24     | 18 15             |                                       |                                      |                                       |                                 | < 100                           |                                      |                                       | < 100                           |                                          |                        |
| 68/11/12     | 18 00             |                                       |                                      |                                       |                                 | < 100                           |                                      |                                       | < 100                           |                                          |                        |
| 68/12/17     | 07 15             |                                       |                                      |                                       |                                 | 80                              |                                      |                                       | 80                              |                                          |                        |
| 69/01/21     | 12 00             |                                       |                                      |                                       |                                 | 100                             |                                      |                                       | 100                             |                                          |                        |
| 69/03/18     | 17 45             |                                       |                                      |                                       |                                 | 40                              |                                      |                                       | 40                              |                                          |                        |
| 69/04/22     | 10 00             |                                       |                                      |                                       |                                 | 1950                            |                                      |                                       | 1950                            |                                          |                        |
| 69/05/14     | 09 00             |                                       |                                      |                                       |                                 | 3000                            |                                      |                                       | 3000                            |                                          |                        |
| 69/06/09     | 11 00             |                                       |                                      |                                       |                                 | 400                             |                                      |                                       | 400                             |                                          |                        |
| 69/07/09     | 14 00             |                                       |                                      |                                       |                                 | 400                             |                                      |                                       | 400                             |                                          |                        |
| 69/09/16     | 17 00             |                                       |                                      |                                       | 8                               |                                 |                                      |                                       |                                 |                                          |                        |
| 69/10/15     | 08 30             |                                       |                                      | 2                                     |                                 |                                 |                                      |                                       |                                 |                                          |                        |
| 69/11/11     | 13 30             |                                       |                                      |                                       | 12                              |                                 |                                      |                                       |                                 |                                          |                        |
| 69/12/16     | 15 45             |                                       |                                      |                                       | 78                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/01/13     | 16 00             |                                       |                                      |                                       | 21                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/02/10     | 09 15             |                                       |                                      |                                       | 17                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/03/17     | 06 45             |                                       |                                      |                                       | 64                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/04/14     | 15 30             |                                       |                                      |                                       | 38                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/05/12     | 14 15             |                                       |                                      |                                       | 290                             |                                 |                                      |                                       |                                 |                                          |                        |
| 70/06/09     | 06 40             |                                       |                                      |                                       | 830                             |                                 |                                      |                                       |                                 |                                          |                        |
| 70/07/22     | 15 00             |                                       |                                      |                                       |                                 |                                 |                                      |                                       |                                 |                                          |                        |
| 70/08/19     | 09 00             |                                       |                                      |                                       | 20                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/09/15     | 13 30             |                                       |                                      |                                       | 16                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/10/13     | 12 00             |                                       |                                      |                                       | 12                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/11/16     | 15 00             |                                       |                                      |                                       | 12                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/12/09     | 11 45             |                                       |                                      |                                       | 38                              |                                 |                                      |                                       |                                 |                                          |                        |
| 70/01/20     | 13 30             |                                       |                                      |                                       | 120                             |                                 |                                      |                                       |                                 |                                          |                        |
| 71/02/16     | 13 15             |                                       |                                      |                                       | 120                             |                                 |                                      |                                       |                                 |                                          |                        |
| 71/03/16     | 13 00             |                                       |                                      |                                       | 1                               |                                 |                                      |                                       |                                 |                                          |                        |
| 71/04/13     | 12 00             |                                       |                                      |                                       | 22                              |                                 |                                      |                                       |                                 |                                          |                        |
| 71/05/18     | 11 45             |                                       |                                      |                                       | 48                              |                                 |                                      |                                       |                                 |                                          |                        |
| 71/06/08     | 12 00             |                                       |                                      |                                       | 320                             |                                 |                                      |                                       |                                 |                                          |                        |
| 71/07/28     | 11 00             |                                       |                                      | 0                                     | 28                              |                                 |                                      | 0.0                                   |                                 |                                          |                        |
| 71/08/16     | 10 30             |                                       |                                      |                                       | 25                              |                                 |                                      |                                       |                                 |                                          |                        |
| 71/09/15     | 09 30             |                                       |                                      |                                       | 68                              |                                 |                                      |                                       |                                 |                                          |                        |
| 71/10/12     | 10 15             |                                       |                                      | 2                                     | 24                              |                                 |                                      | 0.4                                   |                                 |                                          |                        |
| 71/11/09     | 10 00             |                                       |                                      |                                       | 320                             |                                 |                                      |                                       |                                 |                                          |                        |
| 71/12/14     | 10 30             |                                       |                                      |                                       | 43                              |                                 |                                      |                                       |                                 |                                          |                        |
| 72/01/06     | 10 30             |                                       |                                      | 1                                     |                                 |                                 |                                      | 0.2                                   |                                 |                                          |                        |
| 72/02/09     | 09 00             |                                       |                                      |                                       | 700                             |                                 |                                      |                                       |                                 |                                          |                        |
| 72/03/16     | 10 00             | 100                                   |                                      |                                       | 190                             |                                 |                                      |                                       |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.0                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.8                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.9                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.1                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.0                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.2                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.2                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.3                                   |                                 |                                          |                        |
|              |                   |                                       |                                      |                                       |                                 |                                 |                                      | 0.1                                   |                                 |                                          |                        |

TABLE 39.1 CHEMICAL DATA

## KOOTENAI RIVER AT LEONIA, IDAHO

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00010<br>WATER<br>TEMP<br>CENT | 00060<br>STREAM<br>FLOW<br>CFS | 00070<br>TURB<br>JKSN<br>JTU | 00080<br>COLOR<br>PT-CO<br>UNITS | 00095<br>CONDUCTIVITY<br>AT 25C<br>MIC-MHO | 00300<br>DO<br>MG/L | 00301<br>DO<br>SATUR<br>PERCENT | 00310<br>BOD<br>5 DAY<br>MG/L | 00400<br>PH<br>SU | 00405<br>CO2<br>MG/L |
|--------------------|-------------------|---------------|--------------------------------|--------------------------------|------------------------------|----------------------------------|--------------------------------------------|---------------------|---------------------------------|-------------------------------|-------------------|----------------------|
| 68/03/13           | 11 00             |               | 5.8                            |                                |                              |                                  | 325                                        | 12.3                | 104.0                           |                               | 8.30              |                      |
| 68/04/03           | 10 45             |               | 6.0                            |                                | 2.0                          | 10                               | 300                                        | 12.9                | 111.0                           |                               | 8.30              |                      |
| 68/04/17           | 13 30             |               | 7.0                            |                                | 2.0                          | 10                               | 345                                        | 13.1                | 115.0                           |                               | 8.20              |                      |
| 68/05/08           | 13 30             |               | 10.8                           |                                | 6.0                          | 10                               | 230                                        | 11.5                | 110.0                           |                               | 8.00              |                      |
| 68/06/04           | 11 05             |               | 13.0                           |                                | 89.0                         | 20                               | 200                                        | 11.5                | 115.0                           |                               | 7.90              |                      |
| 68/07/10           | 08 10             |               | 17.0                           |                                | 8.0                          | 7                                | 190                                        | 9.6                 | 105.0                           |                               | 8.00              |                      |
| 68/08/06           | 14 00             |               | 18.3                           |                                | 1.0                          | 2                                | 210                                        | 8.9                 | 100.0                           |                               | 8.20              |                      |
| 68/08/20           | 09 45             |               | 15.5                           |                                | 1.0                          | 5                                | 280                                        |                     | 103.0                           |                               | 8.00              |                      |
| 68/11/12           | 13 15             |               | 4.0                            |                                | 2.0                          | 10                               | 235                                        | 12.7                | 104.0                           |                               | 7.80              |                      |
| 69/02/12           | 09 30             |               | 1.0                            |                                | 5.0                          | 5                                | 258                                        | 13.9                | 104.0                           |                               | 7.80              |                      |
| 69/03/18           | 18 00             |               | 2.0                            |                                | 5.0                          | 3                                | 315                                        | 13.8                | 106.0                           |                               | 8.20              |                      |
| 69/05/27           | 22 00             |               | 9.8                            |                                | 60.0                         | 25                               | 190                                        | 11.4                | 107.0                           |                               | 7.80              |                      |
| 69/08/19           | 20 00             |               | 16.9                           |                                | 1.0                          | 5                                | 270                                        | 10.1                | 111.0                           |                               | 8.00              |                      |
| 69/09/17           | 13 30             |               | 13.7                           |                                |                              |                                  | 300                                        | 11.0                | 112.0                           |                               | 8.20              |                      |
| 69/10/20           | 17 00             |               | 5.0                            | 5790                           | 1.0                          | 5                                | 283                                        | 13.3                | 110.0                           | 0.8                           | 8.70              |                      |
| 69/11/18           | 12 55             |               | 2.5                            | 4990                           | 3.0                          | 5                                | 284                                        | 14.1                | 110.0                           | 2.6                           | 8.60              |                      |
| 69/12/16           | 14 20             |               | 0.5                            | 3670                           | 4.0                          | 5                                | 289                                        | 13.6                | 100.0                           | 1.9                           | 8.40              |                      |
| 70/01/28           | 10 25             |               | 0.0                            | 3690                           | 5.0                          | 5                                | 292                                        | 13.5                | 100.0                           | 1.6                           | 8.30              |                      |
| 70/02/25           | 14 05             |               | 2.0                            | 3510                           | 2.0                          | 5                                | 285                                        | 12.9                | 101.0                           | 1.9                           | 8.10              |                      |
| 70/03/24           | 14 30             |               | 7.5                            | 4380                           | 1.0                          | 5                                | 281                                        | 12.0                | 107.0                           | 1.0                           | 8.80              |                      |
| 70/04/27           | 13 05             |               | 7.0                            | 6490                           | 2.0                          | 5                                | 235                                        | 11.8                | 103.0                           | 3.1                           | 8.70              |                      |
| 70/05/18           | 13 40             |               | 10.5                           | 38000                          | 15.0                         | 20                               | 144                                        | 11.4                | 109.0                           | 1.8                           | 8.00              |                      |
| 70/06/16           | 09 20             |               | 10.8                           | 34400                          | 3.0                          | 5                                | 171                                        | 11.6                | 111.0                           | 2.7                           | 8.30              |                      |
| 70/07/14           | 12 45             |               | 16.9                           | 14900                          | 1.0                          | 5                                | 225                                        | 10.1                | 112.0                           | 0.5                           | 8.60              |                      |
| 70/08/17           | 16 00             |               | 19.0                           | 6830                           | 0.0                          |                                  | 264                                        | 10.4                | 118.0                           | 0.5                           | 8.40              |                      |
| 70/09/22           | 09 15             |               | 10.1                           | 6760                           | 0.0                          | 5                                | 298                                        | 11.4                | 107.0                           | 1.2                           | 8.40              |                      |
| 70/10/20           | 13 20             |               | 7.0                            | 4830                           | 1.0                          | 0                                | 283                                        | 12.5                | 110.0                           | 0.6                           | 7.80              |                      |
| 70/11/17           | 09 10             |               | 4.5                            | 4140                           |                              |                                  | 298                                        | 14.4                | 118.0                           | 3.9                           | 7.50              |                      |
| 70/12/15           | 08 00             |               | 1.5                            | 3710                           |                              |                                  | 269                                        | 14.8                | 113.0                           | 4.9                           | 7.10              |                      |
| 71/01/20           | 07 15             |               | 0.0                            | 5260                           |                              |                                  | 219                                        | 14.9                | 107.0                           | 2.2                           | 7.10              |                      |
| 71/02/24           | 09 30             |               | 2.0                            | 6410                           |                              |                                  | 229                                        | 14.0                | 108.0                           | 4.9                           | 7.60              |                      |
| 71/03/24           | 09 15             |               | 3.5                            | 4090                           |                              |                                  | 281                                        | 13.0                | 104.0                           | 3.7                           | 8.10              |                      |
| 71/04/20           | 09 00             |               | 7.0                            | 12100                          | 3.0                          | 5                                | 209                                        | 12.2                | 107.0                           | 2.3                           | 8.00              |                      |
| 71/05/25           | 13 20             |               | 10.5                           | 48200                          |                              |                                  | 175                                        | 12.2                | 112.0                           | 1.5                           | 7.60              |                      |
| 71/06/22           | 08 35             |               | 13.0                           | 42000                          |                              |                                  | 189                                        | 12.0                | 121.0                           | 2.7                           | 6.90              |                      |
| 71/07/27           | 08 35             |               | 16.5                           | 25700                          |                              | 6                                | 192                                        | 10.5                | 114.0                           | 1.3                           | 7.60              |                      |
| 71/08/18           | 13 45             |               | 18.0                           | 10500                          |                              | 7                                | 254                                        | 10.2                | 115.0                           | 2.4                           | 8.00              |                      |
| 71/09/22           | 09 05             |               | 10.0                           | 6820                           | 0.0                          | 5                                | 279                                        | 11.0                | 104.0                           | 1.5                           | 7.40              | 1.4                  |
| 71/10/19           | 09 45             |               | 6.1                            | 5400                           | 2.0                          | 5                                | 290                                        | 12.2                | 104.0                           | 1.7                           | 8.20              | 4.4                  |
| 71/11/16           | 12 50             |               | 4.0                            | 5500                           | 5.0                          | 5                                | 292                                        | 13.2                | 107.0                           | 1.2                           | 7.70              |                      |
| 71/12/07           | 13 10             |               | 0.0                            | 3910                           | 2.0                          | 5                                | 308                                        | 14.1                | 103.0                           | 0.6                           | 7.50              |                      |
| 72/01/10           | 10 00             |               | 0.0                            | 2790                           | 1.0                          | 5                                | 308                                        | 14.1                | 104.0                           | 0.9                           | 7.80              |                      |
| 72/02/03           | 14 30             |               | 0.1                            | 3370                           | 1.0                          | 5                                | 314                                        | 14.5                | 106.0                           | 2.5                           | 6.70              |                      |
| 72/03/02           | 08 35             |               | 0.8                            | 10200                          | 20.0                         | 10                               | 156                                        | 13.9                | 104.0                           | 1.7                           | 6.40              |                      |

KOOTENAI RIVER AT LEONIA, IDAHO

TABLE 39.2 CHEMICAL DATA

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 70300<br>RESIDUE<br>DISS-180<br>C | 70301<br>DISS SOL<br>SEM | OC,110<br>T ALK<br>CAC03 | 00440<br>HCO3 ION<br>HCO3 | 00445<br>CO3 ION<br>CO3 | 00900<br>TOT HARD<br>CAC03 | 00902<br>MC HARD<br>CAC03 |
|--------------------|-------------------|-----------------------------------|--------------------------|--------------------------|---------------------------|-------------------------|----------------------------|---------------------------|
| 68/03/13           | 11 00             |                                   |                          | 82                       | 100                       |                         |                            |                           |
| 68/04/03           | 10 45             |                                   |                          | 82                       | 100                       |                         | 131                        |                           |
| 68/04/17           | 13 30             |                                   |                          | 90                       | 110                       |                         | 146                        |                           |
| 68/05/08           | 13 30             |                                   |                          | 72                       | 88                        |                         | 117                        |                           |
| 68/06/04           | 11 05             |                                   |                          | 87                       | 106                       |                         | 133                        |                           |
| 68/07/10           | 08 10             |                                   |                          | 77                       | 94                        |                         | 163                        |                           |
| 68/08/06           | 14 00             |                                   |                          | 94                       | 115                       |                         | 237                        |                           |
| 68/08/20           | 09 45             |                                   |                          | 96                       | 117                       |                         | 279                        |                           |
| 68/11/12           | 13 15             |                                   |                          | 87                       | 93                        |                         | 108                        |                           |
| 69/02/12           | 09 30             |                                   |                          | 113                      | 138                       |                         | 132                        |                           |
| 69/03/18           | 18 00             |                                   |                          | 101                      | 123                       |                         | 127                        |                           |
| 69/05/27           | 22 00             |                                   |                          | 83                       | 101                       |                         | 94                         |                           |
| 68/08/19           | 20 00             |                                   |                          | 109                      | 133                       |                         | 134                        |                           |
| 69/09/17           | 13 30             |                                   |                          | 117                      | 143                       | 7                       |                            | 27                        |
| 69/10/20           | 17 00             | 176                               |                          | 121                      | 133                       | 6                       | 148                        | 39                        |
| 69/11/18           | 12 55             | 177                               |                          | 122                      | 138                       | 8                       | 149                        | 30                        |
| 69/12/16           | 14 20             | 180                               |                          | 122                      | 133                       | 0                       | 152                        | 32                        |
| 70/01/28           | 10 25             | 169                               |                          | 117                      | 143                       | 0                       | 149                        | 27                        |
| 70/02/25           | 14 05             | 164                               |                          | 114                      | 139                       | 0                       | 161                        | 36                        |
| 70/03/24           | 14 30             | 154                               |                          | 108                      | 116                       | 8                       | 144                        | 22                        |
| 70/04/27           | 13 05             | 128                               |                          | 98                       | 115                       | 2                       | 120                        | 7                         |
| 70/05/18           | 13 40             | 80                                |                          | 61                       | 74                        | 0                       | 68                         | 21                        |
| 70/06/16           | 09 20             | 89                                |                          | 75                       | 92                        | 0                       | 96                         | 20                        |
| 70/07/14           | 12 45             | 116                               |                          | 94                       | 110                       | 2                       | 114                        | 27                        |
| 70/08/17           | 16 00             | 164                               |                          | 109                      | 129                       | 2                       | 145                        | 34                        |
| 70/09/22           | 09 15             | 177                               |                          | 118                      | 132                       | 6                       | 150                        |                           |
| 70/10/20           | 13 20             | 173                               |                          | 117                      | 142                       | 0                       |                            |                           |
| 70/11/17           | 09 10             | 179                               |                          | 118                      | 144                       | 0                       |                            |                           |
| 70/12/15           | 08 00             | 176                               |                          | 108                      | 132                       | 0                       | 110                        | 31                        |
| 71/01/20           | 07 15             | 156                               |                          | 79                       | 96                        | 0                       |                            | 0                         |
| 71/02/24           | 09 30             | 120                               |                          | 89                       | 108                       | 0                       | 98                         |                           |
| 71/03/24           | 09 15             | 162                               |                          | 104                      | 127                       | 0                       |                            |                           |
| 71/04/20           | 09 00             | 104                               |                          | 84                       | 102                       | 0                       |                            |                           |
| 71/05/25           | 13 20             | 124                               |                          | 77                       | 94                        | 0                       |                            |                           |
| 71/06/22           | 08 35             | 106                               |                          | 81                       | 99                        | 0                       | 91                         | 11                        |
| 71/07/27           | 08 35             |                                   |                          | 80                       | 98                        | 0                       | 115                        | 0                         |
| 71/08/18           | 13 45             |                                   |                          | 86                       | 104                       | 0                       | 140                        | 2                         |
| 71/09/22           | 09 05             |                                   |                          | 112                      | 137                       | 0                       | 140                        | 1                         |
| 71/10/19           | 09 45             |                                   |                          | 113                      | 138                       | 0                       | 152                        | 32                        |
| 71/11/16           | 12 50             |                                   |                          | 114                      | 139                       | 0                       | 150                        | 30                        |
| 71/12/07           | 13 10             |                                   |                          | 120                      | 146                       | 0                       | 160                        | 10                        |
| 72/01/10           | 10 00             |                                   |                          | 120                      | 146                       | 0                       | 74                         |                           |
| 72/02/03           | 14 30             |                                   |                          | 124                      | 151                       | 0                       |                            |                           |
| 72/03/02           | 08 35             |                                   |                          | 64                       | 78                        | 0                       |                            |                           |

TABLE 39.3 CHEMICAL DATA

KOOTENAI RIVER AT LEONIA IDAHO

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00600 TOTAL N<br>N MG/L | 00605 ORG N<br>MG/L | 00610 NH3-N<br>TOTAL MG/L | 00613 NO2-N<br>DISS MG/L | 00618 NO3-N<br>DISS MG/L | 00630 NO2&NO3<br>N-TOTAL MG/L | 00665 PHOS-TOT<br>MG/L P | 00666 PHOS-DIS<br>MG/L P | 00671 PHOS-DIS<br>ORTHO MG/L P | 00680 T ORG C<br>C MG/L |
|--------------|-------------|------------|-------------------------|---------------------|---------------------------|--------------------------|--------------------------|-------------------------------|--------------------------|--------------------------|--------------------------------|-------------------------|
| 68/03/13     | 11 00       |            |                         |                     |                           | < 0.010                  | 0.03                     |                               | 0.280                    |                          | 0.290                          |                         |
| 68/04/03     | 10 45       |            | 0.33                    | 0.200               | 0.100                     | 0.003                    | 0.03                     |                               | 0.340                    |                          | 0.320                          |                         |
| 68/04/17     | 13 30       |            | 0.20                    | 0.100               | 0.100                     | < 0.001                  | 0.001                    |                               | 0.310                    |                          | 0.270                          |                         |
| 68/05/08     | 13 30       |            | 0.41                    | 0.200               | < 0.100                   | 0.010                    | 0.10                     |                               | 0.190                    |                          | 0.130                          |                         |
| 68/06/04     | 11 05       |            | 1.32                    | 0.260               | 0.540                     | 0.010                    | 0.10                     |                               | 0.150                    |                          | 0.081                          | 7.0                     |
| 68/07/10     | 08 10       |            | 0.26                    | 0.150               | < 0.050                   | < 0.005                  | 0.06                     |                               | 0.260                    |                          | 0.150                          | 1.0                     |
| 68/08/06     | 14 00       |            | 0.11                    | 0.090               | 0.010                     | 0.005                    | < 0.005                  |                               | 0.042                    |                          | 0.023                          | 12.0                    |
| 68/08/30     | 09 45       |            | 0.12                    | 0.090               | 0.010                     | 0.005                    | 0.01                     |                               | 0.460                    |                          | 0.460                          | 1.0                     |
| 68/11/12     | 13 15       |            | 0.36                    | 0.290               | 0.010                     | 0.010                    | < 0.05                   |                               | 2.130                    |                          | 0.085                          | 1.0                     |
| 69/02/12     | 09 30       |            | 0.42                    | 0.170               | 0.030                     | 0.010                    | 0.21                     |                               | 0.150                    |                          | 0.150                          | 1.0                     |
| 69/03/18     | 18 00       |            | 0.22                    | 0.090               | < 0.010                   | 0.005                    | 0.11                     |                               | 0.100                    |                          | 0.051                          | 1.0                     |
| 69/05/27     | 22 00       |            | 0.45                    | 0.260               | 0.040                     | 0.050                    | 0.10                     |                               | 0.280                    |                          | 0.021                          |                         |
| 69/08/19     | 20 00       |            | 0.23                    | 0.180               | < 0.020                   | 0.010                    | 0.02                     |                               | 0.048                    |                          | 0.042                          |                         |
| 69/09/17     | 13 30       |            | 0.45                    | 0.380               | 0.020                     | 0.001                    | 0.05                     |                               | 0.081                    |                          |                                |                         |
| 69/10/20     | 17 00       |            | 0.04                    | 0.020               | 0.020                     | 0.000                    | 0.00                     |                               | 0.030                    | 0.03                     |                                | 11.0                    |
| 69/11/18     | 12 55       |            | 0.10                    | 0.060               | 0.040                     | 0.000                    | 0.00                     |                               | 0.060                    | 0.05                     |                                | 6.5                     |
| 69/12/16     | 14 20       |            | 0.11                    | 0.010               | 0.000                     | 0.010                    | 0.09                     |                               | 0.010                    | 0.01                     |                                | 0.5                     |
| 70/01/28     | 10 25       |            | 0.19                    | 0.060               | 0.020                     | 0.000                    | 0.11                     |                               | 0.040                    | 0.03                     |                                | 6.0                     |
| 70/02/25     | 14 05       |            | 0.08                    | 0.010               | 0.000                     | 0.000                    | 0.07                     |                               | 0.050                    | 0.05                     |                                | 0.0                     |
| 70/03/24     | 14 30       |            | 0.09                    | 0.040               | 0.000                     | 0.000                    | 0.05                     |                               | 0.010                    | 0.00                     |                                | 1.0                     |
| 70/04/27     | 13 05       |            | 0.06                    | 0.020               | 0.020                     | 0.000                    | 0.02                     |                               | 0.020                    | 0.00                     |                                | 1.5                     |
| 70/05/18     | 13 40       |            | 0.28                    | 0.070               | 0.010                     | 0.010                    | 0.18                     |                               | 0.100                    | 0.01                     |                                | 2.0                     |
| 70/06/16     | 09 20       |            | 0.20                    | 0.080               | 0.030                     | 0.000                    | 0.09                     |                               | 0.060                    | 0.06                     |                                | 0.5                     |
| 70/07/14     | 12 45       |            | 0.08                    | 0.040               | 0.010                     | 0.010                    | 0.02                     |                               | 0.130                    | 0.11                     | 0.100                          | 1.0                     |
| 70/08/17     | 16 00       |            | 0.07                    | 0.060               | 0.010                     | 0.000                    | 0.00                     |                               | 0.050                    | 0.05                     | 0.050                          |                         |
| 70/09/22     | 09 15       |            | 0.08                    | 0.070               | 0.010                     | 0.000                    | 0.00                     |                               | 0.090                    | 0.09                     | 0.080                          | 1.5                     |
| 70/10/20     | 13 20       |            | 0.04                    | 0.000               | 0.020                     | 0.000                    | 0.02                     | 0.1                           | 0.120                    | 0.11                     | 0.110                          | 2.5                     |
| 70/11/17     | 09 10       |            | 0.11                    | 0.000               | 0.020                     | 0.000                    | 0.09                     | 0.4                           | 0.200                    | 0.20                     | 0.180                          | 0.5                     |
| 70/12/15     | 08 00       |            | 0.16                    | 0.010               | 0.050                     | 0.010                    | 0.09                     | 0.4                           | 0.180                    | 0.18                     | 0.160                          | 1.5                     |
| 71/01/20     | 07 15       |            | 0.14                    | 0.020               | 0.020                     | 0.010                    | 0.09                     | 0.4                           |                          | 0.20                     | 0.190                          | 1.5                     |
| 71/02/24     | 09 30       |            | 0.50                    | 0.020               | 0.170                     | 0.010                    | 0.20                     | 0.2                           |                          | 0.13                     | 0.080                          | 1.0                     |
| 71/03/24     | 09 15       |            | 1.10                    | 0.040               | 0.930                     | 0.000                    | 0.10                     | 0.1                           | 0.150                    | 0.10                     | 0.150                          | 2.0                     |
| 71/04/20     | 09 00       |            | 0.41                    | 0.220               | 0.090                     | 0.000                    | 0.10                     | 0.1                           | 0.060                    | 0.050                    | 0.040                          | 2.0                     |
| 71/05/25     | 13 20       |            | 0.45                    | 0.240               | 0.110                     | 0.000                    | 0.10                     | 0.1                           | 0.110                    | 0.080                    | 0.050                          | 3.5                     |
| 71/06/22     | 08 35       |            | 0.52                    | 0.430               | 0.090                     | 0.000                    | 0.00                     | 0.04                          | 0.050                    | 0.020                    | 0.020                          | 1.0                     |
| 71/07/27     | 08 35       |            | 0.17                    | 0.000               | 0.170                     | 0.000                    | 0.00                     | 0.0                           | 0.070                    | 0.060                    | 0.040                          | 0.0                     |
| 71/08/18     | 13 45       |            | 0.35                    | 0.240               | 0.110                     | 0.000                    | 0.00                     | 0.0                           | 0.060                    | 0.050                    | 0.020                          |                         |
| 71/09/22     | 09 05       |            | 0.28                    | 0.090               | 0.140                     | 0.000                    | 0.05                     | 0.05                          | 0.070                    | 0.060                    | 0.030                          |                         |
| 71/10/19     | 09 45       |            | 0.24                    | 0.050               | 0.170                     | 0.000                    | 0.02                     | 0.02                          | 0.120                    | 0.110                    | 0.050                          | 0.5                     |
| 71/11/16     | 12 50       |            | 1.10                    | 0.310               | 0.050                     | 0.000                    | 0.68                     | 0.7                           | 0.150                    | 0.090                    | 0.070                          |                         |
| 71/12/07     | 13 10       |            | 0.25                    | 0.200               | 0.050                     | 0.000                    | 0.00                     | 0.0                           | 0.130                    | 0.100                    | 0.060                          |                         |
| 72/01/10     | 10 00       |            | 0.60                    | 0.290               | 0.070                     | 0.000                    | 0.24                     | 0.2                           | 0.180                    | 0.160                    | 0.130                          | 1.5                     |
| 72/02/03     | 14 30       |            | 0.46                    | 0.200               | 0.050                     | 0.000                    | 0.21                     | 0.2                           | 0.120                    | 0.110                    | 0.110                          |                         |
| 72/06/02     | 08 35       |            | 2.30                    | 0.200               | 0.100                     | 0.000                    | 2.00                     | 2.0                           | 0.110                    | 0.060                    | 0.020                          |                         |

TABLE 39.4 CHEMICAL DATA

## KOOTENAI RIVER AT LEONIA, IDAHO

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00915<br>CALCIUM<br>CA, DISS<br>MG/L | 00925<br>MAGNESIUM<br>MG, DISS<br>MG/L | 00930<br>SODIUM<br>NA, DISS<br>MG/L | 00935<br>POTASSIUM<br>K, DISS<br>MG/L | 00940<br>CHLORIDE<br>CL<br>MG/L | 00945<br>SULFATE<br>SO4-TOT<br>MG/L | 00950<br>FLUORIDE<br>F, DISS<br>MG/L | 00955<br>SILICA<br>DISSOLVED<br>MG/L |
|--------------------|-------------------|---------------|--------------------------------------|----------------------------------------|-------------------------------------|---------------------------------------|---------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 68/03/13           | 11 00             |               |                                      |                                        |                                     | 1.00                                  | 2                               | 30                                  |                                      | 7.8                                  |
| 68/04/03           | 10 45             |               |                                      |                                        | 2.50                                | 0.90                                  | 1                               | 45                                  |                                      | 8.7                                  |
| 68/04/17           | 13 30             |               |                                      |                                        | 2.50                                | 0.90                                  | 1                               | 38                                  |                                      | 7.9                                  |
| 68/05/08           | 13 30             |               |                                      |                                        | 1.80                                | 0.80                                  | 1                               | 31                                  |                                      | 7.1                                  |
| 68/06/04           | 11 05             |               |                                      |                                        | 1.40                                | 0.60                                  | 1                               | 31                                  |                                      | 5.2                                  |
| 68/07/10           | 08 10             |               |                                      |                                        | 1.00                                | 0.50                                  | 2                               | 33                                  |                                      | 4.4                                  |
| 68/08/06           | 14 00             |               |                                      |                                        | 2.90                                | 0.80                                  | 2                               | 27                                  |                                      | 3.0                                  |
| 68/08/20           | 09 45             |               |                                      |                                        | 2.10                                | 0.60                                  | 1                               | 44                                  |                                      | 3.4                                  |
| 68/11/12           | 13 15             |               |                                      |                                        | 2.00                                | 0.60                                  | 2                               | 26                                  |                                      | 6.6                                  |
| 69/02/12           | 09 30             |               |                                      |                                        | 3.80                                | 0.75                                  | 2                               | 27                                  |                                      | 7.0                                  |
| 69/03/18           | 18 00             |               |                                      |                                        | 3.00                                | 0.69                                  | 2                               | 34                                  |                                      | 7.5                                  |
| 69/05/27           | 22 00             |               |                                      |                                        | 2.80                                | 0.70                                  | < 1                             | 10                                  |                                      | 7.0                                  |
| 69/08/19           | 20 00             |               |                                      |                                        | 3.40                                | 0.80                                  | 3                               | 30                                  |                                      |                                      |
| 69/09/17           | 13 30             |               |                                      |                                        |                                     | 0.90                                  | 4                               |                                     |                                      |                                      |
| 69/10/20           | 17 00             |               |                                      |                                        |                                     | 0.90                                  | 4                               |                                     |                                      |                                      |
| 69/11/18           | 12 55             |               |                                      |                                        |                                     | 0.90                                  | 4                               |                                     |                                      |                                      |
| 69/12/16           | 14 20             |               | 40.0                                 | 13.0                                   | 4.10                                | 0.40                                  | 4                               | 33                                  |                                      | 7.0                                  |
| 70/01/28           | 10 25             |               | 38.0                                 | 13.0                                   | 4.60                                | 1.00                                  | 6                               | 36                                  |                                      | 7.0                                  |
| 70/02/25           | 14 05             |               |                                      |                                        |                                     |                                       | 4                               |                                     |                                      |                                      |
| 70/03/24           | 14 30             |               |                                      |                                        |                                     |                                       | 5                               |                                     |                                      |                                      |
| 70/04/27           | 13 05             |               | 31.0                                 | 9.6                                    | 3.70                                | 0.90                                  | 3                               | 20                                  |                                      | 7.7                                  |
| 70/05/18           | 13 40             |               |                                      |                                        |                                     |                                       | 2                               |                                     |                                      |                                      |
| 70/06/16           | 09 20             |               | 25.0                                 | 6.2                                    | 1.60                                | 0.70                                  | 2                               | 13                                  |                                      | 5.7                                  |
| 70/07/14           | 12 45             |               | 31.0                                 | 8.6                                    | 2.30                                | 1.40                                  | 4                               | 19                                  | 0.40                                 | 4.1                                  |
| 70/09/22           | 09 15             |               |                                      |                                        |                                     |                                       | 4                               | 34                                  | 0.70                                 |                                      |
| 70/10/20           | 13 20             |               | 40.0                                 | 12.0                                   |                                     |                                       | 3                               | 32                                  | 0.60                                 | 8.8                                  |
| 71/01/20           | 07 15             |               | 31.0                                 | 9.0                                    |                                     |                                       | 3                               | 24                                  | 0.40                                 |                                      |
| 71/04/20           | 09 00             |               | 28.0                                 | 6.9                                    |                                     |                                       | 1                               | 20                                  | 0.30                                 |                                      |
| 71/07/27           | 08 35             |               | 25.0                                 | 7.1                                    |                                     |                                       | 2                               | 16                                  | 0.50                                 |                                      |
| 71/08/18           | 13 45             |               | 32.0                                 | 8.6                                    | 2.60                                | 0.60                                  | 4                               | 20                                  | 0.70                                 |                                      |
| 71/09/22           | 09 45             |               | 38.0                                 | 11.0                                   | 3.50                                | 0.70                                  | 3                               | 33                                  | 0.70                                 |                                      |
| 71/10/19           | 09 45             |               | 37.0                                 | 11.0                                   | 3.90                                | 0.50                                  | 5                               | 3                                   | 1.10                                 |                                      |
| 71/11/16           | 12 50             |               | 37.0                                 | 11.0                                   | 4.10                                | 0.80                                  | 3                               | 33                                  | 1.00                                 |                                      |
| 71/12/07           | 13 10             |               | 41.0                                 | 12.0                                   | 4.60                                | 0.60                                  | 4                               | 33                                  | 0.50                                 |                                      |
| 72/01/10           | 10 00             |               | 41.0                                 | 12.0                                   | 4.30                                | 1.10                                  | 4                               | 32                                  | 1.30                                 |                                      |
| 72/02/03           | 14 30             |               | 43.0                                 | 13.0                                   | 4.80                                | 0.80                                  | 5                               | 30                                  | 0.50                                 |                                      |
| 72/03/02           | 08 35             |               | 20.0                                 | 5.8                                    | 2.70                                | 0.80                                  | 2                               | 13                                  | 0.20                                 |                                      |

**MOOTENAI RIVER AT LEONIA, IDAHO**

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# APPENDIX

TABLE 40.1 CHEMICAL DATA

KOOTENAI RIVER AT COPELAND IDAHO

| DATE FROM | TIME OF DAY | 00010<br>WATER TEMP<br>CENT | 00060<br>STREAM FLOW<br>CFS | 00070<br>TURB JKS<br>JTU | 00080<br>COLOR FT-CO<br>UNITS | 00095<br>CONDUCTIVITY AT 25C<br>MICRONHO | 00300<br>DO MG/L | 00301<br>DO PERCENT | 00310<br>BOD 5 DAY<br>MG/L | 00400<br>PH SU | 00405<br>CO2 MG/L |
|-----------|-------------|-----------------------------|-----------------------------|--------------------------|-------------------------------|------------------------------------------|------------------|---------------------|----------------------------|----------------|-------------------|
| 69/05/27  | 23 30       | 10.5                        |                             | 32.0                     | 25                            | 150                                      | 10.9             | 105.0               |                            | 7.70           | 2.5               |
| 69/08/19  | 18 30       | 17.7                        |                             | 1.0                      | 5                             | 230                                      | 9.4              | 105.0               |                            | 8.00           | 2.1               |
| 69/09/17  | 13 00       | 15.6                        |                             |                          |                               | 300                                      | 9.3              | 98.0                |                            | 8.20           | 1.4               |
| 69/10/20  | 13 30       | 5.5                         | 5840                        | 2.0                      | 5                             | 280                                      | 12.0             | 101.0               | 2.0                        | 8.60           | 0.5               |
| 69/11/18  | 09 30       | 4.0                         | 5200                        | 2.0                      | 5                             | 261                                      | 12.6             | 102.0               | 2.2                        | 6.60           | 41.7              |
| 69/12/16  | 10 35       | 0.0                         | 4370                        | 2.0                      | 5                             | 278                                      | 13.1             | 95.0                | 1.5                        | 8.20           | 1.5               |
| 70/01/27  | 10 20       | 0.5                         | 3960                        | 1.0                      | 0                             | 282                                      | 13.0             | 96.0                | 1.3                        | 8.30           | 1.1               |
| 70/02/25  | 08 55       | 0.0                         | 4190                        | 2.0                      | 5                             | 266                                      | 13.4             | 99.0                | 2.3                        | 8.10           | 1.7               |
| 70/03/24  | 09 50       | 5.0                         | 4560                        | 2.0                      | 5                             | 276                                      | 11.8             | 99.0                | 0.6                        | 8.20           | 1.3               |
| 70/04/27  | 10 05       | 7.5                         | 7460                        | 0.0                      | 5                             | 208                                      | 11.2             | 98.0                | 1.5                        | 8.20           | 1.0               |
| 70/05/18  | 11 15       | 10.5                        | 33400                       | 6.0                      | 10                            | 129                                      | 10.8             | 103.0               | 1.5                        | 8.20           | 0.7               |
| 70/06/16  | 12 30       | 11.2                        | 35000                       | 3.0                      | 5                             | 169                                      | 11.0             | 108.0               | 2.2                        | 8.10           | 1.2               |
| 70/07/14  | 10 15       | 18.2                        | 15000                       | 2.0                      | 5                             | 221                                      | 9.0              | 101.0               | 0.3                        | 8.50           | 0.6               |
| 70/08/17  | 12 30       | 19.5                        | 6540                        | 0.0                      |                               | 243                                      | 9.4              | 110.0               | 1.4                        | 8.50           | 0.6               |
| 70/09/22  | 12 10       | 10.0                        | 6440                        | 1.0                      | 5                             | 283                                      | 11.3             | 107.0               | 1.0                        | 8.60           | 0.5               |
| 70/10/20  | 09 00       | 7.0                         | 4610                        | 10.0                     | 0                             | 262                                      | 12.4             | 109.0               | 2.3                        | 7.70           | 4.0               |
| 70/11/17  | 13 15       | 4.0                         | 4190                        |                          |                               | 295                                      | 14.3             | 117.0               | 3.2                        | 7.10           | 18.9              |
| 70/12/15  | 14 10       | 0.0                         |                             |                          |                               | 258                                      | 14.8             | 108.0               | 1.0                        | 7.80           | 3.2               |
| 71/01/20  | 13 30       | 0.0                         | 6250                        |                          | 3                             | 291                                      | 14.3             | 104.0               | 1.0                        | 8.30           | 1.1               |
| 71/02/24  | 13 10       | 2.0                         | 6750                        |                          |                               | 212                                      | 13.2             | 101.0               | 3.7                        | 7.30           | 7.9               |
| 71/03/24  | 12 00       | 4.5                         | 4630                        |                          |                               | 266                                      | 12.7             | 105.0               | 2.9                        | 7.80           | 3.0               |
| 71/04/20  | 13 20       | 7.5                         | 13900                       | 4.0                      | 5                             | 190                                      | 11.7             | 104.0               | 2.1                        | 7.80           | 2.3               |
| 71/05/26  | 08 00       | 10.0                        | 60500                       |                          |                               | 157                                      | 10.9             | 103.0               | 0.3                        | 7.30           | 6.2               |
| 71/06/22  | 11 00       | 12.5                        | 46200                       |                          |                               | 182                                      | 11.7             | 117.0               | 2.1                        | 7.00           | 15.2              |
| 71/07/27  | 10 50       | 18.0                        | 25900                       |                          |                               | 185                                      | 9.7              | 109.0               | 0.6                        | 7.60           | 3.8               |
| 71/08/18  | 09 30       | 19.0                        | 11000                       | 5.0                      | 5                             | 234                                      | 9.1              | 103.0               | 0.1                        | 7.20           | 12.0              |
| 71/09/22  | 11 40       | 11.5                        | 5340                        | 1.0                      | 3                             | 270                                      | 10.8             | 105.0               | 2.3                        | 7.30           | 10.4              |
| 71/10/19  | 13 15       | 7.0                         | 5720                        | 1.0                      | 3                             | 276                                      | 12.0             | 105.0               | 1.8                        | 8.30           | 1.1               |
| 71/11/16  | 08 50       | 4.0                         | 5570                        | 1.0                      | 5                             | 278                                      | 12.5             | 102.0               | 1.6                        | 7.80           | 3.2               |
| 71/12/17  | 09 15       | 1.0                         | 3240                        | 2.0                      | 5                             | 305                                      | 13.0             | 98.0                | 0.1                        | 7.30           | 10.9              |
| 72/01/10  | 13 15       | 0.0                         | 3000                        | 1.0                      | 3                             | 311                                      | 13.7             | 100.0               | 1.1                        | 7.70           | 4.5               |
| 72/02/03  | 10 00       | 0.0                         | 2840                        | 2.0                      | 5                             | 281                                      | 13.5             | 98.0                | 1.5                        | 6.80           | 35.0              |
| 72/03/02  | 11 15       | 0.0                         | 13500                       | 30.0                     | 10                            | 137                                      | 13.4             | 98.0                | 1.3                        | 6.00           | 105.6             |

KOOTENAI RIVER AT COPELAND, IDAHO

TABLE 40.2 CHEMICAL DATA

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 70300<br>RESIDUE<br>DISS-180<br>C | 70301<br>DISS SOL<br>SUM | 00410<br>T ALK<br>CACO3 | 00440<br>HCO3 ION<br>HCO3 | 00445<br>CO3 ION<br>CO3 | 00900<br>TOT HARD<br>CACO3 | 00902<br>MC HARD<br>CACO3 |
|--------------------|-------------------|-----------------------------------|--------------------------|-------------------------|---------------------------|-------------------------|----------------------------|---------------------------|
| 69/05/27           | 23 30             |                                   |                          | 67                      | 8                         |                         | 80                         | 14                        |
| 69/08/19           | 18 30             |                                   |                          | 108                     | 132                       |                         | 135                        | 29                        |
| 69/09/17           | 15 00             |                                   |                          | 114                     | 139                       |                         |                            |                           |
| 69/10/20           | 13 30             | 165                               |                          | 103                     | 126                       | 6                       | 135                        | 22                        |
| 69/11/18           | 09 30             | 153                               |                          | 101                     | 123                       | 0                       | 138                        | 37                        |
| 69/12/16           | 10 35             | 188                               |                          | 122                     | 149                       | 0                       | 152                        | 30                        |
| 70/01/27           | 10 20             | 186                               |                          | 117                     | 143                       | 0                       | 142                        | 25                        |
| 70/02/25           | 08 55             | 160                               |                          | 110                     | 134                       | 0                       | 133                        | 23                        |
| 70/03/24           | 09 50             | 155                               |                          | 107                     | 130                       | 0                       | 141                        | 34                        |
| 70/04/27           | 10 05             | 120                               |                          | 85                      | 104                       | 0                       | 103                        | 18                        |
| 70/05/18           | 11 15             | 91                                |                          | 56                      | 68                        | 0                       | 64                         | 8                         |
| 70/06/16           | 12 30             | 100                               |                          | 74                      | 90                        | 0                       | 87                         | 13                        |
| 70/07/14           | 10 15             | 132                               |                          | 93                      | 109                       | 2                       | 110                        | 17                        |
| 70/08/17           | 12 30             | 149                               |                          | 102                     | 116                       | 4                       |                            |                           |
| 70/09/22           | 12 10             | 164                               |                          | 110                     | 134                       | 2                       | 140                        | 30                        |
| 70/10/20           | 09 00             | 169                               |                          | 108                     | 132                       | 0                       | 140                        | 32                        |
| 70/11/17           | 13 15             | 175                               |                          | 119                     | 145                       | 0                       |                            |                           |
| 70/12/15           | 14 10             | 156                               |                          | 105                     | 128                       | 0                       |                            |                           |
| 71/01/20           | 13 30             | 170                               |                          | 114                     | 139                       | 0                       | 150                        | 36                        |
| 71/02/24           | 13 10             | 120                               |                          | 82                      | 100                       | 0                       |                            |                           |
| 71/03/24           | 12 00             | 140                               |                          | 100                     | 122                       | 0                       | 130                        | 30                        |
| 71/04/20           | 13 20             | 88                                |                          | 75                      | 92                        | 0                       | 90                         | 0                         |
| 71/05/26           | 08 00             | 102                               |                          | 65                      | 79                        | 0                       | 69                         | 0                         |
| 71/06/22           | 11 00             | 142                               |                          | 78                      | 95                        | 0                       |                            |                           |
| 71/07/27           | 10 50             | 114                               |                          | 79                      | 96                        | 0                       | 85                         | 6                         |
| 71/08/18           | 09 30             |                                   |                          | 98                      | 120                       | 0                       | 112                        | 0                         |
| 71/09/22           | 11 40             |                                   |                          | 108                     | 132                       | 0                       | 130                        | 0                         |
| 71/10/19           | 13 15             |                                   |                          | 110                     | 134                       | 0                       | 135                        | 25                        |
| 71/11/16           | 08 50             |                                   |                          | 105                     | 128                       | 0                       | 130                        | 25                        |
| 71/12/07           | 09 15             |                                   |                          | 113                     | 138                       | 0                       | 143                        | 29                        |
| 72/01/10           | 13 15             |                                   |                          | 122                     | 149                       | 0                       | 150                        | 28                        |
| 72/02/03           | 10 00             |                                   |                          | 114                     | 139                       | 0                       | 140                        | 26                        |
| 72/03/02           | 11 15             |                                   |                          | 54                      | 66                        | 0                       | 65                         | 10                        |

TABLE 40.3 CHEMICAL DATA

## KOOTENAI RIVER AT COPELAND, IDAHO

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00600<br>TOTAL N<br>N<br>MG/L | 00605<br>ORG N<br>N<br>MG/L | 00610<br>NH3-N<br>TOTAL<br>MG/L | 00613<br>NO2-N<br>DISS<br>MG/L | 00618<br>NO3-N<br>DISS<br>MG/L | 00630<br>NO2&NO3<br>N-TOTAL<br>MG/L | 00665<br>PHOS-TOT<br>MG/L P | 00666<br>PHOS-DIS<br>MG/L P | 00671<br>PHOS-DIS<br>ORTHO<br>MG/L P | 00680<br>T ORG C<br>C<br>MG/L |
|--------------------|-------------------|---------------|-------------------------------|-----------------------------|---------------------------------|--------------------------------|--------------------------------|-------------------------------------|-----------------------------|-----------------------------|--------------------------------------|-------------------------------|
| 69/05/27           | 23                | 30            | 0.16                          | 0.040                       | 0.060                           | 0.050                          | 0.10                           |                                     | 0.150                       |                             | 0.023                                |                               |
| 69/08/19           | 18                | 30            | 0.43                          | 0.380                       | 0.020                           | 0.010                          | 0.02                           |                                     | 0.055                       |                             | 0.048                                |                               |
| 69/09/17           | 15                | 00            | 0.44                          | 0.390                       | 0.010                           | <0.001                         | 0.04                           |                                     | 0.048                       |                             | 0.036                                | 14.0                          |
| 69/10/20           | 13                | 30            | 0.07                          | 0.060                       | 0.010                           | 0.000                          | 0.00                           |                                     | 0.040                       | 0.03                        |                                      | 1.5                           |
| 69/11/18           | 09                | 30            | 0.20                          | 0.100                       | 0.080                           | 0.000                          | 0.02                           |                                     | 0.070                       | 0.07                        |                                      | 5.0                           |
| 69/12/16           | 10                | 35            | 0.15                          | 0.010                       | 0.070                           | 0.000                          | 0.07                           |                                     | 0.010                       | 0.00                        |                                      | 2.5                           |
| 70/01/27           | 10                | 20            | 0.17                          | 0.040                       | 0.030                           | 0.010                          | 0.09                           |                                     | 0.030                       | 0.01                        |                                      | 1.5                           |
| 70/02/25           | 08                | 55            | 0.24                          | 0.000                       | 0.000                           | 0.010                          | 0.23                           |                                     | 0.020                       | 0.02                        |                                      | 1.5                           |
| 70/03/24           | 09                | 50            | 0.14                          | 0.050                       | 0.000                           | 0.000                          | 0.09                           |                                     | 0.020                       | 0.01                        |                                      | 2.5                           |
| 70/04/27           | 10                | 05            | 0.02                          | 0.000                       | 0.000                           | 0.000                          | 0.02                           |                                     | 0.030                       | 0.01                        |                                      | 3.0                           |
| 70/05/18           | 11                | 15            | 0.18                          | 0.060                       | 0.020                           | 0.010                          | 0.09                           |                                     | 0.080                       | 0.03                        |                                      | 1.5                           |
| 70/06/16           | 12                | 30            | 0.19                          | 0.080                       | 0.020                           | 0.000                          | 0.09                           |                                     | 0.090                       | 0.06                        |                                      | 0.5                           |
| 70/07/14           | 10                | 15            | 0.13                          | 0.060                       | 0.050                           | 0.000                          | 0.02                           |                                     | 0.110                       | 0.08                        | 0.080                                | 1.5                           |
| 70/08/17           | 12                | 30            | 0.07                          | 0.070                       | 0.000                           | 0.000                          | 0.00                           |                                     | 0.060                       | 0.06                        | 0.060                                |                               |
| 70/09/22           | 12                | 10            | 0.08                          | 0.050                       | 0.000                           | 0.010                          | 0.02                           |                                     | 0.110                       | 0.07                        | 0.070                                | 0.0                           |
| 70/10/20           | 09                | 00            | 0.09                          | 0.010                       | 0.060                           | 0.000                          | 0.02                           | 0.1                                 | 0.150                       | 0.14                        | 0.130                                | 0.0                           |
| 70/11/17           | 13                | 15            | 0.09                          | 0.010                       | 0.030                           | 0.000                          | 0.05                           | 0.2                                 | 0.200                       | 0.170                       | 0.100                                | 1.0                           |
| 70/12/15           | 14                | 10            | 0.14                          | 0.000                       | 0.030                           | 0.020                          | 0.09                           | 0.4                                 | 0.150                       | 0.15                        | 0.130                                | 1.0                           |
| 71/01/20           | 13                | 30            | 0.20                          | 0.020                       | 0.070                           | 0.020                          | 0.09                           | 0.5                                 | 0.110                       | 0.000                       | 0.000                                | 1.5                           |
| 71/02/24           | 13                | 10            | 0.29                          | 0.020                       | 0.070                           | 0.010                          | 0.19                           | 0.2                                 | 0.110                       | 0.070                       | 0.100                                | 2.0                           |
| 71/03/24           | 12                | 00            |                               |                             | 0.110                           | 0.000                          | 0.10                           | 0.1                                 | 0.050                       | 0.10                        | 0.080                                | 1.0                           |
| 71/04/20           | 13                | 20            | 0.36                          | 0.180                       | 0.080                           | 0.000                          | 0.10                           | 0.1                                 | 0.020                       | 0.020                       | 0.040                                | 2.0                           |
| 71/05/26           | 08                | 00            | 0.41                          | 0.150                       | 0.160                           | 0.000                          | 0.10                           | 0.1                                 | 0.100                       | 0.060                       | 0.040                                | 3.0                           |
| 71/06/22           | 11                | 00            | 0.59                          | 0.400                       | 0.090                           | 0.000                          | 0.10                           | 0.05                                | 0.050                       | 0.020                       | 0.020                                | 1.0                           |
| 71/07/27           | 10                | 50            | 3.10                          | 2.900                       | 0.210                           | 0.000                          | 0.00                           | 0.01                                | 0.080                       | 0.070                       | 0.040                                | 1.0                           |
| 71/08/18           | 09                | 30            | 0.36                          | 0.290                       | 0.070                           | 0.000                          | 0.00                           | 0.00                                | 0.060                       | 0.050                       | 0.020                                |                               |
| 71/09/22           | 11                | 40            | 0.21                          | 0.120                       | 0.070                           | 0.000                          | 0.02                           | 0.02                                | 1.100                       | 0.080                       | 0.040                                |                               |
| 71/10/19           | 13                | 15            | 0.21                          | 0.010                       | 0.200                           | 0.000                          | 0.00                           | 0.00                                | 0.120                       | 0.110                       | 0.060                                | 0.0                           |
| 71/11/19           | 08                | 50            | 0.67                          | 0.040                       | 0.190                           | 0.000                          | 0.44                           | 0.4                                 | 0.140                       | 0.130                       | 0.080                                |                               |
| 71/12/07           | 09                | 15            | 0.16                          | 0.140                       | 0.020                           | 0.000                          | 0.00                           | 0.0                                 | 0.130                       | 0.130                       | 0.090                                | 1.0                           |
| 72/01/10           | 13                | 15            | 0.48                          | 0.200                       | 0.070                           | 0.000                          | 0.21                           | 0.2                                 | 0.110                       | 0.090                       | 0.060                                |                               |
| 72/02/03           | 10                | 00            | 0.59                          | 0.230                       | 0.070                           | 0.000                          | 0.29                           | 0.3                                 | 0.150                       | 0.140                       | 0.130                                |                               |
| 72/03/02           | 11                | 15            | 0.58                          | 0.200                       | 0.120                           | 0.000                          | 0.26                           | 0.3                                 | 0.120                       | 0.050                       | 0.020                                |                               |

TABLE 40.4 CHEMICAL DATA

KOOTENAI RIVER AT COPELAND, IDAHO

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | DEPTH<br>FEET | 00915<br>CALCIUM<br>CA, DISS<br>MG/L | 00925<br>MAGNESIUM<br>MG, DISS<br>MG/L | 00930<br>SODIUM<br>NA, DISS<br>MG/L | 00935<br>POTASSIUM<br>K, DISS<br>MG/L | 00940<br>CHLORIDE<br>CL<br>MG/L | 00945<br>SULFATE<br>SO4-TOT<br>MG/L | 00950<br>FLUORIDE<br>F, DISS<br>MG/L | 00955<br>SILICA<br>DISSOLVED<br>MG/L |
|--------------------|-------------------|---------------|--------------------------------------|----------------------------------------|-------------------------------------|---------------------------------------|---------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| 69/05/27           | 23 30             |               |                                      |                                        |                                     |                                       | 1                               | 14                                  |                                      | 7.5                                  |
| 69/06/19           | 18 30             |               |                                      |                                        | 2.70                                | 0.80                                  | 3                               | 25                                  |                                      | 4.6                                  |
| 69/09/17           | 15 00             |               |                                      |                                        | 3.20                                | 0.90                                  |                                 |                                     |                                      | 3.9                                  |
| 69/10/20           | 13 30             |               |                                      |                                        |                                     | 0.80                                  | 5                               |                                     |                                      |                                      |
| 69/11/18           | 09 30             |               |                                      |                                        |                                     | 1.00                                  | 4                               |                                     |                                      |                                      |
| 69/12/16           | 10 35             |               | 40.0                                 | 12.0                                   | 4.10                                | 0.60                                  | 4                               | 37                                  |                                      | 7.9                                  |
| 70/01/27           | 10 20             |               | 38.0                                 | 11.0                                   | 4.60                                | 1.10                                  | 4                               | 53                                  |                                      | 7.2                                  |
| 70/02/25           | 08 55             |               |                                      |                                        |                                     |                                       | 3                               |                                     |                                      |                                      |
| 70/03/24           | 09 50             |               |                                      |                                        |                                     |                                       | 4                               |                                     |                                      |                                      |
| 70/04/27           | 10 05             |               | 28.0                                 | 8.1                                    | 3.50                                | 0.90                                  | 4                               | 25                                  |                                      | 9.0                                  |
| 70/05/18           | 11 15             |               |                                      |                                        |                                     |                                       | 2                               |                                     |                                      |                                      |
| 70/06/16           | 08 50             |               | 24.0                                 | 6.0                                    | 1.60                                | 0.70                                  | 2                               | 13                                  |                                      | 6.2                                  |
| 70/07/14           | 10 15             |               | 31.0                                 | 8.3                                    | 2.20                                | 1.60                                  | 3                               | 18                                  | 0.30                                 | 4.0                                  |
| 70/09/22           | 12 10             |               |                                      |                                        |                                     |                                       | 4                               | 30                                  | 0.60                                 |                                      |
| 70/10/20           | 09 00             |               | 38.0                                 | 11.0                                   |                                     |                                       | 3                               | 33                                  | 0.60                                 |                                      |
| 70/11/17           | 13 15             |               |                                      |                                        |                                     | 1.60                                  |                                 |                                     |                                      |                                      |
| 71/01/20           | 13 30             |               | 39.0                                 | 12.0                                   |                                     | 1.00                                  | 3                               | 29                                  | 0.60                                 | 9.4                                  |
| 71/03/24           | 12 00             |               | 35.0                                 | 11.0                                   |                                     | 1.00                                  |                                 |                                     |                                      |                                      |
| 71/04/20           | 13 20             |               | 25.0                                 | 6.7                                    |                                     |                                       | 1                               | 19                                  |                                      |                                      |
| 71/05/26           | 08 00             |               | 20.0                                 | 4.6                                    |                                     | 0.50                                  |                                 |                                     |                                      |                                      |
| 71/07/27           | 10 50             |               | 23.0                                 | 6.6                                    | 1.50                                | 0.50                                  | 2                               | 14                                  | 0.20                                 |                                      |
| 71/08/18           | 09 30             |               | 31.0                                 | 8.4                                    | 2.50                                | 0.60                                  | 3                               | 19                                  | 0.50                                 |                                      |
| 71/09/22           | 11 40             |               | 35.0                                 | 11.0                                   | 3.10                                | 0.80                                  | 3                               | 32                                  | 0.70                                 |                                      |
| 71/10/19           | 13 15             |               | 36.0                                 | 11.0                                   | 3.60                                | 0.30                                  | 4                               | 29                                  | 0.90                                 |                                      |
| 71/11/16           | 08 50             |               | 35.0                                 | 10.0                                   | 3.80                                | 0.90                                  | 3                               | 29                                  | 0.80                                 |                                      |
| 72/12/07           | 09 15             |               | 39.0                                 | 11.0                                   | 4.00                                | 0.90                                  | 4                               | 30                                  | 1.10                                 |                                      |
| 72/01/10           | 13 15             |               | 41.0                                 | 12.0                                   | 4.00                                | 1.10                                  | 4                               | 31                                  | 1.40                                 |                                      |
| 72/02/03           | 10 00             |               | 38.0                                 | 12.0                                   | 4.40                                | 0.90                                  | 4                               | 26                                  | 0.80                                 |                                      |
| 72/03/02           | 11 15             |               | 18.0                                 | 4.9                                    | 2.40                                | 0.80                                  | 2                               | 13                                  | 0.30                                 |                                      |

## APPENDIX

TABLE 40.5 CHEMICAL DATA

KOOTENAI RIVER AT COPELAND, IDAHO

| DATE FROM TO | TIME OF DAY | 01000 ARSENIC AS, DISS UG/L | 01002 ARSENIC AS, TOT UG/L | 01005 BARIUM BA, DISS UG/L | 01010 BERYLLIUM BE, DISS UG/L | 01020 BORON B, DISS UG/L | 01022 BORON B, TOT UG/L | 01025 CADMIUM CD, DISS UG/L | 01027 CADMIUM CD, TOT UG/L | 01030 CHROMIUM CR, DISS UG/L | 01032 CHROMIUM HEX-VAL UG/L | 01034 CHROMIUM CR, TOT UG/L |
|--------------|-------------|-----------------------------|----------------------------|----------------------------|-------------------------------|--------------------------|-------------------------|-----------------------------|----------------------------|------------------------------|-----------------------------|-----------------------------|
| 69/11/18     | 09 30       | 5                           |                            | 200                        | 0.00                          | 0                        |                         | 3                           |                            | 2                            |                             |                             |
| 70/01/27     | 10 20       | 3                           |                            | 0                          | 0.00                          | 20                       |                         | 3                           |                            | 0                            |                             |                             |
| 70/04/27     | 10 05       | 1                           |                            | 0                          | 0.00                          | 20                       |                         | 1                           |                            | 0                            |                             |                             |
| 70/05/18     | 11 15       | 0                           |                            | 0                          | 0.00                          | 10                       |                         | 1                           |                            | 0                            |                             |                             |
| 70/07/14     | 10 15       | 2                           |                            | 0                          | 0.00                          | 0                        |                         | 3                           |                            | 0                            |                             |                             |
| 70/09/22     | 12 10       |                             | < 10                       |                            |                               |                          | 20                      |                             | < 1                        |                              |                             |                             |
| 70/10/20     | 09 00       | 0                           |                            |                            |                               |                          |                         |                             |                            |                              |                             | 1                           |
| 70/11/17     | 13 15       | 0                           |                            | 0                          | 10.00                         | 0                        | 20                      | 3                           |                            |                              |                             | 1                           |
| 70/12/15     | 14 10       |                             |                            |                            |                               |                          | < 10                    |                             |                            |                              |                             |                             |
| 71/01/20     | 13 30       | 0                           |                            | 10                         | 0.00                          | 20                       | < 10                    | 0                           |                            |                              |                             | 2                           |
| 71/03/24     | 12 00       | 10                          |                            | 400                        | 5.00                          | 10                       | < 10                    |                             |                            |                              |                             | 1                           |
| 71/05/26     | 08 00       | 0                           |                            | 0                          | 0.00                          | 10                       |                         | 0                           |                            | 0                            |                             |                             |
| 71/07/27     | 10 50       |                             | 1                          | 1000                       | 0.00                          | 10                       |                         | 1                           | < 1                        | 1                            |                             | 1                           |
| 71/10/19     | 13 15       | 0                           | 8                          |                            |                               |                          |                         | 0                           | 3                          | 2                            |                             | 2                           |
| 72/01/10     | 13 15       | 0                           | 3                          |                            |                               |                          |                         | 1                           | < 1                        | 0                            |                             | 1                           |

TABLE 40.6 CHEMICAL DATA

KOOTENAI RIVER AT COPELAND, IDAHO

| DATE FROM TO | TIME OF DAY | 01035 COBALT CO, DISS UG/L | 01037 COBALT CO, TOTAL UG/L | 01040 COPPER CU, DISS UG/L | 01042 COPPER CU, TOT UG/L | 01045 IRON FE, TOT UG/L | 01046 IRON FE, DISS UG/L | 01049 LEAD PB, DISS UG/L | 01051 LEAD PB, TOT UG/L | 01055 MANGANESE MN UG/L | 01056 MANGANESE MN, DISS UG/L |
|--------------|-------------|----------------------------|-----------------------------|----------------------------|---------------------------|-------------------------|--------------------------|--------------------------|-------------------------|-------------------------|-------------------------------|
| 69/11/18     | 09 30       | 2                          |                             | 30                         |                           |                         | 20                       | 11                       |                         |                         | 20.0                          |
| 70/01/27     | 10 20       | 3                          |                             | 4                          |                           |                         | 40                       | 23                       |                         |                         | 30.0                          |
| 70/04/27     | 10 05       | 2                          |                             | 5                          |                           |                         | 20                       | 7                        |                         |                         | 20.0                          |
| 70/05/18     | 11 15       | 3                          |                             | 4                          |                           |                         | 40                       | 8                        |                         |                         | 0.0                           |
| 70/07/14     | 10 15       | 3                          |                             | 8                          |                           |                         | 10                       | 7                        |                         |                         | 0.0                           |
| 70/09/22     | 12 10       |                            |                             |                            | 10                        | 200                     |                          |                          | < 1                     | 20.0                    |                               |
| 70/11/17     | 13 15       | 0                          |                             | 1                          | 10                        | 120                     | 40                       | 0                        | 5                       | 10.0                    | 0.0                           |
| 70/12/15     | 14 10       |                            |                             |                            | 10                        | 120                     |                          |                          | 60                      | 20.0                    |                               |
| 71/01/20     | 13 30       | 0                          |                             | 0                          | 10                        | 10                      | 200                      | 0                        | < 1                     | 20.0                    | 0.0                           |
| 71/03/24     | 12 00       | 2                          |                             | 0                          | 10                        | 170                     | 60                       | 2                        | 12                      | 40.0                    | 390.0                         |
| 71/05/26     | 08 00       | 0                          |                             | 2                          | 10                        | 1300                    | 70                       | 3                        | 9                       | 50.0                    | 80.0                          |
| 71/07/27     | 10 50       | 0                          |                             | 1                          | < 10                      | 30                      | 10                       | 0                        | 2                       |                         | 10.0                          |
| 71/09/18     | 09 30       |                            |                             | 0                          |                           |                         | 20                       | 0                        |                         |                         |                               |
| 71/09/22     | 11 40       |                            |                             | 0                          |                           |                         | 20                       | 3                        |                         |                         |                               |
| 71/10/19     | 13 15       |                            |                             | 1                          | < 1                       |                         | 10                       | 0                        | < 1                     |                         |                               |
| 71/11/16     | 08 50       |                            |                             | 1                          |                           |                         | 40                       | 2                        |                         |                         |                               |
| 71/12/07     | 09 15       |                            |                             | 0                          |                           |                         | 20                       | 0                        |                         |                         |                               |
| 72/01/10     | 13 15       |                            |                             | 1                          | < 1                       |                         | 20                       | 1                        | < 1                     |                         |                               |
| 72/02/03     | 10 00       |                            |                             | 2                          |                           |                         | 50                       | 14                       |                         |                         |                               |
| 72/03/02     | 11 15       |                            |                             | 2                          |                           |                         | 50                       | 5                        |                         |                         |                               |

APPENDIX

KOOTENAI RIVER AT COPELAND, IDAHO

TABLE 40.7 CHEMICAL DATA

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01060<br>MOLY<br>MO, DISS<br>UG/L | 01065<br>NICKEL<br>NI, DISS<br>UG/L | 01075<br>SILVER<br>AG, DISS<br>UG/L | 01080<br>STRONTIUM<br>SR, DISS<br>UG/L | 01082<br>STRONTIUM<br>SR, TOT<br>UG/L | 01085<br>VANADIUM<br>V, DISS<br>UG/L | 01090<br>ZINC<br>ZN, DISS<br>UG/L | 01092<br>ZINC<br>ZN, TOT<br>UG/L |
|--------------------|-------------------|-----------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|
| 69/11/18           | 09 30             | 2                                 | 9                                   | 0.0                                 | 160                                    |                                       | 0                                    | 30                                |                                  |
| 70/01/27           | 10 20             | 3                                 | 10                                  | 1.0                                 | 180                                    |                                       | 1                                    | 10                                |                                  |
| 70/04/27           | 10 05             | 0                                 | 6                                   | 10.0                                | 120                                    |                                       | 0                                    | 10                                |                                  |
| 70/05/18           | 11 15             | 0                                 | 4                                   | 5.0                                 | 90                                     |                                       | 0                                    | 10                                |                                  |
| 70/07/14           | 10 15             | 2                                 | 5                                   | 1.0                                 | 200                                    |                                       | 0                                    | 10                                |                                  |
| 70/09/22           | 12 10             |                                   |                                     |                                     |                                        |                                       |                                      |                                   | 30                               |
| 70/10/20           | 09 00             | 0                                 |                                     |                                     |                                        |                                       |                                      |                                   |                                  |
| 70/11/17           | 13 15             |                                   | 7                                   | 0.0                                 |                                        | 140                                   | 0.4                                  | 0                                 | 20                               |
| 70/12/15           | 14 10             |                                   |                                     |                                     |                                        | 90                                    | 0.3                                  | 0                                 | 20                               |
| 71/01/20           | 13 30             |                                   | 0                                   | 1.0                                 |                                        | 100                                   | 0                                    | 40                                | 50                               |
| 71/03/24           | 12 00             | 0                                 | 7                                   |                                     |                                        | 100                                   | 0                                    | 60                                | 30                               |
| 71/05/26           | 08 00             | 2                                 | 3                                   |                                     |                                        | 60                                    | 0.2                                  | 50                                | 30                               |
| 71/07/27           | 10 50             | 2                                 | 4                                   | 0.0                                 | 80                                     |                                       | 2.2                                  | 80                                | 10                               |
| 71/08/18           | 09 30             |                                   |                                     |                                     |                                        |                                       |                                      | 170                               |                                  |
| 71/09/22           | 11 40             |                                   |                                     |                                     |                                        |                                       |                                      | 30                                |                                  |
| 71/10/19           | 13 15             |                                   |                                     |                                     |                                        |                                       | 0                                    | 10                                | 10                               |
| 71/11/16           | 08 50             |                                   |                                     |                                     |                                        |                                       |                                      | 140                               |                                  |
| 71/12/07           | 09 15             |                                   |                                     |                                     |                                        |                                       | 0.8                                  | 30                                | 10                               |
| 72/01/10           | 13 15             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                |                                  |
| 72/02/03           | 10 00             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                |                                  |
| 72/03/02           | 11 15             |                                   |                                     |                                     |                                        |                                       |                                      | 20                                |                                  |

KOOTENAI RIVER AT COPELAND, IDAHO

TABLE 40.8 CHEMICAL DATA

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 01104<br>ALUMINUM<br>AL, DISS<br>UG/L | 01130<br>LITHIUM<br>LI, DISS<br>UG/L | 01145<br>SELENIUM<br>SE, DISS<br>UG/L | 31501<br>TOT COLI<br>MP/100 ML<br>/100 ML | 31503<br>TOT COLI<br>MP/100 ML<br>/100 ML | 71890<br>MERCURY<br>HG, DISS<br>UG/L | 71900<br>MERCURY<br>HG, TOTAL<br>UG/L | 31503<br>TOT COLI<br>MP/100 ML<br>/100 ML | 31616<br>FEC. COLI<br>MP/100 ML<br>/100 ML | 38260<br>HEAVY<br>METALS<br>MG/L |
|--------------------|-------------------|---------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------------|---------------------------------------|-------------------------------------------|--------------------------------------------|----------------------------------|
| 69/05/27           | 23 30             |                                       |                                      |                                       |                                           |                                           |                                      |                                       |                                           |                                            |                                  |
| 69/06/19           | 18 30             | 60                                    |                                      |                                       | 69                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 69/11/18           | 09 30             |                                       |                                      | 2                                     | 100                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 69/12/16           | 10 35             |                                       |                                      | 0                                     | 84                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/01/27           | 10 20             | 100                                   |                                      |                                       | 63                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/02/25           | 08 55             |                                       |                                      |                                       | 50                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/03/24           | 09 30             | 0                                     |                                      | 2                                     | 60                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/04/27           | 10 05             | 100                                   |                                      | 2                                     | 680                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/05/18           | 11 15             |                                       |                                      |                                       |                                           |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/06/16           | 12 30             | 100                                   |                                      | 1                                     | 370                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/07/14           | 10 15             |                                       |                                      |                                       | 330                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/08/17           | 12 30             |                                       |                                      |                                       | 140                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/09/22           | 12 10             |                                       |                                      |                                       |                                           |                                           | 0.1                                  |                                       |                                           |                                            |                                  |
| 70/10/20           | 09 01             | 0                                     |                                      | 9                                     |                                           |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/11/17           | 13 15             |                                       |                                      |                                       |                                           |                                           |                                      |                                       |                                           |                                            |                                  |
| 70/12/15           | 14 10             |                                       |                                      |                                       |                                           |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/01/20           | 13 30             | 300                                   |                                      | 13                                    | 1100                                      |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/02/24           | 13 10             |                                       |                                      |                                       | 220                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/03/24           | 12 00             | 500                                   |                                      | 0                                     | 96                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/04/20           | 13 20             | 600                                   |                                      | 10                                    | 180                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/05/26           | 08 00             |                                       |                                      |                                       | 2400                                      |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/06/22           | 11 00             | 500                                   | 8                                    | 2                                     | 1100                                      |                                           |                                      | 0.3                                   |                                           |                                            |                                  |
| 71/07/27           | 10 50             |                                       |                                      |                                       |                                           |                                           |                                      | 0.2                                   |                                           |                                            |                                  |
| 71/08/18           | 09 30             |                                       |                                      |                                       | 350                                       |                                           |                                      | 0.3                                   |                                           |                                            |                                  |
| 71/09/22           | 11 40             |                                       |                                      |                                       | 39                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/10/19           | 13 15             |                                       |                                      |                                       | 70                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/11/16           | 08 50             |                                       |                                      |                                       | 130                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 71/12/07           | 09 15             |                                       |                                      |                                       | 17                                        |                                           |                                      |                                       |                                           |                                            |                                  |
| 72/01/10           | 13 15             |                                       |                                      | 3                                     | 360                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 72/02/03           | 10 00             |                                       |                                      |                                       | 180                                       |                                           |                                      |                                       |                                           |                                            |                                  |
| 72/03/02           | 11 15             |                                       |                                      |                                       | 60                                        |                                           |                                      |                                       |                                           |                                            |                                  |

TABLE 41.1 CHEMICAL DATA

## KOOTENAI RIVER AT PORTELL, IDAHO

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 00010<br>WATER<br>TEMP<br>CENT | 00060<br>STREAM<br>FLOW<br>CFS | 00070<br>TURB<br>JESH<br>JTU | 00080<br>COLOR<br>PT-CO<br>UNITS | 00095<br>CONDUCTIVITY<br>AT 25C<br>MICROMHO | 00300<br>DO<br>MG/L | 00301<br>DO<br>SATUR<br>PERCENT | 00310<br>BOD<br>5 DAY<br>MG/L | 00400<br>PH<br>SU | 00405<br>CO2<br>MG/L |
|--------------------|-------------------|--------------------------------|--------------------------------|------------------------------|----------------------------------|---------------------------------------------|---------------------|---------------------------------|-------------------------------|-------------------|----------------------|
| 68/03/13           | 08 45             | 4.5                            |                                |                              |                                  | 260                                         | 13.0                | 107.0                           |                               | 7.80              | 2.0                  |
| 68/04/03           | 08 55             | 6.0                            |                                | 2.0                          | 10                               | 235                                         | 11.8                | 101.0                           |                               | 7.80              | 2.0                  |
| 68/04/17           | 14 00             | 8.0                            |                                | 2.0                          | 10                               | 295                                         | 11.7                | 104.0                           |                               | 8.20              | 0.9                  |
| 68/05/08           | 13 15             | 10.0                           |                                | 3.0                          | 10                               | 200                                         | 11.0                | 103.0                           |                               | 7.60              | 2.9                  |
| 68/06/04           | 09 25             | 12.0                           |                                | 11.0                         | 10                               | 160                                         | 11.0                | 108.0                           |                               | 7.80              | 1.8                  |
| 68/07/10           | 09 45             | 18.0                           |                                | 1.0                          | 8                                | 190                                         | 9.3                 | 105.0                           |                               | 8.10              | 1.2                  |
| 68/08/06           | 12 00             | 19.2                           |                                | 1.0                          | 2                                | 205                                         | 8.2                 | 93.0                            |                               | 8.10              | 1.4                  |
| 68/08/20           | 07 45             | 15.5                           |                                | <1.0                         | <5                               | 240                                         | 9.1                 | 96.0                            |                               | 7.70              | 3.6                  |
| 68/09/24           | 21 45             | 11.2                           |                                | 1.0                          | 5                                | 260                                         | 10.2                | 98.0                            |                               | 8.30              | 0.8                  |
| 68/11/12           | 11 45             | 4.5                            |                                | 1.0                          | 5                                | 220                                         | 11.8                | 97.0                            |                               | 7.60              | 4.0                  |
| 68/12/16           | 20 05             | 2.5                            |                                | <1.0                         | 5                                | 235                                         | 13.1                | 102.0                           |                               | 7.80              | 2.7                  |
| 69/02/12           | 07 20             | 1.0                            |                                | 1.0                          | 5                                | 220                                         | 13.0                | 97.0                            |                               | 7.50              | 6.3                  |
| 69/03/18           | 16 30             | 1.5                            |                                | 5.0                          | 3                                | 330                                         | 13.0                | 96.0                            |                               | 8.00              | 2.1                  |
| 69/04/22           | 12 00             | 8.0                            |                                | 23.0                         | 15                               | 170                                         | 12.1                | 108.0                           |                               | 7.60              | 3.2                  |

TABLE 41.2 CHEMICAL DATA

## KOOTENAI RIVER AT PORTELL, IDAHO

| DATE<br>FROM<br>TO | TIME<br>OF<br>DAY | 70300<br>RESIDUE<br>DISS-180<br>C MG/L | 70301<br>DISS SOL<br>SUM<br>MG/L | 00410<br>T ALK<br>CACO3<br>MG/L | 00440<br>HCO3 ION<br>MG/L | 00445<br>CO3 ION<br>CO3<br>MG/L | 00900<br>TOT HARD<br>CACO3<br>MG/L | 00902<br>NC HARD<br>CACO3<br>MG/L |
|--------------------|-------------------|----------------------------------------|----------------------------------|---------------------------------|---------------------------|---------------------------------|------------------------------------|-----------------------------------|
| 68/03/13           | 08 45             |                                        |                                  | 65                              | 79                        |                                 |                                    |                                   |
| 68/04/03           | 08 55             |                                        |                                  | 66                              | 80                        |                                 | 105                                |                                   |
| 68/04/17           | 14 00             |                                        |                                  | 76                              | 93                        |                                 | 123                                |                                   |
| 68/05/08           | 13 15             |                                        |                                  | 59                              | 72                        |                                 | 100                                |                                   |
| 68/06/04           | 09 25             |                                        |                                  | 60                              | 73                        |                                 | 113                                |                                   |
| 68/07/10           | 09 45             |                                        |                                  | 79                              | 96                        |                                 | 148                                |                                   |
| 68/08/06           | 12 00             |                                        |                                  | 89                              | 109                       |                                 | 228                                |                                   |
| 68/08/20           | 07 45             |                                        |                                  | 98                              | 119                       |                                 | 256                                |                                   |
| 68/09/24           | 21 45             |                                        |                                  | 84                              | 102                       |                                 | 131                                |                                   |
| 68/11/12           | 11 45             |                                        |                                  | 82                              | 100                       |                                 | 111                                |                                   |
| 68/12/16           | 20 05             |                                        |                                  | 88                              | 107                       |                                 | 99                                 |                                   |
| 69/02/12           | 07 20             |                                        |                                  | 108                             | 132                       |                                 | 125                                |                                   |
| 69/03/18           | 16 30             |                                        |                                  | 107                             | 130                       |                                 | 134                                |                                   |
| 69/04/22           | 12 00             |                                        |                                  | 65                              | 75                        |                                 | 75                                 |                                   |

TABLE 41.3 CHEMICAL DATA

KOOTENAI RIVER AT PORTHILL, IDAHO

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00600<br>TOTAL N<br>N | 00605<br>OMC N<br>N | 00610<br>NH <sub>3</sub> -N<br>TOTAL | 00613<br>NH <sub>2</sub> -N<br>DISS | 00618<br>NO <sub>3</sub> -N<br>DISS | 00630<br>NH <sub>4</sub> -N<br>N-TOTAL | 00665<br>PHOS-TOT<br>P | 00666<br>PHOS-DIS<br>P | 00671<br>PHOS-DIS<br>ORTHO P | 00680<br>T OMC C<br>C |
|--------------|-------------|------------|-----------------------|---------------------|--------------------------------------|-------------------------------------|-------------------------------------|----------------------------------------|------------------------|------------------------|------------------------------|-----------------------|
| 68/03/13     | 08 45       |            |                       |                     |                                      | < 0.010                             | 0.11                                |                                        | 0.290                  | 0.250                  | 0.250                        |                       |
| 68/04/03     | 08 55       |            | .80                   | .60                 | 0.100                                | 0.006                               | 0.09                                |                                        | 0.240                  | 0.200                  | 0.200                        |                       |
| 68/04/17     | 14 00       |            | .21                   | .10                 | < 0.100                              | 0.001                               | 0.01                                |                                        | 0.330                  | 0.250                  | 0.250                        |                       |
| 68/05/08     | 15 15       |            | .30                   | .10                 | < 0.100                              | 0.010                               | 0.09                                |                                        | 0.150                  | 0.110                  | 0.110                        |                       |
| 68/06/04     | 08 25       |            | .48                   | .30                 | 0.100                                | 0.001                               | 0.08                                |                                        | 0.200                  | 0.067                  | 0.067                        | 8.0                   |
| 68/07/10     | 09 45       |            | .48                   | .35                 | < 0.050                              | < 0.005                             | 0.07                                |                                        | 0.160                  | 0.110                  | 0.110                        | 1.0                   |
| 68/08/06     | 12 00       |            | .21                   | .19                 | < 0.010                              | < 0.005                             | 0.005                               |                                        | 0.090                  | 0.053                  | 0.053                        | 3.0                   |
| 68/08/20     | 07 45       |            | .12                   | .09                 | < 0.010                              | < 0.005                             | 0.01                                |                                        | 0.220                  | 0.200                  | 0.200                        | 1.0                   |
| 68/09/24     | 21 45       |            | .22                   | .20                 | 0.005                                | 0.005                               | 0.05                                |                                        | 0.240                  | 0.200                  | 0.200                        | 2.0                   |
| 68/11/12     | 11 45       |            | .26                   | .19                 | 0.010                                | < 0.010                             | < 0.05                              |                                        | 0.072                  | 0.050                  | 0.050                        | < 1.0                 |
| 68/12/16     | 20 05       |            | .44                   | .38                 | 0.020                                | < 0.020                             | 0.20                                |                                        | 0.170                  | 0.160                  | 0.160                        | 3.0                   |
| 69/02/12     | 07 20       |            | .92                   | .69                 | 0.010                                | < 0.010                             | 0.21                                |                                        | 0.180                  | 0.180                  | 0.180                        | 1.0                   |
| 69/03/18     | 16 30       |            | .44                   | .19                 | 0.010                                | < 0.005                             | 0.25                                |                                        | 0.130                  | 0.093                  | 0.093                        | < 1.0                 |
| 69/04/22     | 12 00       |            | .56                   | .28                 | 0.120                                | 0.010                               | 0.15                                |                                        | 0.110                  | 0.022                  | 0.022                        | 2.0                   |

TABLE 41.4 CHEMICAL DATA

KOOTENAI RIVER AT PORTHILL, IDAHO

| DATE FROM TO | TIME OF DAY | 00915<br>CALCIUM<br>CA, DISS | 00925<br>MAGNESIUM<br>MG, DISS | 00930<br>SODIUM<br>NA, DISS | 00935<br>POTASSIUM<br>K, DISS | 00940<br>CHLORIDE<br>CL | 00945<br>SULFATE<br>SO <sub>4</sub> -TOT | 00950<br>FLUORIDE<br>F, DISS | 00955<br>SILICA<br>DISSOLVED | 00956<br>SILICA<br>TOTAL |
|--------------|-------------|------------------------------|--------------------------------|-----------------------------|-------------------------------|-------------------------|------------------------------------------|------------------------------|------------------------------|--------------------------|
| 68/03/13     | 08 45       |                              |                                |                             | 1.00                          |                         |                                          |                              |                              | 9.2                      |
| 68/04/03     | 08 55       |                              |                                | 2.50                        | 0.90                          | 2                       | 30                                       |                              |                              | 9.7                      |
| 68/04/17     | 14 00       |                              |                                | 2.80                        | 0.80                          | 1                       | 43                                       |                              |                              | 8.7                      |
| 68/05/08     | 15 15       |                              |                                | 1.80                        | 0.90                          | 1                       | 32                                       |                              |                              | 7.7                      |
| 68/06/04     | 09 25       |                              |                                | 1.40                        | 0.50                          | 1                       | 23                                       |                              |                              | 5.2                      |
| 68/07/10     | 09 45       |                              |                                | 1.00                        | 0.80                          | 2                       | 24                                       |                              |                              | 4.7                      |
| 68/08/06     | 12 00       |                              |                                | 1.80                        | 0.60                          | 2                       | 25                                       |                              |                              | 3.2                      |
| 68/08/20     | 07 45       |                              |                                | 2.20                        | 0.60                          | 2                       | 37                                       |                              |                              | 5.5                      |
| 68/09/24     | 21 45       |                              |                                | 2.20                        | 0.70                          | 2                       | 37                                       |                              |                              | 6.2                      |
| 68/11/12     | 11 45       |                              |                                | 2.10                        | 0.60                          | 2                       | 25                                       |                              |                              | 7.5                      |
| 68/12/16     | 20 05       |                              |                                | 2.30                        | 0.60                          | 1                       | 58                                       |                              |                              | 8.0                      |
| 69/02/12     | 07 20       |                              |                                | 3.60                        | 0.80                          | 2                       | 24                                       |                              |                              | 8.4                      |
| 69/03/18     | 16 30       |                              |                                | 3.30                        | 0.77                          | 2                       | 34                                       |                              |                              | 10.0                     |
| 69/04/22     | 12 00       |                              |                                | 1.80                        | 0.82                          | 1                       | 16                                       |                              |                              |                          |

TABLE 41.5 CHEMICAL DATA

KOOTENAI RIVER AT PORTHILL, IDAHO

| DATE FROM TO | TIME OF DAY | 01104<br>ALUMINUM<br>AL, DISS | 01130<br>LITHIUM<br>LI, DISS | 01145<br>SELENIUM<br>SE, DISS | 31501<br>TOT COLI<br>MPN/100 ML | 31503<br>TOT COLI<br>MPN/100 ML | 71890<br>MERCURY<br>HG, DISS | 71900<br>MERCURY<br>HG, TOTAL | 31503<br>TOT COLI<br>MPN/100 ML | 31616<br>FEC COLI<br>MPN-FCIR | 38260<br>HEAS |
|--------------|-------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|---------------------------------|------------------------------|-------------------------------|---------------------------------|-------------------------------|---------------|
| 68/03/13     | 08 45       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/04/03     | 08 55       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/04/17     | 14 00       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/05/08     | 15 15       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/06/04     | 09 25       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/07/10     | 09 45       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/08/06     | 12 00       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/08/20     | 07 45       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/09/24     | 21 45       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/11/12     | 11 45       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 68/12/16     | 20 05       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 69/02/12     | 07 20       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |
| 69/04/22     | 12 00       |                               |                              |                               |                                 |                                 |                              |                               |                                 |                               |               |

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12301933 - KOOTENAI R. BL LIBBY DAM NR LIBBY, MONT.  
COMPOSITE WATER QUALITY DATA, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

TABLE 42.1

| DATE                | DIS-<br>CHARGE<br>(CFS) | DIS-<br>SOLVED<br>SILICA<br>(MG/L) | DIS-<br>SOLVED<br>IRON<br>(PPM) | DIS-<br>SOLVED<br>CAL-<br>CIUM<br>(MG/L) | DIS-<br>SOLVED<br>MAG-<br>NESIUM<br>(MG/L) | DIS-<br>SOLVED<br>SODIUM<br>(MG/L) | DIS-<br>SOLVED<br>TAS-<br>SIUM<br>(MG/L) | BICAR-<br>BONATE<br>(MG/L) | CAR-<br>BONATE<br>(MG/L) | DIS-<br>SOLVED<br>SULFATE<br>(MG/L) | DIS-<br>SOLVED<br>CHLO-<br>RIDE<br>(MG/L) | DIS-<br>SOLVED<br>FLUO-<br>RIDE<br>(MG/L) |
|---------------------|-------------------------|------------------------------------|---------------------------------|------------------------------------------|--------------------------------------------|------------------------------------|------------------------------------------|----------------------------|--------------------------|-------------------------------------|-------------------------------------------|-------------------------------------------|
| OCT.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 03-15               | 5070                    | 6.1                                | --                              | 61                                       | 12                                         | 3.4                                | 1.0                                      | 140                        | 0                        | 85                                  | 1.9                                       | 1.4                                       |
| 16-24               | 4840                    | 6.0                                | --                              | 60                                       | 12                                         | 3.1                                | .6                                       | 138                        | 0                        | 82                                  | 2.2                                       | 1.4                                       |
| 25-31               | 4830                    | 5.7                                | --                              | 58                                       | 12                                         | 3.0                                | .6                                       | 142                        | 0                        | 78                                  | 1.9                                       | 1.3                                       |
| NOV.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-03               | 4830                    | 5.7                                | --                              | 58                                       | 12                                         | 3.0                                | .6                                       | 142                        | 0                        | 78                                  | 1.9                                       | 1.3                                       |
| 04-10               | 4620                    | 5.2                                | --                              | 40                                       | 11                                         | 3.0                                | .8                                       | 136                        | 0                        | 38                                  | 1.8                                       | .4                                        |
| 11-26               | 4080                    | 6.3                                | --                              | 65                                       | 13                                         | 3.2                                | 1.0                                      | 144                        | 0                        | 92                                  | 2.1                                       | 1.6                                       |
| 27-30               | 3060                    | 7.1                                | --                              | 70                                       | 14                                         | 3.5                                | .8                                       | 158                        | 0                        | 101                                 | 2.1                                       | 1.5                                       |
| DEC.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-13               | 3270                    | 7.4                                | --                              | 72                                       | 14                                         | 3.5                                | .9                                       | 152                        | 0                        | 106                                 | 3.6                                       | 1.9                                       |
| 14-31               | 2660                    | 8.4                                | --                              | 82                                       | 15                                         | 3.7                                | .9                                       | 160                        | 0                        | 126                                 | 3.2                                       | 2.3                                       |
| JAN.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-14               | 2750                    | 8.9                                | --                              | 81                                       | 15                                         | 3.8                                | .7                                       | 160                        | 0                        | 128                                 | 3.0                                       | 2.1                                       |
| 15-31               | 3350                    | 9.2                                | --                              | 79                                       | 14                                         | 3.7                                | 1.2                                      | 164                        | 0                        | 117                                 | 3.2                                       | 2.3                                       |
| FEB.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-26               | 3240                    | 8.0                                | --                              | 79                                       | 14                                         | 3.8                                | .8                                       | 152                        | 0                        | 125                                 | 3.4                                       | 2.3                                       |
| 27-29               | 3630                    | 7.2                                | --                              | 73                                       | 13                                         | 3.3                                | .9                                       | 140                        | 0                        | 113                                 | 2.0                                       | 2.0                                       |
| MAR.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-26               | 3630                    | 7.2                                | --                              | 73                                       | 13                                         | 3.3                                | .9                                       | 140                        | 0                        | 113                                 | 2.0                                       | 2.0                                       |
| 27-31               | 3950                    | 6.1                                | --                              | 67                                       | 12                                         | 3.2                                | 1.0                                      | 143                        | 0                        | 94                                  | 2.0                                       | 1.5                                       |
| APR.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-08               | 3950                    | 6.1                                | --                              | 67                                       | 12                                         | 3.2                                | 1.0                                      | 143                        | 0                        | 94                                  | 2.0                                       | 1.5                                       |
| 09-30               | 3980                    | 5.7                                | --                              | 67                                       | 12                                         | 3.4                                | .8                                       | 143                        | 0                        | 98                                  | 1.9                                       | 1.8                                       |
| MAY                 |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-12               | 11400                   | 6.2                                | --                              | 43                                       | 8.5                                        | 2.1                                | .8                                       | 115                        | 0                        | 50                                  | 1.4                                       | .9                                        |
| 13-31               | 31400                   | 5.1                                | --                              | 35                                       | 6.8                                        | 1.4                                | .6                                       | 104                        | 0                        | 26                                  | .8                                        | .5                                        |
| JUNE                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-30               | 42100                   | 3.5                                | --                              | 30                                       | 6.2                                        | 1.4                                | .3                                       | 104                        | 0                        | 22                                  | .6                                        | .5                                        |
| JULY                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-14               | 30400                   | 4.2                                | --                              | 29                                       | 6.5                                        | 1.2                                | .5                                       | 98                         | 0                        | 23                                  | .6                                        | .4                                        |
| 15-31               | 16900                   | 4.5                                | --                              | 33                                       | 8.6                                        | 1.8                                | .9                                       | 111                        | 0                        | 30                                  | 1.1                                       | .4                                        |
| AUG.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-18               | 10800                   | 4.2                                | --                              | 36                                       | 9.2                                        | 2.1                                | .5                                       | 120                        | 0                        | 32                                  | 1.7                                       | .4                                        |
| 19-31               | 8710                    | 5.0                                | --                              | 48                                       | 10                                         | 2.4                                | 1.0                                      | 130                        | 0                        | 60                                  | 1.9                                       | 1.1                                       |
| SEP.                |                         |                                    |                                 |                                          |                                            |                                    |                                          |                            |                          |                                     |                                           |                                           |
| 01-17               | 7130                    | 6.1                                | --                              | 52                                       | 11                                         | 2.6                                | .7                                       | 130                        | 0                        | 71                                  | 1.8                                       | 1.3                                       |
| 18-30               | 8030                    | 6.6                                | --                              | 40                                       | 10                                         | 2.2                                | .4                                       | 125                        | 0                        | 41                                  | 1.5                                       | 1.2                                       |
| WTD. AVG.           | --                      | 4.9                                | --                              | 41                                       | 8.4                                        | 1.9                                | .6                                       | 115                        | 0                        | 43                                  | 1.3                                       | .8                                        |
| TIME WTD. AVG.      | 11100                   | 6.2                                | --                              | 57                                       | 11                                         | 2.8                                | .8                                       | 134                        | 0                        | 76                                  | 2.0                                       | 1.4                                       |
| TONS PER DAY (SECT) | --                      | 146                                | --                              | 1210                                     | 290                                        | 58                                 | 17                                       | 3450                       | 0                        | 1290                                | 38                                        | 24                                        |

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12301933 - KOOTENAI R. BL LIBBY DAM NR LIBBY, MONT.  
COMPOSITED WATER QUALITY DATA, WATER YEAR OCTOBER 1967 TO SEPTEMBER 1968

TABLE 42.2

| DATE                            | DIS-<br>SOLVED<br>NITRATE<br>(NO3)<br>(MG/L) | DIS-<br>SOLVED<br>BORON<br>(B)<br>(UG/L) | DIS-<br>SOLVED<br>SOLIDS<br>(MG/L) | DIS-<br>SOLVED<br>SOLIDS<br>(TONS)<br>PER<br>AC-FT) | DIS-<br>SOLVED<br>SOLIDS<br>(TONS)<br>PER<br>DAY) | HARD-<br>NESS<br>(CA, MG)<br>(MG/L) | NON-<br>CAR-<br>BONATE<br>HARD-<br>NESS<br>(MG/L) | SODIUM<br>AD-<br>SORP-<br>TION<br>RATIO | SPF-<br>CIFIC<br>CON-<br>DUCT-<br>ANCE<br>(MICRO-<br>MHOS) | PH<br>(UNITS) | COLOR<br>(PLAT-<br>INUM-<br>COBALT<br>UNITS) |
|---------------------------------|----------------------------------------------|------------------------------------------|------------------------------------|-----------------------------------------------------|---------------------------------------------------|-------------------------------------|---------------------------------------------------|-----------------------------------------|------------------------------------------------------------|---------------|----------------------------------------------|
| OCT.<br>03-15                   | .2                                           | 20                                       | 252                                | .34                                                 | 3450                                              | 203                                 | 88                                                | .1                                      | 406                                                        | 7.9           | 2                                            |
| 16-24                           | .1                                           | 20                                       | 240                                | .33                                                 | 3140                                              | 200                                 | 87                                                | .1                                      | 390                                                        | 8.0           | 4                                            |
| 25-31                           | .1                                           | 10                                       | 239                                | .33                                                 | 3120                                              | 196                                 | 80                                                | .1                                      | 389                                                        | 7.8           | 5                                            |
| NOV.<br>01-03                   | .1                                           | 10                                       | 239                                | .33                                                 | 3120                                              | 196                                 | 80                                                | .1                                      | 389                                                        | 7.8           | 5                                            |
| 04-10                           | .1                                           | 10                                       | 185                                | .25                                                 | 2310                                              | 147                                 | 35                                                | .1                                      | 305                                                        | 7.8           | 4                                            |
| 11-26                           | .0                                           | 0                                        | 315                                | .43                                                 | 3470                                              | 215                                 | 97                                                | .1                                      | 419                                                        | 7.8           | 4                                            |
| 27-30                           | .2                                           | 20                                       | 305                                | .41                                                 | 2520                                              | 230                                 | 100                                               | .1                                      | 449                                                        | 8.1           | 4                                            |
| DEC.<br>01-13                   | .0                                           | 30                                       | 294                                | .40                                                 | 2600                                              | 236                                 | 111                                               | .1                                      | 451                                                        | 7.5           | 6                                            |
| 14-31                           | .0                                           | 30                                       | 330                                | .45                                                 | 2370                                              | 265                                 | 134                                               | .1                                      | 502                                                        | 7.5           | 6                                            |
| JAN.<br>01-14                   | .0                                           | 0                                        | 329                                | .45                                                 | 2440                                              | 263                                 | 132                                               | .1                                      | 496                                                        | 7.4           | 7                                            |
| 15-31                           | .0                                           | 30                                       | 318                                | .43                                                 | 2880                                              | 255                                 | 121                                               | .1                                      | 485                                                        | 7.6           | 7                                            |
| FEB.<br>01-26                   | .0                                           | 10                                       | 333                                | .45                                                 | 2910                                              | 254                                 | 129                                               | .1                                      | 483                                                        | 7.6           | --                                           |
| 27-29                           | .3                                           | 10                                       | 299                                | .41                                                 | 2930                                              | 234                                 | 119                                               | .1                                      | 456                                                        | 7.6           | 4                                            |
| MAR.<br>01-26                   | .3                                           | 10                                       | 299                                | .41                                                 | 2930                                              | 234                                 | 119                                               | .1                                      | 456                                                        | 7.6           | 4                                            |
| 27-31                           | .2                                           | 0                                        | 274                                | .37                                                 | 2920                                              | 217                                 | 99                                                | .1                                      | 422                                                        | 7.9           | 3                                            |
| APR.<br>01-08                   | .2                                           | 0                                        | 274                                | .37                                                 | 2920                                              | 217                                 | 99                                                | .1                                      | 422                                                        | 7.9           | 3                                            |
| 09-30                           | .1                                           | 0                                        | 277                                | .38                                                 | 2980                                              | 218                                 | 101                                               | .1                                      | 433                                                        | 7.9           | 3                                            |
| MAY<br>01-12                    | .1                                           | 0                                        | 187                                | .25                                                 | 5760                                              | 142                                 | 48                                                | .1                                      | 294                                                        | 8.0           | 4                                            |
| 13-31                           | .1                                           | 0                                        | 136                                | .18                                                 | 11500                                             | 115                                 | 30                                                | .1                                      | 222                                                        | 8.0           | 4                                            |
| JUNE<br>01-30                   | .2                                           | 0                                        | 121                                | .16                                                 | 13800                                             | 100                                 | 15                                                | .1                                      | 212                                                        | 7.7           | 7                                            |
| JULY<br>01-14                   | .0                                           | 0                                        | 126                                | .17                                                 | 10300                                             | 99                                  | 19                                                | .1                                      | 204                                                        | 7.5           | 20                                           |
| 15-31                           | .0                                           | 0                                        | 136                                | .18                                                 | 6210                                              | 118                                 | 27                                                | .1                                      | 242                                                        | 7.5           | 3                                            |
| AUG.<br>01-18                   | .1                                           | 0                                        | 156                                | .21                                                 | 4550                                              | 128                                 | 29                                                | .1                                      | 268                                                        | 7.6           | 1                                            |
| 19-31                           | .1                                           | 0                                        | 200                                | .27                                                 | 4700                                              | 162                                 | 55                                                | .1                                      | 331                                                        | 7.7           | 1                                            |
| SEP.<br>01-17                   | .1                                           | 10                                       | 222                                | .30                                                 | 4270                                              | 173                                 | 67                                                | .1                                      | 356                                                        | 7.7           | 2                                            |
| 18-30                           | .1                                           | 0                                        | 163                                | .22                                                 | 3530                                              | 141                                 | 39                                                | .1                                      | 289                                                        | 7.8           | 1                                            |
| MTD. AVG.<br>TIME MTD.          | .1                                           | 3                                        | 168                                | .23                                                 | --                                                | 136                                 | 41                                                | .1                                      | 274                                                        | 7.7           | --                                           |
| AVG.<br>TONS<br>PER DAY (SHORT) | .1                                           | 8                                        | 236                                | .32                                                 | --                                                | 187                                 | 77                                                | .1                                      | 369                                                        | 7.7           | --                                           |
|                                 | 3.4                                          | 0                                        | 5010                               | --                                                  | --                                                | --                                  | --                                                | --                                      | --                                                         | --            | --                                           |

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COMPOSIED WATER QUALITY DATA, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

TABLE 42.3

| DATE           | DIS-<br>CHARGE<br>(CFS) | DIS-<br>SOLVED<br>SILICA<br>(SI02)<br>(MG/L) | DIS-<br>SOLVED<br>IRON<br>(FE)<br>(UG/L) | DIS-<br>SOLVED<br>CAL-<br>CIUM<br>(CA)<br>(MG/L) | DIS-<br>SOLVED<br>MAG-<br>NE-<br>SIUM<br>(MG)<br>(MG/L) | DIS-<br>SOLVED<br>SODIUM<br>(NA)<br>(MG/L) | DIS-<br>SOLVED<br>TAS-<br>SIUM<br>(K)<br>(MG/L) | BICAR-<br>BONATE<br>(HCO3)<br>(MG/L) | CAR-<br>BONATE<br>(CO3)<br>(MG/L) | DIS-<br>SOLVED<br>SULFATE<br>(SO4)<br>(MG/L) | DIS-<br>SOLVED<br>CHLO-<br>RIDE<br>(CL)<br>(MG/L) | DIS-<br>SOLVED<br>FLUO-<br>RIDE<br>(F)<br>(MG/L) |
|----------------|-------------------------|----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------------------|--------------------------------------------|-------------------------------------------------|--------------------------------------|-----------------------------------|----------------------------------------------|---------------------------------------------------|--------------------------------------------------|
| OCT.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-31 6670     | 5.4                     | --                                           | --                                       | 38                                               | 11                                                      | 2.8                                        | 1.2                                             | 137                                  | 0                                 | 33                                           | 1.6                                               | 1.0                                              |
| NOV.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-30 5510     | 6.1                     | --                                           | --                                       | 39                                               | 11                                                      | 2.7                                        | .8                                              | 142                                  | 0                                 | 33                                           | 2.0                                               | .8                                               |
| DEC.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-28 374C     | 6.7                     | --                                           | --                                       | 43                                               | 12                                                      | 3.2                                        | 1.9                                             | 154                                  | 0                                 | 39                                           | 1.9                                               | .8                                               |
| FEB.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 04... 290C     | 7.5                     | 120                                          | 120                                      | 46                                               | 13                                                      | 3.4                                        | .9                                              | 158                                  | 0                                 | 44                                           | 2.6                                               | .9                                               |
| MAR.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 04... 2700     | 7.2                     | 70                                           | 70                                       | 46                                               | 13                                                      | 3.5                                        | .8                                              | 160                                  | 0                                 | 44                                           | 2.2                                               | 1.1                                              |
| 17-31 3830     | 7.3                     | --                                           | --                                       | 44                                               | 12                                                      | 3.7                                        | .9                                              | 148                                  | 0                                 | 44                                           | 1.8                                               | 1.3                                              |
| APR.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-11 7950     | 8.9                     | --                                           | --                                       | 39                                               | 10                                                      | 2.9                                        | .8                                              | 132                                  | 0                                 | 31                                           | .6                                                | .7                                               |
| 12-30 18900    | 7.8                     | --                                           | --                                       | 35                                               | 8.3                                                     | 2.1                                        | .8                                              | 125                                  | 0                                 | 21                                           | .7                                                | .4                                               |
| MAY            |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-09 21400    | 7.7                     | --                                           | --                                       | 32                                               | 8.3                                                     | 2.0                                        | .5                                              | 126                                  | 0                                 | 13                                           | 3.8                                               | .4                                               |
| 10-31 46300    | 5.6                     | --                                           | --                                       | 28                                               | 6.3                                                     | 1.5                                        | .5                                              | 114                                  | 0                                 | 14                                           | .8                                                | .2                                               |
| JUNE           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-09 56200    | 5.0                     | --                                           | --                                       | 28                                               | 6.0                                                     | 1.3                                        | 1.0                                             | 114                                  | 0                                 | 12                                           | .8                                                | .2                                               |
| 10-21 40400    | 1.9                     | --                                           | --                                       | 32                                               | 6.4                                                     | 1.4                                        | .7                                              | 112                                  | 0                                 | 19                                           | 1.2                                               | .3                                               |
| 22-30 47500    | 4.6                     | --                                           | --                                       | 27                                               | 6.4                                                     | 1.4                                        | .4                                              | 104                                  | 0                                 | 15                                           | 1.8                                               | .4                                               |
| JULY           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-16 33200    | 4.2                     | --                                           | --                                       | 31                                               | 7.7                                                     | 2.0                                        | .9                                              | 119                                  | 0                                 | 21                                           | .6                                                | .1                                               |
| 17-31 16900    | 5.6                     | --                                           | --                                       | 33                                               | 9.8                                                     | 2.2                                        | .7                                              | 134                                  | 0                                 | 22                                           | 1.2                                               | .2                                               |
| AUG.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-31 9130     | 4.8                     | --                                           | --                                       | 40                                               | 11                                                      | 3.4                                        | .6                                              | 144                                  | 0                                 | 28                                           | 2.6                                               | .3                                               |
| SEP.           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| 01-30 6040     | 5.6                     | --                                           | --                                       | 42                                               | 12                                                      | 3.5                                        | .8                                              | 152                                  | 0                                 | 35                                           | 2.4                                               | .5                                               |
| MTD. AVG.      | --                      | --                                           | --                                       | 32                                               | 8.0                                                     | 2.0                                        | .7                                              | 123                                  | 0                                 | 20                                           | 1.3                                               | .3                                               |
| TIME MTD.      |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| AVG. 16800     | 5.8                     | --                                           | --                                       | 37                                               | 9.9                                                     | 2.6                                        | .9                                              | 135                                  | 0                                 | 28                                           | 1.7                                               | .6                                               |
| TONS           |                         |                                              |                                          |                                                  |                                                         |                                            |                                                 |                                      |                                   |                                              |                                                   |                                                  |
| PER DAY (SECT) | --                      | 238                                          | --                                       | 1470                                             | 361                                                     | 90                                         | 33                                              | 5560                                 | 0                                 | 922                                          | 60                                                | 16                                               |

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TABLE 42.4 COMPOSITED WATER QUALITY DATA, WATER YEAR OCTOBER 1968 TO SEPTEMBER 1969

| DATE                   | DIS-<br>SOLVED<br>NITRATE<br>(NO3)<br>(MG/L) | DIS-<br>SOLVED<br>BORON<br>(B)<br>(UG/L) | DIS-<br>SOLVED<br>SOLIDS<br>(RESI-<br>DUE AT<br>180 C)<br>(MG/L) | DIS-<br>SOLVED<br>SOLIDS<br>(TONS<br>PER<br>AC-FT) | DIS-<br>SOLVED<br>SOLIDS<br>(TONS<br>PER<br>DAY) | HARD-<br>NESS<br>(CA-MG)<br>(MG/L) | NON-<br>CAR-<br>BONATE<br>HARD-<br>NESS<br>(MG/L) | SODIUM<br>AD-<br>SORP-<br>TION<br>RATIO | SPE-<br>CIFIC<br>CON-<br>DUCT-<br>ANCE<br>(MICRO-<br>MHOS) | PH<br>(UNITS) | COLOR<br>(PLAT-<br>INUM-<br>COBALT<br>UNITS) |
|------------------------|----------------------------------------------|------------------------------------------|------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|------------------------------------|---------------------------------------------------|-----------------------------------------|------------------------------------------------------------|---------------|----------------------------------------------|
| OCT.<br>01-31          | .1                                           | 0                                        | 170                                                              | .23                                                | 3060                                             | 139                                | 27                                                | .1                                      | 285                                                        | 7.9           | 3                                            |
| NOV.<br>01-30          | .1                                           | 0                                        | 172                                                              | .23                                                | 2560                                             | 143                                | 27                                                | .1                                      | 287                                                        | 8.0           | 1                                            |
| DEC.<br>01-28          | .1                                           | 20                                       | 196                                                              | .27                                                | 1980                                             | 157                                | 31                                                | .1                                      | 321                                                        | 8.0           | 4                                            |
| FEB.<br>04...          | .8                                           | 40                                       | 208                                                              | .28                                                | 1850                                             | 169                                | 40                                                | .1                                      | 331                                                        | 8.0           | 1                                            |
| MAR.<br>14...          | .3                                           | 10                                       | 211                                                              | .29                                                | 1570                                             | 169                                | 38                                                | .1                                      | 335                                                        | 7.9           | 2                                            |
| APR.<br>17-31          | .2                                           | 10                                       | 208                                                              | .28                                                | 2150                                             | 160                                | 39                                                | .1                                      | 320                                                        | 8.2           | 1                                            |
| MAY<br>01-11           | .2                                           | 10                                       | 184                                                              | .25                                                | 3950                                             | 139                                | 31                                                | .1                                      | 273                                                        | 7.9           | 15                                           |
| MAY<br>12-30           | .1                                           | 10                                       | 154                                                              | .21                                                | 7860                                             | 121                                | 19                                                | .1                                      | 231                                                        | 7.9           | 10                                           |
| MAY<br>01-09           | .0                                           | 20                                       | 156                                                              | .21                                                | 9010                                             | 114                                | 11                                                | .1                                      | 239                                                        | 7.4           | 2                                            |
| MAY<br>10-31           | .1                                           | 0                                        | 132                                                              | .18                                                | 16500                                            | 96                                 | 2                                                 | .1                                      | 200                                                        | 7.7           | 5                                            |
| JUNE<br>01-09          | .0                                           | 0                                        | 114                                                              | .16                                                | 17300                                            | 95                                 | 1                                                 | .1                                      | 195                                                        | 8.0           | 8                                            |
| JUNE<br>10-21          | .1                                           | 0                                        | 123                                                              | .17                                                | 13400                                            | 106                                | 15                                                | .1                                      | 208                                                        | 7.9           | 2                                            |
| JUNE<br>22-30          | .0                                           | 0                                        | 122                                                              | .17                                                | 15600                                            | 94                                 | 8                                                 | .1                                      | 189                                                        | 7.5           | 7                                            |
| JULY<br>01-16          | .0                                           | 10                                       | 137                                                              | .19                                                | 12300                                            | 109                                | 12                                                | .1                                      | 233                                                        | 7.3           | 3                                            |
| JULY<br>17-31          | .0                                           | 20                                       | 142                                                              | .19                                                | 6330                                             | 123                                | 13                                                | .1                                      | 256                                                        | 7.7           | 5                                            |
| AUG.<br>01-31          | .0                                           | 0                                        | 164                                                              | .22                                                | 4040                                             | 146                                | 28                                                | .1                                      | 290                                                        | 7.8           | 5                                            |
| SEP.<br>01-30          | .0                                           | 50                                       | 180                                                              | .24                                                | 2940                                             | 153                                | 28                                                | .1                                      | 305                                                        | 7.6           | 7                                            |
| WTD. AVG.<br>TIME WTD. | .1                                           | 6                                        | 142                                                              | .19                                                | --                                               | 113                                | 13                                                | .1                                      | 231                                                        | 7.7           | --                                           |
| AVG.<br>TONS           | .1                                           | 11                                       | 163                                                              | .22                                                | --                                               | 133                                | 22                                                | .1                                      | 268                                                        | 7.8           | --                                           |
| PER DAY (SHORT)        | 2.5                                          | 0                                        | 6440                                                             | --                                                 | --                                               | --                                 | --                                                | --                                      | --                                                         | --            | --                                           |

Table 43. Physical and Chemical Data Obtained By The U.S. Corps of Engineers From Station 1

Kootenai River near Randford  
Lat. 49° 51' 20" Long. 115° 13' 37"  
River Kilometer 419.2  
Elevation 609 Meters MSL

| DATE: | 00010 | 00076 | 00094 | 00300      | 00301      | 00400      | 00405      | 00410      | 00440      |
|-------|-------|-------|-------|------------|------------|------------|------------|------------|------------|
| YEAR  | MO    | DA    | TIME  | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP |
| 1969  | May   | 3     | 1400  | 8.5        | 15         | 272        | 10.3       | 96         | 8.3        |
|       | Jun   | 3     | 1120  | 12.2       | 51         | 206        | 8.7        | 89         | 8.4        |
|       | Jun   | 30    |       | 14.0       | 48         | 167        | 9.6        | 102        | 7.8        |
|       | Aug   | 5     |       | 15.0       | 3          | 258        | 11.3       | 122        | 8.6        |
|       | Sep   | 2     |       | 14.4       | 2          | 285        | 10.2       | 109        | 8.6        |
|       | Oct   | 2     |       | 9.0        | 29         | 280        | 10.9       | 103        | 8.6        |
|       | Nov   | 4     |       | 5.5        | 3          | 322        | 12.1       | 105        | 7.8        |
|       | Dec   | 2     | 1030  | 0.5        | 3          | 336        | 13.1       | 99         | 8.5        |
| 1970  | Jan   | 2     | 1010  | 0.5        | 2          | 356        | 12.7       | 96         | 8.0        |
|       | Feb   | 3     | 1030  | 1.0        | 2          | 375        | 13.2       | 100        | 8.3        |
|       | Mar   | 3     | 1025  | 0.5        | 1          | 350        | 11.8       | 103        | 8.3        |
|       | Apr   | 2     | 1130  | 6.0        | 2          | 262        | 10.3       | 102        | 7.9        |
|       | May   | 5     | 1130  | 11.0       | 53         | 173        | 10.2       | 106        | 7.8        |
|       | Jun   | 5     | 1130  | 15.0       | 94         | 219        | 8.6        | 97         | 7.9        |
|       | Jul   | 10    | 0945  | 17.0       | 3          | 237        | 8.4        | 93         | 8.2        |
|       | Aug   | 3     | 1345  | 18.0       | 3          | 275        | 9.1        | 95         | 8.2        |
|       | Sep   | 4     | 1130  | 13.5       | 3          | 290        | 10.9       | 94         | 8.3        |
|       | Oct   | 8     | 1100  | 5.5        | 3          |            |            |            |            |

Table 44. Physical and Chemical Data Obtained By The U.S. Corps of Engineers From Station 2

Kootenai River at Warland  
Lat. 49° 30' 00" Long. 115° 17' 02"  
River Kilometer 367.9  
Elevation 657 Meters MSL

| DATE: | 00010 | 00076 | 00094 | 00300      | 00301      | 00400      | 00405      | 00410      | 00440      |
|-------|-------|-------|-------|------------|------------|------------|------------|------------|------------|
| YEAR  | MO    | DA    | TIME  | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP |
| 1969  | Apr   | 15    |       | 7.0        | 15         | 210        | 10.8       | 101        | 8.3        |
|       | May   | 5     | 1615  | 9.0        | 21         |            |            |            |            |
|       | May   | 12    | 1230  | 8.5        | 105        |            |            |            |            |
|       | May   | 14    | 1130  | 8.5        | 110        |            |            |            |            |
|       | Jun   | 3     | 0940  | 13.3       | 43         | 163        | 9.8        | 101        | 8.3        |
|       | Jun   | 30    |       | 16.7       | 13         |            |            |            |            |
|       | Sep   | 2     |       | 14.4       | 2          | 267        | 10.8       | 104        | 8.6        |
|       | Oct   | 2     |       | 10.0       | 18         | 276        | 13.1       | 112        | 7.9        |
|       | Nov   | 4     |       | 5.5        | 3          | 322        | 13.6       | 102        | 8.4        |
|       | Dec   | 2     | 1315  | 0.5        | 4          | 356        | 13.6       | 102        | 8.6        |
| 1970  | Jan   | 2     | 1150  | 0.5        | 2          | 340        | 12.7       | 113        | 8.3        |
|       | Apr   | 2     | 1220  | 7.0        | 2          | 233        | 10.5       | 104        | 7.9        |
|       | May   | 5     | 1310  | 11.5       | 43         | 164        | 10.1       | 104        | 7.9        |
|       | Jun   | 5     | 1330  | 13.0       | 100        | 218        | 8.7        | 101        | 8.1        |
|       | Jul   | 10    | 1135  | 18.0       | 3          | 257        | 9.8        | 112        | 8.5        |
|       | Aug   | 4     | 1300  | 14.5       | 5          | 268        | 9.8        | 104        | 8.5        |
|       | Sep   | 4     | 1415  | 6.0        | 3          | 283        | 11.7       | 102        | 8.7        |
|       | Oct   | 8     | 1330  |            |            |            |            |            |            |

Table 45. Physical and Chemical Data Obtained By The U.S. Corps of Engineers From Station 3

Kootenai River below Libby Dam, near Libby, Montana  
Lat. 49° 21' 00" Long. 115° 19' 20"  
River Kilometer 351.2  
Elevation 646 Meters MSL

| DATE: | 00010 | 00076 | 00094 | 00300      | 00301      | 00400      | 00405      | 00410      | 00440      |
|-------|-------|-------|-------|------------|------------|------------|------------|------------|------------|
| YEAR  | MO    | DA    | TIME  | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP |
| 1969  | Apr   | 1     | 1530  | 6.5        | 21         |            |            |            |            |
|       | May   | 15    | 1015  | 8.5        | 20         |            |            |            |            |
|       | Jun   | 6     | 1110  | 15.0       | 32         | 234        | 10.4       | 96         | 8.5        |
|       | Jun   | 30    | 1535  | 14.0       | 65         | 201        | 10.0       | 105        | 7.8        |
|       | Aug   | 3     |       | 17.5       | 2          | 273        | 10.3       | 114        | 8.6        |
|       | Sep   | 2     |       | 13.2       | 20         | 293        | 10.6       | 109        | 8.7        |
|       | Oct   | 2     |       | 9.0        | 20         | 306        | 12.5       | 107        | 7.7        |
|       | Nov   | 4     |       | 5.5        | 3          | 324        | 13.6       | 104        | 8.6        |
|       | Dec   | 2     | 1530  | 0.5        | 3          | 330        | 12.7       | 95         | 8.2        |
| 1970  | Jan   | 2     | 1530  | 0.5        | 1          | 335        | 13.6       | 102        | 8.6        |
|       | Feb   | 3     | 1315  | 0.5        | 1          | 325        | 12.3       | 108        | 8.3        |
|       | Mar   | 2     | 1225  | 6.5        | 2          | 260        | 10.1       | 102        | 7.8        |
|       | Apr   | 5     | 1330  | 12.0       | 90         | 172        | 10.4       | 109        | 7.8        |
|       | Jun   | 5     | 1445  | 13.8       |            | 215        | 9.5        | 104        | 8.5        |
|       | Jul   | 10    | 1300  | 18.5       | 2          | 258        | 8.5        | 107        | 8.6        |
|       | Sep   | 4     | 1450  | 17.0       | 3          | 270        | 10.0       | 108        | 8.6        |
|       | Oct   | 8     | 1320  | 6.0        | 3          | 283        | 11.9       | 104        | 8.7        |

Table 46. Physical and Chemical Data Obtained By The U.S. Corps of Engineers From Station 7

Kootenai River at Libby  
Lat. 49° 21' 52" Long. 115° 31' 48"  
River Kilometer 329.0  
Elevation 625 Meters MSL

| DATE: | 00010 | 00076 | 00094 | 00300      | 00301      | 00400      | 00405      | 00410      | 00440      |
|-------|-------|-------|-------|------------|------------|------------|------------|------------|------------|
| YEAR  | MO    | DA    | TIME  | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP | WATER TEMP |
| 1969  | May   | 6     | 1025  | 9.0        | 17         | 238        | 10.6       | 99         | 8.5        |
|       | May   | 14    | 0730  | 8.5        | 120        | 142        |            |            |            |
|       | Jun   | 3     | 1630  | 15.0       | 49         | 185        | 10.3       | 110        | 8.1        |
|       | Jun   | 30    |       | 17.8       | 3          | 276        | 10.7       | 122        | 8.5        |
|       | Sep   | 2     |       | 14.7       | 5          | 283        | 9.4        | 100        | 8.6        |
|       | Oct   | 3     |       | 9.0        | 21         | 266        | 10.9       | 102        | 8.8        |
|       | Nov   | 4     |       | 5.5        | 4          | 322        | 13.3       | 114        | 7.9        |
|       | Dec   | 2     | 1450  | 0.5        | 14         | 328        | 13.9       | 104        | 8.4        |
| 1970  | Jan   | 3     | 1410  | 0.5        | 3          | 340        | 12.9       | 96         | 8.1        |
|       | Feb   | 3     | 1410  | 0.5        | 3          | 340        | 12.9       | 102        | 8.5        |
|       | Mar   | 3     | 1410  | 6.0        | 5          | 325        | 13.8       | 111        | 8.2        |
|       | Apr   | 2     | 1415  | 6.0        | 44         | 225        | 10.4       | 104        | 7.8        |
|       | May   | 5     | 1500  | 12.0       |            | 142        | 10.2       | 109        | 7.8        |
|       | Jun   | 5     | 1500  | 14.9       | 3          | 215        | 9.0        | 104        | 8.3        |
|       | Jul   | 10    | 0940  | 18.5       | 5          | 283        | 8.7        | 96         | 8.6        |
|       | Sep   | 4     | 1415  | 15.0       | 4          | 283        | 10.3       | 110        | 8.7        |
|       | Oct   | 8     | 1445  | 6.5        | 3          | 280        | 11.8       | 103        | 8.7        |

LOADING CALCULATIONS, KOOTENAI RIVER NEAR REEFORD (STATION 1)

TABLE 47.1

| DATE     | DISCH.<br>MEAN DLY<br>CFS | RESIDUE<br>F <sup>1</sup> SS-180<br>T(M)/DAY | CALCIUM<br>CA DISS<br>T(M)/DAY | MAGNESIUM<br>MG DISS<br>T(M)/DAY | SODIUM<br>Na DISS<br>T(M)/DAY | HC03 ION<br>HC03<br>T(M)/DAY | SULFATE<br>SO4-TOT<br>T(M)/DAY | CHLORIDE<br>CL<br>T(M)/DAY | SILICA<br>SiO2<br>T(M)/DAY | FLUORIDE<br>F DISS<br>MG/DAY |
|----------|---------------------------|----------------------------------------------|--------------------------------|----------------------------------|-------------------------------|------------------------------|--------------------------------|----------------------------|----------------------------|------------------------------|
| 67/06/29 | 56200*                    | 16915                                        | 4676                           | 880                              | 131                           | 14990                        | 2200                           | 55                         | 633                        | 41256                        |
| 67/07/27 | 17500*                    | 6295                                         | 1584                           | 368                              | 77                            | 4796                         | 1456                           | 77                         | 214                        | 21411                        |
| 67/09/08 | 6680*                     | 3580                                         | 850                            | 180                              | 46                            | 2158                         | 1161                           | 20                         | 100                        | 21250                        |
| 67/10/11 | 4520                      | 2909                                         | 741                            | 144                              | 34                            | 1593                         | 1040                           | 24                         | 69                         | 5530                         |
| 67/11/07 | 4080                      | 1877                                         | 429                            | 120                              | 28                            | 1448                         | 379                            | 19                         | 59                         | 1197                         |
| 67/12/19 | 2200                      | 1879                                         | 458                            | 81                               | 19                            | 888                          | 743                            | 12                         | 46                         | 11305                        |
| 68/01/29 | 3540                      | 2625                                         | 658                            | 113                              | 38                            | 1299                         | 996                            | 21                         | 57                         | 29432                        |
| 68/03/19 | 3510                      | 2886                                         | 653                            | 120                              | 29                            | 1305                         | 1074                           | 15                         | 54                         | 19755                        |
| 68/04/22 | 34800                     | 10644                                        | 2725                           | 545                              | 136                           | 8345                         | 2384                           | 102                        | 630                        | 51091                        |
| 68/05/22 | 30900                     | 11493                                        | 2571                           | 567                              | 106                           | 8771                         | 2193                           | 45                         | 401                        | 45367                        |
| 68/07/14 | 18500                     | 5168                                         | 1252                           | 319                              | 69                            | 6603                         | 929                            | 65                         | 214                        | 12113                        |
| 68/08/29 | 9980                      | 3571                                         | 1033                           | 218                              | 43                            | 2681                         | 1362                           | 48                         | 110                        | 19777                        |
| 68/10/04 | 7340                      | 2928                                         | 726                            | 180                              | 37                            | 1938                         | 665                            | 29                         | 108                        | 19757                        |
| 68/11/06 | 5740                      | 2500                                         | 548                            | 155                              | 32                            | 1480                         | 449                            | 34                         | 76                         | 12641                        |
| 68/12/02 | 4060                      | 1600                                         | 378                            | 115                              | 27                            | 1384                         | 378                            | 19                         | 65                         | 8941                         |
| 69/01/06 | 3300                      | 1752                                         | 371                            | 113                              | 27                            | 1083                         | 306                            | 18                         | 62                         | 7268                         |
| 69/02/07 | 2800                      | 1453                                         | 308                            | 89                               | 23                            | 1092                         | 307                            | 14                         | 47                         | 8153                         |
| 69/03/06 | 2790                      | 1468                                         | 314                            | 96                               | 26                            | 1771                         | 527                            | 29                         | 74                         | 12328                        |
| 69/04/01 | 4580                      | 2320                                         | 538                            | 146                              | 47                            | 5669                         | 1019                           | 44                         | 257                        | 13287                        |
| 69/05/02 | 18100                     | 6776                                         | 1506                           | 407                              | 93                            | 17527                        | 1683                           | 140                        | 575                        | 42064                        |
| 69/06/09 | 57300                     | 4347                                         | 4347                           | 883                              | 134                           | 9285                         | 1498                           | 150                        | 337                        | 22463                        |
| 69/07/09 | 30600                     | 9809                                         | 2321                           | 644                              | 120                           | 5940                         | 732                            | 62                         | 138                        | 0                            |
| 69/08/07 | 11500                     | 4362                                         | 985                            | 310                              | 82                            | 2277                         | 447                            | 43                         | 72                         | 2883                         |
| 69/09/04 | 5890                      | 2638                                         | 577                            | 187                              | 61                            | 1883                         | 419                            | 32                         | 71                         | 7385                         |
| 69/10/16 | 5030                      | 2326                                         | 505                            | 148                              | 46                            | 1577                         | 394                            | 32                         | 73                         | 6064                         |
| 69/11/05 | 4130                      | 2072                                         | 424                            | 131                              | 42                            | 1235                         | 313                            | 23                         | 49                         | 5814                         |
| 69/12/01 | 2970                      | 1541                                         | 342                            | 102                              | 32                            | 1071                         | 284                            | 14                         | 22                         | 2227                         |
| 70/01/05 | 1300                      | 801                                          | 162                            | 51                               | 18                            | 974                          | 308                            | 31                         | 44                         | 4488                         |
| 70/02/02 | 2620                      | 1430                                         | 308                            | 90                               | 36                            | 1432                         | 284                            | 26                         | 45                         | 5799                         |
| 70/03/05 | 2370                      | 1299                                         | 284                            | 87                               | 32                            | 4627                         | 413                            | 30                         | 51                         | 6149                         |
| 70/04/08 | 3590                      | 1915                                         | 413                            | 114                              | 39                            | 8196                         | 877                            | 88                         | 160                        | 19943                        |
| 70/05/08 | 16300                     | 6023                                         | 1276                           | 339                              | 100                           | 4627                         | 1249                           | 117                        | 258                        | 23418                        |
| 70/06/03 | 31900                     | 9211                                         | 2108                           | 554                              | 156                           | 4825                         | 790                            | 92                         | 171                        | 8320                         |
| 70/07/07 | 17000                     | 5408                                         | 1248                           | 333                              | 87                            | 2600                         | 489                            | 41                         | 25                         | 7821                         |
| 70/08/05 | 7990                      | 3089                                         | 704                            | 196                              | 63                            | 1630                         | 365                            | 27                         | 40                         | 10945                        |
| 70/09/02 | 4970                      | 2226                                         | 474                            | 134                              | 36                            | 1331                         | 420                            | 38                         | 66                         | 8007                         |
| 70/10/22 | 4090                      | 1902                                         | 440                            | 120                              | 44                            | 1346                         | 372                            | 41                         | 50                         | 8858                         |
| 70/11/13 | 3620                      | 1718                                         | 372                            | 106                              | 38                            | 1461                         | 398                            | 39                         | 68                         | 8325                         |
| 70/12/08 | 3780                      | 1942                                         | 416                            | 120                              | 55                            | 1267                         | 311                            | 31                         | 41                         | 6607                         |
| 71/01/18 | 2700                      | 1321                                         | 330                            | 92                               | 34                            | 1070                         | 346                            | 28                         | 64                         | 10923                        |
| 71/02/18 | 3770                      | 1821                                         | 451                            | 118                              | 43                            | 1619                         | 315                            | 38                         | 42                         | 10963                        |
| 71/03/17 | 2800                      | 1562                                         | 329                            | 96                               | 43                            | 1759                         | 424                            | 28                         | 64                         | 13038                        |
| 71/04/14 | 4440                      | 1977                                         | 478                            | 141                              | 43                            | 16521                        | 1111                           | 14                         | 399                        | 19600                        |
| 71/05/20 | 26700                     | 7318                                         | 203                            | 562                              | 124                           | 6642                         | 958                            | 170                        | 741                        | 30881                        |
| 71/06/09 | 63100                     | 4015                                         | 4015                           | 973                              | 170                           | 3926                         | 660                            | 83                         | 125                        | 13899                        |
| 71/07/15 | 26100                     | 7409                                         | 1788                           | 473                              | 121                           | 2272                         | 501                            | 54                         | 86                         | 10733                        |
| 71/08/01 | 14200                     | 4031                                         | 1008                           | 299                              | 122                           | 1861                         | 478                            | 50                         | 75                         | 11628                        |
| 71/09/07 | 7310                      | 2683                                         | 626                            | 179                              | 55                            | 1851                         | 579                            | 49                         | 68                         | 11354                        |
| 71/10/14 | 5280*                     | 2351                                         | 517                            | 155                              | 53                            | 1132                         | 257                            | 43                         | 42                         | 6118                         |
| 71/11/11 | 4640*                     | 2566                                         | 488                            | 148                              | 51                            | 967                          | 306                            | 36                         | 44                         | 6729                         |
| 71/12/16 | 2500*                     | 1456                                         | 300                            | 86                               | 32                            | 1897                         | 449                            | 45                         | 96                         | 14976                        |
| 72/01/10 | 2500*                     | 1297                                         | 288                            | 86                               | 33                            | 1897                         | 449                            | 45                         | 96                         | 14976                        |
| 72/02/07 | 2500*                     | 1370                                         | 288                            | 86                               | 33                            | 1897                         | 449                            | 45                         | 96                         | 14976                        |
| 72/03/14 | 5100*                     | 2122                                         | 549                            | 150                              | 52                            | 1897                         | 449                            | 45                         | 96                         | 14976                        |

\*Instantaneous Discharge

TABLE 47.2

LOADING CALCULATIONS, KOOTENAI RIVER NEAR REEFORD (STATION 1)

| DATE     | PHOS-DIS<br>OUTBO-P<br>KG/DAY | PHOS-DIS<br>P<br>KG/DAY | PHOS-TOT<br>P<br>KG/DAY | NR3-N<br>TOT N<br>KG/DAY | NR3-N<br>N<br>KG/DAY | ORG N<br>N<br>KG/DAY | TOT N<br>N<br>KG/DAY | DATE     | ARSENIC<br>AS-DISS<br>KG/DAY | COPPER<br>CU-DISS<br>KG/DAY | LEAD<br>PB-DISS<br>KG/DAY | IRON<br>FE-DISS<br>KG/DAY | MANGNESE<br>MN-DISS<br>KG/DAY | ZINC<br>ZN-DISS<br>KG/DAY |
|----------|-------------------------------|-------------------------|-------------------------|--------------------------|----------------------|----------------------|----------------------|----------|------------------------------|-----------------------------|---------------------------|---------------------------|-------------------------------|---------------------------|
| 67/06/29 |                               |                         |                         |                          |                      |                      |                      | 67/06/29 |                              |                             |                           |                           |                               |                           |
| 67/07/27 |                               |                         |                         |                          |                      |                      |                      | 67/07/27 |                              |                             |                           |                           |                               |                           |
| 67/09/08 |                               |                         |                         |                          |                      |                      |                      | 67/09/08 |                              |                             |                           |                           |                               |                           |
| 67/10/11 | 6304                          | 6968                    |                         |                          |                      |                      |                      | 67/10/11 |                              |                             |                           |                           |                               |                           |
| 67/11/07 | 697                           | 899                     |                         |                          |                      |                      |                      | 67/11/07 |                              |                             |                           |                           |                               |                           |
| 67/12/19 | 4953                          | 5060                    |                         |                          |                      |                      |                      | 67/12/19 |                              |                             |                           |                           |                               |                           |
| 68/01/29 | 5222                          | 5868                    |                         |                          |                      |                      |                      | 68/01/29 |                              |                             |                           |                           |                               |                           |
| 68/03/19 | 4851                          | 5024                    |                         |                          |                      |                      |                      | 68/03/19 |                              |                             |                           |                           |                               |                           |
| 68/04/22 | 6442                          | 6098                    |                         |                          |                      |                      |                      | 68/04/22 |                              |                             |                           |                           |                               |                           |
| 68/05/22 | 33211                         | 38320                   |                         |                          |                      |                      |                      | 68/05/22 |                              |                             |                           |                           |                               |                           |
| 68/06/17 | 10586                         | 17391                   |                         |                          |                      |                      |                      | 68/06/17 |                              |                             |                           |                           |                               |                           |
| 68/07/24 | 13728                         | 15343                   |                         |                          |                      |                      |                      | 68/07/24 |                              |                             |                           |                           |                               |                           |
| 68/08/29 | 7471                          | 8130                    |                         |                          |                      |                      |                      | 68/08/29 |                              |                             |                           |                           |                               |                           |
| 68/10/04 | 2874                          | 3053                    |                         |                          |                      |                      |                      | 68/10/04 |                              |                             |                           |                           |                               |                           |
| 68/11/06 | 5759                          | 6180                    |                         |                          |                      |                      |                      | 68/11/06 |                              |                             |                           |                           |                               |                           |
| 68/12/02 | 1888                          |                         |                         |                          |                      |                      |                      | 68/12/02 |                              |                             |                           |                           |                               |                           |
| 69/01/06 |                               |                         |                         |                          |                      |                      |                      | 69/01/06 |                              |                             |                           |                           |                               |                           |
| 69/02/07 | 1096                          | 1233                    |                         |                          |                      |                      |                      | 69/02/07 |                              |                             |                           |                           |                               |                           |
| 69/03/06 | 1775                          | 1843                    |                         |                          |                      |                      |                      | 69/03/06 |                              |                             |                           |                           |                               |                           |
| 69/04/01 | 112                           | 336                     |                         |                          |                      |                      |                      | 69/04/01 |                              |                             |                           |                           |                               |                           |
| 69/05/02 | 3986                          | 3986                    |                         |                          |                      |                      |                      | 69/05/02 |                              |                             |                           |                           |                               |                           |
| 69/07/09 | 3744                          | 16473                   |                         |                          |                      |                      |                      | 69/07/09 |                              |                             |                           |                           |                               |                           |
| 69/08/07 | 1407                          | 9568                    |                         |                          |                      |                      |                      | 69/08/07 |                              |                             |                           |                           |                               |                           |
| 69/09/04 | 432                           | 1008                    |                         |                          |                      |                      |                      | 69/09/04 |                              |                             |                           |                           |                               |                           |
| 69/10/16 | 615                           | 985                     |                         |                          |                      |                      |                      | 69/10/16 |                              |                             |                           |                           |                               |                           |
| 69/11/05 | 606                           | 2324                    |                         |                          |                      |                      |                      | 69/11/05 |                              |                             |                           |                           |                               |                           |
| 69/12/01 | 581                           | 945                     |                         |                          |                      |                      |                      | 69/12/01 |                              |                             |                           |                           |                               |                           |
| 70/01/05 | 445                           | 477                     |                         |                          |                      |                      |                      | 70/01/05 |                              |                             |                           |                           |                               |                           |
| 70/02/02 | 256                           | 256                     |                         |                          |                      |                      |                      | 70/02/02 |                              |                             |                           |                           |                               |                           |
| 70/03/05 | 522                           | 696                     |                         |                          |                      |                      |                      | 70/03/05 |                              |                             |                           |                           |                               |                           |
| 70/04/08 | 791                           | 966                     |                         |                          |                      |                      |                      | 70/04/08 |                              |                             |                           |                           |                               |                           |
| 70/05/08 | 2393                          | 2393                    |                         |                          |                      |                      |                      | 70/05/08 |                              |                             |                           |                           |                               |                           |
| 70/06/03 | 3903                          | 5464                    |                         |                          |                      |                      |                      | 70/06/03 |                              |                             |                           |                           |                               |                           |
| 70/07/07 | 2912                          | 3328                    |                         |                          |                      |                      |                      | 70/07/07 |                              |                             |                           |                           |                               |                           |
| 70/08/05 | 1173                          | 1369                    |                         |                          |                      |                      |                      | 70/08/05 |                              |                             |                           |                           |                               |                           |
| 70/09/02 | 1216                          | 1459                    |                         |                          |                      |                      |                      | 70/09/02 |                              |                             |                           |                           |                               |                           |
| 70/10/22 | 1902                          | 1902                    |                         |                          |                      |                      |                      | 70/10/22 |                              |                             |                           |                           |                               |                           |
| 70/11/13 | 3100                          | 3366                    |                         |                          |                      |                      |                      | 70/11/13 |                              |                             |                           |                           |                               |                           |
| 70/12/08 | 1850                          | 2590                    |                         |                          |                      |                      |                      | 70/12/08 |                              |                             |                           |                           |                               |                           |
| 71/01/18 | 66                            | 2730                    |                         |                          |                      |                      |                      | 71/01/18 |                              |                             |                           |                           |                               |                           |
| 71/02/18 | 910                           | 1781                    |                         |                          |                      |                      |                      | 71/02/18 |                              |                             |                           |                           |                               |                           |
| 71/03/17 | 1096                          | 1602                    |                         |                          |                      |                      |                      | 71/03/17 |                              |                             |                           |                           |                               |                           |
| 71/04/14 | 326                           | 13067                   |                         |                          |                      |                      |                      | 71/04/14 |                              |                             |                           |                           |                               |                           |
| 71/05/20 | 5227                          | 46322                   |                         |                          |                      |                      |                      | 71/05/20 |                              |                             |                           |                           |                               |                           |
| 71/06/09 | 9264                          | 2555                    |                         |                          |                      |                      |                      | 71/06/09 |                              |                             |                           |                           |                               |                           |
| 71/07/15 | 639                           | 1737                    |                         |                          |                      |                      |                      | 71/07/15 |                              |                             |                           |                           |                               |                           |
| 71/08/10 | 347                           | 1737                    |                         |                          |                      |                      |                      | 71/08/10 |                              |                             |                           |                           |                               |                           |
| 71/09/07 | 527                           | 1968                    |                         |                          |                      |                      |                      | 71/09/07 |                              |                             |                           |                           |                               |                           |
| 71/10/14 | 129                           | 2326                    |                         |                          |                      |                      |                      | 71/10/14 |                              |                             |                           |                           |                               |                           |
| 71/11/11 | 908                           | 1346                    |                         |                          |                      |                      |                      | 71/11/11 |                              |                             |                           |                           |                               |                           |
| 71/12/16 | 1040                          | 1346                    |                         |                          |                      |                      |                      | 71/12/16 |                              |                             |                           |                           |                               |                           |
| 72/01/10 | 918                           | 1162                    |                         |                          |                      |                      |                      | 72/01/10 |                              |                             |                           |                           |                               |                           |
| 72/02/07 | 734                           | 1997                    |                         |                          |                      |                      |                      | 72/02/07 |                              |                             |                           |                           |                               |                           |
| 72/03/14 | 749                           |                         |                         |                          |                      |                      |                      | 72/03/14 |                              |                             |                           |                           |                               |                           |

TABLE 48.1

## LOADING CALCULATIONS, KOOTENAI RIVER BELOW LIBBY DAM (STATION 3)

| DATE     | DISCH<br>MEAN DLY<br>CFS | RESIDUE<br>DISS-180<br>T(M)/DAY | CALCIUM<br>CA, DISS<br>T(M)/DAY | MENSTUM<br>MG, DISS<br>T(M)/DAY | SODIUM<br>NA, DISS<br>T(M)/DAY | HC03 ION<br>HC03<br>T(M)/DAY | SULFATE<br>SO4-TOT<br>T(M)/DAY | CHLORIDE<br>CL<br>T(M)/DAY | SILICA<br>SiO2<br>T(M)/DAY | FLUORIDE<br>F, DISS<br>MG/DAY |
|----------|--------------------------|---------------------------------|---------------------------------|---------------------------------|--------------------------------|------------------------------|--------------------------------|----------------------------|----------------------------|-------------------------------|
| 67/06/29 | 56800                    | 16956                           | 4448                            | 917                             | 195                            | 15011                        | 2363                           | 125                        | 598                        | 69495                         |
| 67/07/26 | 18200                    | 7037                            | 1648                            | 387                             | 71                             | 5077                         | 1692                           | 62                         | 232                        | 31175                         |
| 67/09/07 | 6930                     | 3663                            | 899                             | 187                             | 47                             | 2306                         | 1153                           | 14                         | 98                         | 22045                         |
| 67/10/11 | 4790                     |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 67/11/07 | 4330                     |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 67/12/15 | 1950                     | 1612                            | 387                             | 72                              | 18                             | 782                          | 6346                           | 12                         | 35                         | 9543                          |
| 68/01/24 | 4100                     | 3263                            | 752                             | 127                             | 37                             | 1462                         | 1208                           | 24                         | 83                         | 9536                          |
| 68/03/07 | 4330                     | 12015                           | 3004                            | 646                             | 137                            | 10013                        | 2367                           | 164                        | 573                        | 36411                         |
| 68/04/24 | 3690                     |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 68/05/27 | 37200                    |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 68/06/17 | 31000                    |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 68/07/23 | 17500                    |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 68/08/28 | 8300                     | 4468                            | 995                             | 203                             | 49                             | 2579                         | 1300                           | 37                         | 104                        | 24372                         |
| 68/10/01 | 8260                     |                                 |                                 |                                 |                                |                              |                                |                            |                            |                               |
| 68/12/05 | 4430                     | 1854                            | 455                             | 130                             | 33                             | 1604                         | 390                            | 23                         | 68                         | 9756                          |
| 69/02/04 | 2900                     | 1476                            | 326                             | 92                              | 24                             | 1121                         | 312                            | 20                         | 53                         | 6387                          |
| 69/03/04 | 2700                     | 1394                            | 304                             | 86                              | 23                             | 1057                         | 291                            | 15                         | 48                         | 7268                          |
| 69/04/03 | 6110                     | 2736                            | 598                             | 164                             | 49                             | 2078                         | 568                            | 24                         | 124                        | 11961                         |
| 69/05/07 | 21200                    | 7730                            | 1764                            | 457                             | 130                            | 6173                         | 986                            | 52                         | 379                        | 15563                         |
| 69/06/05 | 61100                    | 16895                           | 4485                            | 942                             | 150                            | 17792                        | 1794                           | 120                        | 419                        | 29902                         |
| 69/07/08 | 33500                    | 10903                           | 2951                            | 689                             | 172                            | 10821                        | 1394                           | 131                        | 369                        | 24592                         |
| 69/08/04 | 11700                    | 4609                            | 1002                            | 286                             | 77                             | 3951                         | 773                            | 57                         | 137                        | 5726                          |
| 69/09/02 | 6560                     | 2793                            | 610                             | 193                             | 53                             | 2456                         | 449                            | 39                         | 83                         | 3210                          |
| 69/10/15 | 5550                     | 2417                            | 530                             | 190                             | 49                             | 2037                         | 462                            | 24                         | 71                         | 9506                          |
| 69/11/04 | 4340                     | 2124                            | 435                             | 138                             | 48                             | 1572                         | 404                            | 35                         | 72                         | 5310                          |
| 69/12/02 | 3000                     | 1527                            | 345                             | 103                             | 30                             | 1248                         | 301                            | 27                         | 49                         | 5139                          |
| 70/01/12 | 2700                     | 1272                            | 270                             | 90                              | 33                             | 1024                         | 265                            | 20                         | 41                         | 3377                          |
| 70/02/04 | 2400                     | 1381                            | 317                             | 92                              | 36                             | 1090                         | 304                            | 32                         | 44                         | 5286                          |
| 70/03/04 | 2400                     | 1304                            | 294                             | 82                              | 32                             | 969                          | 300                            | 30                         | 45                         | 6460                          |
| 70/04/06 | 3080                     | 1673                            | 339                             | 106                             | 45                             | 1206                         | 362                            | 26                         | 45                         | 6783                          |
| 70/05/06 | 10800                    | 4017                            | 872                             | 230                             | 77                             | 3171                         | 661                            | 58                         | 156                        | 15857                         |
| 70/06/04 | 40700                    | 11752                           | 2291                            | 598                             | 189                            | 9362                         | 1295                           | 13                         | 299                        | 19919                         |
| 70/07/06 | 18100                    | 6156                            | 1417                            | 390                             | 106                            | 5182                         | 886                            | 102                        | 199                        | 8858                          |
| 70/08/04 | 8650                     | 3302                            | 762                             | 205                             | 51                             | 2815                         | 550                            | 40                         | 17                         | 10583                         |
| 70/09/01 | 5340                     | 2313                            | 497                             | 144                             | 39                             | 1777                         | 405                            | 21                         | 34                         | 7840                          |
| 70/10/22 | 4220                     | 1931                            | 444                             | 124                             | 44                             | 1425                         | 423                            | 48                         | 53                         | 9294                          |
| 70/11/16 | 3640                     | 1888                            | 383                             | 107                             | 61                             | 1256                         | 383                            | 39                         | 45                         | 5344                          |
| 70/12/07 | 3400                     | 1780                            | 383                             | 108                             | 47                             | 1298                         | 383                            | 43                         | 62                         | 9152                          |
| 71/01/19 | 2900                     | 1391                            | 348                             | 99                              | 37                             | 1050                         | 298                            | 106                        | 47                         | 6387                          |
| 71/02/19 | 5000                     | 2423                            | 514                             | 147                             | 50                             | 1676                         | 428                            | 38                         | 86                         | 13458                         |
| 71/03/18 | 2840                     | 1571                            | 327                             | 90                              | 41                             | 980                          | 306                            | 35                         | 38                         | 10424                         |
| 71/04/15 | 5600                     | 2576                            | 548                             | 164                             | 53                             | 1918                         | 466                            | 32                         | 97                         | 15074                         |
| 71/05/19 | 27900                    | 8193                            | 1980                            | 539                             | 123                            | 7646                         | 1024                           | 123                        | 444                        | 20481                         |
| 71/06/10 | 58000                    | 17315                           | 3690                            | 908                             | 114                            | 15470                        | 1561                           | 142                        | 709                        | 28385                         |
| 71/07/14 | 25300                    | 7305                            | 1672                            | 446                             | 93                             | 6315                         | 1548                           | 87                         | 272                        | 12382                         |
| 71/08/11 | 14000                    | 4522                            | 1062                            | 298                             | 79                             | 3940                         | 719                            | 123                        | 116                        | 17129                         |
| 71/09/08 | 7500                     | 2753                            | 661                             | 184                             | 59                             | 2367                         | 514                            | 50                         | 90                         | 12846                         |
| 71/10/15 | 5100                     | 2396                            | 512                             | 162                             | 52                             | 1760                         | 437                            | 50                         | 69                         | 11231                         |
| 71/11/12 | 4400                     | 2175                            | 474                             | 140                             | 47                             | 1518                         | 366                            | 56                         | 61                         | 9690                          |
| 71/12/17 | 2600                     | 1425                            | 312                             | 89                              | 32                             | 1101                         | 267                            | 31                         | 45                         | 6362                          |
| 72/01/05 | 2900                     | 1333                            | 319                             | 99                              | 31                             | 1157                         | 291                            | 32                         | 50                         | 7096                          |
| 72/02/08 | 2800                     | 1507                            | 329                             | 103                             | 36                             | 1117                         | 295                            | 41                         | 50                         | 7537                          |
| 72/03/13 | 4600                     | 2004                            | 428                             | 124                             | 52                             | 1576                         | 371                            | 52                         | 100                        | 10131                         |
| 72/03/20 | 6400                     | 2455                            | 549                             | 153                             | 53                             | 1954                         | 406                            | 39                         | 136                        | 9690                          |
| 72/03/27 | 2200                     | 851                             | 188                             | 51                              | 17                             | 684                          | 120                            | 16                         | 48                         | 2692                          |

Table 48.2

LOADING CALCULATIONS, KOOTENAI RIVER BELOW LIBBY DAM (STATION 3)

| DATE     | PHOS-DIS<br>ORTHOP-P<br>KG/DAY | PHOS-DIS<br>P<br>KG/DAY | PHOS-TOT<br>P<br>KG/DAY | NO3-N<br>TOT N<br>KG/DAY | NO3-N<br>N<br>KG/DAY | ORG N<br>N<br>KG/DAY | TOT N<br>N<br>KG/DAY | ASSENIC<br>AS, DISS<br>KG/DAY | COPPER<br>CU, DISS<br>KG/DAY | LEAD<br>PB, DISS<br>KG/DAY | IRON<br>FE, DISS<br>KG/DAY | MANGNESE<br>MN, DISS<br>KG/DAY | ZINC<br>ZN, DISS<br>KG/DAY |
|----------|--------------------------------|-------------------------|-------------------------|--------------------------|----------------------|----------------------|----------------------|-------------------------------|------------------------------|----------------------------|----------------------------|--------------------------------|----------------------------|
| 67/06/29 |                                |                         |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 67/07/26 | 6614                           | 7292                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 67/09/07 | 6212                           | 8439                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 67/10/11 | 848                            | 2768                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 67/11/07 | 2338                           | 12039                   |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 67/12/15 | 10835                          | 7629                    |                         |                          | 529                  |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/01/24 | 6230                           | 6501                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/04/24 | 29129                          | 30039                   |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/05/27 | 12896                          | 15930                   |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/06/17 | 5995                           | 6423                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/07/23 | 11171                          | 11171                   |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/08/28 | 3234                           | 3234                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/10/01 | 4661                           |                         |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 68/12/05 | 1419                           | 1490                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/02/04 | 1255                           | 1321                    |                         |                          | 462                  |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/03/04 | 150                            | 299                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/04/03 | 3113                           | 3631                    |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/05/07 |                                |                         |                         |                          |                      |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/06/05 | 2459                           | 19674                   |                         |                          | 2594                 |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/07/08 | 6585                           | 14029                   |                         |                          | 13456                |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/08/04 | 321                            | 3692                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/09/02 | 407                            | 1222                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/10/15 | 1274                           | 2336                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/11/04 | 1175                           | 1835                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 69/12/02 | 394                            | 450                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/01/12 | 264                            | 822                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/02/04 | 763                            | 754                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/03/04 | 75                             | 754                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/04/06 | 2378                           | 2642                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/05/06 | 3984                           | 3984                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/06/04 | 4429                           | 5758                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/07/06 | 3175                           | 3810                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/08/04 | 1045                           | 1176                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/09/01 | 1652                           |                         |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/10/22 | 2227                           |                         |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/11/16 | 3078                           |                         |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 70/12/07 |                                |                         |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/01/19 | 1224                           | 2814                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/02/19 | 1112                           | 1807                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/03/18 | 685                            | 1370                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/04/15 | 9558                           | 17068                   |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/05/19 | 3677                           | 28385                   |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/06/10 | 619                            | 3095                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/07/14 | 343                            | 2741                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/08/11 | 551                            | 2019                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/09/08 | 125                            | 1997                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/10/15 | 861                            | 431                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/11/12 | 1272                           | 1718                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 71/12/17 | 923                            | 1135                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 72/01/05 | 822                            | 1233                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 72/02/08 | 1238                           | 1576                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 72/03/13 | 162                            | 1777                    |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |
| 72/03/20 | 54                             | 646                     |                         |                          | 0                    |                      |                      |                               |                              |                            |                            |                                |                            |

Table 48.3

LOADING CALCULATIONS, KOOTENAI RIVER BELOW LIBBY DAM, (STATION 3)

| DATE     | ASSENIC<br>AS, DISS<br>KG/DAY | COPPER<br>CU, DISS<br>KG/DAY | LEAD<br>PB, DISS<br>KG/DAY | IRON<br>FE, DISS<br>KG/DAY | MANGNESE<br>MN, DISS<br>KG/DAY | ZINC<br>ZN, DISS<br>KG/DAY |
|----------|-------------------------------|------------------------------|----------------------------|----------------------------|--------------------------------|----------------------------|
| 67/06/29 |                               |                              |                            |                            |                                |                            |
| 67/07/26 |                               |                              |                            |                            |                                |                            |
| 67/09/07 |                               |                              |                            |                            |                                |                            |
| 67/10/11 |                               |                              |                            |                            |                                |                            |
| 67/11/07 |                               |                              |                            |                            |                                |                            |
| 67/12/15 |                               |                              |                            |                            |                                |                            |
| 68/01/24 |                               |                              |                            |                            |                                |                            |
| 68/03/07 |                               |                              |                            |                            |                                |                            |
| 68/04/24 |                               |                              |                            |                            |                                |                            |
| 68/05/27 |                               |                              |                            |                            |                                |                            |
| 68/06/17 |                               |                              |                            |                            |                                |                            |
| 68/07/23 |                               |                              |                            |                            |                                |                            |
| 68/08/28 |                               |                              |                            |                            |                                |                            |
| 68/10/01 |                               |                              |                            |                            |                                |                            |
| 68/12/05 |                               |                              |                            |                            |                                |                            |
| 69/02/04 |                               |                              |                            |                            |                                |                            |
| 69/03/04 |                               |                              |                            |                            |                                |                            |
| 69/04/03 |                               |                              |                            |                            |                                |                            |
| 69/05/07 |                               |                              |                            |                            |                                |                            |
| 69/06/05 |                               |                              |                            |                            |                                |                            |
| 69/07/08 |                               |                              |                            |                            |                                |                            |
| 69/08/04 |                               |                              |                            |                            |                                |                            |
| 69/09/02 |                               |                              |                            |                            |                                |                            |
| 69/10/15 |                               |                              |                            |                            |                                |                            |
| 69/11/04 |                               |                              |                            |                            |                                |                            |
| 69/12/02 |                               |                              |                            |                            |                                |                            |
| 70/01/12 |                               |                              |                            |                            |                                |                            |
| 70/02/04 |                               |                              |                            |                            |                                |                            |
| 70/03/04 |                               |                              |                            |                            |                                |                            |
| 70/04/06 |                               |                              |                            |                            |                                |                            |
| 70/05/06 |                               |                              |                            |                            |                                |                            |
| 70/06/04 |                               |                              |                            |                            |                                |                            |
| 70/07/06 |                               |                              |                            |                            |                                |                            |
| 70/08/04 |                               |                              |                            |                            |                                |                            |
| 70/09/01 |                               |                              |                            |                            |                                |                            |
| 70/10/22 |                               |                              |                            |                            |                                |                            |
| 70/11/16 |                               |                              |                            |                            |                                |                            |
| 70/12/07 |                               |                              |                            |                            |                                |                            |
| 71/01/19 |                               |                              |                            |                            |                                |                            |
| 71/02/19 |                               |                              |                            |                            |                                |                            |
| 71/03/18 |                               |                              |                            |                            |                                |                            |
| 71/04/15 |                               |                              |                            |                            |                                |                            |
| 71/05/19 |                               |                              |                            |                            |                                |                            |
| 71/06/10 |                               |                              |                            |                            |                                |                            |
| 71/07/14 |                               |                              |                            |                            |                                |                            |
| 71/08/11 |                               |                              |                            |                            |                                |                            |
| 71/09/08 |                               |                              |                            |                            |                                |                            |
| 71/10/15 |                               |                              |                            |                            |                                |                            |
| 71/11/12 |                               |                              |                            |                            |                                |                            |
| 71/12/17 |                               |                              |                            |                            |                                |                            |
| 72/01/05 |                               |                              |                            |                            |                                |                            |
| 72/02/08 |                               |                              |                            |                            |                                |                            |
| 72/03/13 |                               |                              |                            |                            |                                |                            |
| 72/03/20 |                               |                              |                            |                            |                                |                            |

LOADING CALCULATIONS, KOOTENAI RIVER AT PORTHILL-COPELAND (STATIONS 9-10)

TABLE 49.1

| DATE     | DISCHG<br>MEAN DLY<br>CFS | RESIDUE<br>DISS-180<br>T(M)/DAY | CALCIUM<br>CA, DISS<br>T(M)/DAY | MAGNESIUM<br>MG, DISS<br>T(M)/DAY | SODIUM<br>NA, DISS<br>T(M)/DAY | IRON<br>FeO3<br>T(M)/DAY | SULFATE<br>SO4-TOT<br>T(M)/DAY | CHLORIDE<br>CL<br>T(M)/DAY | SILICA<br>SiO2<br>T(M)/DAY | FLUORIDE<br>F, DISS<br>KG/DAY |
|----------|---------------------------|---------------------------------|---------------------------------|-----------------------------------|--------------------------------|--------------------------|--------------------------------|----------------------------|----------------------------|-------------------------------|
| 68/03/13 | 7950                      | 3074                            |                                 |                                   |                                | 1538                     | 660                            | 44                         | 179                        |                               |
| 68/04/03 | 8990                      | 3146                            |                                 |                                   | 55                             | 1760                     |                                | 22                         | 213                        |                               |
| 68/04/17 | 8970                      | 3929                            |                                 |                                   | 61                             | 2041                     | 944                            | 22                         | 191                        |                               |
| 68/05/08 | 22100                     | 6597                            |                                 |                                   | 97                             | 3894                     | 1731                           | 54                         | 416                        |                               |
| 68/06/04 | 67400                     | 15997                           |                                 |                                   | 231                            | 12040                    | 3793                           | 165                        | 858                        |                               |
| 68/07/10 | 37200                     | 10559                           |                                 |                                   | 91                             | 8739                     | 2185                           | 182                        | 428                        |                               |
| 68/08/06 | 13100                     | 4007                            |                                 |                                   | 58                             | 3494                     | 801                            | 64                         | 103                        |                               |
| 68/08/20 | 11400                     | 4073                            |                                 |                                   | 61                             | 3320                     | 1032                           | 56                         | 153                        |                               |
| 68/09/24 | 10800                     | 4176                            |                                 |                                   | 58                             | 2696                     | 978                            | 53                         |                            |                               |
| 68/11/11 | 8050                      | 2640                            |                                 |                                   | 41                             | 1970                     | 492                            | 39                         | 122                        |                               |
| 68/12/16 | 7520                      | 2631                            |                                 |                                   | 42                             | 1969                     | 1067                           | 18                         | 138                        |                               |
| 69/02/12 | 5020                      | 1646                            |                                 |                                   | 44                             | 1621                     | 295                            | 25                         | 98                         |                               |
| 69/03/18 | 5340                      | 8443                            |                                 |                                   | 43                             | 1699                     | 444                            | 26                         | 110                        |                               |
| 69/04/22 | 33500                     | 18193                           |                                 |                                   | 148                            | 6476                     | 1312                           | 82                         | 820                        |                               |
| 69/05/27 | 81700                     | 3712                            |                                 |                                   | 66                             | 16393                    | 2799                           | 200                        | 1499                       |                               |
| 69/08/19 | 9980                      | 7015                            |                                 |                                   | 53                             | 3224                     | 611                            | 73                         | 112                        |                               |
| 69/09/17 | 6770                      | 2475                            |                                 |                                   | 53                             | 2303                     |                                | 68                         | 65                         |                               |
| 69/10/20 | 6130                      | 1966                            |                                 |                                   |                                | 1890                     |                                | 51                         |                            |                               |
| 69/11/18 | 5250                      | 2010                            | 428                             | 128                               | 44                             | 1593                     | 396                            | 43                         | 84                         |                               |
| 69/12/16 | 4370                      | 1857                            | 379                             | 110                               | 46                             | 1428                     | 529                            | 40                         | 72                         |                               |
| 70/01/27 | 6080                      | 1633                            |                                 |                                   |                                | 1367                     |                                | 31                         |                            |                               |
| 70/02/25 | 4170                      | 1771                            |                                 |                                   |                                | 1486                     |                                | 46                         |                            |                               |
| 70/03/24 | 4570                      | 2311                            | 539                             | 156                               | 67                             | 2003                     | 481                            | 67                         | 173                        |                               |
| 70/04/27 | 7870                      | 8484                            |                                 |                                   |                                | 6340                     |                                | 186                        |                            |                               |
| 70/05/18 | 38100                     | 8589                            | 2061                            | 515                               | 137                            | 7730                     | 1117                           | 129                        | 533                        |                               |
| 70/06/16 | 35100                     | 4942                            | 1161                            | 311                               | 82                             | 4081                     | 674                            | 112                        | 150                        | 11231                         |
| 70/07/14 | 13300                     | 2490                            |                                 |                                   |                                | 1938                     |                                | 54                         |                            | 9235                          |
| 70/08/17 | 6830                      | 2324                            |                                 |                                   |                                | 1631                     | 462                            | 33                         |                            | 7416                          |
| 70/09/22 | 6290                      | 2088                            | 470                             | 136                               |                                | 1682                     | 408                            |                            |                            |                               |
| 70/10/20 | 5050                      | 2030                            |                                 |                                   |                                | 1284                     |                                | 41                         | 144                        | 9176                          |
| 70/11/17 | 4740                      | 1565                            | 596                             | 184                               |                                | 2126                     | 444                            |                            |                            |                               |
| 70/12/15 | 4100                      | 1920                            | 392                             | 123                               |                                | 1600                     |                                | 46                         |                            |                               |
| 71/01/20 | 6540                      | 1569                            | 820                             | 220                               |                                | 1367                     | 623                            |                            |                            |                               |
| 71/02/24 | 4580                      | 2886                            | 2839                            | 653                               |                                | 1017                     |                                |                            |                            |                               |
| 71/04/20 | 13400                     | 14476                           |                                 |                                   |                                | 11212                    |                                |                            |                            |                               |
| 71/05/26 | 58000                     | 16401                           | 1435                            | 412                               | 94                             | 10972                    |                                | 106                        |                            | 12480                         |
| 71/06/22 | 47200                     | 7113                            | 819                             | 222                               | 66                             | 5990                     | 874                            | 66                         |                            | 13214                         |
| 71/07/27 | 25500                     | 3753                            | 510                             | 160                               | 45                             | 3171                     | 502                            | 38                         |                            | 10192                         |
| 71/08/18 | 10800                     | 2388                            | 490                             | 150                               | 49                             | 1922                     | 466                            | 52                         |                            | 12245                         |
| 71/09/22 | 5950                      | 2286                            | 476                             | 136                               | 52                             | 1823                     | 395                            | 45                         |                            | 10884                         |
| 71/10/19 | 5560                      | 2177                            | 353                             | 100                               | 36                             | 1741                     | 272                            | 33                         |                            | 9959                          |
| 71/11/16 | 5560                      | 1684                            | 339                             | 99                                | 33                             | 1249                     | 256                            | 31                         |                            | 3308                          |
| 71/12/07 | 3700                      | 1563                            | 270                             | 85                                | 31                             | 1232                     | 185                            | 28                         |                            | 5677                          |
| 72/01/10 | 3380                      | 1213                            | 270                             | 85                                | 31                             | 986                      | 429                            | 56                         |                            | 9910                          |
| 72/02/03 | 2900                      | 1213                            | 595                             | 162                               | 79                             | 2180                     |                                |                            |                            |                               |
| 72/03/02 | 13500                     | 2742                            |                                 |                                   |                                |                          |                                |                            |                            |                               |

TABLE 49.3  
LOADING CALCULATIONS, KOOTENAI RIVER AT POKTHILL-COPELAND (STATION 9-10)

TABLE 49.2  
LOADING CALCULATIONS, KOOTENAI RIVER AT POKTHILL-COPELAND (STATIONS 9-10)

| DATE     | PROG-DIS<br>KG/DAY | PROG-DIS<br>P | PROG-TOT<br>P | ME3-N<br>TOT N<br>KG/DAY | ME3-N<br>N | ME3-N<br>KG/DAY | ME3-N<br>N | ME3-N<br>KG/DAY | TOT N<br>KG/DAY | DATE     | ARSENIC<br>AS, DISS<br>KG/DAY | COPPER<br>CU, DISS<br>KG/DAY | LEAD<br>PB, DISS<br>KG/DAY | IRON<br>FE, DISS<br>KG/DAY | MANGANESE<br>MANG, DISS<br>KG/DAY | ZINC<br>ZN, DISS<br>KG/DAY |
|----------|--------------------|---------------|---------------|--------------------------|------------|-----------------|------------|-----------------|-----------------|----------|-------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------------|----------------------------|
| 68/03/13 | 4863               |               | 5642          | 2200                     | 2140       | 13199           | 17511      | 13199           | 17511           | 68/03/13 |                               |                              |                            |                            |                                   |                            |
| 68/04/03 | 4879               |               | 5855          | 2195                     | 1980       | 13199           | 17511      | 13199           | 17511           | 68/04/03 |                               |                              |                            |                            |                                   |                            |
| 68/04/17 | 5487               |               | 7243          | 2195                     | 2200       | 13199           | 17511      | 13199           | 17511           | 68/04/17 |                               |                              |                            |                            |                                   |                            |
| 68/05/08 | 5949               |               | 8112          | 5406                     | 4847       | 5406            | 4847       | 5406            | 4847            | 68/05/08 |                               |                              |                            |                            |                                   |                            |
| 68/06/04 | 11050              |               | 32086         | 16493                    | 13194      | 4847            | 4847       | 4847            | 4847            | 68/06/04 |                               |                              |                            |                            |                                   |                            |
| 68/07/10 | 10013              |               | 14555         | 4551                     | 6372       | 31860           | 42238      | 31860           | 42238           | 68/07/10 |                               |                              |                            |                            |                                   |                            |
| 68/08/06 | 1699               |               | 2085          | 341                      | 160        | 6091            | 6732       | 6091            | 6732            | 68/08/06 |                               |                              |                            |                            |                                   |                            |
| 68/08/20 | 6137               |               | 8137          | 279                      | 279        | 2311            | 3208       | 2311            | 3208            | 68/08/20 |                               |                              |                            |                            |                                   |                            |
| 68/09/14 | 5286               |               | 6348          | 132                      | 132        | 3286            | 3945       | 3286            | 3945            | 68/09/14 |                               |                              |                            |                            |                                   |                            |
| 68/11/11 | 985                |               | 3128          | 197                      | 984        | 3743            | 3122       | 3743            | 3122            | 68/11/11 |                               |                              |                            |                            |                                   |                            |
| 69/02/12 | 2211               |               | 2568          | 123                      | 2560       | 6953            | 11301      | 6953            | 11301           | 69/02/12 |                               |                              |                            |                            |                                   |                            |
| 69/03/18 | 1215               |               | 1699          | 131                      | 3267       | 8476            | 5815       | 8476            | 5815            | 69/03/18 |                               |                              |                            |                            |                                   |                            |
| 69/04/22 | 1803               |               | 9017          | 9837                     | 12296      | 22953           | 45906      | 22953           | 45906           | 69/04/22 |                               |                              |                            |                            |                                   |                            |
| 69/05/27 | 3798               |               | 29588         | 11995                    | 19992      | 7997            | 31987      | 7997            | 31987           | 69/05/27 |                               |                              |                            |                            |                                   |                            |
| 69/06/19 | 1172               |               | 1343          | 488                      | 488        | 9280            | 10501      | 9280            | 10501           | 69/06/19 |                               |                              |                            |                            |                                   |                            |
| 69/09/17 | 596                |               | 795           | 166                      | 663        | 6461            | 7306       | 6461            | 7306            | 69/09/17 |                               |                              |                            |                            |                                   |                            |
| 69/10/20 |                    | 450           | 600           | 150                      | 0          | 900             | 1050       | 900             | 1050            | 69/10/20 |                               |                              |                            |                            |                                   |                            |
| 69/11/18 |                    | 899           | 899           | 1028                     | 257        | 1285            | 2569       | 1285            | 2569            | 69/11/18 |                               |                              |                            |                            |                                   |                            |
| 69/12/16 |                    | 0             | 107           | 749                      | 749        | 107             | 1604       | 107             | 1604            | 69/12/16 |                               |                              |                            |                            |                                   |                            |
| 70/01/27 |                    | 100           | 299           | 300                      | 899        | 399             | 1697       | 399             | 1697            | 70/01/27 |                               |                              |                            |                            |                                   |                            |
| 70/02/25 |                    | 204           | 204           | 0                        | 2347       | 0               | 2449       | 0               | 2449            | 70/02/25 |                               |                              |                            |                            |                                   |                            |
| 70/03/24 |                    | 114           | 300           | 0                        | 1028       | 571             | 1600       | 571             | 1600            | 70/03/24 |                               |                              |                            |                            |                                   |                            |
| 70/04/27 |                    | 193           | 578           | 0                        | 385        | 0               | 385        | 0               | 385             | 70/04/27 |                               |                              |                            |                            |                                   |                            |
| 70/05/18 |                    | 2797          | 7458          | 1865                     | 8391       | 5594            | 16782      | 5594            | 16782           | 70/05/18 |                               |                              |                            |                            |                                   |                            |
| 70/06/16 |                    | 5153          | 7730          | 1718                     | 7730       | 6871            | 16319      | 6871            | 16319           | 70/06/16 |                               |                              |                            |                            |                                   |                            |
| 70/07/14 |                    | 2995          | 4118          | 1872                     | 749        | 2246            | 4867       | 2246            | 4867            | 70/07/14 |                               |                              |                            |                            |                                   |                            |
| 70/08/17 |                    | 1003          | 1003          | 0                        | 0          | 1170            | 1170       | 1170            | 1170            | 70/08/17 |                               |                              |                            |                            |                                   |                            |
| 70/09/22 |                    | 1077          | 1693          | 0                        | 308        | 770             | 1231       | 770             | 1231            | 70/09/22 |                               |                              |                            |                            |                                   |                            |
| 70/10/20 |                    | 1606          | 1854          | 741                      | 247        | 124             | 1112       | 124             | 1112            | 70/10/20 |                               |                              |                            |                            |                                   |                            |
| 70/11/17 |                    | 1160          | 2320          | 348                      | 580        | 116             | 1044       | 116             | 1044            | 70/11/17 |                               |                              |                            |                            |                                   |                            |
| 70/12/15 |                    | 1304          | 1505          | 301                      | 903        | 0               | 1405       | 0               | 1405            | 70/12/15 |                               |                              |                            |                            |                                   |                            |
| 71/01/20 |                    | 0             | 1071          | 1071                     | 1376       | 306             | 3059       | 306             | 3059            | 71/01/20 |                               |                              |                            |                            |                                   |                            |
| 71/02/24 |                    | 1600          | 1760          | 1120                     | 3041       | 320             | 4641       | 320             | 4641            | 71/02/24 |                               |                              |                            |                            |                                   |                            |
| 71/03/24 |                    | 897           | 1233          | 1121                     | 1121       | 5902            | 11804      | 5902            | 11804           | 71/03/24 |                               |                              |                            |                            |                                   |                            |
| 71/04/20 |                    | 1312          | 1639          | 656                      | 3279       | 21289           | 58190      | 21289           | 58190           | 71/04/20 |                               |                              |                            |                            |                                   |                            |
| 71/05/26 |                    | 5677          | 8516          | 22708                    | 14193      | 46199           | 68144      | 46199           | 68144           | 71/05/26 |                               |                              |                            |                            |                                   |                            |
| 71/06/22 |                    | 2310          | 5775          | 10395                    | 11550      | 180956          | 193435     | 180956          | 193435          | 71/06/22 |                               |                              |                            |                            |                                   |                            |
| 71/07/27 |                    | 2496          | 4992          | 13104                    | 0          | 180956          | 193435     | 180956          | 193435          | 71/07/27 |                               |                              |                            |                            |                                   |                            |
| 71/08/18 |                    | 529           | 1586          | 1859                     | 0          | 7664            | 9514       | 7664            | 9514            | 71/08/18 |                               |                              |                            |                            |                                   |                            |
| 71/09/22 |                    | 582           | 16016         | 1019                     | 0          | 1747            | 3058       | 1747            | 3058            | 71/09/22 |                               |                              |                            |                            |                                   |                            |
| 71/10/19 |                    | 816           | 1497          | 2721                     | 0          | 136             | 2857       | 136             | 2857            | 71/10/19 |                               |                              |                            |                            |                                   |                            |
| 71/11/16 |                    | 1088          | 1905          | 2585                     | 5986       | 544             | 9156       | 544             | 9156            | 71/11/16 |                               |                              |                            |                            |                                   |                            |
| 71/12/07 |                    | 814           | 1177          | 181                      | 0          | 1268            | 1449       | 1268            | 1449            | 71/12/07 |                               |                              |                            |                            |                                   |                            |
| 72/01/10 |                    | 496           | 910           | 579                      | 1737       | 0               | 3970       | 1737            | 3970            | 72/01/10 |                               |                              |                            |                            |                                   |                            |
| 72/02/03 |                    | 923           | 1064          | 497                      | 2058       | 1632            | 4187       | 1632            | 4187            | 72/02/03 |                               |                              |                            |                            |                                   |                            |
| 72/03/02 |                    | 661           | 3964          | 3964                     | 8589       | 6607            | 19160      | 6607            | 19160           | 72/03/02 |                               |                              |                            |                            |                                   |                            |

## LIBBY DAM PROJECT

Table 50. Number of Insects Collected by Bottom Sampling in the Kootenai River  
1968-1971

| Location<br>No. of Samples<br>Year | Total of All Stations |              |              |              |
|------------------------------------|-----------------------|--------------|--------------|--------------|
|                                    | 38<br>1968            | 60<br>1969   | 72<br>1970   | 60<br>1971   |
| <b>Plecoptera</b>                  |                       |              |              |              |
| Pteronarcys                        | 3                     | 9            | 1            | 1            |
| Pteronarcella                      | 239                   | 443          | 457          | 475          |
| Capnia                             | 37                    | 947          | 35           |              |
| Isocapnia                          |                       | 2            |              |              |
| Brachyptera                        | 24                    | 1062         |              | 318          |
| Nemoura                            |                       | 26           |              |              |
| Isogenus                           | 285                   | 1597         | 569          | 1112         |
| Arcynopteryx                       | 1                     | 3            |              | 8            |
| Isoperla                           | 234                   | 104          | 749          | 150          |
| Diura                              |                       |              | 429          |              |
| Acronuria                          |                       | 3            | 30           | 11           |
| Classenia                          | 1                     | 4            |              | 45           |
| Alloperla                          | 386                   | 21           | 1038         | 1338         |
| Unidentified                       |                       |              |              | 10           |
| <b>Ephemeroptera</b>               |                       |              |              |              |
| Baetis                             | 270                   | 3163         | 3613         | 1937         |
| Callibaetis                        |                       | 3            |              |              |
| Ameletus                           | 2                     | 82           |              | 9            |
| Parameletus                        |                       | 81           |              |              |
| Ephemerella                        | 94                    | 870          | 246          | 106          |
| Leptophlebia                       | 19                    |              |              |              |
| Paraleptophlebia                   |                       | 1            |              |              |
| Heptagenia                         | 7                     | 12           | 187          | 148          |
| Rhithrogena                        | 12                    | 34           | 65           | 756          |
| Cinygmula                          | 3                     |              | 30           | 75           |
| Epeorus (Iron)                     |                       | 13           |              |              |
| Unidentified                       |                       | 2            |              |              |
| <b>Trichoptera</b>                 |                       |              |              |              |
| Hydropsyche                        | 1878                  | 2083         | 6350         | 4170         |
| Parapsyche                         | 126                   | 378          | 113          | 52           |
| Arctopsyche                        | 13                    |              |              |              |
| Cheumatopsyche                     |                       | 4            |              | 4072         |
| Brachycentridae                    | 134                   | 155          | 298          | 178          |
| Glossosoma                         | 31                    | 82           |              | 49           |
| Rhyacophila                        | 1                     |              |              |              |
| Limnephilidae                      | 18                    | 146          |              |              |
| Neothremma                         | 11                    |              |              |              |
| Unidentified                       |                       | 1            | 41           | 125          |
| <b>Diptera</b>                     |                       |              |              |              |
| Tendipedidae                       | 3558                  | 8285         | 10329        | 7360         |
| Tipula                             | 55                    | 50           | 54           | 109          |
| Holorusia                          | 12                    | 24           | 15           |              |
| Hexatoma                           | 48                    | 26           | 75           | 108          |
| Simulium                           | 2                     | 19           | 7            |              |
| Tanyderidae                        |                       |              |              | 2            |
| Rhagionidae                        |                       | 4            | 6            |              |
| Atherix v.                         | 7                     | 2            |              | 14           |
| Empididae                          | 1                     | 2            |              |              |
| Tabanidae                          |                       |              |              | 1            |
| Unidentified                       | 18                    | 94           |              | 230          |
| <b>Odonata</b>                     |                       |              |              |              |
| Zygoptera                          |                       | 1            |              |              |
| Agrion                             |                       | 1            |              |              |
| <b>Coleoptera</b>                  |                       |              |              |              |
| Elmidae                            | 25                    | 11           |              | 19           |
| Hydrophilus                        |                       | 1            |              |              |
| Dytiscidae                         |                       | 7            |              |              |
| <b>Megaloptera</b>                 |                       |              |              |              |
| Sialis                             | 1                     |              |              |              |
| <b>Hemiptera</b>                   |                       |              |              |              |
| Corixidae                          | 64                    | 11           |              | 1            |
| <b>TOTAL</b>                       | <b>7622</b>           | <b>19869</b> | <b>24737</b> | <b>22989</b> |

## LIBBY DAM PROJECT

Table 51. Number of Insects Collected by Bottom Sampling in the Kootenai River  
1968-1971

| Location<br>No. of Samples<br>Year | Rexford (station 1) |             |             |             |
|------------------------------------|---------------------|-------------|-------------|-------------|
|                                    | 9<br>1968           | 15<br>1969  | 18<br>1970  | 15<br>1971  |
| <b>Placoptera</b>                  |                     |             |             |             |
| Pteronarcys                        |                     | 7           |             |             |
| Pteronarcella                      | 156                 | 157         | 214         | 322         |
| Capnia                             | 34                  | 13          | 6           |             |
| Isocapnia                          |                     |             |             |             |
| Brachyptera                        | 3                   | 231         |             | 5           |
| Nemoura                            |                     | 10          |             |             |
| Isogenus                           | 115                 | 277         | 185         | 431         |
| Arcynopteryx                       |                     |             |             | 8           |
| Isoperla                           | 128                 | 5           | 274         | 51          |
| Diura                              |                     |             | 155         |             |
| Actoneuria                         |                     |             | 9           | 8           |
| Classenia                          | 1                   | 1           |             | 23          |
| Alloperla                          | 108                 | 10          | 200         | 205         |
| Unidentified                       |                     |             |             | 1           |
| <b>Ephemeroptera</b>               |                     |             |             |             |
| Baetis                             | 92                  | 893         | 1433        | 312         |
| Callibaetis                        |                     |             |             |             |
| Ameletus                           | 2                   | 8           |             |             |
| Parameletus                        |                     | 6           |             |             |
| Ephemerella                        | 50                  | 184         | 82          | 51          |
| Leptophlebia                       |                     |             |             |             |
| Paraleptophlebia                   |                     |             |             |             |
| Heptagenia                         |                     | 1           | 62          | 11          |
| Rhithrogena                        |                     | 9           | 25          | 94          |
| Cinygmula                          |                     |             | 1           | 17          |
| Epeorus (Iron)                     |                     |             |             |             |
| Unidentified                       |                     |             |             |             |
| <b>Trichoptera</b>                 |                     |             |             |             |
| Hydropsyche                        | 1121                | 400         | 1919        | 2139        |
| Parapsyche                         | 110                 | 69          | 52          | 21          |
| Arctopsyche                        | 7                   |             |             |             |
| Cheumatopsyche                     |                     | 4           |             | 216         |
| Brachycentridae                    | 48                  | 14          | 129         | 67          |
| Glossosoma                         | 12                  | 3           |             | 30          |
| Rhyacophila                        |                     |             |             |             |
| Limnephilidae                      | 1                   | 72          |             |             |
| Neothremma                         |                     |             |             |             |
| Unidentified                       |                     |             | 3           | 3           |
| <b>Diptera</b>                     |                     |             |             |             |
| Tendipedidae                       | 635                 | 1817        | 3121        | 1714        |
| Tipula                             | 31                  | 8           | 15          | 25          |
| Holorusia                          |                     | 8           |             |             |
| Hexatoma                           | 7                   | 10          | 21          | 19          |
| Simulium                           |                     | 15          | 7           |             |
| Tanyderidae                        |                     |             |             |             |
| Rhagionidae                        |                     | 2           | 1           |             |
| Atherix v.                         | 3                   |             |             | 11          |
| Empididae                          |                     |             |             |             |
| Tabanidae                          |                     |             |             |             |
| Unidentified                       |                     | 35          |             | 95          |
| <b>Odonata</b>                     |                     |             |             |             |
| Zygoptera                          |                     | 1           |             |             |
| Agrion                             |                     |             |             |             |
| <b>Coleoptera</b>                  |                     |             |             |             |
| Elmidae                            |                     | 2           |             | 6           |
| Hydrophilus                        |                     |             |             |             |
| Dytiscidae                         |                     | 4           |             |             |
| <b>Megaloptera</b>                 |                     |             |             |             |
| Sialis                             |                     |             |             |             |
| <b>Hemiptera</b>                   |                     |             |             |             |
| Corixidae                          |                     | 4           |             |             |
| <b>TOTAL</b>                       | <b>2664</b>         | <b>4280</b> | <b>7916</b> | <b>5885</b> |

## LIBBY DAM PROJECT

Table 52. Number of Insects Collected by Bottom Sampling in the Kootenai River  
1968-1971

| Location<br>No. of Samples<br>Year | 10<br>1968  | Warland (Station 2)<br>15<br>1969 | 18<br>1970  | 15<br>1971  |
|------------------------------------|-------------|-----------------------------------|-------------|-------------|
| <b>Plecoptera</b>                  |             |                                   |             |             |
| Pteronarcys                        | 3           |                                   |             |             |
| Pteronarcella                      | 58          | 87                                | 195         | 58          |
| Capnia                             | 3           | 623                               | 9           |             |
| Isocapnia                          |             | 2                                 |             |             |
| Brachyptera                        |             | 465                               |             | 87          |
| Nemoura                            |             |                                   |             |             |
| Isogenus                           | 90          | 164                               | 235         | 289         |
| Arcynopteryx                       |             |                                   |             |             |
| Isoperla                           | 46          | 58                                | 211         | 11          |
| Diura                              |             |                                   | 122         |             |
| Acronaeria                         |             | 2                                 | 19          | 3           |
| Classania                          |             | 1                                 |             | 12          |
| Alloperla                          | 67          |                                   | 456         | 452         |
| Unidentified                       |             |                                   |             |             |
| <b>Ephemeroptera</b>               |             |                                   |             |             |
| Baetis                             | 17          | 778                               | 1047        | 991         |
| Callibaetis                        |             |                                   |             |             |
| Ameletus                           |             | 47                                |             |             |
| Parameletus                        |             | 60                                |             |             |
| Ephemerella                        | 1           | 258                               | 98          | 18          |
| Leptophlebia                       |             |                                   |             |             |
| Paraleptophlebia                   |             |                                   |             |             |
| Haptagenia                         |             | 3                                 | 52          | 129         |
| Rhithrogena                        |             | 6                                 | 26          | 317         |
| Cinygmula                          | 3           |                                   | 18          | 58          |
| Epeorus (Iron)                     |             | 6                                 |             |             |
| Unidentified                       |             |                                   |             |             |
| <b>Trichoptera</b>                 |             |                                   |             |             |
| Hydropsyche                        | 261         | 540                               | 2572        | 696         |
| Parapsyche                         | 6           | 206                               | 43          | 6           |
| Arctopsyche                        | 5           |                                   |             |             |
| Chaumatopsyche                     |             |                                   |             | 2437        |
| Brachycentridae                    | 27          | 87                                | 92          | 51          |
| Glossosoma                         | 1           | 8                                 |             | 4           |
| Rhyacophila                        | 1           |                                   |             |             |
| Limnophilidae                      | 4           | 39                                |             |             |
| Neothremma                         |             |                                   |             |             |
| Unidentified                       |             |                                   |             | 110         |
| <b>Diptera</b>                     |             |                                   |             |             |
| Tendipedidae                       | 1345        | 3036                              | 2801        | 2131        |
| Tipula                             | 14          | 14                                | 18          | 51          |
| Holorusia                          |             | 4                                 | 7           |             |
| Hexatoma                           | 32          | 9                                 | 17          | 57          |
| Simulium                           | 2           |                                   |             |             |
| Tanyderidae                        |             |                                   |             |             |
| Rhagionidae                        |             | 1                                 | 1           |             |
| Atherix v.                         |             |                                   |             | 1           |
| Empididae                          |             |                                   |             |             |
| Tabanidae                          |             |                                   |             |             |
| Unidentified                       | 1           | 38                                |             | 57          |
| <b>Odonata</b>                     |             |                                   |             |             |
| Zygoptera                          |             |                                   |             |             |
| Agria                              |             |                                   |             |             |
| <b>Coleoptera</b>                  |             |                                   |             |             |
| Elmidae                            | 2           | 5                                 |             | 13          |
| Hydrophilus                        |             |                                   |             |             |
| Dytiscidae                         |             | 2                                 |             |             |
| <b>Megaloptera</b>                 |             |                                   |             |             |
| Sialis                             | 1           |                                   |             |             |
| <b>Hemiptera</b>                   |             |                                   |             |             |
| Corixidae                          | 64          | 7                                 |             |             |
| <b>TOTAL</b>                       | <b>2034</b> | <b>6556</b>                       | <b>8039</b> | <b>8039</b> |

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Table 53. Number of Insects Collected by Bottom Sampling in the Kootenai River  
1968-1971

| Location<br>No. of Samples<br>Year | Below Dam (Station 3) |             |             |             |
|------------------------------------|-----------------------|-------------|-------------|-------------|
|                                    | 9<br>1968             | 15<br>1969  | 18<br>1970  | 15<br>1971  |
| <b>Placoptera</b>                  |                       |             |             |             |
| Pteronarcys                        |                       | 2           | 1           |             |
| Pteronarcalla                      | 21                    | 170         | 4           | 16          |
| Capnia                             |                       | 207         |             |             |
| Isocapnia                          |                       |             |             |             |
| Brachyptera                        | 7                     | 259         |             | 118         |
| Nemoura                            |                       | 16          |             |             |
| Isogenus                           | 62                    | 716         | 52          | 208         |
| Arcynopteryx                       | 1                     | 3           |             |             |
| Isoperla                           | 8                     | 24          | 177         | 86          |
| Diura                              | 2                     |             | 95          |             |
| Acronaeria                         |                       |             |             |             |
| Classenania                        |                       | 2           |             | 3           |
| Alloperla                          | 158                   | 8           | 264         | 412         |
| Unidentified                       |                       |             |             |             |
| <b>Ephemeroptera</b>               |                       |             |             |             |
| Baetis                             | 106                   | 1247        | 749         | 278         |
| Callibaetis                        |                       |             |             |             |
| Ameletus                           |                       | 14          |             | 2           |
| Parameletus                        |                       | 15          |             |             |
| Ephemerella                        | 42                    | 320         | 40          | 8           |
| Leptophlebia                       | 19                    |             |             |             |
| Paraleptophlebia                   |                       | 1           |             |             |
| Heptagenia                         | 7                     | 3           | 28          | 7           |
| Rhithrogena                        | 12                    | 12          | 5           | 114         |
| Cinygmula                          |                       |             | 10          |             |
| Epeorus (Iron)                     |                       | 7           |             |             |
| Unidentified                       |                       |             |             |             |
| <b>Trichoptera</b>                 |                       |             |             |             |
| Hydropsyche                        | 317                   | 972         | 958         | 416         |
| Parapsyche                         | 4                     | 87          | 8           | 14          |
| Arctopsyche                        | 1                     |             |             |             |
| Cheumatopsyche                     |                       |             |             | 843         |
| Brachycentridae                    | 52                    | 51          | 43          | 43          |
| Glossosoma                         | 18                    | 68          |             | 12          |
| Rhyacophila                        |                       |             |             |             |
| Limnephilidae                      | 11                    | 32          |             |             |
| Nothrama                           | 8                     |             |             |             |
| Unidentified                       |                       |             | 22          |             |
| <b>Diptera</b>                     |                       |             |             |             |
| Tendipedidae                       | 246                   | 1602        | 1963        | 1878        |
| Tipula                             | 6                     | 17          | 10          | 16          |
| Holorusia                          | 7                     | 4           | 8           |             |
| Hexatoma                           | 9                     | 3           | 25          | 16          |
| Simulium                           |                       | 1           |             |             |
| Tanyderidae                        |                       |             |             | 1           |
| Rhagionidae                        |                       | 1           | 2           |             |
| Atherix v.                         | 3                     | 2           |             | 1           |
| Empididae                          | 1                     | 2           |             |             |
| Tabanidae                          |                       |             |             |             |
| Unidentified                       | 17                    | 16          |             | 26          |
| <b>Odonata</b>                     |                       |             |             |             |
| Zygoptera                          |                       |             |             |             |
| Agrion                             |                       | 1           |             |             |
| <b>Coleoptera</b>                  |                       |             |             |             |
| Elmidae                            | 9                     | 4           |             |             |
| Hydrophilus                        |                       | 1           |             |             |
| Dytiscidae                         |                       |             |             |             |
| <b>Megalopectera</b>               |                       |             |             |             |
| Sialis                             |                       |             |             |             |
| <b>Hemiptera</b>                   |                       |             |             |             |
| Corixidae                          |                       |             |             | 1           |
| <b>TOTAL</b>                       | <b>1154</b>           | <b>5890</b> | <b>4466</b> | <b>4319</b> |

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Table 54. Number of Insects Collected by Bottom Sampling in the Kootenai River  
1968-1971

| Location<br>No. of Samples<br>Year | 10<br>1968  | Lowry Gulch<br>15<br>1969 | (Station 4)<br>18<br>1970 | 15<br>1971  |
|------------------------------------|-------------|---------------------------|---------------------------|-------------|
| <b>Plecoptera</b>                  |             |                           |                           |             |
| Pteronarcys                        |             |                           |                           | 1           |
| Pteronarcella                      | 4           | 29                        | 44                        | 79          |
| Capnia                             |             | 104                       | 20                        |             |
| Isocapnia                          |             |                           |                           |             |
| Brachyptera                        | 14          | 107                       |                           | 108         |
| Nemoura                            |             |                           |                           |             |
| Isogenus                           | 18          | 440                       | 97                        | 184         |
| Arcynopteryx                       |             |                           |                           |             |
| Isoperla                           | 52          | 17                        | 87                        | 2           |
| Diura                              |             |                           | 57                        |             |
| Acroneturia                        |             | 1                         |                           |             |
| Classenia                          |             |                           |                           | 7           |
| Alloperla                          | 53          | 3                         | 118                       | 269         |
| Unidentified                       |             |                           |                           | 9           |
| <b>Ephemeroptera</b>               |             |                           |                           |             |
| Baetis                             | 55          | 245                       | 384                       | 356         |
| Callibaetis                        |             | 3                         |                           |             |
| Ameletus                           |             | 13                        |                           | 7           |
| Parameletus                        |             |                           |                           |             |
| Ephemerella                        | 1           | 108                       | 26                        | 29          |
| Leptophlebia                       |             |                           |                           |             |
| Paraleptophlebia                   |             |                           |                           |             |
| Heptagenia                         |             | 5                         | 45                        | 1           |
| Rhithrogena                        |             | 7                         | 7                         | 231         |
| Cinygmula                          |             |                           | 1                         |             |
| Epeorus (Iron)                     |             |                           |                           |             |
| Unidentified                       |             | 2                         |                           |             |
| <b>Trichoptera</b>                 |             |                           |                           |             |
| Hydropsyche                        | 179         | 171                       | 901                       | 919         |
| Parapsyche                         | 6           | 16                        | 10                        | 11          |
| Arctopsyche                        |             |                           |                           |             |
| Cheumatopsyche                     |             |                           |                           | 576         |
| Brachycentridae                    | 7           | 3                         | 34                        | 17          |
| Glossosoma                         |             | 3                         |                           | 3           |
| Rhyacophila                        |             |                           |                           |             |
| Limnephilidae                      | 2           | 3                         |                           |             |
| Neothremma                         | 3           |                           |                           |             |
| Unidentified                       |             | 1                         | 16                        | 12          |
| <b>Diptera</b>                     |             |                           |                           |             |
| Tendipedidae                       | 1332        | 1830                      | 2444                      | 1637        |
| Tipula                             | 4           | 11                        | 11                        | 17          |
| Holorusia                          | 5           | 8                         |                           |             |
| Hexatoma                           |             | 4                         | 12                        | 16          |
| Simulium                           |             | 3                         |                           |             |
| Tanyderidae                        |             |                           |                           | 1           |
| Rhagionidae                        |             |                           | 2                         |             |
| Atherix v.                         | 1           |                           |                           | 1           |
| Epididae                           |             |                           |                           |             |
| Tabanidae                          |             |                           |                           | 1           |
| Unidentified                       |             | 5                         |                           | 52          |
| <b>Odonata</b>                     |             |                           |                           |             |
| Zygoptera                          |             |                           |                           |             |
| Agrion                             |             |                           |                           |             |
| <b>Coleoptera</b>                  |             |                           |                           |             |
| Elmidae                            | 14          |                           |                           |             |
| Hydrophilus                        |             |                           |                           |             |
| Dytiscidae                         |             | 1                         |                           |             |
| <b>Megaloptera</b>                 |             |                           |                           |             |
| Sialis                             |             |                           |                           |             |
| <b>Hemiptera</b>                   |             |                           |                           |             |
| Corixidae                          |             |                           |                           |             |
| <b>TOTAL</b>                       | <b>1750</b> | <b>3143</b>               | <b>4316</b>               | <b>4546</b> |

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Table 55. Number and Weight of Insects Collected by Bottom Sampling in the Kootenai River 1968-1971.

| Total of all stations |       |       |        | Location: |      |      |      |
|-----------------------|-------|-------|--------|-----------|------|------|------|
| No. of Samples        | 38    | 60    | 72     | 60        | 72   | 1970 | 1971 |
| Year                  | 1968  | 1969  | 1970   | 1971      | 1970 | 1971 | 1971 |
| Plecoptera            |       |       |        |           |      |      |      |
| Number                | 1212  | 4221  | 3308   | 3468      |      |      |      |
| Weight                | 20.25 | 26.81 | 80.91  | 76.99     |      |      |      |
| Ephemeroptera         |       |       |        |           |      |      |      |
| Number                | 407   | 4261  | 4141   | 3031      |      |      |      |
| Weight                | 1.58  | 14.44 | 14.40  | 16.41     |      |      |      |
| Trichoptera           |       |       |        |           |      |      |      |
| Number                | 2212  | 2849  | 6802   | 8646      |      |      |      |
| Weight                | 31.15 | 29.02 | 102.07 | 187.35    |      |      |      |
| Diptera               |       |       |        |           |      |      |      |
| Number                | 3701  | 8506  | 10486  | 7824      |      |      |      |
| Weight                | 14.05 | 20.46 | 29.73  | 46.21     |      |      |      |
| Odonata               |       |       |        |           |      |      |      |
| Number                |       | 2     |        |           |      |      |      |
| Weight                |       | 0.12  |        |           |      |      |      |
| Coleoptera            |       |       |        |           |      |      |      |
| Number                | 25    | 19    |        | 19        |      |      |      |
| Weight                | 0.02  | 0.08  |        | tr        |      |      |      |
| Megaloptera           |       |       |        |           |      |      |      |
| Number                | 1     |       |        |           |      |      |      |
| Weight                | tr    |       |        |           |      |      |      |
| Hemiptera             |       |       |        |           |      |      |      |
| Number                | 64    | 11    |        | 1         |      |      |      |
| Weight                | 1.22  | tr    |        | tr        |      |      |      |
| TOTAL                 | 7622  | 19869 | 24737  | 22989     |      |      |      |
| Number                | 68.27 | 90.93 | 227.11 | 326.96    |      |      |      |
| Weight                |       |       |        |           |      |      |      |

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Table 56. Number and Weight of Insects Collected by Bottom Sampling in the Kootenai River 1968-1971.

| Location:      |       |       |       | Ranford (Station 1) |      |      |      |
|----------------|-------|-------|-------|---------------------|------|------|------|
| No. of Samples | 9     | 15    | 18    | 15                  | 18   | 15   | 15   |
| Year           | 1968  | 1969  | 1970  | 1971                | 1970 | 1971 | 1971 |
| Plecoptera     |       |       |       |                     |      |      |      |
| Number         | 545   | 711   | 1043  |                     |      |      |      |
| Weight         | 10.75 | 6.60  | 31.59 |                     |      |      |      |
| Ephemeroptera  |       |       |       |                     |      |      |      |
| Number         | 144   | 1101  | 1605  |                     |      |      |      |
| Weight         | 0.40  | 2.89  | 4.63  |                     |      |      |      |
| Trichoptera    |       |       |       |                     |      |      |      |
| Number         | 1299  | 562   | 2103  |                     |      |      |      |
| Weight         | 14.83 | 6.77  | 32.38 |                     |      |      |      |
| Diptera        |       |       |       |                     |      |      |      |
| Number         | 676   | 1895  | 3165  |                     |      |      |      |
| Weight         | 1.64  | 5.27  | 8.07  |                     |      |      |      |
| Odonata        |       |       |       |                     |      |      |      |
| Number         |       | 1     |       |                     |      |      |      |
| Weight         |       | 0.12  |       |                     |      |      |      |
| Coleoptera     |       |       |       |                     |      |      |      |
| Number         |       | 6     |       |                     |      |      |      |
| Weight         |       | 0.04  |       |                     |      |      |      |
| Megaloptera    |       |       |       |                     |      |      |      |
| Number         |       |       |       |                     |      |      |      |
| Weight         |       |       |       |                     |      |      |      |
| Hemiptera      |       |       |       |                     |      |      |      |
| Number         |       | 4     |       |                     |      |      |      |
| Weight         |       | tr    |       |                     |      |      |      |
| TOTAL          |       |       |       |                     |      |      |      |
| Number         | 2664  | 4280  | 7916  |                     |      |      |      |
| Weight         | 27.62 | 21.69 | 76.67 |                     |      |      |      |
| Weight         |       |       |       |                     |      |      |      |

## LIBBY DAM PROJECT

Table 57. Number and Weight of Insects Collected by Bottom Sampling in the Kootenai River 1968-1971.

| Location:      |       | Warland (Station 2) |       |        | Below Dam (Station 3) |       |       |
|----------------|-------|---------------------|-------|--------|-----------------------|-------|-------|
| No. of Samples | 10    | 15                  | 18    | 15     | 9                     | 15    | 18    |
| Year           | 1968  | 1969                | 1970  | 1971   | 1968                  | 1969  | 1970  |
| Plecoptera     |       |                     |       |        |                       |       |       |
| Number         | 267   | 1042                | 1247  | 912    | 259                   | 1407  | 595   |
| Weight         | 6.18  | 6.86                | 32.03 | 16.85  | 1.98                  | 9.36  | 6.63  |
| Ephemeroptera  |       |                     |       |        |                       |       |       |
| Number         | 21    | 1158                | 1241  | 1513   | 186                   | 1619  | 832   |
| Weight         | 0.30  | 4.93                | 4.22  | 6.85   | 0.70                  | 5.64  | 2.68  |
| Trichoptera    |       |                     |       |        |                       |       |       |
| Number         | 305   | 880                 | 2707  | 3304   | 411                   | 1210  | 1031  |
| Weight         | 7.24  | 8.95                | 40.00 | 72.00  | 7.52                  | 10.16 | 15.90 |
| Diptera        |       |                     |       |        |                       |       |       |
| Number         | 1394  | 3102                | 2844  | 2297   | 289                   | 1648  | 2008  |
| Weight         | 8.28  | 5.57                | 8.00  | 17.90  | 1.60                  | 5.30  | 6.51  |
| Odonata        |       |                     |       |        |                       |       |       |
| Number         |       |                     |       |        |                       | 1     |       |
| Weight         |       |                     |       |        |                       | tr    |       |
| Coleoptera     |       |                     |       |        |                       |       |       |
| Number         | 2     | 7                   |       | 13     | 9                     | 5     |       |
| Weight         | tr    | 0.03                |       | tr     | 0.01                  | 0.01  |       |
| Megaloptera    |       |                     |       |        |                       |       |       |
| Number         | 1     |                     |       |        |                       |       |       |
| Weight         | tr    |                     |       |        |                       |       |       |
| Hemiptera      |       |                     |       |        |                       |       |       |
| Number         | 64    | 7                   |       |        |                       |       |       |
| Weight         | 1.22  | tr                  |       |        |                       |       |       |
| TOTAL          | 2054  | 6556                | 8039  | 8039   | 1154                  | 5890  | 4466  |
| Number         | 23.22 | 26.34               | 84.25 | 113.60 | 11.81                 | 30.47 | 31.72 |
| Weight         |       |                     |       |        |                       |       |       |

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Table 59 Number and Weight of Insects Collected by Bottom Sampling in the Kootenai River 1968-1971.

| Location:            |      | Lowry Gulch (Station 4) |       |       |       |
|----------------------|------|-------------------------|-------|-------|-------|
| No. of Samples       | Year | 10                      | 15    | 18    | 15    |
|                      |      | 1968                    | 1969  | 1970  | 1971  |
| <b>Plecoptera</b>    |      |                         |       |       |       |
| Number               |      | 141                     | 701   | 423   | 659   |
| Weight               |      | 1.34                    | 3.99  | 10.66 | 13.32 |
| <b>Ephemeroptera</b> |      |                         |       |       |       |
| Number               |      | 56                      | 383   | 463   | 624   |
| Weight               |      | 0.18                    | 0.98  | 2.87  | 3.61  |
| <b>Trichoptera</b>   |      |                         |       |       |       |
| Number               |      | 197                     | 197   | 961   | 1538  |
| Weight               |      | 1.56                    | 3.14  | 13.79 | 29.10 |
| <b>Diptera</b>       |      |                         |       |       |       |
| Number               |      | 1342                    | 1861  | 2469  | 1725  |
| Weight               |      | 2.53                    | 4.32  | 7.15  | 9.55  |
| <b>Odonata</b>       |      |                         |       |       |       |
| Number               |      |                         |       |       |       |
| Weight               |      |                         |       |       |       |
| <b>Coleoptera</b>    |      |                         |       |       |       |
| Number               |      | 14                      | 1     |       |       |
| Weight               |      | 0.01                    | tr    |       |       |
| <b>Megaloptera</b>   |      |                         |       |       |       |
| Number               |      |                         |       |       |       |
| Weight               |      |                         |       |       |       |
| <b>Hemiptera</b>     |      |                         |       |       |       |
| Number               |      |                         |       |       |       |
| Weight               |      |                         |       |       |       |
| TOTAL                |      | 1750                    | 3143  | 4316  | 4546  |
|                      |      | 5.62                    | 12.43 | 34.47 | 55.58 |

## LIBBY DAM PROJECT

Table 60 Number and Weight of Insects Per Square Meter Collected by Bottom Sampling in the Kootenai River, 1968-1971.

| Location             |  | Total of all stations |      |      |      |
|----------------------|--|-----------------------|------|------|------|
| Year                 |  | 1968                  | 1969 | 1970 | 1971 |
| <b>Plecoptera</b>    |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 343                   | 757  | 495  | 622  |
| gm/m <sup>2</sup>    |  | 5.7                   | 4.8  | 12.1 | 13.8 |
| <b>Ephemeroptera</b> |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 115                   | 764  | 619  | 544  |
| gm/m <sup>2</sup>    |  | 0.4                   | 2.6  | 2.2  | 2.9  |
| <b>Trichoptera</b>   |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 627                   | 511  | 1017 | 1551 |
| gm/m <sup>2</sup>    |  | 8.8                   | 5.2  | 15.3 | 33.6 |
| <b>Diptera</b>       |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 1048                  | 1526 | 1568 | 1404 |
| gm/m <sup>2</sup>    |  | 4.0                   | 3.7  | 4.4  | 8.3  |
| <b>Odonata</b>       |  |                       |      |      |      |
| no/m <sup>2</sup>    |  |                       |      |      |      |
| gm/m <sup>2</sup>    |  |                       |      |      |      |
| <b>Coleoptera</b>    |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 7                     | tr   |      | 3    |
| gm/m <sup>2</sup>    |  | tr                    | tr   |      | tr   |
| <b>Megaloptera</b>   |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 1                     | 3    |      |      |
| gm/m <sup>2</sup>    |  | tr                    | tr   |      |      |
| <b>Hemiptera</b>     |  |                       |      |      |      |
| no/m <sup>2</sup>    |  | 18                    | 2    |      | tr   |
| gm/m <sup>2</sup>    |  | 0.3                   | tr   |      | tr   |
| TOTAL                |  | 2159                  | 3565 | 3698 | 4124 |
|                      |  | 19.3                  | 16.3 | 34.0 | 58.7 |

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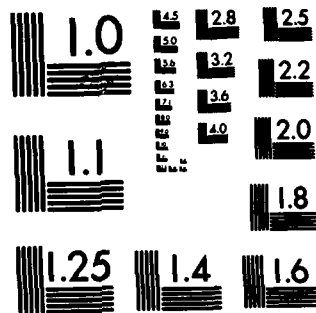
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## LIBBY DAM PROJECT

Table 61 Number and Weight of Insects Per Square Meter Collected by Bottom Sampling in the Kootenai River, 1968-1971.

| Location                                                | Rexford (Station 1) |              |              |              |
|---------------------------------------------------------|---------------------|--------------|--------------|--------------|
|                                                         | 1968                | 1969         | 1970         | 1971         |
| Plecoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 652<br>13.0         | 510<br>4.7   | 624<br>18.9  | 756<br>23.3  |
| Ephemeroptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup> | 172<br>0.5          | 790<br>2.1   | 960<br>1.7   | 348<br>2.7   |
| Trichoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   | 1554<br>17.7        | 403<br>4.9   | 1258<br>19.4 | 1777<br>42.4 |
| Diptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       | 809<br>2.0          | 1360<br>3.8  | 1893<br>4.8  | 1338<br>7.1  |
| Odonata<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       |                     | 1<br>0.1     |              |              |
| Coleoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    |                     | 4<br>tr      |              | 4<br>tr      |
| Megaloptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   |                     |              |              |              |
| Hemiptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>     |                     | 3<br>tr      |              |              |
| Total<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>         | 3225<br>33.0        | 3071<br>15.6 | 4734<br>45.8 | 4223<br>75.5 |

## LIBBY DAM PROJECT

Table 62 Number and Weight of Insects Per Square Meter Collected by Bottom Sampling in the Kootenai River, 1968-1971.

| Location                                                | Warland (Station 2) |              |              |              |
|---------------------------------------------------------|---------------------|--------------|--------------|--------------|
|                                                         | 1968                | 1969         | 1970         | 1971         |
| Plecoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 287<br>6.7          | 1006<br>4.9  | 746<br>19.2  | 654<br>12.1  |
| Ephemeroptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup> | 22<br>0.5           | 831<br>3.5   | 742<br>2.5   | 1086<br>4.9  |
| Trichoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   | 328<br>7.8          | 632<br>6.4   | 1619<br>23.9 | 2371<br>51.7 |
| Diptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       | 1501<br>8.9         | 2226<br>4.0  | 1701<br>4.7  | 1648<br>12.8 |
| Odonata<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       |                     |              |              |              |
| Coleoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 2<br>tr             | 5<br>tr      |              | 9<br>tr      |
| Megaloptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   | 1<br>tr             |              |              |              |
| Hemiptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>     | 69<br>1.3           | 5<br>tr      |              |              |
| Total<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>         | 2211<br>25.0        | 4704<br>18.9 | 4807<br>50.4 | 5769<br>81.5 |

## LIBBY DAM PROJECT

Table 63 Number and Weight of Insects Per Square Meter Collected by Bottom Sampling in the Kootenai River, 1968-1971.

| Location                                                | Below Dam (Station 3) |              |              |              |
|---------------------------------------------------------|-----------------------|--------------|--------------|--------------|
|                                                         | 1968                  | 1969         | 1970         | 1971         |
| Year                                                    |                       |              |              |              |
| Placoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 310<br>2.3            | 1009<br>6.7  | 356<br>3.8   | 605<br>10.3  |
| Ephemeroptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup> | 201<br>0.8            | 1162<br>4.0  | 498<br>1.6   | 294<br>1.6   |
| Trichoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   | 492<br>9.0            | 868<br>7.3   | 616<br>9.5   | 953<br>19.5  |
| Diptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       | 346<br>1.9            | 1183<br>3.8  | 1201<br>3.9  | 1391<br>6.3  |
| Odonata<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       |                       | 1<br>tr      |              |              |
| Coleoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 11<br>tr              | 4<br>tr      |              |              |
| Megaloptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   |                       |              |              |              |
| Hemiptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>     |                       |              |              | 1<br>tr      |
| Total<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>         | 1360<br>14.1          | 4227<br>21.9 | 2671<br>19.0 | 3243<br>37.7 |

## LIBBY DAM PROJECT

Table 64 Number and Weight of Insects Per Square Meter Collected by Bottom Sampling in the Kootenai River, 1968-1971.

| Location                                                | Lowry Gulch (Station 4) |             |              |              |
|---------------------------------------------------------|-------------------------|-------------|--------------|--------------|
|                                                         | 1968                    | 1969        | 1970         | 1971         |
| Year                                                    |                         |             |              |              |
| Placoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 152<br>1.4              | 503<br>2.9  | 253<br>6.4   | 473<br>9.6   |
| Ephemeroptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup> | 60<br>0.2               | 275<br>0.7  | 277<br>1.7   | 448<br>2.6   |
| Trichoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   | 212<br>1.7              | 141<br>2.3  | 575<br>8.2   | 1104<br>20.9 |
| Diptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       | 1445<br>2.7             | 1335<br>3.1 | 1476<br>4.3  | 1238<br>6.9  |
| Odonata<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>       |                         |             |              |              |
| Coleoptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>    | 15<br>tr                | 1<br>tr     |              |              |
| Megaloptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>   |                         |             |              |              |
| Hemiptera<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>     |                         |             |              |              |
| Total<br>no/m <sup>2</sup><br>gm/m <sup>2</sup>         | 1684<br>6.0             | 2255<br>8.9 | 2581<br>20.6 | 3262<br>39.9 |

## LIBBY DAM PROJECT

Table 65 Number of Insects Collected by Cylindrical Substrate Sampler in the Kootenai River in 1968 and 1969.

| Location       | Remford | Warland | Below Dam | Total |
|----------------|---------|---------|-----------|-------|
| No. of Samples | 9       | 5       | 9         | 23    |
| Year           | 1968    | 1969    | 1968      | 1969  |
| Plecoptera     |         |         |           |       |
| Pteronarcys    | 132     | 256     | 129       | 289   |
| Capnia         | 9       | 3       | 158       | 12    |
| Brachyptera    | 4       | 11      | 7         | 11    |
| Neuroptera     | 45      | 13      | 24        | 92    |
| Leucophaea     | 124     | 225     | 109       | 259   |
| Arsenopteryx   | 2       | 29      | 1         | 1     |
| Isoperla       | 2       | 4       | 22        | 30    |
| Acanthocnema   | 1       | 3       | 13        | 1     |
| Alloperla      | 30      | 2       | 57        | 117   |
| Ephemeroptera  | 38      | 410     | 133       | 275   |
| Heptagenia     | 5       | 112     | 29        | 107   |
| Leptophlebia   | 1       | 6       | 1         | 2     |
| Heptagenia     | 6       | 3       | 2         | 11    |
| Chironomidae   | 30      | 8       | 394       | 404   |
| Trichoptera    |         |         |           |       |
| Hydropsyche    | 388     | 576     | 5016      | 5479  |
| Parapsyche     | 45      | 137     | 225       | 313   |
| Chamaetopseps  | 18      | 11      | 11        | 38    |
| Brachycentrus  | 68      | 35      | 411       | 486   |
| Glossosoma     | 27      | 19      | 17        | 102   |
| Physoptera     | 87      | 30      | 123       | 240   |
| Limnephilidae  |         |         |           |       |
| Neochlamis     |         |         |           |       |
| Diptera        |         |         |           |       |
| Tendipedidae   | 268     | 454     | 455       | 913   |
| Tipula         | 3       | 7       | 19        | 22    |
| Belostomatidae | 3       | 5       | 17        | 12    |
| Simulium       | 19      | 50      | 31        | 96    |
| Atherix v.     | 4       | 4       | 2         | 10    |
| Unidentified   |         |         |           |       |
| Odonata        |         |         |           |       |
| Agrius         |         |         |           |       |
| Coleoptera     |         |         |           |       |
| Elmidae        | 1       | 1       | 2         | 4     |
| Hydrophilus    |         |         |           |       |
| Byrrhidae      |         |         |           |       |
| Megaloptera    |         |         |           |       |
| Stelis         | 1       |         |           | 1     |
| TOTAL          | 1217    | 2453    | 614       | 8613  |

## LIBBY DAM PROJECT

Table 66 Total Number and Weight of Insects Collected by Cylindrical Substrate Sampler in the Kootenai River in 1968 and 1969.

| Location:      | Remford | Warland | Below Dam | Total  |
|----------------|---------|---------|-----------|--------|
| No. of Samples | 9       | 5       | 9         | 23     |
| Year           | 1968    | 1969    | 1968      | 1969   |
| Plecoptera     |         |         |           |        |
| Number         | 347     | 543     | 349       | 812    |
| Weight         | 8.73    | 3.32    | 7.97      | 19.36  |
| Ephemeroptera  |         |         |           |        |
| Number         | 44      | 535     | 163       | 384    |
| Weight         | 0.07    | 1.75    | 0.82      | 1.11   |
| Trichoptera    |         |         |           |        |
| Number         | 539     | 862     | 5697      | 6341   |
| Weight         | 14.51   | 7.89    | 100.63    | 117.69 |
| Diptera        |         |         |           |        |
| Number         | 287     | 511     | 573       | 1076   |
| Weight         | 0.42    | 1.91    | 4.48      | 5.83   |
| Odonata        |         |         |           |        |
| Number         |         |         | 2         | 2      |
| Weight         |         |         | 0.03      | 0.03   |
| Coleoptera     |         |         |           |        |
| Number         | 1       | 2       | 6         | 9      |
| Weight         | tr      | tr      | 0.14      | 0.14   |
| Megaloptera    |         |         |           |        |
| Number         | 1       | tr      |           | 1      |
| Weight         | tr      |         |           | tr     |
| Hemiptera      |         |         |           |        |
| Number         |         |         |           |        |
| Weight         |         |         |           |        |
| Total          |         |         |           |        |
| Number         | 1217    | 2453    | 614       | 8613   |
| Weight         | 23.73   | 14.87   | 6.30      | 44.32  |

# LIBBY DAM PROJECT

Table 67 Average Number and Weight of Insects Collected by Cylindrical Substrate in the Kootenai River in 1968 and 1969.

| Location:            | Rexford |      | Warland |      | Below Dam |      | Total |      |
|----------------------|---------|------|---------|------|-----------|------|-------|------|
| No. of Samples       | 9       | 9    | 5       | 9    | 9         | 9    | 23    | 27   |
| Year                 | 1968    | 1969 | 1968    | 1969 | 1968      | 1969 | 1968  | 1969 |
| <b>Plecoptera</b>    |         |      |         |      |           |      |       |      |
| Number/sample        | 39      | 60   | 23      | 130  | 39        | 124  | 35    | 105  |
| Weight/sample        | 1.0     | 0.4  | 0.5     | 0.9  | 0.9       | 0.7  | 0.8   | 0.6  |
| <b>Ephemeroptera</b> |         |      |         |      |           |      |       |      |
| Number/sample        | 5       | 59   | 35      | 126  | 18        | 185  | 17    | 123  |
| Weight/sample        | tr      | 0.2  | tr      | 0.1  | 0.1       | 0.4  | tr    | 0.2  |
| <b>Trichoptera</b>   |         |      |         |      |           |      |       |      |
| Number/sample        | 60      | 96   | 21      | 220  | 633       | 710  | 276   | 342  |
| Weight/sample        | 1.6     | 0.9  | 0.6     | 1.5  | 11.2      | 3.5  | 5.1   | 2.0  |
| <b>Diptera</b>       |         |      |         |      |           |      |       |      |
| Number/sample        | 32      | 57   | 43      | 127  | 64        | 141  | 47    | 108  |
| Weight/sample        | tr      | 0.2  | 0.2     | 0.4  | 0.5       | 0.3  | 0.3   | 0.3  |
| <b>Odonata</b>       |         |      |         |      |           |      |       |      |
| Number/sample        |         |      |         |      |           | tr   |       | tr   |
| Weight/sample        |         |      |         |      |           | tr   |       | tr   |
| <b>Coleoptera</b>    |         |      |         |      |           |      |       |      |
| Number/sample        |         | tr   |         | tr   |           | 1    |       | tr   |
| Weight/sample        |         | tr   |         | tr   |           | tr   |       | tr   |
| <b>Megaloptera</b>   |         |      |         |      |           |      |       |      |
| Number/sample        |         | tr   |         |      |           |      |       | tr   |
| Weight/sample        |         | tr   |         |      |           |      |       | tr   |
| <b>Hemiptera</b>     |         |      |         |      |           |      |       |      |
| Number/sample        |         |      |         |      |           |      |       |      |
| Weight/sample        |         |      |         |      |           |      |       |      |
| <b>Total</b>         |         |      |         |      |           |      |       |      |
| Number/sample        | 135     | 273  | 123     | 602  | 754       | 1161 | 374   | 679  |
| Weight/sample        | 2.6     | 1.7  | 1.3     | 2.8  | 12.7      | 4.9  | 6.3   | 3.1  |

Note: Totals may not add due to rounding.

