SPOKANE RIVER BASIN MODEL PROJECT

Volume II - Data Report

bу

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for the

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EPA Review Notice

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ABSTRACT

Three existing mathematical models, capable of representing water quality in rivers and lakes, have been modified and adapted to the Spokane River Basin in Washington and Idaho. The resulting models were named the Steady-state Stream Model, the Dynamic Stream Model, and the Stratified Reservoir Model. They are capable of predicting water quality levels resulting from alternative basinwide wastewater management schemes, and are designed to assist EPA, State, and local planning organizations to evaluate water quality management strategies and to establish priorities and schedules for investments in abatement facilities in the basin.

Physical data and historical hydrologic, water quality and meteorologic data were collected, assessed and used for the model calibrations and verifications.

The modified models are all capable of simulating the behavior of various subsets of up to sixteen different water quality constituents. Sensitivity analyses were conducted with all three models to determine the relative importance of a number of individual model parameters.

The models were provided to the EPA as computer source card decks in FORTRAN IV language, with accompanying data decks. All development work on, and applications made with, these models were fully documented so as to permit their easy utilization and duplication of historical simulations by other potential users. A user's manual with a complete program listing was prepared for each model.

This report was submitted in fulfillment of Contract No. 68-01-0756 under the sponsorship of the Environmental Protection Agency.

The titles and identifying numbers of the final report volumes are:

<u>Title</u>	EPA 1	Report N	lo.
SPOKANE RIVER BASIN MODEL PROJECT Volume I - Final Report		DOC _	_/74
SPOKANE RIVER BASIN MODEL PROJECT Volume II - Data Report		_ DOC	_/74
SPOKANE RIVER BASIN MODEL PROJECT Volume III - Verification Report		_ DOC	_/74
SPOKANE RIVER BASIN MODEL PROJECT Volume IV - User's Manual for Steady-state Stream Model		_ DOC	_/74
SPOKANE RIVER BASIN MODEL PROJECT Volume V - User's Manual for Dynamic Stream Model	 , -	_ DOC	_/74
SPOKANE RIVER BASIN MODEL PROJECT Volume VI - User's Manual for Stratified Reservoir Model		_ DOC _	_/74

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SECTION I

INTRODUCTION

Under the sponsorship of the Environmental Protection Agency, Systems Control, Inc. has modified and adapted to the principal rivers and lakes of the Spokane River Basin three existing mathmatical water quality models.

This Data Report, Volume II in a series of six volumes documenting the project, describes the data assembly, assessment, categorization, and processing techniques used.

PRESENTATION FORMAT

This report is organized into four main sections. The first section describes the data assembly phase of the project including data needs for the models, the procedure employed in collecting data throughout the study area and the availability of data which resulted from this collection. The data particularly sought was that required to verify the DOSAG and Storm Water Management Models (SWMM), and the Deep Reservoir Model (DRM). In addition to the STORET data which was readily obtained, a large quantity of miscellaneous information and data on the Spokane River Basin was received.

The second section of the report deals with the assessment of the data. An assessment determined that there were several reports which contributed useful information in addition to that entered on STORET. Some documents of importance to planners, though not to this project, were received as well and have been included in the Bibliography. Once the assessment was completed, a selection of the simulation periods for each region based primarily on water quality and stream flow data availability was made.

The third section of the report describes the data processing techniques and results. A categorized bibliography of all data-related information received on the Spokane River Basin has been included as the fourth report section. This bibliography indicates those documents which were found to be useful on this project and will likely be of value to future users of the improved models.

Since this report was a deliverable required during the earlier stages of the project, it was written in January 1973.

BACKGROUND

As concern about environmental problems has grown in recent years there has been a great expansion in efforts to collect and tabulate streamflow and water quality data. Consequently, it is now becoming practicable to use mathematical models to simulate water quality with presently available data. These models use mathematical relations to describe both the river's flow and the interrelationships between water quality constituents throughout the river.

The area included in this study consists of all or portions of the Spokane, Little Spokane, Hangman Creek, Coeur d'Alene, St. Joe, and St. Maries Rivers, and Long Lake, Coeur d'Alene Lake, and the Spokane arm of Roosevelt Lake. Within this area, the South Fork Coeur d'Alene River and the Spokane River in the vicinity of Spokane have the most severe water quality problems.

The South Fork of the Coeur d'Alene River traverses a large mining, smelting, and refining area. The lead and silver mines in the basin have operated for over 30 years and have been a major source of pollution for the downstream portions of the river basin. Since 1968, this pollution has been somewhat curbed by the installation of tailings ponds at all active mining operations. Domestic sewage, discharged to the river without treatment, creates a serious health problem. Considerable improvement of the water quality of the South Fork and consequently of the whole area is still needed. The ultimate impact on the ecological system due to further reduction of metals cannot be precisely determined. Among other effects, algae populations suppressed by the toxic metals may increase substantially.

A number of municipal waste treatment facilities in and around Spokane are located adjacent to and discharge into the Spokane River.

In addition to the municipal wastes, there are a number of industries which deposit wastes in the river. Although there is not presently a serious problem in the immediate Spokane region, the water, which is already substandard coming from Idaho, is further polluted while passing through the region.

This study has been undertaken to prepare models of the water quality in the Spokane River Basin for use in planning the abatement of water pollution in the study area. This report, dealing specifically with data, has been prepared to document the large volume of information presently available on the Spokane River Basin and to describe the means employed in selecting those data to be used for model verification. The resulting data inventory indicates that important information, particularly effluent and physical data, is lacking in some regions. This shortcoming is expected to impair the reliability and accuracy of the models ultimately developed.

SECTION II

SPOKANE RIVER NETWORK

A map of the Spokane River Basin (Figure 1) shows the location of the study region. A very simple schematic layout of the Spokane River System has been prepared (Figure 2) in order to facilitate easy recognition of the system's principal features. The system contains three major lakes, namely Coeur d'Alene Lake, Long Lake, and the Spokane arm of the Franklin D. Roosevelt Lake. The river system has been divided into five regions designated as follows:

Region	Name
1	St. Joe-St. Maries Rivers
2	Coeur d'Alene and South Fork Coeur d'Alene Rivers
3	Spokane River between Long Lake and Coeur d'Alene Lake, including Hangmar Creek
4	Little Spokane River
5	Spokane River between Roosevelt Lake and Long Lake.

The schematic layouts for each region are shown in Figures 3 through 8. In addition, networks have been prepared which show the channels as modeled by SWMM (Figures 9 through 14). The channels (reaches) shown on the network diagrams are as defined for the Receiving Water Module of the Storm Water Management Program. DOSAG will model the regions using similar reaches with additional point sources. These reaches have zero length and are added wherever tributary inflow conditions, either quantity and/or quality, are known. In some cases where inflows are close together, a point reach includes more than one tributary or outfall. In general, a new reach occurs when there is a change in the physical characteristics of the river or where there is an important water quality or quantity gauge.

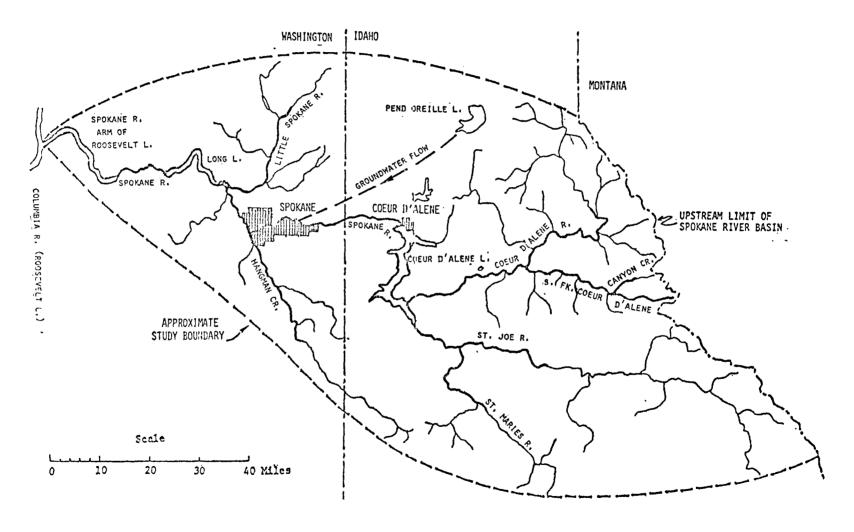


FIGURE 1. SPOKANE RIVER BASIN (PORTIONS TO BE MODELED IN BOLD)

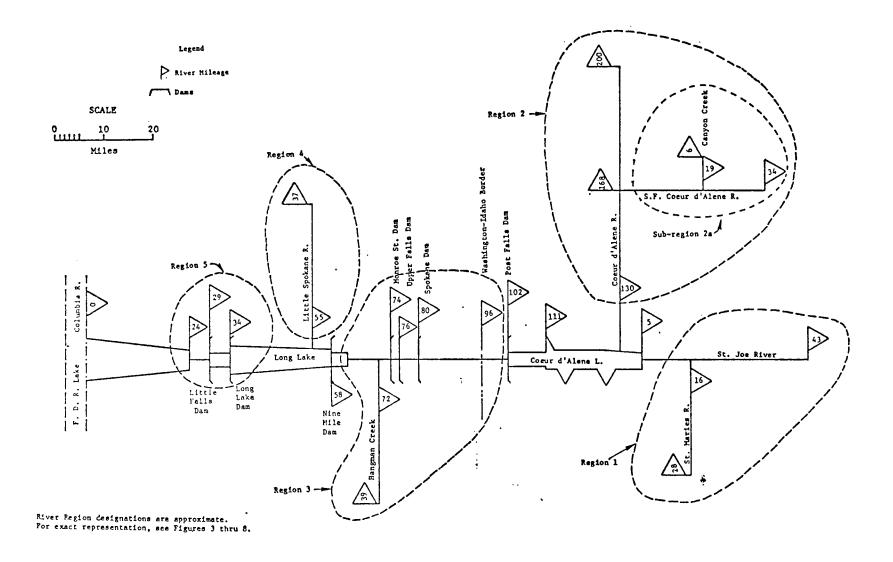


FIGURE 2. LAYOUT OF SPOKANE RIVER SYSTEM

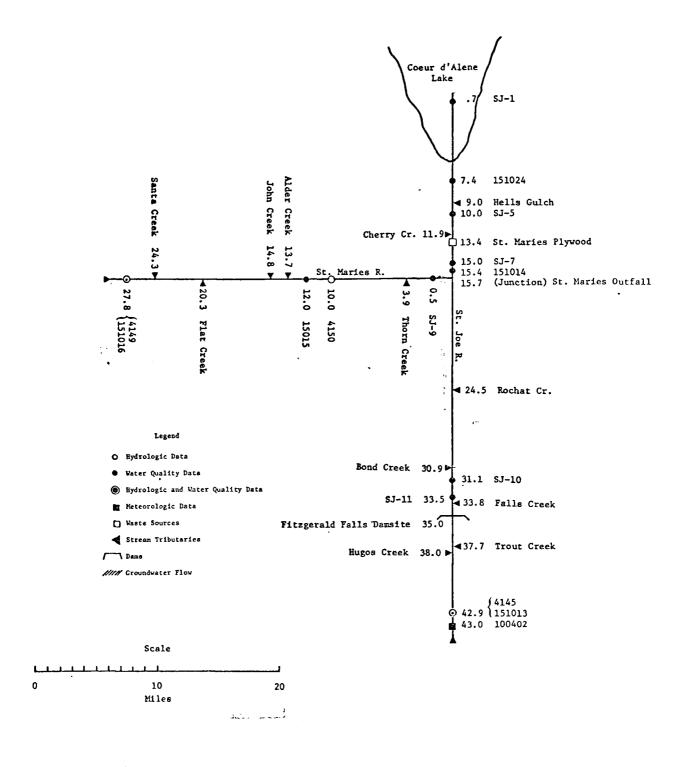


FIGURE 3. METEOROLOGIC, QUALITY AND QUANTITY DATA POINTS RIVER REGION 1 - ST. JOE - ST. MARIES

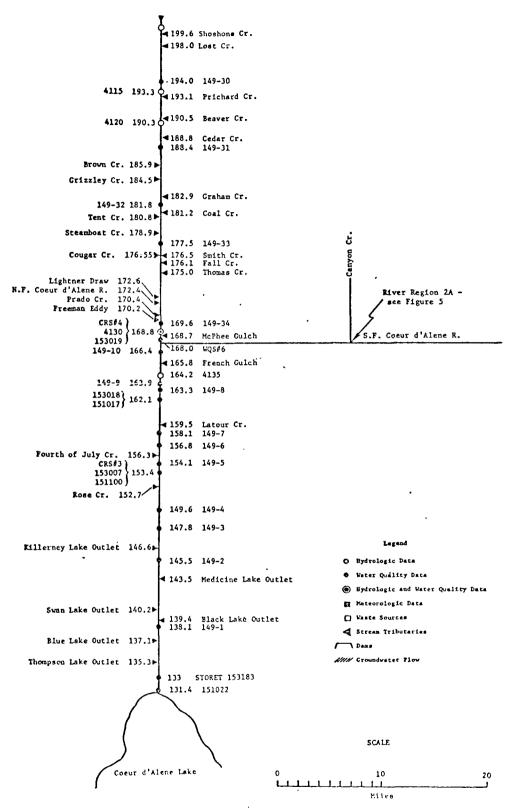


FIGURE 4. METEOROLOGICAL QUALITY AND QUANTITY DATA POINTS RIVER REGION 2 - COEUR D'ALENE R. & S.F. COEUR D'ALENE RIVER

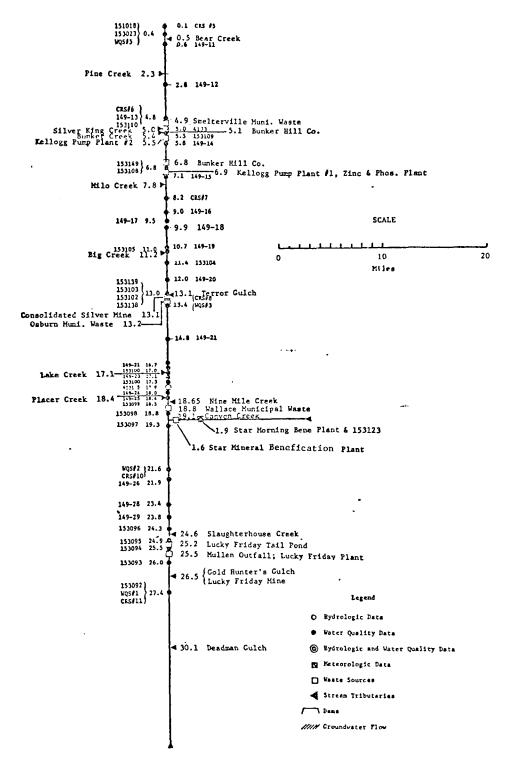


FIGURE 5. METEOROLOGIC, QUALITY AND QUANTITY REGION 2A - S.F. COEUR D'ALENE RIVER

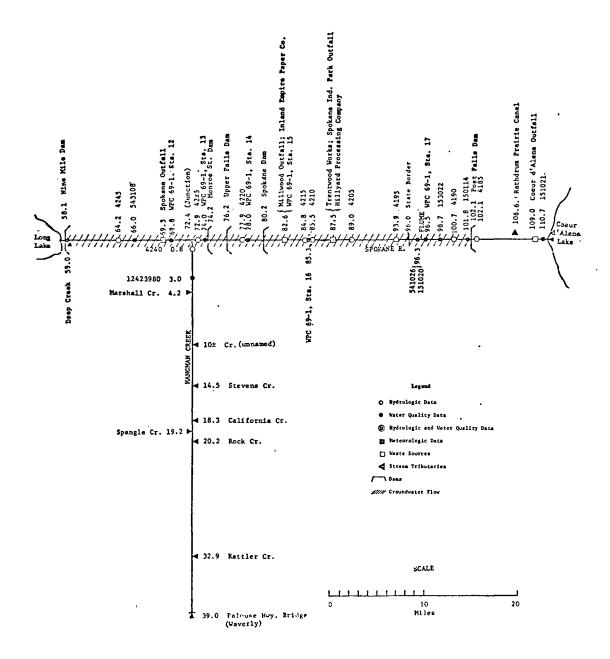


FIGURE 6. METEOROLOGICAL, QUALITY AND QUANTITY DATA POINTS RIVER REGION 3 - SPOKANE RIVER FROM LONG LAKE TO COEUR D'ALENE LAKE

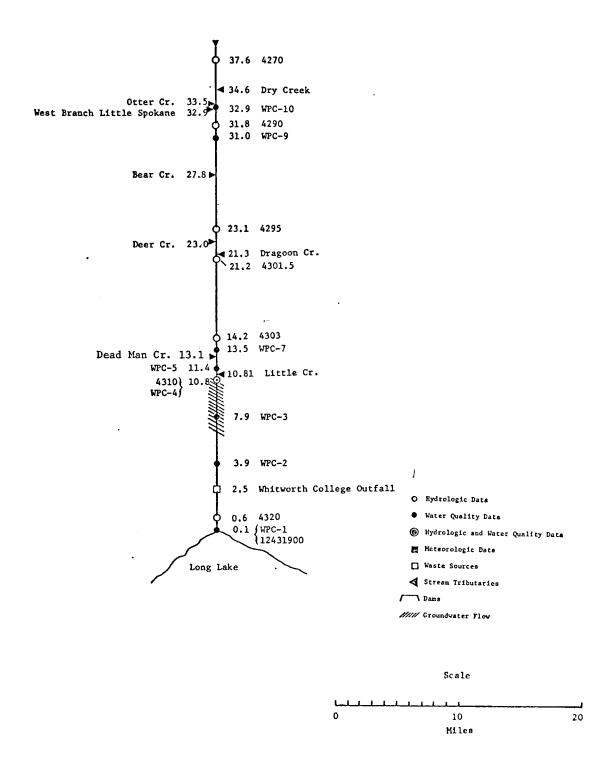


FIGURE 7. METEOROLOGIC, QUALITY AND QUANTITY DATA POINTS REGION 4 - LITTLE SPOKANE RIVER

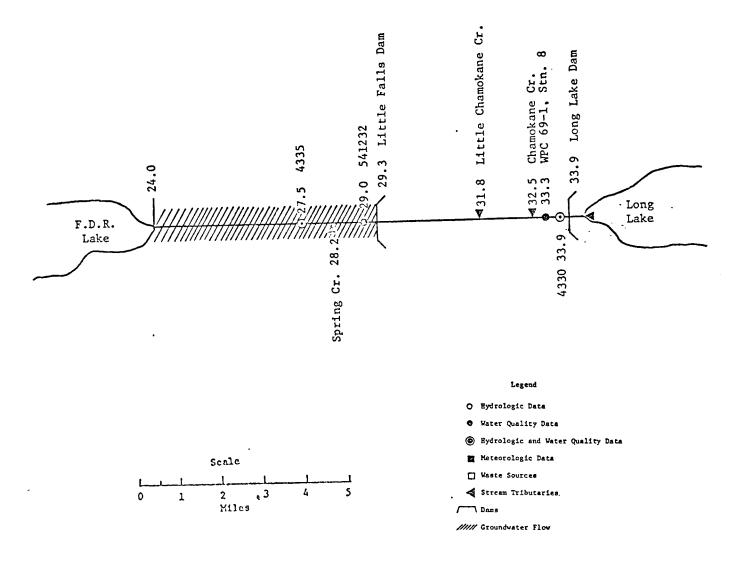


FIGURE 8. METEOROLOGIC, QUALITY AND QUANTITY DATA POINTS REGION 5 - SPOKANE RIVER FROM ROCSEVELT L. TO LONG L.

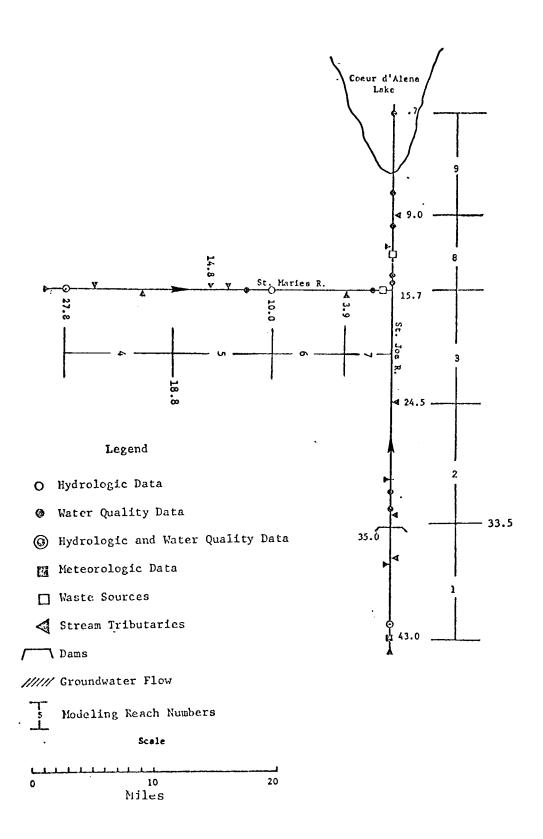


FIGURE 9. MODELING REACHES
RIVER REGION 1 ST. JOE - ST. MARIES

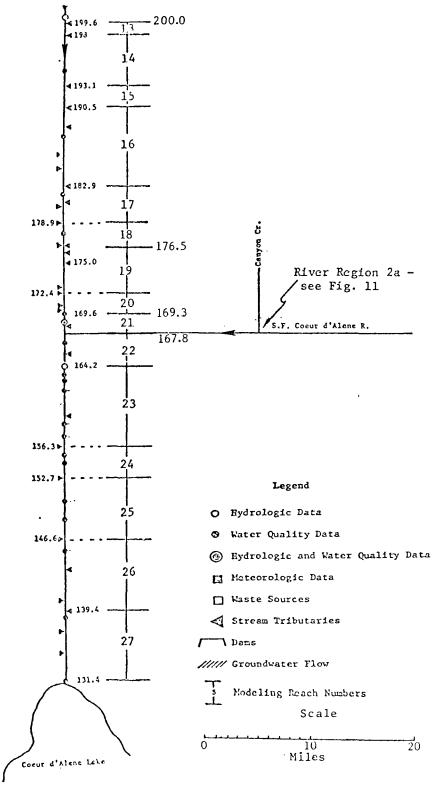


FIGURE 10. MODELING REACHES, RIVER REGION 2 - COEUR D'ALENE & S.F. COEUR D'ALENE R.

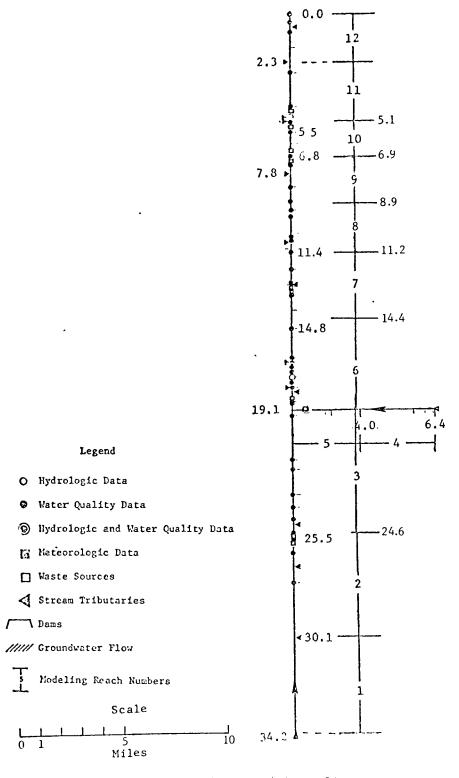


FIGURE 11. MODELING REACHES, REGION 2A - S.F. COEUR D'ALENE RIVER

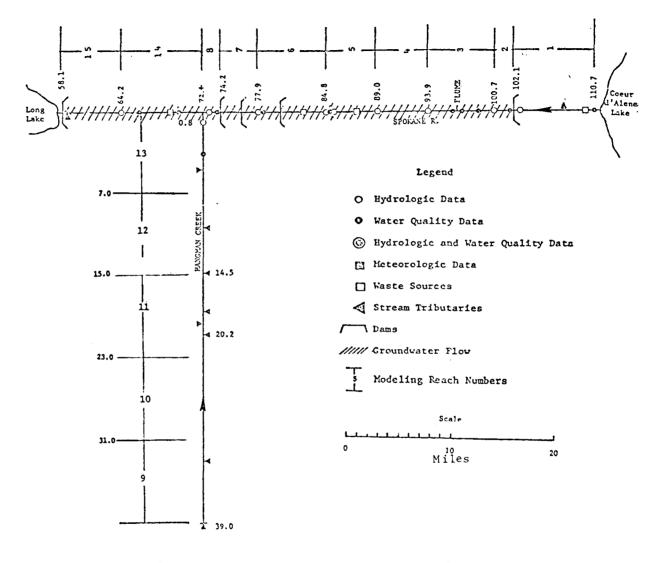


FIGURE 12. MODELING REACHES, RIVER REGION 3 - SPOKANE RIVER FROM LONG LAKE TO COEUR D'ALENE LAKE

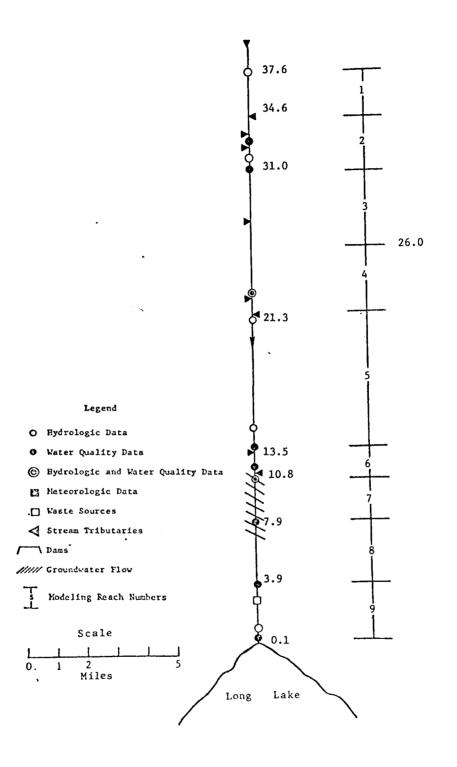
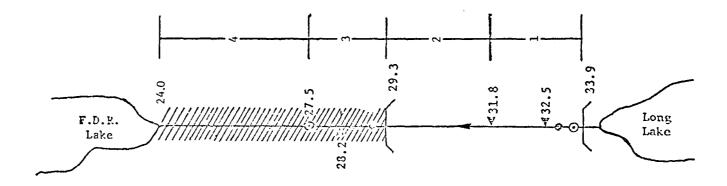


FIGURE 13. MODELING REACHES, REGION 4, LITTLE SPOKANE RIVER



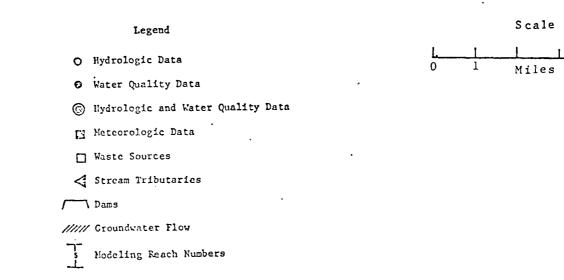


FIGURE 14. MODELING REACHES, RIVER REGION 5 - ROOSEVELT LAKE TO LONG LAKE .

SECTION III

DATA REQUIREMENTS AND ACQUISITION

DATA NEEDS

The data needs for this project were determined by review of the input requirements for the DOSAG, DRM, and SWMM models. Four general types of information were needed including physical data, meteorological data, water quantity data and water quality data. Data for DOSAG and SWMM were needed for all river reaches. Data for the DRM were needed for Coeur d'Alene Lake, Long Lake and the Spokane arm of Roosevelt Lake.

The data requirements are listed below and are summarized by model in Table 1. BOD has been used in Table 1 in place of carbonaceous or nitrogeneous BOD since this was the only quantity available in the data received.

DOSAG

- 1. Physical locations of inflow and outflow points, and non-point sources.
- 2. Mean channel depths, areas, slopes, roughnesses.
- 3. Mean solar radiation.
- 4. Streamflow rates and correlations with depth and velocity; stage/discharge relations.
- 5. Withdrawal rates and return flows (industrial, municipal, agricultural, groundwater).
- 6. Pollution concentrations throughout the rivers.
- 7. Pollution loading rates in all inflows.
- 8. Water temperatures throughout the rivers and extinction depths.
- Coefficients and parameters for pollution constituent processes.

TABLE 1. DATA SUMMARY

			AT. EE	-	•	oti ;	•			iia LAF			'_''							ca	ble
		T.			ارد	714	Ì	1	711	A	ויוי	<u>.</u>		UF	716	1	נפו	1,		11	از
		DOSAG	SWIM	DRM	RR #1	RR #2	RR #3	RR #4	RR #5	FDR L.	г. г.	Cd. A. I		RR #1	RR #2	RR #3	RR #4	RR #5	FDR L.	L. L.	Cd. A. I
PHY	SICAL		Γ																		7
1.	Locations: River mileages to dams, tributaries, outfalls, other inflows, diversions; general areas of non-point waste sources and groundwater accretions.	x	х	x	x	x	x	x	x	х	x	X									
2.	Reservoirs: sounding maps, cross- sections for lakebed topographies; volume and surface area vs. elevation relations; full pool and dam intake elevations; spillway crest elevations, lengths, positions, types; reservoir operating schemes.			x			_		_	P	x	P			_				P		P
3.	Channels (by reach): average depths, areas, mean slopes, average Manning's roughness coefficients.	х	x	-	х	Х	х	P	x	-	•	-					P		-	-	-
MET	EOROLOGICAL		_				_		_											7	
4.	Solar radiation; cloud cover.	â	x	х	x	х	x	х	х	х	x	х									
5.	Air temperature, humidity.	-	-	x	-	-	-	-	-	х	х	х		-	1	-	-	-			
6.	Wind speeds and directions.	_	х	х	х	х	х	х	X	Х	Х										
7.	Evaporation rates, coefficients.	_	x	х	x	х	х	х	х	х	х	х									
WAT	ER QUANTITY	Γ		<u> </u>										_							
8.	Streamflows: inflow and outflow rates; stage/discharge relations at gaging stations; discharge correlations with depth and mean velocity.																				
		Х	Х	P	Х	Х	Х	Х	Х	P	P	Р				_	_		2	P	P
9.	Withdrawals: rates and locations for irrigation, water supply, industry.	x	х	х			Х														

TABLE 1. (Continued)

		AT.		1		": AT/					•		-":							cat	ole
	DOSAG	SWMM	DRM		1		9	7	5	L.	•	A. L.		11	12	13	14	/5	FDR L.	•	Cd. A. L.
10. Return flows: rates and locations, e.g. for agricultural drains, industry; municipal and other wastewater outfalls; groundwater accretions.	x	x	x			P	P	P	P			х			P	P	P	P			
11. Downstream outlet conditions: weir elevations, coefficients.	-	х	_							-	-	-		x	x	x	x	х	-	-	_
12. Lakes: histories of water surface elevations.	-	-	х		-	-	-	-	-	Х	х	х		_	_	-	-	-			
WATER QUALITY Water quality data will be required for: Total Nitrogen Coliforms Carbonaceous Chlorides Ammonia BOD Heavy metals, Nitrate Chlorophyll a ions Nitrite Dissolved Phosphorus Oxygen Temperature 13. Concentrations of the above at various time throughout the system of rivers and lakes (other than EPA STORET data); general areas of non- point sources; past monitoring pro- grams or stream surveys for biologi- cal and chemical data.	X	X	X		P	P	P	P	Р	P	P	P		P	P	P	P	P	P	P	P
14. Concentrations and loading rates or patterns of the above mentioned constituents in all inflows into the system (in tributary flows, effluents, non-point sources, etc.); plant and process data that will enable their estimation when measurements are unavailable; land use and surface runoff data that might enable the estimation of unmeasured non-point waste loads (e.g., from mine tailings).		X	x		P	P	P	P	P	Р	P	P		P	P	P	P	P	P	P	P

TABLE 1. (Continued)

		_	AT.			P"	: A /	•										pli CIE		able
		DOSAG	SWMM	DRM	RR #1	RR #2	RR #3	RR #4	RR #5	FDR L.	L. L.	Cd. A. L.				RR #4		12	L. L.	Cd. A. L.
15.	Past analyses of field data to determine degradation rates, reaeration coefficients, and decay coefficients for non-conservative constituents above.	x	x	x									x	x	x	x	х	х	x	x
16.	Water temperatures: of rivers, tributaries, effluents; of lake interiors and release waters; depths of short wave extinctions in lakes or solar radiation extinction coefficient secchi disk measurements in lakes.		x	X	x	x	X	X	х	P	P	P						P	P	P

SWMM

- 1. Physical locations of inflow and outflow points, and non-point sources.
- 2. Channel data
 - a. length, effective width, average depth
 - b. Manning's coefficient
 - c. initial velocity.
- 3. Meteorological data
 - a. solar radiation
 - b. wind speed and direction
 - c. evaporation.
- 4. Junction data
 - a. initial head
 - b. initial constituent concentrations
 - c. area contribution of one-dimensional channels
 - d. inflow and outflow histories
 - e. depths and mean values of Manning's coefficient
 - f. inflow constituent loading rate histories
 - g. water temperatures and extinction depths.
- 5. Coefficients and parameters for pollution constituent processes.
- 6. Downstream outlet conditions.

DRM

- 1. Reservoir latitude, longitude, elevation.
- 2. Lakebed topography; maximum water surface elevation.
- 3. Physical locations of inflow and outflow points, and non-point sources.
- 4. Number and types of reservoir outlets and their elevations; dam width at elevations of outlets.

- 5. Reservoir diffusion parameters; minimum thermal gradient considered stable.
- 6. Meteorological data
 - a. atmospheric pressure
 - b. wind speed and direction
 - c. sky cover
 - d. dry bulb air temperature
 - e. wet bulb air temperature
 - f. dew point temperature
 - g. short wave solar radiation
 - h. short wave extinction depths
 - i. evaporation.
- 7. Initial water surface elevation, temperatures and constituent concentrations.
- 8. Inflow and outflow histories; water surface elevation histories.
- 9. Inflow constituent loading rate histories.
- 10. Coefficients and parameters for pollution constituent processes.

DATA COLLECTION

The collection of data was begun by requesting a printout of STORET data available from the Environmental Protection Agency. Additional data was solicited from federal, state and local government agencies, special purpose districts and private corporations and individuals in Washington and Idaho. A list of potential data sources (Appendix I, Attachment 2) was compiled based on review of past reports on the Spokane River Basin and through discussion with knowledgeable individuals. Data survey questionnaires were sent to each person on the initial distribution list. In addition to inquiring as to the availability of specific data, one portion of the questionnaire requested further references to other potential sources of data. All suggested data sources were solicited by way of the questionnaire to determine data availability and request further suggestions of potential sources. This iterative procedure was continued until all suggestions were exhausted. Upon return of the questionnaire, all available data pertaining to the Spokane River Basin and pertinent to the study were requested.

Data Survey

The questionnaires (Appendix I, Attachment 1) consisted of two parts. The first part was a compiled listing of data requirements for the three computer models. It requested information about the type and frequency of available data and the ease of providing this data. The second part of the questionnaire requested information about alternative data sources including the name of an individual or agency and the types of data possibly available. The completion and return of the questionnaires was accomplished only after substantial delays necessitating multiple mailings and repetitive telephone requests for action. The return of the completed questionnaires, anticipated to require one month, in fact required nearly two months during which several days were devoted to intensive telephone followup.

Note should be made of the special assistance of the Project Officer in searching agency archives and the recovery and provision of materials from EPA files.

Requests for Data

Upon collection of the completed questionnaires, a review was made to identify data of value to the study. This data was then requested by phone where possible in order to collect the data more rapidly, and by letter otherwise. The urgency of need was greatly stressed. The letter and a sample attachment are shown in Appendix I, Attachment 4. The attachment identified the data which was requested, and consisted of a reproduction of that portion of the returned questionnaire on which the desired available data had been described. The data requested was often slow in arriving and substantially delayed progress on later portions of the project. As of January 2, 1973, all data requested in this manner had been collected.

In all, 96 inquiries were made in formal questionnaires and informal phone calls. There were 90 replies, either positive or negative, most of which were received by telephone. Data was solicited from 28 sources and of these 26 returned the requested information. In spite of the large number of contacts which brought no data, the effort has been considered successful from the quantity of important information received which was not in the STORET system.

Special Solicitation of Critical Data

Once the data requested was assessed, it was determined that in some areas crucial data was still lacking. Phone calls were made to a number of agencies throughout the country in an attempt to discover sources. This additional effort met with only limited success.

DATA AVAILABILITY

Review of the data collected revealed that there was a relatively larger amount of receiving water quality, water quantity, and meteorological data available, and a minimal amount of physical and effluent data. The data points were located and plotted on the regional layout schematics to show availability. With this information, data deficiencies were determinable by river segment (Figure 15) and for lakes and are shown in Table 2. Data received on municipal and industrial outfalls are summarized in Table 3.

To aid the future user of these models, a list has also been included in Appendix IV of some planned projects and studies underway which are related to this project, and which may provide further useful information in the near future.

Type and Quality of Data Received

Data was received in many forms including reports, raw data sheets, maps, charts, and graphs. Documents were reviewed to determine the value to the project of data included therein. A bibliography has been compiled of the numerous items received (Appendix II) in which the data is classified into meteorological, physical, water quality, and water quantity categories. The listing includes a reference to the source from which the data was obtained. There were several duplications of important documents and an initial review revealed that over half of the information received was of little immediate value to the project. This was primarily because many of the items provided dealt with tributaries of upper reaches of the rivers not included in the project as other than point sources. Other information was too general to be of value or dealt with subjects not covered by the project. Data reports which proved valuable and provided usable information for the study are indicated in the bibliography (Appendix II).

Network Schematics

Once the locations of data points were established by river mile they were located on the network schematics (Figures 3 through 8) along with a note as to the type of information available at each point. Information on the time period of data availability and frequency of data collection were not included on the network schematics because of the volume of information.

Table 2 gives a listing of data shown on the networks by river segment including type of data (water quality, waste source, streamflow, or meteorological) and dates of record. The sources of these data are also included. Figure 15 shows the location and labeling of river segments by river mile.

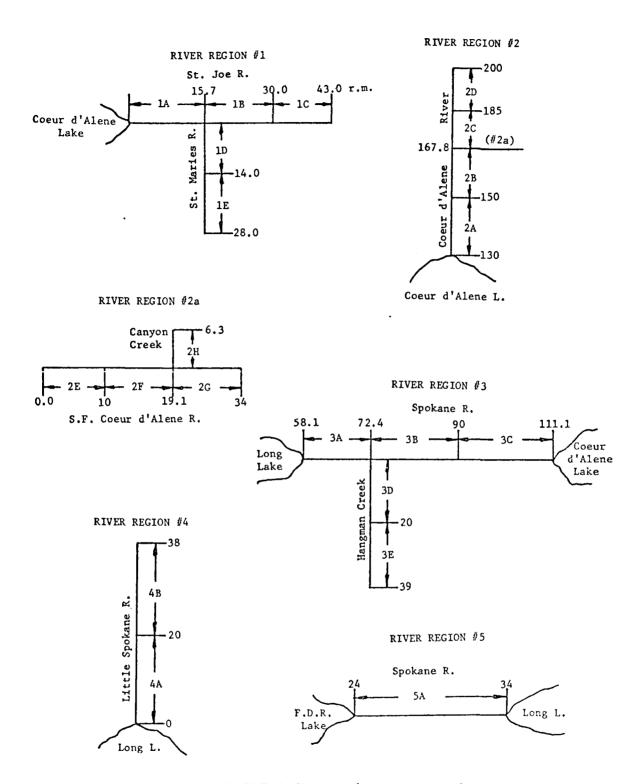


FIGURE 15. RIVER SEGMENTS (NOT TO SCALE)

TABLE 2. DATA AVAILABILITY AND DEFICIENCY BY RIVER SEGMENT

Segment	Data Source ¹	Type ²	Dates	Deficiencies
Region #	1			
St. Joe	River			
1A	STORET 151024 '	V/Q	71/05/20 & 71/08/20	Meteorological
	St. Joe National Forest Data, Station 1	WQ	70/06/29 - 72/07/31	Stream Flow
	St. Joe National Forest Data, Station 5	V/Q	70/07/02 - 72/07/31	
	St. Maries Plywood, RAPP	WS		
	St. Joe National Forest Data, Station 7	VIQ	70/03/04 - 72/07/31	
	STORET 151014	VQ	69/08/19 - 71/08/20	
	St. Joe River, Water Surface Profiles	ΡΉ		
	St. Joe River Profile Points	PH	57/12	
1B	St. Joe River, Water Surface Profiles	PН		Water Quality
	St. Joe River Profile Points	ľН	57/12	Stream Flow
				Meteorological
1C	St. Joe National Forest Data, Station 10	17Q	70/03/04 - 72/07/31	
	St. Joe National Forest Data, Station 11	11Q	70/03/04 - 72/07/31	
	USGS 4145	SF	11/05 - 71/09	
	STORET 151013	I/Q	69/08/19 - 71/08/20	
	St. Joe National Forest Data, 100402	Met.	63/06 - 71/09	
	St. Joe River Profile Points	PH	57/12	
	Discharge Measurement Notes @ RM 42.9	PH	1971 - 1972	

Explanation of IBMG:	Abbreviations: Idaho Bureau of Mines and Geology, pamphlet 149	Source No. 38
CRS:	Coeur d'Alene River Survey	35
WQS:	Water Quality Survey	41
WWPC:	Washington Water Pollution Control Communication TR No. 70-1	31
WWPC 69-1:	Washington Water Pollution Control Communication TR No. 69-1	30
² _{WQ} :	Water Quality	
WS:	Waste Source	
SF:	Stream Flow	
Met.:	Meteorological	
PH:	Physical	

TABLE 2. (Continued)

Segment	Data Source ^l	Type ²	Dates	Deficiencies
St. Mar	ies River			
1D	St. Maries Outfall (FWQA) St. Joe National Forest Data, Station 9 USGS 4150 STORET 151015 St. Maries River, Water Surface Profiles St. Maries River Profile Points	WS WQ SF WQ PH PH	1963 70/03/04 - 71/07/31 12/07 - 66/9 69/08/19 - 71/08/20 57/12	Stream Flow Meteorological
1E	USGS 4149 STORET 151016 Discharge Measurement Notes @ RM 27.8	SF WQ PH	68/10 - 71/9 71/05/20 & 71/08/20 1971 - 1972	Physical Water Quality Meteorological
Region (72 1'Alene River			
2A	STORET 151022 STORET 153183 IBMG, 149-1 IBMG, 149-2 IBMG, 149-3 IBMG, 149-4 Coeur d'Alene River Profile Points	WQ WQ WQ WQ WQ PH	71/06/16 & 71/08/25 71/01/13 68/12/17 - 70/03/20 68/12/17 - 70/03/20 68/12/17 - 70/03/20 68/12/17 - 70/03/20 59/09/08	Stream Flow Physical Data Meteorological
2B	CRS #3 STORET 153007 STORET 151100 IBMG, 149-5 IBMG, 149-6 IBMG, 149-7 STORET 153018 STORET 151017 WQS #7	WQ WQ WQ WQ WQ WQ WQ	70/05/26 - 70/09/14 68/04/18 & 72/05/03 70/04/02 - 71/08/25 68/12/17 - 70/03/20 68/12/17 - 70/03/20 68/12/17 - 70/03/20 69/02/11 - 72/07/19 69/05/06 & 71/08/25 70/08/19 - 71/07/12	Physical Meteorological

TABLE 2. (Continued)

Segment	Data Source ¹	Type ²	Dates	Deficiencies
2B	IBMG, 149-8	WQ	68/12/17 - 70/03/20	Physical
	IBMG, 149-9	WQ	68/12/17 - 70/03/20	Meteorological
	IBMG, 149-10	WQ	68/12/17 - 70/03/20	· ·
	USGS 4135	SF	11/05/01 - 71/09/30	
	Coeur d'Alene River Profile Points	PH	56/09/08	
2C	WQS #6	WQ	70/08/19 - 71/07/14	Meteorological
	CRS #4	WQ	70/05/26 - 70/09/14	•
	USGS 4130	SF	12/03/01 - 71/09/30	
	STORET 153019	WQ	69/02/11 - 72/05/03	
	IBMG, 149-34	WQ	68/12/17 - 70/03/20	
	IBMG, 149-33	WQ	68/12/17 - 70/03/20	
	IBMG, 149-32	WQ	68/12/17 - 70/03/20	
	Coeur d'Alene River Profile Points	PH	56/09/08	
	Discharge Measurement Notes	PH	1971	
20	IBMG, 149-31	WQ	68/12/17 - 70/03/20	Meteorological
	USGS 4120	DISCONTINUED		
	USGS 4115	DISCONTINUED		
	IBMG, 149-30	WQ	68/12/17 - 70/03/20	
	USGS 4110	SF	50/10/01 - 71/09/30	
	Coeur d'Alene River Profile Points	PH	56/09/08	
	Discharge Measurement Notes	PH	1971	
South F	ork Coeur d'Alene River			
2E	CRS #5	WQ	70/05/26 - 70/09/14	Meteorological
	STORET 151018	WQ	69/08/18 - 71/08/25	•
	STORET 153023	WQ	70/01/14 - 72/05/03	
	WQS #5	WQ	70/05/27 - 71/07/14	
	IBMG, 149-11	WQ	68/12/17 - 70/03/20	
	IBMG, 149-12	WQ	68/12/17 - 70/03/20	
	CRS #6	WQ	70/05/26 - 70/09/14	
	IBMG, 149-13	WQ	68/12/17 - 70/03/20	

TABLE 2. (Continued)

gment	Data Source ¹	Type ²	Dates	Deficiencies
2E	STORET 153110	WQ	70/01/14 - 71/09/22	Meteorological
	Smelterville Outfall	ws	1969	
	USGS 4133	SF & WQ	68/10/01 - 71/09/30	
	STORET 153109	WQ	71/02/18 & 71/09/23	
	Bunker Hill Co.	WS		
	Kellogg Pump Plant #2, 153193	WS	72/03	
	IBMG, 149-14	WQ	68/12/17 - 70/03/20	
	Bunker Hill Co., RAPP	WS		
	Kellogg Pump Plant #1, 153194	WS	72/03	
	Zinc and Phosphorus Plant, 153195	WS	72/03	
	STORET 153149	WQ	71/09/23 & 72/03/01	
	STORET 153108	WQ	71/01/12 - 72/07/20	
	IBMG, 149-15	WQ	68/12/17 - 70/03/20	
	CRS #7	WQ	70/05/26 - 70/09/14	
	IBMG, 149-16	WQ	68/12/17 - 70/03/20	
	IBMG, 149-17	WQ	68/12/17 - 70/03/20	
	IBMG, 149-18	WQ	68/12/17 - 70/03/20	
	Coeur d'Alene River Profile Points	PH	48/07/22	
2F	IBMG, 149-19	WQ	68/12/17 - 70/03/20	Physical
	STORET 153105	WQ	71/09/22	Meteorological
	STORET 153104	WQ	71/09/22	
	IBMG, 149-20	WQ	68/12/17 - 70/03/20	
	STORET 153139	WQ	71/09/22	
	STORET 153103	WQ	71/09/22	
	STORET 153102	WQ	71/09/22	
	STORET 153138	WQ	71/09/22	
	CRS #8	WQ	70/05/26 - 70/09/14	
	WQS #3	WQ	70/08/19 - 71/07/14	
	IBMG, 149-21	WQ	68/12/17 - 70/03/20	
	IBMG, 149-22	WQ	68/12/17 - 70/03/20	
	STORET 153101	WQ	71/09/22	
	IBMG, 149-23	WQ	68/12/17 - 70/03/20	

TABLE 2. (Continued)

Segment	Data Source ¹	Type ²	Dates	Deficiencies
2F	USGS 4131.5	SF	68/10/01 - 71/09/30	Physical
	IBMG, 149-24	₩Q	68/12/17 - 70/03/20	Meteorological
	IBMG, 149-25	WQ	68/12/17 - 70/03/20	-
	STORET 153098	WQ	71/09/22	
	Wallace Outfall	ЖS		
	STORET 153099	ЪД	71/09/22	
	Coeur d'Alene R iver Profile Points	PH	48/07/22	
	Discharge Measurement Notes	PH	1971	
2G	STORET 153097	WQ	71/09/22	Physical
	WQS #2	WQ	70/08/19 - 71/07/14	Meteorological
	CRS #10	WQ	70/05/26 - 70/09/14	_
	IBMG, 149-26	WQ	68/12/17 - 70/03/20	
	IBMG, 149-28	WQ	68/12/17 - 70/03/20	
	IBMG, 149-29	WQ	68/12/17 - 70/03/20	
	STORET 153096	WQ	71/09/22	
	STORET 153095	WQ	71/02/17 & 71/09/22	
	Mullan Outfall	WS		
	STORET 153094	WQ	71/09/22	
	Lucky Friday Benefication Plant, RAPP	WS		
	STORET 153093	WQ	71/09/22	
	Lucky Friday Tailings Pond	WS	70/11	
	STORET 153092	WQ	70/05/12 - 71/09/22	
	WQS #1	WQ	70/08/19 - 71/07/14	
	CRS #11	WQ	70/05/26 - 70/09/1 4	
	Coeur d'Alene River Profile Points	PH	48/07/22	
	Discharge Measurement Notes	PH	1972	
2H	STORET 153123	WQ	70/05/15 - 71/09/22	Physical
	Star Mineral Benefication Plant	พร้	71/09	Meteorological
	Coeur d'Alene River Profile Point	PH	48/07/22	
	Discharge Measurement Notes	PH	1972	

TABLE 2. (Continued)

Segment	Data Source ¹	Type ²	Dates	Deficiencies
Region #	3		•	
Spokane	River			
3A	WWPC 69-1, Station 10 USGS 4245	WQ DISCONTINUED	66/09/12 - 66/09/16	Stream Flow Physical
	STORET 543108	WQ	71/06/08	Meteorological
	Spokane Municipal Outfall (FWQA)	WS	1958	
	WPCC 69-1, Station 12	WQ	66/09/12 - 66/09/16	
	Soil Survey, Spokane Co.	PH	68/03	
	Spokane River Profile Points	PH	48/05/24	
3B	USGS 4225	SF	91/04/01 - 71/09/30	
	WPCC 69-1, Station 13	WQ	66/09/12 - 66/09/16	
	USGS 4220	DISCONTINUED		
	WPCC 69-1, Station 14	WQ	66/09/12 - 66/09/16	
	Millwood Outfall (FWQA)	WS	1965	
	Inland Empire Paper Co.	WS		
	WPCC 69-1, Station 15	WQ	66/09/12 - 66/09/16	
	USGS 4215	DISCONTINUED		
	WPCC 69-1, Station 16	WQ	66/09/12 - 66/09/16	
	USGS 4210	DISCONTINUED		
	Trentwood Works, RAPP	WS		
	Spokane Industrial Park Outfall, RAPP	WS		
	Hillyard Processing Co., RAPP	WS		
	USGS 4205	DISCONTINUED	10//	
	Spokane River and tributaries, Topography	РН	1944	
	Spokane River Profile Points	PH	.48/05/24	
	Soil Survey, Spokane Co.	PH	68/03	
	Discharge Measurement Notes	PH	1971	
	Climatological Data	Met.	1968 - 1972	

TABLE 2. (Continued)

Segment	Data Source ¹	Type ²	Dates	Deficiencies
3C	USGS 4195	SF	60/10/01 - 71/09/30	Meteorological
	STORET 541026	WQ	59/07/29 - 71/09/19	•
	STORET 151020	WQ	69/04/08 - 71/08/27	
	STORET 543135	WQ	71/01/13 & 71/02/18	
	WPCC 69-1, Station 17	WQ	66/09/12 - 69/09/16	
	STORET 153022	WQ	69/08/20 - 71/08/25	
	USGS 4190	SF	13/02/01 - 71/09/30	
	STORET 150114	WQ	62/05/28 - 71/03/09	
	USGS 4185	SF	61/04/10 - 65/09/30	
	USGS 4180	SF	61/04/21 - 69/09/21	
	STORET 151021	WQ	69/04/08 - 71/08/27	
	Spokane River and Tributaries, Topography	PH	1944	
	Spokane River Profile Points	PH	48/05/24	
	Discharge Measurement Notes	PH	1971	
3D	USGS 4240	SF	48/04/01 - 71/09/30	Physical
	STORET 12423980	WQ	68/02/20 & 68/06/28	Stream Flow
	Hangman Creek Water Surface Profiles	PH	72/05	Water Quality
	Hangman Creek Cross Sections	PH	72/08	Meteorological
3E	No Data			Water Quality Stream Flow Physical Meteorological
Region #	4			
Little	Spokane River			
4 A	WWPC #1	WQ	68/02/13 - 68/09/10	Physical
	STORET 55B070	WQ	70/11/30 - 71/09/19	Meteorological
	STORET 12431900	WO	70/11/30 - 71/09/19	
	USGS 4320	DISCONTINUED	, ==,	

TABLE 2. (Continued)

Segment	Data Source ¹	Type ²	Dates	Deficiencies
4A	USGS 4315	DISCONTINUED	,	Physical
	WWPC #2	WQ	68/02/13 - 68/09/10	Meteorological
	WWPC #3	WQ	68/02/13 - 69/09/10	•
	WWPC #4	WQ	68/02/13 - 69/09/10	
	USGS 4310	SF	29/05/01 - 71/09/30	
	STORET 12431000	₩Q	60/07/28 - 70/09/20	
	STORET 541025	k ∕Q	60/07/28 - 66/04/24	
	WWPC #5	WQ	68/02/13 - 68/09/10	
	WWPC #7	VQ	68/02/13 - 68/09/10	
	USGS 4303	DISCONTINUED		
	Discharge Measurement Notes	PH	1971	
4B	USGS 4301.5	DISCONTINUED		Physical
	USGS 4295	DISCONTINUED		Meteorological
	WWPC #9	WQ	68/02/13 - 68/09/10	· ·
	USGS 4290	DISCONTINUED		
	WWPC #10	WQ	68/02/13 - 68/09/10	
	USGS 4270	SF	48/10/01 - 71/09/31	
egion #	5			
Spokane	River			
5A	USGS 4335	DISCONTINUED		Physical
	STORET 541232	WO	70/05/06 - 70/11/24	Meteorological
	USGS 4330	SF	39/04/01 - 71/09/30	
	WWPC 69-1 #8	WQ	66/09/12 - 66/09/16	
	Discharge Measurement Notes	PH	1971	
Coeur d	'Alene Lake			
	4155	ľН	04/08/01 - 72/09/30	Stream Flow
	ET 151023	WQ	69/06 - 71/08	Water Quality
	ET 151023	WQ	71/06 & 71/08	Physical
		WO	/ L / U U O	

w

TABLE 2. (Continued)

Segment	Data Source ¹	Type ²	Dates	Deficiencies
Coeur d'Alene Lake				
Source 4		PH		Stream Flow
Source 43		PH	71/07 - 71/11	Water Quality
WQS		WO	69/09/11 - 71/07/14	Physical
CRS		WQ	70/05/12 - 70/05/17	•
Source 61		SF		
Source 62		SF	1954	
Climatological	Data	Met.	68/07 - 72/09	
Long Lake		~		
USGS 4260		WQ	70/11 - 71/09	Stream Flow
STORET 543002		TVQ	70/01 - 71/08	
Source 45		TVQ.	72/07 - 72/09	
Source 29		WQ & SF	71/07 - 71/09	
Source 30		WQ & PH	66/09	
Source 64		PH	49/11/30	
Source 4		PH		
Source 5		PH	71/08 - 72/06	
Source 75		Met.	66/06 /29 - 72/08 /14	
Climatological	Data	Met.	68/07 - 72/09	
F. D. Roosevelt La	ke_			
Source 29		WQ & PH	70/06 - 71/09	Stream Flow
STORET 541226		110	70/05 - 70/11	
STORET 541227		V/Q	70/05 - 70/11	
STORET 541228		. MQ	70/05 - 70/11	
STORET 541229		VIQ	70/05 - 70/11	
STORET 541230		WQ	70/05 - 70/11	
STORET 541231		WQ	70/05 - 70/11	

Table 3. EFFLUENT DATA INVENTORY

				S		Table	3. E	FFLUEN:	ATAD 1	INVENT	ORY:									
	BECOMMING	Divino		O U R	AVER.	AVER.	AVER.				AVERAGE	DAILY C	ONCENTRAT	IONS (MC	G/L)					7
OUTFALL	RECEIVING WATERS	RIVER MILE	DATE	C E	FLOW (CFS)	TEMP F.	MPN	BOD	N	NH3	NO ₂	^{NO} 3	PHOS	CL	cu	FE	PB	zx	TDS	F
St. Maries Mun.	St. Joe R.	15.7	63	F	. 37			41.0												
St. Maries Ply.	St. Joe R.	13.4		R	.59	76	398				0.000			1.0	.003	3.79		.39		
Star-Morn T. Pd.	Canyon Cr.	1.9	71	В	3.00										.960		.19	.78		
Star Mine	Canyon Cr.	1.6		R	3.35	62		10.0	1.96	2.0	0.055	1.50	.03	6.8	1.720	1.72	.20	.97	622	
Star Mine	Canyon Cr.	1.6		R	.45	62	4000	2.0	.05	.05	.008	.05	.20	16.0	.010	1.08	.03	.09	28	
Lucky Fri. Mine	S.F.C.d'A.R.	26.5		R	.60	78	2500	8.0	2.90	2.95	.160	1.90	.20	10.0	.010	4.00	1.24	.88	312	
Mullan Mun.	S.F.C.d'A.R.	25.7		F	.22			204.0												
ucky Fri. Mine	S.F.C.d'A.R.	25.5		R	1.22	65		2.0	.51	.20	.043	1.50	.10	2.2	.021	1.02	.12	.05	126	
ucky Fri. T.Pd.	S.F.C.d'A.R.	25.2	70	В											.010		1.35	1.07		
Star-Morning M.	S.F.C.d'A.R.	24.6		R	.27	67	100	16.0	.24	.20	.010	.35	.20	1.3	.030	1.60	.18	.50	590	
Wallace Mun.	S.F.C.d'A.R.			F	.37			204.0												
Rex 11111	S.F.C.d'A.R.			. R	.16	68		17.2	.21	. 25	.038		.01	4.3	.775	2.25	.50	3.60	279	
Dayrock Plant	S.F.C.d'A.R.			R	.08	68		1.0	4.40	4.20	.100	4.05	.05	6.1	.025	3.70	.50	.39	246	
Galena Mine	S.F.C.d'A.R.			R	1.15	66	30	10.0	6.14	6.04		5.25	.04	7.2	.150	.75	.02	.069	264	
Osburn Mun.	S.F.C.d'A.R.			F	.16			245.0												
Cons. Silver M.	S.F.C.d'A.R.		71	В											.003		.01	.02		
Cellorg Mine	S.F.C.d'A.R.		, <u>-</u>	R	2.40			66.8	.09	.09	.455	.01	.03	38.8		21.00		.09	525	
unker Hill Co.	S.F.C.d'A.R.			R	1.12			25.0	.91	1.07		.14	.01	4.0	.194	4.43	1.14	.85	140	
unker Hill Co.	S.F.C.d'A.R.			R	.76			45.0	2.89	3.02		1.82	.25	21.0	.050	29.20		24.30	430	
ellogg Mun.	S.F.C.d'A.R.			F	.77			200.0	2.07	5.02		1.02	***			-,	,			
Bunker Hill Co.	S.F.C.d'A.R.		71	В	6.00			200.0							.670		2.50	150.00		
Bunker Hill CIA	S.F.C.d'A.R.		71	В	5.70															
Bunker Hill Co.	S.F.C.d'A.R.		11	R	7.80			12.2	.93	1.04		. 37	.08		.056	1.33	3.97	13.90	272	
Bunker Hill Co.	S.F.C.d'A.R.			R	2.23			4.0	.1.74	2.00		.40	.18	100.0	.343	1.93		243.00	1107	
	S.F.C.d'A.R.			R	.22			6.2	112.91	135.60		4.04	.50	180.0	.190		1.37	64.30	1200	
Bunker Hill Co. Bunker Hill Co.	S.F.C.d'A.R.			R	2,23			6.3	.30	.18		.68	.03	50.0	.070	.12	.09	13.00	345	
	S.F.C.d'A.R.			R	5.58			30.0	3.75	4.05		1.81	2.50	30.0		•	•••	20100	1360	
Bunker Hill Co.	S.F.C.d'A.R.			R	5.58			5.0	8.68	10.00		2.00	60.00	150.0		35 30	4.12	142.10	2931	
Bunker Hill Co.	S.F.C.d'A.R.		69	F	.14			41.0	0.00	10.00		2.00	00.00	150.0		33.30	71.22		2931	
Smelterville M.			69	F	.06			39.0												
Rockford Mun.	Hangman Crk.	109.0		F	2.48			40.0										-		
.d'Alene Mun.	Spokane R.			R		65	2	5.3	3.12	3.40		1.42	5.90	23.0	.128	.67	.28	.16		
Spokane Ind. Pk.	Spokane R.	87.7			.84 .84	57	2		1.49	1.76		.18				.07	0.00	0.00	250	
Hillyard Pr.Co.	Spokane R.	87.5		R				.1					.01	1.7	.002		0.00		73	
rentwood Works	Spokane R.	87.5		R	11.60	70		1.7	1.61	2.00		.04	1.42	1.0	.010	.20		.35	40	
rentwood Works	Spokane R.	87.0		R	10.10	72	70	5.5	1.24	1.50		.03	.11	1.0		. 30		.35	22	
In.Emp.Paper Co.	Spokane R.	82.6		X	6.40	70	17	45.2	.02	0.00		.10	.69	16.0	.010		.01	.27	97	
Millwood Mun.	Spokane R.	82.6	65	F	.02			72.8												
ipokane Mun.	Spokane R.	69.5	58	F	46.50			91.0												
eer Park Mun.	L.Spokane R.	21.3		F	.23			44.0												
ead Works	L.Spokane R.	13.0		R	5.73	75	1900	. 4	1.46	1.45		1.20	.22	15.4	.030		.01	.10	163	
orthwest Ter.	L.Spokane R.			F	.06			200.0												
hitworth Col.	L:Spokane R.		56	P	.19			39.0												
otlatch For.	C.d'A. Lake			R	1.04	74	110	41.0	.27	. 30	0.000	.10	.17	1.0		.33			82	
otlatch For.	C.d'A. Lake			R	7.22	76		2.1	.19	:20		.15	.13	1.0					48	
otlatch For.	C.d'A. Lake			R	.01	180		41.0	.51		0.000	.08	.63	8.0	2/0	2200.			1103	
		94.0			.01			41.0		.00					. 240	2200.				
Groundwater	Spokane R.		71-72	Δ		12			.46		.020	2.00	.10	6.0						

Source: A = Storet Retrieval 72/10/27

B = Storet Retrieval 72/10/25

F = FWQA Storet System Retrieval (Municipal Waste Facilities Inventory) 72/10/18
R = RAPP Retrieval 72/10/19
X = Extract from RAPP application form by EPA Seattle, about 72/10

The networks include indication of all known points of water quantity and quality data collection, the location of all waste sources for which data are available and points of confluence with small tributaries throughout the river regions. The general area of important groundwater flow in the Spokane region is shown based on available information.

Locations of data points for lakes have not in all cases been explicitly described. However, the reports which contain the available data do include figures showing sampling points. Appendix V consists of figures from these existing reports. On each figure, the approximate location of other data points has been shown.

Data Deficiencies

A summary of data deficiencies as shown by comparison of data needs with data available and acquired is shown in Table 1. They are shown there for each river region and lake. Categories of data deficiencies are shown for each river segment in Table 2. In addition to this, more detailed water quality deficiencies by component are shown in Table 4. The significant deficiencies disclosed were chlorophyll—a which was absent from all data, TDS which was absent from all but the Coeur d'Alene River Region, and BOD data absent for all rivers. The following is a list of the principal data deficiencies by region:

River Region #1 - St. Joe-St. Maries

1. physical data above r.m. 10.2, St. Maries River

River Region #2 - Coeur d'Alene River

- 1. physical data above r.m. 19.3, S.F. Coeur d'Alene River
- 2. physical data along Canyon Creek
- 3. water quality data along Canyon Creek

River Region #3 - Upper Spokane River

- 1. water quality data along Hangman Creek
- 2. physical data along all but 2 miles of Hangman Creek
- 3. water quality data from Long Lake (r.m. 58) to r.m. 93.9

River Region #4 - Little Spokane River

1. physical data along entire river

TABLE 4. DEFICIENCIES IN WATER QUALITY CONSTITUENTS DATA

	R.R.1	R.R.2	R.R.3	R.R.4	R.R.5	ALL
emperature						
0.0.						
B.O.D.	x		х		x	
Nitrogen	x		x	x	x	
Ammonia						
Nitrite	x					
Nitrate						
Chloride						
Phosphorus						
Coliforms						
Copper						
Iron				X	X	
Lead				x		
Zinc						
Chlorophyll <u>a</u>	X	х	X	X	X	x
T.D.S.	X		X	x	Х	

River Region #5 - Lower Spokane River

- 1. physical data except at dams
- 2. water quality data except at r.m. 29.0

Coeur d'Alene Lake

- 1. temperature profiles
- 2. bottom profile (The Project Officer provided lake bottom topography data and volume information on April 27, 1973; this will be incorporated in Phase III input.)
- 3. water quality data over a six-month period

Long Lake

1. none

Roosevelt Lake

- 1. temperature profiles
- 2. storage vs. elevation
- 3. subsurface water quality data over a six month period

There was also a major deficiency in the effluent data received. No quality data for constituents other than BOD were recorded for any of the municipal waste facilities (see Table 3). This, and the lack of daily or even many dated measurements at the outfalls will significantly reduce the accuracy of modeling water quality constituents.

In regions where significant data deficiencies occurred, rough estimates had to be made in order to run the models. Where point data was available, such as information on the physical characteristics of a channel in the vicinity of gauging stations, this was used to guide the preparation of estimates. The need for estimation limits the efficacy of the models and unfortunately will make them a less reliable tool than had been hoped and anticipated.

SECTION IV

DATA ASSESSMENT

The data gathered covered a wide range of subjects and areas. As described in the preceding section, an initial assessment was completed by eliminating types of information not useful to the study and information for points outside of the study area. Once the relatively large bulk of information was reduced to a manageable amount, other criteria were employed to determine the validity of the remaining data. Subsequent to the review for validity, the data was tabulated in a form useful for pre-selecting a simulation period.

VALIDITY

Once the material to be used was identified, it was carefully examined to determine whether there was any invalid data. Where available, methods of collection and measurement were studied and, if there was no mention of problems and the procedures appeared valid, the data was accepted.

A few sets of information were received as raw data without any description of collection methods. It was, therefore, impossible to assess the validity of this data except to eliminate values that appeared obviously erroneous. Otherwise, this data was used as received.

There were two areas where identification of valid data caused some additional problems. Hygro-thermograph charts for Lookout Point, 10 miles NNW of Spokane were received for years between 1966 and 1972. James Holcomb, Meteorologist, National Weather Service, U.S. Department of Commerce, reported that some of the data was erroneous due to malfunctions in the humidity element. Correction factors were also given for most days. This data was carefully analyzed and we were able to determine from it the necessary temperature information for the Deep Reservoir Model.

Another major problem occurred in the identification of valid measurements for ground water flows. Information was received from several sources which appeared equally valid but which were somewhat contradictory. This information is summarized in Table 5. In arriving at a figure for use in the study, very high or low figures were eliminated. The SCI estimate was then made based on the remaining data.

SELECTION OF SIMULATION PERIODS: RIVERS

The objective in selecting simulation periods for the river regions was to specify periods that would best represent steady state summer

TABLE 5. ESTIMATES OF GROUND WATER INFLOWS

Average cfs Over Years Indicated:	A '21-'29	A '29-'41	A '41-'51	B '50	A '51-'60	c <u>'54-'63</u>	D '47-'64	SCI Estimate
Post Falls to Spokane	521	417	554	900	534			600
Greenacres to Spokane						670		
Spokane to Long Lake	701	694	661		542			600
Spokane to Nine Mile Nine Mile to Long Lake Indiana St. Area				195 220		60		
Post Falls to Long Lake (Total)	1222	1111	1215	1315	1076	730		1200
Little Falls to Mouth of Spokane		320						
Little Spokane River						275		250
Above Dartford 4 mi. Reach Below Dartford							160 60	
Discharge to Wells: Spokane	65	75	85		95	170		150
Little Spokane Area							38	
TOTAL								1600

Estimates for Table 5 were taken from the following documents:

- A: (68) Spokane Ground Water by Walter E. Johnson, Hydrologist (retired) WWP Co.
- B: (57) Analysis of Increments of Discharge in Spokane River, Post Falls, Idaho to Long Lake, Washington, 1951, Anon.
- C: (58) Public Health Relationship of the Minnehaha Sewer District to the Greater Spokane Community, prepared for the City of Spokane by Esvelt and Saxton, Consulting Engineers, December 1964.
- D: (59) Ground-Water Resources and Related Geology North-Central Spokane and Southeastern Stevens Counties of Washington by Denzel R. Cline, Washington Department of Water Resources, Water Supply Bulletin No. 27, 1969.

conditions of two months duration. From Table 2, Data Availability and Deficiency by River Segment, it was apparent that there were no significant water quality data recorded prior to 1968, and that the simulation periods would therefore fall during the summer months of 1968, 1969, 1970, or 1971. There were no water quality data recorded during the low-flow months of 1972, and minimal amounts reported in October and November 1971. The great majority of the available effluent data is undated (see Table 3), so they cannot influence the selection of simulation periods. In addition to the lesser availability of earlier quality data, a question existed as to its validity. It was reported by Mr. Michael J. McMasters of the Idaho Department of Environmental Protection and Health that "much of the material contained in reports prior to 1968 include data collected and analyses by methods other than those approved by the U.S. Public Health Service Standard Methods Procedure." With this additional information in hand, a decision was made to concentrate efforts on the 1968-1971 data.

Tables 6 through 14 show the availability of water quality data during the low flow periods of at least two months duration for each region. Whereas Figures 3 through 8 depict all known network data points met during this study, Figures 16 through 21 have been prepared to present only those stations having data during the candidate simulation periods. These latter figures therefore correspond to Tables 6 through 14, and provide easy reference to the location of alternative data points which was a selection consideration, particularly in Regions #3 and #5. The highs and lows for each low flow period are given in Table 15 for each USGS station operating in a particular year. In order to facilitate an accurate choice of simulation days it was necessary to prepare hydrographs (Figures 22 through 26) for those regions and years in which the preferred simulation period was not an obvious choice.

Tables 16 through 21 show the stability of water quality constituent concentrations where this information was available for more than one day at a particular station.

RECOMMENDED SIMULATION PERIODS: RIVERS

The following sections discuss low flow data availability for each Region.

Region 1 - St. Joe-St. Maries

It was readily apparent from the water quality data available that the simulation period must be in 1971 in order to have two days with sufficient quality information for verification. The hydrograph for this period shows some fluctuation. However, the variation was fairly small compared to annual fluctuations (days in May 1971 exceed 20,000 cfs) and in combination with the availability of quality data was a logical choice. July and Autust 1971 were the months chosen for this region as they had significant quality data and fell during the more stable streamflow periods (see Figure 22).

WATER QUALITY DATA AVAILABILITY TABLES 6-14

LEGEND

Symbols

- one bit of information
- more than one bit of information
- low flow period of at least two months, at USGS station indicated

Data Collection Stations

4xxx	USGS Water Quantity and Water Quality Stations
15xxx	STORET Data Stations
54xxx	\
SJx	Forest Service Stations, St. Joe National Forest.
100402	Fire Weather Reporting Station at Calder, Idaho, St. Joe National Forest.
149-XX	Stations in Idaho Bureau of Mines and Geology pamphlet 149. Effect of Industrial and Domestic Effluent on the Water Quality of the Coeur d'Alene River.
W QS ∦ x	Water Quality Survey, Coeur d'Alene River - Coeur d'Alene Lake, Lee W. Stokes and Gene L. Ralston.
CRS#x	Coeur d'Alene River Survey, EPA, Gary O'Neal.
WPC-x	Report on the Water Quality of the Little Spokane River, Washington Water Pollution Control Commission.

TABLE 6. WATER QUALITY DATA AVAILABILITY - REGION 1

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TABLE 7. WATER QUALITY DATA AVAILABILITY - REGION 1

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149-12	CHLORIDE INON, NITRATE I TOP, DO, SOD, ZINC, INDE NITRATE, FOS, LEAD CHLORIDE, COPPER IDC, DO, BOD, ZINC, INDE NITRATE, FOS, LEAD KHLORIDE, COPPER	0		3		•		8
149-12	CHLORIDE FROM, NITMATE 1 TEPP, DO, BOD, ZINC, INDE HITMATE, FOO, LEAD CHLORIDE, COPPEA TEPP, DO, BOD, ZINC, INDE BITHATE, FOO, LEAD CHLORIDE, COPPEA 1 FEOV, DO, SED, ZINC, INDE 1 FEOV, DO, SED, ZINCE, INDE	0 0 0 0				•		•
149-12 149-11	CHLORIDE FROM, NITMATE 1 TEPP, DO, SUD, ZINC, IROE HITMATE, FON, LEAD CHLORIDE, COPPER 1 TEPS, DO, SUD, ZINC, IROE HITMATE, FON, LEAD CHLORIDE, COPPER 1 TEPN, DO, SUD, ZINC, IROE HITMATE, FON, LEAD CHLORIDE, COPPER 1 TEN, DO, SUD, ZINC, IROE HITMATE, FON, LEAD CHLORIDE, COPPER	0		3		•		0
149-12 149-11	CHIORIOE IRON, NITATE ITOP, DO, BOD, IROC, IROE HITRATE, FOR, LEAD CHIORIDE, COPPER ITOP, DO, BOD, IIIC, IROE HITRATE, FOR, LEAD HITRATE, FOR, LEAD HITRATE, FOR, LEAD LOCATION, COPPER LOCATION,					•		8
149-12 149-11	CHLORIOE IRON, NITATE ITOP, DO, BOD, IRKC, IRON HITRATE, FOR, LEAD CHLORIDE, COPPER ITOP, DO, BOD, IINC, IRON HITRATE, FOR, LEAD GLORIDE, COPPER TLOP, DO, BCD, LINC, LRON HITRATE, FOR, LEAD GLORIDE, COPPER HITRATE, FOR, LEAD GLORIDE, COPPER G	9 9 9				•		0 0 0 0 0
149-12 149-11 149-14	CHIGATOR IRON, NITATE I TOP, DO, BOD, IRK, IRON HITRAIT, POS, LEAD CHICAGE, COPPLA TOP, DO, BOD, IIKC, IRON HITRAIT, POS, LEAD HITRAIT, POS, LEAD HITRAIT, POS, LEAD HITRAIT, POS, LEAD GULDRIE, COPPLE ITATI, POS, LEAD GULDRIE, COPPLE ITATI, POS, LEAD GULDRIES, COPPLE HITRAIT, POS, LEAD GULDRIES, COPPLE HOP, DO, DOS, LINC, IRON HITRAIT, POS, LEAD GULDRIES, COPPLE HOP, DO, DOS, LINC, IRON HITRAIT, POS, LEAD GULDRIES, COPPLE HOP, DO, COPPLE HOP, DO, COPPLE HOP, DOS, COPPLE HOP, DOS, COPPLE HOP, DOS, COPPLE HOP HITRAIT, POS, LEAD GULDRIES, COPPLE HOP, DOS, COPPLE HO	99				e 		0 0 0 0 0 0
149-12 149-11 149-14	CHURIOE IRON, NITATE ILOP, DO, NO, IROC, IROE HITRAIT, FON, LEAB CHURIDE, COPPLE ITO, DO, SO, TINC, IROP ITO, DO, SO, TINC, IROP CHURIDE, COPPLE ITO, DO, NO, IROC, IROS HITRAIT, FOX, LEAB CHURIDE, COPPLE ILOP, DO, ECO, IROC, IROS HITRAIT, FOX, LEAB CHURIDE, COPPLE ILOP, DO, ECO, IROC, IROS HITRAIT, FOX, LEAB CHURIDE, COPPLE ILOP, DO, ECO, IROC, IROS HITRAIT, FOX, LEAB CHURIDE, COPPLE HITRAIT, FOX, LEAB CHURITER HITRAIT HITRAIT HITRAIT HITRAIT HITRAIT HITRAIT HITRAIT HITRAIT HITRAIT HITRA	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9				6		0 0 0 0 0 0 0
149-12 149-13 149-14 149-14	CHLORIOE IRON, NITATE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAD CHLORIDE, COPPLA TIPE, DO, BOD, IROC, IROE HITBAIL, FOR, LEAD CHLORIDE, COPPLE ITOM, LEAD CHLORIDE, COPPLE ITOM, LEAD HITBAIL, FOR, LEAD	6 0 9 9 0 0 0 0				0		
149-12 149-13 149-14 149-14	CHLORIOE IRON, NITATE ITCP, DO, BOD, IROC, IRON HITRAIT, POS, LEAD CHLORIDE, COPPLA TICP, DO, BOD, IROC, IRON HITRAIT, POS, LEAD HITRAIT, POS, LEAD HITRAIT, POS, LEAD GLORIDE, COPPLA THEP, DO, BOD, IROC, IRON HITRAIT, POS, LEAD CHLORIDE, COPPLA THERAIT, POS, LEAD CHLORIDE, COPPLA THERAIT, POS, LEAD CHLORIDE, COPPLA THERAIT, POS, LEAD HITRAIT, POS, LEAD HITRAIT, POS, LEAD CHLORIDE, COPPLA THERAIT, POS, LEAD CHLORIDE, COPPLE THERAIT, POS, LEAD CHLORIDE, COPPLE THERAIT, POS, LEAD CHLORIDE, COPPLE THERAIT, POS, LEAD HITRAIT, POS, LEAD CHLORIDE, COPPLE THERAIT, POS, LEAD HITRAIT, POS, LEAD	60 99 90 90 90				e 		0 0 0 0 0 0 0
149-12 149-13 149-14 149-14	CHLORIOE IRON, NITATE ITOP, DO, BOD, IRO, HOSE HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, IIIC, HOSE HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, IIIC, HOSE HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, IIIC, HOSE HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, LING, HOSE HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, LON, COPPLA ITOP, LON, COPPLA ITOP, LON, END, LING HITRAIT, PON, LEAD HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, LON, END, LING HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, LON, END, LING HITRAIT, PON, LING HITRA	6 0 9 9 0 0 0 0				0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
149-12 149-13 149-14 149-15 149-16	CHURIOE IRON, NITATE ILOP, DO, BOD, IROC, IROE HITBAIL, FOR, LLAB CHURIEL, COPPLE ILOP, DO, BOD, LING, IROE HITBAIL, FOR, LLAB CHURIEL, COPPLE ILOP, DO, BOD, IROC, IROE HITBAIL, FOR, LLAB CHURIEL, COPPLE ILOP, DO, EOD, IROC, IROE HITBAIL, FOR, LLAB ILOP, DO, EOD, IROC, IROE HITBAIL, FOR, LLAB ILOP, DO, EOD, IROC, IROE HITBAIL, FOR, LLAB CHURIEL, COPPLE ILOP, DO, EOD, IROC, IROE HITBAIL, FOR, LLAB CHURIEL, FOR, LRAB CHURIEL, COPPLE ILOP, DO, NO, IROC, IROE EITHAIL, FOR, LRAB CHURIEL, COPPLE ILOP, CO, NO, IROC, IROE EITHAIL, FOR, LRAB	60 03 69 60 60 60 60 60 60 60 60 60 60 60 60 60		1		0		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-13 149-14 149-15 149-16	CHURIOE IRON, NITATE IEPP, DO, BOD, IROC, IROE WITHAIL, FON, LEAD CHURIDE, COPPLE ITTO, DO, BOD, IROC, IROE HITHAIL, FON, IROS BITHAIL, FON, IROC, IROE HITHAIL, FON, IROC, IROE HITHAIL, FON, IROC, IROE HITHAIL, FON, LEAD CHURIDE, COPPLE IEPP, DO, END, IROC, IROE HITHAIL, FON, LEAD CHURIDE, COPPLE IEPP, DO, END, LINC, IROE HITHAIL, FON, LEAD CHURIDE, COPPLE CHURIDE, COPPLE CHURIDE, COPPLE IEPP, DO, BOD, IROC, IROE HITHAIL, FON, LEAD CHURIDE, COPPLE IND. DO, BOD, IROC, IROE HITHAIL, FON, LEAD CHURIDE, COPPLE IND. DO, BOD, IROC, IROE HITHAIL, FON, LEAD CHURIDE, COPPLE	60 03 09 00 00 00 00 00 00 00 00 00 00 00 00				0		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-13 149-14 149-16 149-16 149-17 149-17	CHLORIOE IRON, NITATE ITOP, DO, BOD, ITEC, IRON HITBAIL, FOR, LEAD CHLORIDE, COPPLA TUPO, DO, BOD, ITEC, IRON HITBAIL, FOR, LEAD CHLORIDE, COPPLE ITOR, DO, EDD, LING, LEON HITBAIL, FOR, LEAD CHLORIDE, COPPLE ITOR, LEAD CHLORIDE, COPPLE ITOR, DO, LING, LEON HITBAIL, FOR, LEAD CHLORIDE, COPPLE ITOR, DO, SOD, LING, LEON HITBAIL, FOR, LEAD CHLORIDE, COPPLE ITOR, DO, LEON, LEON HITBAIL, FOR, LEAD HITBAIL, FOR, LEA	60 03 60 60 00 00 00 00 00 00 00 00 00 00 00				0		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
149-12 149-13 149-14 149-16 149-16 149-17 149-17	CHURIOE TROM, NITMATE ITEP, DO, SOD, ITEC, ITEM HITMATE, FON, LEAB CHORIDE, COPPLE HITMATE, FON, LEAB CHORIDE, COPPLE HITMATE, FON, LEAB CHURIDE, COPPLE HITMATE, FON, LEAB HITMATE, FON, LEAB CHURIDE, COPPLE HITMATE, FON, LEAB CHURID HITMATE, FON, LEAB CHURIDE, COPPLE HITMATE, FON, LEAB CHURIDE,	60 03 69 60 60 60 60 60 60 60 60 60 60 60 60 60				•		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-13 149-14 149-12 149-12 149-12 149-12 149-12	CRUANCE TROW, NITATE ITEP, DO, SOD, ITEC, IDDE WITHAIT, FON, LEAD CHOOLINE, COPPLE THOU DO, SOD, LING, LIDSE THOU DO, SOD, LING, LIDSE THOU DO, SOD, LING, LIDSE HITMAIT, FOX, LEAD SHITMAIT, FOX, LEAD CHOOSIDE, COPPLE SHITMAIT, FOX, LEAD CHOOLIDE, COPPLE SHITMAIT, FOX, LEAD OND, SHOR, LING, LING SHITMAIT, FOX, LEAD OND, SHOR, LING SHITMAIT, FOX, LEAD SHITMAIT, FOX, LEAD OND, SHOR, LING SHITMAIT, FOX, LEAD OND, SHOR, LING SHITMAIT, FOX, LEAD SHITMAIT, FOX, LE	60 03 69 60 60 60 60 60 60 60 60 60 60 60 60 60				•		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-13 149-14 149-12 149-12 149-12 149-12 149-12	CHLORIOE IRON, NITATE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LEAB CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, SOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, DO, SOD, IROC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, IROE HITBAIL, FOR, LEAB CHLORIDE, COPPLE ITOP, LO, SOD, LINC, LINCE CHLORIDE, COPPLE CHLORIDE,					• • • • • • • • • • • • • • • • • • •		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-12 149-12 149-12 149-13 149-13 149-13 149-13 149-13	CHLORIOE IRON, NITATE ITOP, DO, BOD, IROC, IROE WITHAIT, FOR, LEAD CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITHAIT, FOR, LEAD SITHAIT, FOR, LEAD CHLORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITHAIT, FOR, LEAD CHLORIDE, COPPLE ITOP, DO, END, IROC, IROE HITHAIT, FOR, LEAD CHLORIDE, COPPLE ITOP, DO, END, LINC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE CHRORIDE, COPPLE ITOP, DO, BOD, IROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, DO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, DO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE CHRORIDE, COPPLE ITOP, CO, BOD, AIROC, IROE HITHAIT, FOR, LEAD CHRORIDE, COPPLE CHRORIDE, CO	60 03 60 00 00 00 00 00 00 00 00 00 00 00 00				•		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-12 149-12 149-12 149-13 149-13 149-13 149-13 149-13	CHLORIOE IRON, NITATE I TOP, DO, BOD, IRO, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE ITOP, DO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE ITOP, DO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE ITOP, DO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE ITOP, DO, BOD, LINC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, LINC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, LINC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, PON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD CHLORIDE, COPPLE I TOP, EO, BOD, IIIC, HOW HITRAIT, FON, LEAD	60 00 00 00 00 00 00 00 00 00 00 00 00 0				• • • • • • • • • • • • • • • • • • •		00 00 00 00 00 00 00 00 00 00 00 00 00
149-14 149-14 149-14 149-16 149-17 149-1 149-1 149-1 149-2	CRUANTOE TROM, NITMATE ITEP, DO, SOD, ITEC, ITOM WITHAIT, FOR, LEAD CHOOLINE, COPPLE TICE, DO, SOD, LINC, LION HITCH, COPPLE ITEP, DO, LOO, LINC, LION HITCH, POA, LEAD CHOOSIDE, COPPLE ITEP, DO, LOO, LINC, LION HITCH, POA, LEAD CHOOLINE, COPPLE ITEP, DO, LOO, LINC, LION HITCH, POA, LEAD CHOOLINE, COPPLE ITEP, DO, NO, LINC, LION HITCH, COPPLE ITEP, DO, LOO, LINC, LION HITCH, COPPLE ITEP, DO, LOO, LINC, LION HITCH, COPPLE ITEP, DO, LOO, LINC, LOOP HITCH, COPPLE ITEP, LOO, LOO, LINC, LOOP HITCH, LOOP HITCH, COPPLE ITEP, LOO, LOO, LINC, LOOP HITCH, LOOP	60 00 00 00 00 00 00 00 00 00 00 00 00 0				0 0 0 0 0 0		00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-12 149-12 149-12 149-12 149-1 149-1 149-2 149-2	CRUGATOR TROM, NITMATE I TOP, DO, BOD, ITMC, IRON WITHARI, FOR, LEAB CHOOKIDE, COPPLE TICO, DO, BOD, CINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, BOD, TINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, BOD, TINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, BOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE THARI, FOR, LEAB CHORNIES, COPPLE THARIT, FOR, LEAB CHORNIES, COPPLE THOR, DO, DO, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, BOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON HITHARI, FOR, LEAB CHORNIES, COPPLE TOP, DO, LO, LINC, IRON HITHARIES, FOR, LEAB CHORNIES, COPPLE TOP, DO, LO, LINC, IRON CHORNIES, COPPLE TOP, DO, SOD, LINC, IRON CHORNIES, COPPLE TOP, DO, LO, J. LINC, IRON CHORNIES, COPPLE TOP, DO, LO, COPPLE TOP, DO, LO, LINC, IRON CHORNIES, COPPLE TOP, DO, COPPLE T	60 00 00 00 00 00 00 00 00 00 00 00 00 0						00 00 00 00 00 00 00 00 00 00 00 00 00
149-12 149-12 149-12 149-12 149-12 149-1 149-1 149-2 149-2	CHLORIOE IRON, NITATE ITOP, DO, DO, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA TITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD HITRAIT, PO, LEAD HITRAIT, PO, LEAD GLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PO, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, ITEC, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, LINCK, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, JENCK, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, JENCK, ITOM HITRAIT, PON, LEAD CHLORIDE, COPPLA ITOP, DO, BOD, JENCK, ITOM	60 93 94 96 90 90 90 90 90 90 90 90 90 90 90 90 90				9 9 9 9 0		00 00 00 00 00 00 00 00 00 00 00 00 00
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TABLE 10. WATER QUALITY DATA AVAILABILITY - REGION 2

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TABLE 14. WATER QUALITY DATA AVAILABILITY - REGION 5

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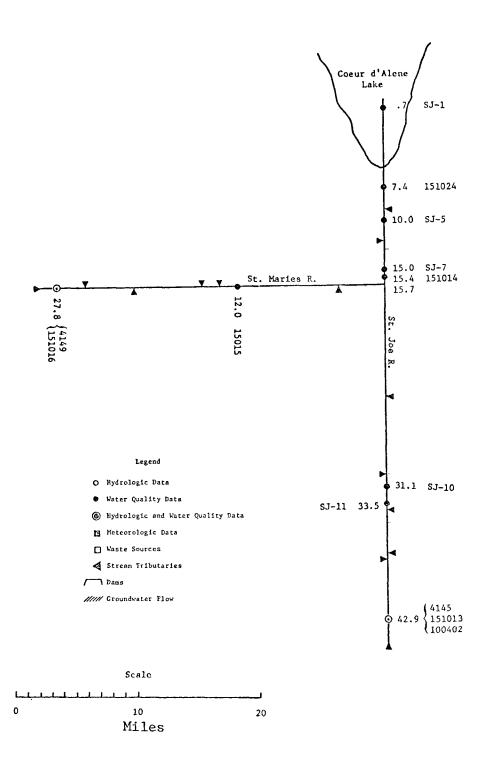


FIGURE 16. LOW FLOW DATA POINTS, RIVER REGION 1 - ST. JOE - ST. MARIES

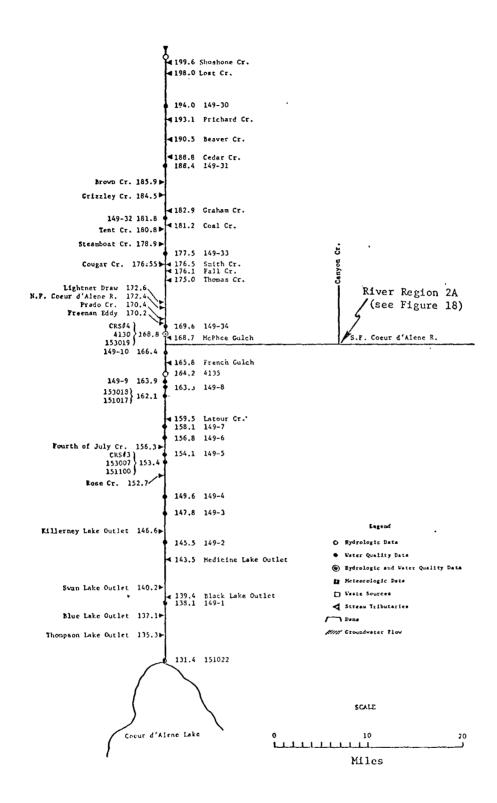


FIGURE 17. LOW FLOW DATA POINTS, RIVER REGION 2 - COEUR D'ALENE R. & S.F. COEUR D'ALENE R.

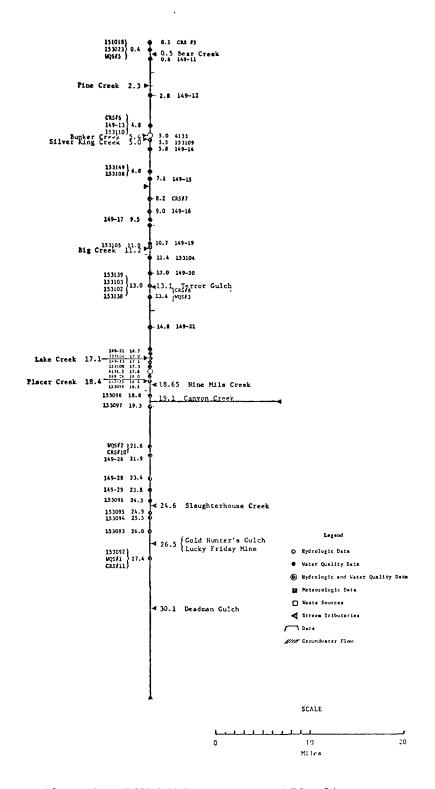


FIGURE 18. LOW FLOW DATA POINTS, REGION 2A - S.F. COEUR D'ALENE RIVER

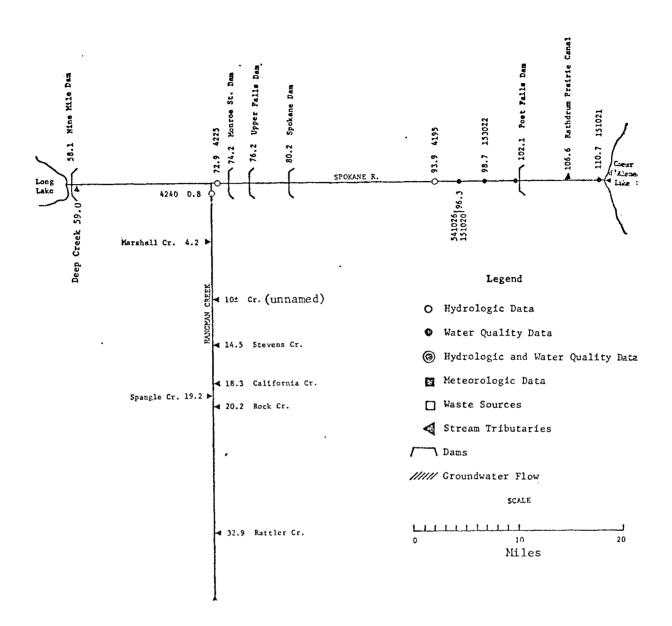


FIGURE 19. LOW FLOW DATA POINTS, REGION 3 - SPOKANE R. FROM LONG LAKE TO COEUR D'ALENE L.

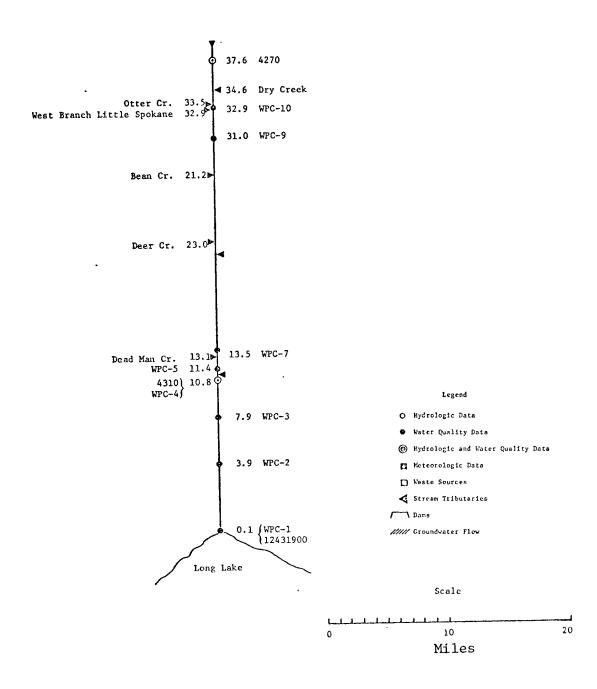


FIGURE 20. LOW FLOW DATA POINTS, REGION 4 - LITTLE SPOKANE RIVER

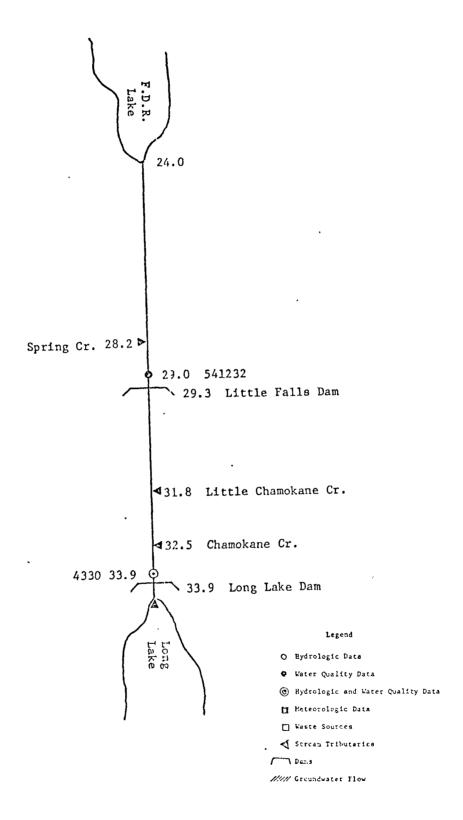


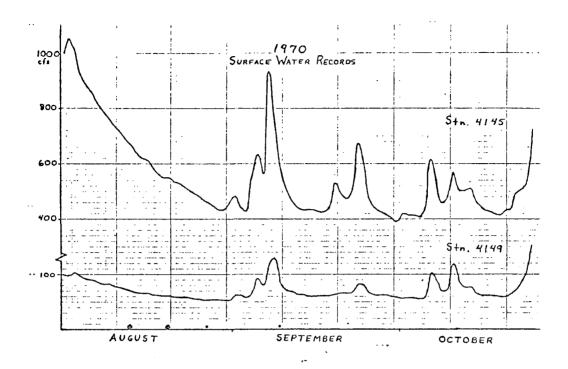
FIGURE 21. LOW FLOW DATA POINTS, REGION 5 - SPOKANE RIVER FROM ROOSEVELT L. TO LONG L.

TABLE 15. STEADY-STATE FLOW PERIODS

Region #1 - St. Jo	2			
USGS			771	(-5-)
Stn.	Year	Dates	Flows High	(cfs) Low
4145	1969	8/1 - 10/9 10/11 - 12/12	622 548	330 250
	1970 1971	9/8 - 11/16 8/1 - 9/30	726 1200	390 472
4149	1969	7/27 - 9/30	86	45
	1970	10/11 - 12/10 8/1 - 10/23 7/16 - 9/30	84 130 176	33 54 59
Region #2 - Coeur	1971	7/10 - 9/30	170	29
4110	1969	7/30 - 10/1	152	93
4110		10/11 - 12/11	130	75
	1970 1971	8/7 - 10/23 8/1 - 3/30	133 212	81 109
4130	1969	8/1 - 9/30	393	221
	1970	10/12 - 12/12 8/8 - 10/23	370 407	170 231
	1971	8/1 - 9/30	612	246
4131.5	1969	8/5 - 10/15	73	52
	1970	10/12 - 12/11 8/11 - 11/15	62 89	45 50
	1971	8/1 - 9/30	139	55
4133	1969	8/8 - 10/30	143	98
	1970	10/11 - 12/10 8/6 - 10/23	125 158	81 103
	1971	8/1 - 9/30	239	117
4135	1969	8/1 - 9/30	555	332
	1970	8/9 - 10/23	527 8 10	344 445
Destar #2 Castron	1971	8/1 - 9/30	910	447
Region #3 - Spokan		7/6 - 9 /29	1460	641
4195	1969	$\frac{7}{10}$ = $\frac{9}{29}$ $\frac{10}{1}$ = $\frac{12}{21}$	1980	1550
	1970	8/1 - 10/8	1440	737
	1971	8/1 - 9/30	1780	403
4225	1969	7/24 - 9/29 10/1 - 12/12	1890 2400	1140 1980
	1970	$\frac{10}{1} - \frac{12}{12}$ $\frac{7}{24} - \frac{10}{10}$	2110	1980
	1971	8/1 - 9/30	2380	11.00
4240	1969	7/19 - 9/25	20	12
	1070	9/21 - 12/10	24	18
	1970	8/1 - 10/4 9/6 - 11/10	17 26	7.5 16

TABLE 15. (Continued)

Region #4 - Little	Spokane			
			Flows	(cfs)
Stn.	Year	Dates	High	Low
4270	1968	6/24 - 9/10	44	33
	1969	7/20 - 12/20	49	40
	1970	8/6 - 10/5	43	38
	1971	7/22 - 9/30	45	40
4310	1968	7/1 - 9/10	147	92
	1969	7/23 - 9/30	166	129
	1970	7/30 - 10/4	152	121
	1971	7/22 - 9/27	157	123
Region #5 - Spokane	<u>2</u>			
4330	1969	7/25 - 10/22	3160	1100
	1970	8/5 - 10/6	2910	1530
	1971	7/27 - 9/30	3870	830



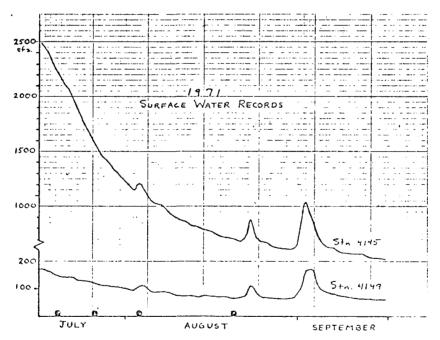


FIGURE 22. LOW FLOW HYDROGRAPH, RIVER REGION 1

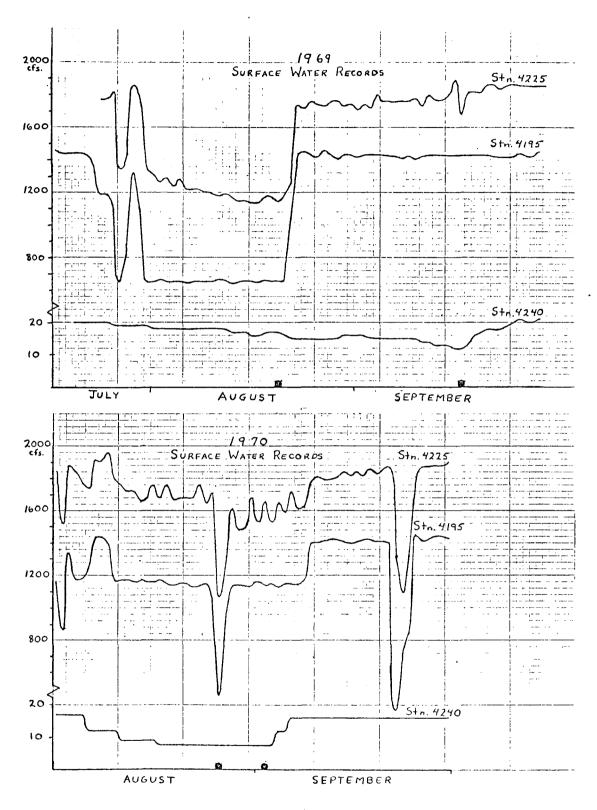


FIGURE 23. LOW FLOW HYDROGRAPH, RIVER REGION 3

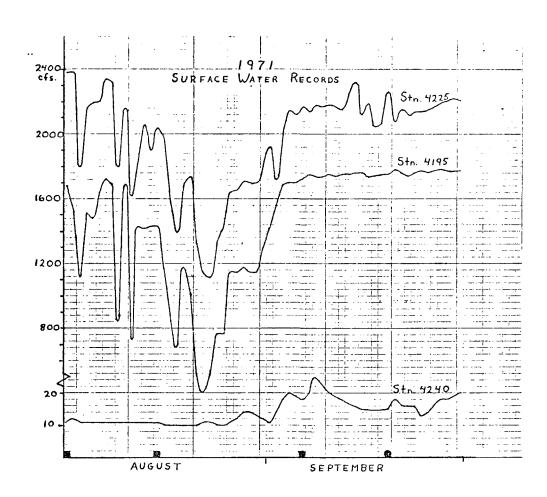


FIGURE 24. LOW FLOW HYDROGRAPH, RIVER REGION 3

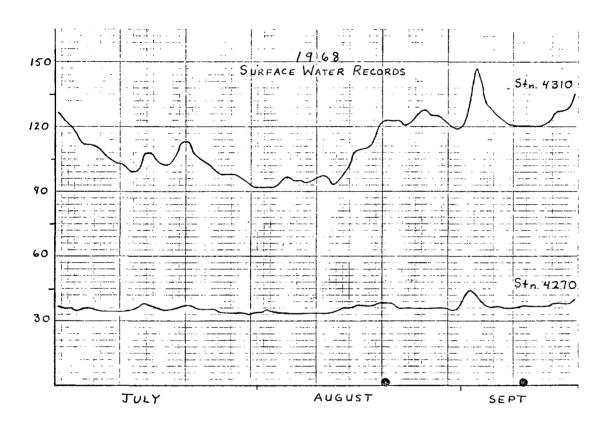


FIGURE 25. LOW FLOW HYDROGRAPH, RIVER REGION 4

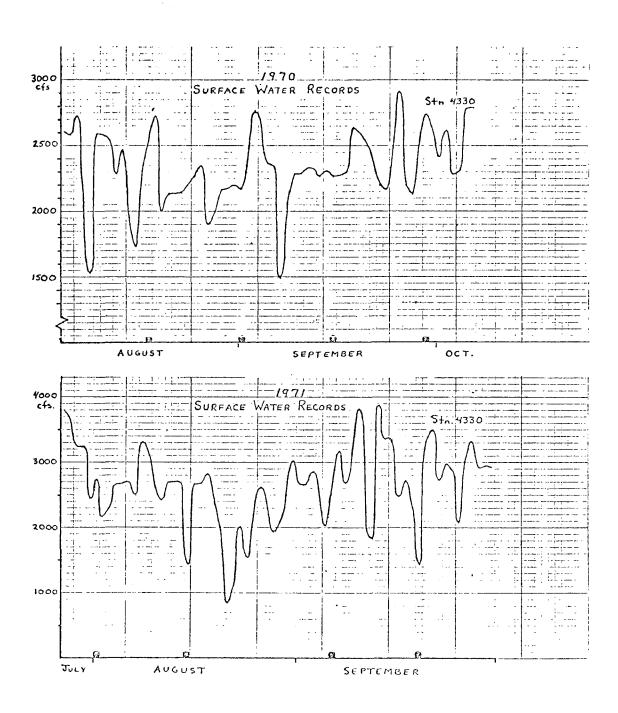


FIGURE 26. LOW FLOW HYDROGRAPH, RIVER REGION 5

TABLE 16. WATER QUALITY STABILITY, RIVER REGION #1, 1970-1971

1970			8/13	8/20	8/27	9/9	
Station * (Source 47)	Constituent		1	/alues			
6J-1	Temp		20	20		20	
	DO		8	6.4			
	Coli		5	12		28	
SJ-5	Temp		22	20			
	DO		9	6.6			
	Coli		40	36			
SJ-7	Temp			20	21		
SJ-10	Coli			10	60		
SJ-11	Temp			19	20		
1971		7/19	7/26	8/3	8/9	8/17	8/:
	_	• •	24	26	23	20	21
SJ-1	Temp Coli	18 38	44 44	52	23	60	36
	6011	30					00
SJ-5	Temp	17	24	26	23	19	22
	Coli	20	20	28		24	20
SJ-7	Temp	16	22	23	23	19	20
,33-7	Coli	190	260	200		300	20
CT 10	Temp	16	18	20	22	20	19
SJ-10	Coli	20	16	48		36	52

TABLE 17. WATER QUALITY STABILITY, RIVER REGION #2-1969

	AUG 19	SEP 13	AUG 19	SEP 13	AUG 19	SEP 13	AUG 19	SEP 13
Stn.	Temp.	Temp.	D.O.	D.O.	C1	Cl	B.O.D.	B.O.D
L49 -1	20.0	17.5	7.5	_	0.0	1.5	1.3	-
2	19.5	16.5	7.6	9.0	0.0	0.0	1.0	1,6
3 4	19.5	16.5	7.5	9.5	0.0	0.0	0.7	1.6
4	19.0	16.0	7.7	-	0.0	0.0	1.0	-
5	19.0	16.5	7.7	9.3	0.0	0.0	1.3	1.4
6	19.0	16.5	8.2	9.0	0.0	0.0	0.7	1.3
7	17.5	17.0	8.1	8.6	0.0	0.0	1.2	0.7
8	16.0	15.5	7.6	9.0	0.0	0.0	0.9	1.1
9	15.5	15.0	7.5	9.0	0.0	0.0	1.2	1.6
10	17.5	15.0	8.5	9.2	0.0	0.0	1.0	1.2
11	21.0	10.0	8.2	8.6	1.0	0.0	1.7	1.1
12	17.0	11.0	7.6	8.6	0.5	2.0	1.8	1.8
13	17.5	11.0	8.2	8.8	3.0	0.0	4.5	1.4
14	16.5	8.5	7.9	9.3	0.0	0.0	0.9	1.3
15	17.0	8.5	8.2	10.2	0.0	0.5	1.4	1.8
16	16.5	8.5	7.8	9.5	0.0	0.0	1.1	1.5
17	16.5	9.0	7.3	9.1	0.0	0.0	4.2	1.4
18	16.0	9.5	8.3	2.5	2.0	1.0	2.9	>2.5
19	18.0	8.5	8.3	10.7	0.0	0.5	6.5	2.1
20	18.0	8.5	8.2	10.3	0.0	0.5	1.7	1.6
21	16.0	9.0	8.9	10.3	6.0	1.0	2.4	1.7
22	16.0	8.5	8.6	10.0	0.0	0.0	3.4	1.3
23	17:5	8.5	7.8	10.0	0.0	0.0	1.7	1.7
24	18.5	8.0	7.9	9.8	0.0	0.0 0.0	1.7	1.3
. 25	18.0	8.0	7.9	9.8	0.0	0.0	1.8	1.5
26 28	15.0	8.0 8.0	7.9 8.1	9.5 9.6	0.0	0.0	1.9 1.2	1.6 1.0
28	15.5	8.0	8.1	9.0	0.0	0.0	1.2	1.0
29	20.5	13.5	8.1	9.0	0.0	0.0	0.9	0.9
3 0 ·	19.0	13.5	8.2	9.1	0.0	0.0	0.8	1.0
31	20.0	13.5	8.0	8.9	0.0	0.0	1.0	1.0
32	17.5	13.5	8.3	9.3	0.0	0.0	1.0	1.7
33	18.5	14.0	8.1	8.8	0.0	0.0	1.0	0.5
34	19.0	14.0	7.6	8.8	0.0	0.0	0.9	0.6

TABLE 17. (Continued)

AUG 19	SEP 13	AUG 19	SEP 13	AUG 19	SEP 13
Cu	Cu	Zn	Zn	Fe	Fe
	<0.1	2.6	2.6	0.2	<0.1
<0.1	<0.1	1.8	4.1	0.2	0.2
<0.1	<0.1	1.7	3.5	0.2	<0.1
. 0.0	<0.1	1.6	2.7	0.2	<0.1
<0.1	<0.1	1.7	3.0	0.2	<0.1
<0.1	<0.1	1.7	3.5	0.2	0.1
<0.1	<0.1	1.8	4.8	0.2	<0.1
0.0	<0.1	2.0	5.3	0.1	<0.1
0.0	<0.1	2.0	5.3	0.1	0.2
0.0	<0.1	1.9	4.7	0.1	<0.1
0.0	<0.1	5.1	15.0	0.1	0.4
0.0	<0.1	6.8	7.3	0.2	0.2
0.0	<0.1	6.5	21.0	0.1	0.2
0.0	<0.1	0.5	2.0	0.1	<0.1
0.0	<0.1	0.3	2.1	0.2	<0.1
0.0 0.0	<0.1	0.3	1.1	0.1	<0.1
<0.1	<0.1	012	1.0	0.2	<0.1
<0.1	<0.1	0.2	0.9	0.2	<0.1
0.1	<0.1	0.4	1.7	0.1	<0.1
<0.1	<0.1	C.6	1.5	0.1	<0.1
<0.1	<0.1	0.6	1.3	0.1	0.1
<0.1	<0.1	0.7	2.4	0.1	<0.1
0.0	<0.1	0.8	2.8	0.1	<0.1
0.0	<0.1	1.0	2.7	0.2	<0.1
0.0	<0.1	1.0	0.3	0.1	0.1
0.0	<0.1	<0.1	0.2	0.1	<0.1
0.0	<0.1	<0.1	<0.1	0.1	<0.1
0.0	<0.1	<0.1	<0.1	0.2	<0.1
0.0	<0.1	<0.1	<0.1	0.2	<0.1
0.0	<0.1	<0.1	<0.1	0.1	0.1
0.0	<0.1	<0.1	<0.1	0.1	<0.1
0.0	<0.1	<0.1	<0.1	0.1	<0.1
<0.1 0.0	<0.1	<0.1	<0.1	0.2	<0.1

TABLE 17. (Continued)

OCT 30	NOV 24	OCT 30	NOV 24	OCT 30	NOV 24	OCT 30	NOV 24	OCT 30	NOV 30	OCT 30
Stn.	Temp.	Temp.	D.O.	D.O.	B.O.D.	B.O.D.	Zn	Zn	Fe	Fe
49-1	8.0	5.0	10.6	11.2	1.5	2.8	5.1	3.5	0.1	0.1
2	8.0	4.5	_	11.2	_	0.3	4.8	3.6	0.1	0.1
3	8.5	4.0	-	11.5	_	2.4	5.3	3.7	0.1	0.1
4	8.0	4.0	-	11.7	_	5.4	6.4	4.5	<0.1	0.1
5	8.0	5.0	-	11.3	_	2.0	5.8	7.0	0.1	0.1
6	8.0	5.5	10.1	11.0	1.8	_	5.5	5.9	<0.1	0.1
7	8.0	5.5	_	11.0	-	1.0	5.3	5.0	0.1	0.1.
8	9.0	4.5	-	11.5	-	6.3	5.3	5.3	0.1	<0.1
9	9.0	4.5	_	11.4	_	1.6	5.6	5.6	0.1	<0.1
10	9.0	4.5	10.6	11.4	1.7	1.1	5.0	5.0	0.1	0.1
					1.7		3.0	3.0	0.1	
11	10.0	5.0	10.1	11.2	1.7	2.0	13.0	12.0	0.1	<0.1
12	9.5	5.0	9.3	11.2	0.9	4.2	17.5	11.8	0.1	<0.1
13	10.0	5.5	9.6	11.3	1.7	4.8	17.5	13.5	<0.1	<0.1
14	7.5	3.0	10.7	11.4	1.8	_	2.7	3.4	<0.1	<0.1
15	7.5	3.0	10.5	12.3	1.4	2.7	2.4	3.4	<0.1	<0.1
16	7.0	3.0	10.2	11.9	1.3	2.3	2.2	3.4	<0.1	<0.1
17	8.0	3.0	9.6	11.6	1.5	2.6	1.2	2.6	<0.1	<0.1
18	7.5	3.0	7.4	9.4	2.5	_	0.2	3.1	<0.1	<0.1
19	7.2	`2.0	10.6	12.7	2.5	3.6	2.3	4.0	0.1	<0.1
20	7.0	2.0	_	12.3	- -	2.8	2.7	4.0	0.1	<0.1
21	7.0	2.0	10.7	12.4	2.8	4.5	2.6	3.3	<0.1	<0.1
22	7.0	1.5	10.6	12.7	2.3	3.5	2.8	4.0	<0.1	<0.1
23	7.0	1.5	10.8	12.3	2.3	3.8	2.9	4.2	<0.1	<0.1
24	8.0	1.5	-	12.4	2.9 -	3.9	2.9	0.5	<0.1	<0.1
25	7.5	1.0	10.6	12.4	1.7	3.3	0.2	0.2	<0.1	<0.1
26	7.2	1.0	10.7	12.5		3.1	0.1	0.1	<0.1	<0.1
28	6.5	1.0	10.7	12.0	2.9	3.0	<0.1	<0.1	<0.1	<0.1
20	0.5	200	10.5	12.0	1.0	3.0	\0.1	VU.1	\0.1	٧٠.١
29	7.5	3.0	_	11.9	_	3.2	<0.1	<0.1	<0.1	<0.1
30	7.0	3.0	10.9	12.1	1.2	2.6	<0.1	<0.1	<0.1	<0.1
31	8.0	3.0	-	11.8	-	1.5	<0.1	<0.1	<0.1	<0.1
32	8.0	4.0	_	11.7	_	2.0	<0.1	<0.1	<0.1	<0.1
33	8.0	4.0	_	12.2	_	3.0	<0.1	<0.1	<0.1	<0.1
34	8.5	5.0	10.4	11.4	1.0	-	<0.1	<0.1	<0.1	<0.1
J-1	0.5		10.4	44.7	1.0	-	·0.1	\U.1	10.1	-0.1

TABLE 18. WATER QUALITY STABILITY, RIVER REGION #2 - 1969-1971

1969		8/5	8/26	9/23	10/8	11/18	12/10
Station	Constituent			Value	8		
153007	Temp DO NH3-N NO2-N NO3-N Phos C1 Coli Iron Lead Zinc	18.4 8.9 .003 .01 .04 1 25 670 93 3,850	20.5 9.0 .027 .010 .02 .03 6 1750 275 30 5,700	13.0 9.0 .090 .003 .08 .03	10.5 10.0 .060 .003 .09 .01 1 2800 400 50 4,400	5.0 10.4 .060 .002 .13 .01 2 5 340 45 6,040	.080 .004 .15 .01 1 40 76 32 13,20
153019	Temp DO NH3-N NO2-N NO3-N Phos C1 Coli Iron Lead Zinc	14.3 8.5 .003 .02 .03 1 130 110 12	18.5 8.7 .036 .010 .02 .01 1 400 110 12	12.5 9.6 .20 .002 .04 .03 1 170 10	10.5 9.0 .02 .001 .02 .01 520 150 10	5.2 11.3 .01 .001 .01 .01 1 100 39 9	4.0 12.0 .01 .001 .02 .04 1 50 23 5
153018	Temp DO NH3-N NO2-N NO3-N Phos Chlor Iron Lead Zinc	15.2 8.5 .003 .03 .05 1 370 69 4,750	17.5 8.9 .027 .010 .01 .03 2 215 57 6,200	12.7 9.3 .070 .003 .10 .03 620 55 6,800	11.0 9.2 .070 .003 .09 .03 1 290 85 5,780	4.8 11.0 .070 .002 .12 .03 2 2220 9 4,700	4.0 11.0 .080 .003 .14 .04 1 1850 190 655
151017	Cl Iron Nitrate		8/8 27 10		9/4 30 100		

TABLE 18. (Continued)

1970		8/12	9/28
Station	Constituent	Va	lues
153007	Temp DO NH3-N NO2-N NO3-N Phos Cl Lead Zinc Coli	18.2 10.1 .01 .001 .001 .13 2 7 3,640	14.0 8.5 .02 .003 .10 .05 1 1 3,600
153018	Temp DO NH3-N NO2-N NO3-N Phos C1 Iron Lead Coli	17.3 8.1 .01 .001 .03 .02 1 360 75	14.0 8.6 .02 .003 .10 .05 1 470 100
153019	Temp DO NH3-N NO2-N NO3-N Phos C1 Iron Lead Co1i	15.2 8.0 .01 .001 .01 .12 1 100 28 180	13 9.0 .01 .001 .01 .01 1 470 100
153023	Temp DO NH3-N NO2-N NO3-N Phos C1 Cu Iron Lead Zinc Coli	13.8 8.5 .29 .006 .29 .05 2 50 2200 433	16.0 8.7 .16 .015 .42 .19 2 30 2000 750

TABLE 18. (Continued)

1971		8/25	8/30	9/23
Station	Constituent	Valu	es	
153007	Temp DO Phos NH3-N NO2-N NO3-N C1 Coli	17.5 9.3 .03 .002 .002 .02	20.5 10.3 .07 .13 0 .10 1 4500	13.0 11.5 .40 .06 0 .10 1
		, '		
153019	Temp DO NH3-N NO2-N NO3-N Col1 Ch1 Phos Amm	17.7 9.2 .012 .001 .001 100	18.5 9.0 .04 0 0 1200 1 .08	10.0 10.2 .06 0 0 530 1 .96
153023	Temp DO NH3-N NO2-N NO3-N Phos Ch1 Co1i Amm	•	19.5 9.5 .76 0 .3 1.1 2 4500 1.0	12.5 11.2 .53 0 .3 2.9 2 1200

TABLE 19. WATER QUALITY STABILITY, RIVER REGION #3, 1969-1971

		7/21	8/9	9/21	10/12	11/16	12/14
Station	Constituent			Values			
4195	Temp DO Chl Nítrate	24.0 8.7 .1 0	23.0 8.0 .4 1.1	17.0 8.0 .2 .6	11.7 11.0 .2 .6	7.0 10.0 0	6.0 10.1 .3 .6
			8/20	9/17	10/21	11/20	12/10
153022	Temp DO NH3-N NO2-N NO3-N Phos Ch1 Copper Iron Lead Zinc Coli		21.5 8.1 .06 .01 .04 .07 1 5 210 7	17.7 8.8 .02 .001 .04 .06	10.0 9.9 .02 .001 .01 .04 1 2 98 9 400 180	7.0 11.0 .01 .001 .04 2 4 97 13 670 345	5.0 10.9 .02 .001 .05 .04 1 3 164 5 302
150114	Temp DO NH3-N NO2-N NO3-N Phos C1 Cu Iron Lead Zinc		21.5 8.2 .04 .01 .05 .06 2 3 140 7	17.7 8.8 .04 .001 .05 .06 4 220 10			5.0 10.9 .02 .001 .08 .04 1 4 82 5 302

TABLE 19. (Continued)

Spokane River	1970	7/26	7/28	8/23	8/26	9/2	9/20
Station Co	onstituent			7	/alues		
4195	Temp DO Chl Nitrate	24.0 9		24.0 8.6 .2 .3			16.0 8.8 .1 .4
150114	Temp DO NH3-N NO2-N NO3-N Phos Ch1 Copper Lead Iron Coli		21.9 8.0 .01 1 6 6 100 900		23.0 8.4 .01 .001 .03 .02 1 20 100 40	.01 .001 .005 .03 1	
153022	Temp DO NH3-N NO2-N NO3-N Phos Ch1 Copper Iron Lead Coli		21.8 7.9 2 6 100 5		22.0 7.9 .02 .001 .03 .03 1 20 40 100 25	.01 .001 .001 .03	
Spokane Rive	r 1971		7/25	8/1	8/15	9/6	9/19
4195	Temp DO NH3-N NO2-N NO3-N Phos Copper Lead Zinc Coli		23.4 7.6 .06 0 .02 .02 1 7 120 400	25.2 8.0 .11 .01 .08 .02 1 4 230 400	29.2 8.2 .05 0 .01 .02 2 3 120 1600	17.8 9.8 .07 0 .30 .03 1 6 180 2000	16.4 9.8 .05 0 .24 .02 0 6 160

TABLE 20. WATER QUALITY STABILITY, RIVER REGION #4 - 1968 AND 1971

1968		8/20	9/10
Station (Source 31)	Constituent	Valu	es
WWPC-1	DO	9.8	8.6
	Temp	12.3	12.0
	Coli	6200	2100
	Phos	.02	.01 .05
	NO3-N Nitrogen	nil .2	.34
	Ch1	2.5	1.5
	5.1.1		
WWPC-2	DO	8.7	8.6
	Temp	12.5	12.0 1300
	Coli Phos	3600 .01	.01
	NO3-N	1.20	.23
	Nitrogen ,	.1	.25
	Ch1	2.8	1.0
WWPC-3	DO	8.6	8.2
WWI C-3	Temp	12.9	12.2
	Coli	2200	5000
	Phos	.003	.01
	NO3-N	1.40	.11
	Nitrogen	.1	.25
	Ch1	2.5	1.0
WWPC-4	DO	9.9	9.8
	Temp	15.0	15.0
	Coli	5200	5400
	Phos	.07 .66	.02 .20
	NO3-N	.66	.20 .45
	Nitrogen Chl	3.0	1.5
	ong	3.0	212
WWPC-5	DO	9.4	9.6
	Temp	14.9	15.0
	Coli	5400	7000
	Phos	.01	.01
	NO3-N	1.06	1.11
	Nitrogen Chl	.1 3.5	.50 1.0

TABLE 20. (Continued)

1968		8/20		9/10		
Station	Constituent		Values			
(Source 81) WWPC-7	DO Temp Coli Phos NO3-N Nitrogen Chl	9.9 14.9 2700 .01 .70 .1		9.4 14.5 3100 .01 ni1 .36		
WWPC-9	DO Temp Col1 Phos NO3-N Nitrogen Ch1	10.4 16.0 11,000 .01 .52 .2		10.6 16.5 630 .01 .18 .31		
WWPC-10	DO Temp Coli Phos NO3-N Nitrogen Ch1	9.7 15.2 13,000 .01 n11 .3		9.8 15.5 450 .01 ni1 .28 2.0		
<u> 1971</u>		7/25	8/1	8/15	9/6	9/
4319	Temp DO NH3-N NO3-N NO2-N Phos Co11	15.9 8.6 .02 .01 1.3 .04 2500	15.8 8.2 .02 .03 1.2 .04 2200	13.7 9.0 .03 .01 1.3 .02 1600	12.8 10.0 .02 .02 2.1 .02 800	9. 10 .0 0 2.

TABLE 21. WATER QUALITY STABILITY, RIVER REGION #5, 1970 AND 1971

1970		7/21	7/28	8/4	8/18	8/23	9/1	9/15	9/20	9/22	9/29	10/6
Station	Constituent					•	Values					
4330	Coll Temp Cl Nitrate DO					930 19 2.3 2.4 4.8			70 16 2.2 2.4 5.5			
541232	Temp DO NH3-N	21.1 8.3 0	18.3 7.3	21.1 8.3	19.4 5.3 .09		19.4 5.4	17.2 5.2 0		16.1 3.4	14.6 5.8	13.4 5.5
	NH3-N NO3-N Phos Coli	.22 .09 46		.34	.09 .99 .03 50		.34 .04 55	.63 .04 180		200	.52 1800	.58 .02 2200
<u>1971</u>				8/1		8/15		9/1		9/19		
4330	C1 Nitrite NH3-N Nitrate Phos Temp DO Coli Cu Lead Zinc			1.4 .19 .06 .49 .04 20.2 6.1 800 2		1.9 .02 .05 .77 .07 20.0 3.1 500 0		2.8 .04 .21 1.1 .10 17.5 3.7 1200 0		2.0 .01 .01 .39 .07 16.7 5.9 7500		

Although there was a conspicuous lack of DO data in 1971, a review of the available values showed that DO was quite stable in August 1971, falling between 9.0 and 10.0, while values on the two days in 1970 fell between 6.4 and 9.2. Since the other constituent data was equally variable in both years (see Table 16), 1971 was still the preferred year.

Region 2 - Coeur d'Alene River

The low flow period with the most information obviously falls in August and September of 1969. The data represented was primarily taken from "Effect of Industrial and Domestic Effluents on the Water Quality of the Coeur d'Alene River Basin," by Mink, Williams and Wallace, March 1971. The months selected for this region are August and September 1969, because they have considerably more data than any other low flow period. No hydrograph was prepared for this region because flow fluctuation, as shown in Table 15 was so slight. Water quality values were also reasonably stable in 1969 (see Tables 17 and 18) as compared with 1970 and 1971.

Region 3 - Upper Spokane: Coeur d'Alene Lake to Long Lake

Hydrographs were drawn for all three years in this region since the choice of a preferred simulation period was not at all apparent from the amounts of quality data alone. Although 1971 had a few more constituents represented throughout this region, this was the year with the largest fluctuations in flow rates. Only one data (September 18) with water quality data in 1971 was preceded by a reasonable duration of near-steady flow, so this year was rejected. The low flow periods in 1969 and 1970 were periods of similar water quality data availability. Of the two water quality dates in 1970, one (August 26) coincided with a sharp local fluctuation. In 1969 there was a step change in flow level in the middle of the low flow period, but the water quality data dates (August 20 and September 17) are each preceded by at least 20 days of very steady flow (see Figure 23); water quality data stability verified the choice of 1969 as the year to simulate (see Table 19). These months are therefore preferred and recommended.

Region 4 - Little Spokane

The water quality data for two days in 1968 greatly exceeded that available in any other year; further, the 1968 quality data was the most stable (see Table 20). This year was therefore clearly preferred. The 1968 steady state flow period had one minor peak during the first days of September. This peak, however, did not occur during the days in which water quality data was available. Due to the stability and relatively large quantity of quality data on August 20 and September 10, 1968, these months were chosen for the simulation periods.

Region 5 - Lower Spokane: Long Lake to FDR Lake

The choice was clearly between 1970 and 1971 periods on the basis of quality data. During the low flow periods there were fluctuations in flow rates. However, the fluctuations are relatively minor when compared with the annual variation of flow. In both 1970 and 1971 water quality data was fairly unstable (see Table 21). Although 1970 was possibly slightly more stable, there were considerably more water quality constituents reported in 1971. August and September 1971 were chosen as being the best period overall.

Summary: Rivers

As a result of the analysis made, including review of effluent data and the steadiness of quality levels within low flow periods, it is recommended that data from the following periods be used for the model simulation of the several river regions.

River Region 1 - St. Joe - St. Maries	July 16 - Sept. 16, 1971
River Region 2 - Coeur d'Alene	Aug. 1 - Sept. 30, 1969
River Region 3 - Upper Spokane	Aug. 1 - Sept. 30, 1969
River Region 4 - Little Spokane	July 15 - Sept. 15, 1968
River Region 5 - Lower Spokane	Aug. 1 - Sept. 30, 1971

SELECTION OF SIMULATION PERIODS: LAKES

The contract called for a six month simulation period (June through November). The objective in selecting simulation periods for the lakes was to specify periods providing optimal types and quantities of needed data. In order to facilitate a decision, Tables 22 through 33 were prepared showing availability of all dated water quality, meteorological and inflow-outflow data for each of the lakes and for each year in which there was some data besides meteorological data (which is available in all years). The numbers under "Source" on these Tables refer to Bibliography references.

The great majority of the available effluent data is undated (see Table 3), so they cannot influence the selection of simulation periods. The same question existed as to the validity of earlier quality data as is noted under the corresponding section for river simulation periods.

RECOMMENDED SIMULATION PERIODS: LAKES

The following sections discuss data availability and the reasons for recommending the simulation period which was selected for each lake.

TABLE 22. DATA AVAILABILITY - LONG LAKE

					196	6		
Source	No. of Stations	Type of Data Recorded	Turna	11	A~	C	0-5	37
		Type of Data Recorded	June	July	Aug.	Sept.	oce.	NOA
5	1	water surface elevations		T	T	1:::===		:-
29	?	daily inflow						
USGS	1	daily average discharge					AND COMMENTS	e recessor
46	1	discharge water temperatures			1	-		,
30	7	thermal stratification						
30	8	values by depth: temp, DO, PO4						1
		NO3-N, NO2-N, NH3-N, nitroger	1	i	1			
29	6	values by depth: temp, DO,		17				
		NO3-N. PO4						
USGS	1	temp, DO, N, NH3-N, NO2-N,		1				
	-	NO3-N, PO4, coliform	121		1	je		t <u>-</u> -
STORET	1	intensive monitoring: temp,				ļi.		
BIOREI	-	DO, coliform, PO4, NH3-N,		 	 			
		NO2-N, NO3-N		ļ- 			;	
STORET	1							
310/021	4	temp, DO, PO4, C1, NH3-N, NO2-N	-			1		
29	5	NO3-N, N, Zn, coliform						
45	1	temp and DO depth profile						
43 75	_	DO at various depths						
	1	air temp and humidity		1		1		
NOAA	1	air temp, wind speed, sky cover,			erabili.		No.	
***		dry bulb, wet bulb averages	The state of the s	-				T-METER
NOAA	1	solar radiation	FERRE					
NOAA	3	air temp	HERET.		SALL	Andrew Trees	N 2 E	T. CLES
NOAA	1	evaporation and wind				0.1.2.2.2		
USGS	2	inflow data: temp, DO,	1:			11.7.1	1	
		coliform, discharge				<u> - </u>		
USGS	1	inflow data: N, NO2-N,		<u> </u>	·	<u> </u>		
		NO3-N, NH3-N, PO4		1				
បន់ចំន	1	outflow data: chloride, NO3	1					
		N, NO2, NH3, PO4,		<u> </u>				
		temp, DO, coliform		1			;	
USGS	1	daily inflows	6878.65.52	er en	·		· Compression of the Compression of t	endou en in

Source	No. of Stations	Type of Data Recorded	June	July	Aug.	Sept.	Oct.	Nov.
5	1	water surface elevations						
29	?	daily inflow	j			· · · · · · · · · · · · · · · · · · ·		
USGS	1	daily average discharge		-		272		Total Control
46	1	discharge water temperatures		1		1	· ·	
30	7	thermal stratification						
30	8	values by depth: temp, DO, PO4 NO3-N, NO2-N, NH3-N, nitrogen						
29	6	values by depth: temp, DO, NO3-N, PO4					-III	
USGS	1	temp, DO, N, NH3-N, NO2-N, NO3-N, PO4, coliform						
STORET	1	intensive monitoring: temp, DO, coliform, PO4, NH3-N, NO2-N, NO3-N				=== === :===		
STORET	1	temp, DO, PO4, C1, NH3-N, NO2-N NO3-N, N, Zn, coliform		- E		N.	1	
29	5	temp and DO depth profile			127 - 27			
45	1	DO at various depths]		
75	1	air temp and humidity	I ETTS	سامعرم عطانات	ELECK I.	633		
NOAA	1	air temp, wind speed, sky cover, dry bulb, wet bulb averages			A STATE OF THE			
NOAA	1	solar radiation	And and an article	00000	HUEL TAS	X 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		7727722
NOAA	3	air temp		170.			NINE AS ASSESSED.	355555
NOAA	1	evaporation and wind					With the second	Z-11-6-2
, USGS	2	<pre>inflow data: temp, DO, coliform, discharge</pre>						
USGS	1	inflow data: N, NO2-N, NO3-N, NH3-N, PO4						
บรรัร	1	outflow data: chloride, NO3 N, NO2, NH3, PO4, temp, DO, coliform						
USGS	1	daily inflows				Towns (
		•		1				

Source	No. of Stations	Type of Data Recorded	June	July	Aug.	Sept.	Oct.	Nov.
5	1	water surface elevations		Ţ <u>.</u>		ļ		
29	?	daily inflow	LIFT					`
USGS	i	daily average discharge	*****		*****	erecentaries	and the service	4
46	ī	discharge water temperatures	-			THE PERSON NAMED IN		
30	7	thermal stratification	F17.7.7.					
30	8	values by depth: temp, DO, PO4						
30	•	NO3-N, NO2-N, NH3-N, nitrogen	i					
29	6	values by depth: temp, DO,	1111111					
	•	NO3-N, PO4	1					
USGS	1	temp, DO, N, NH3-N, NO2-N,			·			
	_	NO3-N, PO4, coliform			1=====			
STORET	1	intensive monitoring: temp,						
	_	DO, coliform, PO4, NH3-N,					- -	
		NO2-N, NO3-N						
STORET	1	temp, DO, PO4, C1, NH3-N, NO2-N	- a-	,				
		NO3-N, N, Zn, coliform						
29	5	temp and DO depth profile						
45	ī	DO at various depths				1	1	
75	1	air temp and humidity	- E.	i unuma	TELESTA:	17318		
NOAA	1	air temp, wind speed, sky cover,			1			
		dry bulb, wet bulb averages	1212	7.			13.700.71	ス・作品 登録
NOAA	1	solar radiation					A. D. C.	
NOAA	3	air temp			المستنافظة			
NOAA	1	evaporation and wind						
USGS	2	inflow data: temp, DO,		·		ادعتتا		
		coliform, discharge	Li					
USGS	1	inflow data: N, NO2-N,		ļ.——	:			
		NO3-N, NH3-N, PO4	17.					
uscs	1	outflow data: chloride, NO3	B		· · · · · · · · · · · · · · · · · · ·	· &	,	
		N, NO2, NH3, PO4,						B
		temp, DO, coliform	:::: U:.	J		v		
USGS	1	daily inflows	E AND LES		1			- P. A. 2
		•				!		•

TABLE 25. DATA AVAILABILITY - LONG LAKE

					197	1		
	No. of							
Source	Stations	Type of Data Recorded	June	July	Aug.	Sept.	Oct.	Nov.
5	1	water surface elevations		1				
29	?	daily inflow	. 22 E	q ssag	E	22 GE	1	
USGS	1	daily average discharge						
46	1	discharge water temperatures	-		Park 15-7-5		100 m	
30	7	thermal stratification	. :			į		
30	8	values by depth: temp, DO, PO4 NO3-N, NO2-N, NH3-N, nitroger						
29	6	values by depth: temp, DO, NO3-N, PO4			. 111	2 5 0 E 0 E		
USGS	1	temp, DO, N, NH3-N, NO2-N, NO3-N, PO4, coliform	8 E	1 5		8 8		
STORET	1	<pre>intensive monitoring: temp, DO, coliform, PO4, NH3-N, NO2-N, NO3-N</pre>					1	
STORET	1	temp, DO, PO4, C1, NH3-N, NO2-N NO3-N, N, Zn, coliform			0			
29	5	temp and DO depth profile				1 5	<u> </u>	
45	1	DO at various depths		<u> </u>	<u> </u>			
75	1	air temp and humidity		1				
NOAA	1	air temp, wind speed, sky cover, dry bulb, wet bulb averages						
NOAA	1	solar radiation	Carrier to	to represent		anger i til de ty A tidlitan dian i	or a man may rang	
NOAA	3	air temp	100			4		
NOAA	1	evaporation and wind			1742			
USGS	2	inflow data: temp, DO, coliform, discharge) y	1 5 7 8	7 T	D 9		
USGS	1	inflow data: N, NO2-N, NO3-N, NH3-N, PO4	5_2		9 U) ;		
USGS	1	outflow data: chloride, NO3 N, NO2, NH3, PO4, temp, DO, coliform	1 B	# T	3	1 1		
USGS	1	daily inflows	F I .	مرتخشمان،دسم ا ه ه	enter inventoriore. No 18	· Martineria. · Martineria.	! i	
U 3G3	1	daily inilows	Participation .	A STATE OF THE STA	1 - VI	r_xerenezeni. I	to the same of	222

					197	72		
Source	No. of Stations	Type of Data Recorded	June	July	Aug.	Sept.	Oct.	Nov.
5	1	water surface elevations		1777				
29	?	daily inflow		ļ ·		!- · 		- :
USGS	1	daily average discharge	Tax Date		ا د العيكان ميد ته ي		ii	
46	1	discharge water temperatures				建西州州	The second	223 · · · ·
30	7	thermal stratification	1:			i - · · - · ·	· ;	
30	8	values by depth: temp, DO, PO4 NO3-N, NO2-N, NH3-N, nitrogen						· · · · · · · · · · ·
29	6	values by depth: temp, DO, NO3-N, PO4				· · · · · · · · · · · · · · · · · · ·	-	
USGS	1	temp, DO, N, NH3-N, NO2-N, NO3-N, PO4, coliform						
STORET	1	intensive monitoring: temp, DO, coliform, PO4, NH3-N, NO2-N, NO3-N						
STORET	1	temp, DO, PO4, C1, NH3-N, NO2-N NO3-N, N, Zn, coliform						
29	5	temp and DO depth profile			-11			
45	1	DO at various depths			BER.	T		
75	1	air temp and humidity						
NOAA	1	air temp, wind speed, sky cover, dry bulb, wet bulb averages						
NOAA	1	solar radiation						
NOAA	3	air temp	Received to					
NOAA	1	evaporation and wind			7.7.2.370			
USGS	2	inflow data: temp, DO, coliform, discharge						
usgs	1	inflow data: N, NO2-N, NO3-N, NH3-N, PO4			1		-	
usĠs	1	outflow data: chloride, NO3 N, NO2, NH3, PO4, temp, DO, coliform						
USGS	1	daily inflows		andre .	perana Perana			

TABLE 27. DATA AVAILABILITY - SPOKANE RIVER ARM OF FDR LAKE

					197	0		
	No. of		_			_		
Source	Stations	Type of Data Recorded	June	July	Aug.	Sept.	Oct.	Nov.
29	1	water surface elevations	12000		X	B 8	* # 1	1 1
29	6	temp and DO depth profiles			::::::	:2::		1
STORET	1	temp, DO						1
STORET	6	temp, DO, NH3-N, NO3-N, nitroger PO4, coliform, secchi disc	n . # #	E 9 2 E	E		21. 1 21. 1	
29	6	coliform, DO, temp, PO4, NO3-N	D_5	9 3 2 0		QD	لسلا	¥
NOAA	2	air temp			Ches Lan			
NOAA	1	<pre>*wind, sky cover, wet bulb, dry bulb, humidity</pre>						2225
NOAA	1	solar radiation	The same	-		م ينه مد بساميسه	***************************************	
NOAA	1	*evaporation and wind		1			FERE	
STORET	1	inflow data: temp, DO, NH3, NO3, N, PO4, coliform, secchi disc	E 2	200 S	8 B] - j
USGS ·	1	daily inflows						

TABLE 28. DATA AVAILABILITY - SPOKANE RIVER ARM OF FDR LAKE

	No. of		1971
Source	Stations	Type of Data Recorded	June July Aug. Sept. Oct. Nov.
29	1	water surface elevations	
29	6	temp and DO depth profiles	
STORET	1	temp, DO	
STORET	6	temp, DO, NH3-N, NO3-N, nitrogen PO4, coliform, secchi disc	
29	6	coliform, DO, temp, PO4, NO3-N	
NOAA	2	air temp	
NOAA	1	*wind, sky cover, wet bulb, dry	The state of the s
		bulb, humidity	and the second s
NOAA	1	solar radiation	
NOAA	1	*evaporation and wind	
STORET	1	inflow data: temp, DO,	
		NH3, NO3, N, PO4, coliform, secchi disc	
USGS	1	daily inflows	
		t station at Spokane	Let 1111 Hards hard a street 111 Street 111 Anna 111

TABLE 29. DATA AVAILABILITY - SPOKANE RIVER ARM OF FDR LAKE

			1972
	No. of		
Source	Stations	Type of Data Recorded	June July Aug. Sept. Oct. Nov.
29	1	water surface elevations	
29	6	temp and DO depth profiles	
STORET	1	temp, DO	
STORET	6	temp, DO, NH3-N, NO3-N, nitrogen PO4, coliform, secchi disc	
29	6	coliform, DO, temp, PO4, NO3-N	
NOAA	2	air temp	
NOAA	1	*wind, sky cover, wet bulb, dry	
		bulb, humidity	
NOAA	1	solar radiation	
NOAA	1	*evaporation and wind	
STORET	1	inflow data: temp, DO, NH3, NO3, N, PO4, coliform, secchi disc	
USGS	1	daily inflows	
* data	from nearest	t station at Spokane	· · · · · · · · ·

TABLE 30. DATA AVAILABILITY - COEUR D'ALENE LAKE

_	No. of	Mars of Data Passalad	tuna	7.,1,,	A.,,a	Sept.	000	You
Source	Stations	Type of Data Recorded	June	July	Aug.	sept.	000.	NOV.
USGS	1	water surface elevations			AND THE SECOND			
5	1	water surface elevations		·		1		i.
43	3	6 month average depth		<u>'</u>				· · · · · · ·
41	3	temp, DO,						
		TDS, C1, NO3, PO4, NH3				# . T.		
41	2	temp, DO						} · i-
		TDS, C1, NO3, PO4, NH3			:-:::::::::::::::::::::::::::::::::::::			
STORET	1	temp, DO, NH3-N,						
		PO4, C1, NO3,				·		
		coliform	-777					
STORET	1	temp, DO, NH3-N						
		PO4, C1, NO3,		1-				
		coliform		L		<u>i</u>	1	i
STORET	1	temp, DO, NH3-N,		15500			.=:=:	
		NO3, coliform, PO4, C1	31	ļ <u>-</u>	1		:- :	
42	?	18 month average: temp, DO, BOD,	arres of	~ 2177 <u>0</u> 02	X19513652		SCICETURA	
		NO3, PO4, Zn, Secchi disc,	KHE THE	The part of the control of the contr	THE STATE OF THE S		ALCO TO	
		coeff. ext.			eranar	TET ST		N. 1917
43	12	6 month average DO				1	i	i :_:-
41	14	Zn, Cu, Pb, Cd						
NOAA	2	air temp	3 27.37.38.	CONTRACTOR OF THE PARTY OF THE	132			
NOAA	1	*sky cover, dry bulb, wet bulb		11:51				
NOAA	ī	*evaporation and wind			100		anama	
NOAA	ī	*solar radiation				T		
47	ī	inflow data: temp		125	Ī	1 :		1
	-	DO .	1					
		chloride, mitrate		1	- ""	lui di vi	1	1 - 1
		coliform						· · · · ·
		TDS, armonia, PO4	1			-		1
STORET	1	inflow data: coliform,	1	1	1			
	_	temp, DO, NH3, NO3, PO4,						
		chloride					1	
STORET	1	outflow data: temp		[7.1			i	
010	_	DO, NH3, NO2, C1						
		coliform	1					
usgs	3	daily inflows			। इ.स.च्याचन		इत्यसम्बद्धाः सम्बद्धाः	
USGS	1	daily outflows			ر			
	-	- •			1			1
			}			i - I		;

TABLE 31. DATA AVAILABILITY - COEUR D'ALENE LAKE

Source	No. of Stations	Type of Data Recorded	June	July	Aug.	Sept.	Oct.	Nov.
USGS	1	water surface elevations	ARCHIE					Carrie and
5	1	water surface elevations	1					i
43	3	6 month average depth		122.54.7		<u> </u>	· ·	
41	3	temp, DO, TDS, C1, NO3, PO4, NH3						
41	2	temp, DO TDS, C1, NO3, PO4, NH3			a	1 1 1 1	1	
STORET	1	temp, DO, NH3-N, PO4, C1, NO3,						
		coliform	THE	laina:				
STORET'	1	temp, DO, NH3-N						
		PO4, C1, NO3,						
STORET	1	coliform temp, DO, NH3-N,		177171				
	_	NO3, coliform, PO4, C1					1	
42	?	18 month average: temp, DO, BOD, NO3, PO4, Zn, Secchi disc, coeff. ext.						
43	12	6 month average DO				1		AND CONTRACTOR
41	14	Zn, Cu, Pb, Cd		:-::			7 272	
NOAA	2	air temp	Action Action 2) स्वयुक्तकः भारतीयमुद्धः	्र साम्बर्धाः जनसङ्ख्या	an and the state of	+	CONTRACT.
NOAA	1	*sky cover, dry bulb, wet bulb	-	and the second of the second	the second second	ing the free factor of the second	الوائدة المعالدات ووصور عبه و ي	Sanda de de sales. Como esta de descripto
NOAA	î	*evaporation and wind		tri eman	al and a second	ina Makada Ngjaragaran	and areas (Section).	oruzen ituak Sekain Semigi
NOAA	î	*solar radiation	PERSONAL		Andreas and albeiras.	n wii, zi i i i Ni i Mar Xish	Market Street	NAC CARRES
47	ì	inflow data: temp				R		• 1
		chloride, nitrate				1.77	***	
		coliform	,					
		TDS, armonia, PO4	1	1. Tagi.,			1	•
STORET	1	inflow data: coliform,	1				10.1	
510101	•	temp, DO, NH3, NO3, PO4, chloride						
STORET	1	outflow data: temp	7.3.17.	15	1			
SIONEI	•	DO, NH3, NO2, C1			. 8			
uscs	3	daily inflows	120	1	محدد المالية ا	روي موارك المواركية المواركية	। h. मस्यासम ्य	respondent
USGS	1	daily outflows	EURIE	e ogeneen Boggetting		The second of th		
					1		1	. 1

TABLE 32. DATA AVAILABILITY - COEUR D'ALENE LAKE

Source	No. of Stations	Type of Data Recorded	June	July	197	'i Sept.	Oct.	Nov.
usgs	1	water surface elevations water surface elevations			12.000.5	en en en		
5	1			<u>i</u>		N SAMORY		
43.	3	6 month average depth	I	See Land		300		
41	3	temp, DO, TDS, C1, NO3, PO4, NH3						
41	2	temp, DO TDS, C1, NO3, PO4, NH3		F				
STORET	1	temp, DO, NH3-N, PO4, C1, NO3,	n	1-1511			-1111.	
		coliform	7.5				t	
STORET	1	temp, DO, NH3-N			lener v			
		PO4, C1, NO3,		· ÷-	· &			1
		coliform	g]	7.		111	1
STORET	1	temp, DO, NH3-N,	7.,					
010101	•	NO3, coliform, PO4, C1	1			}		1
42	?	18 month average: temp, DO, BOD,	1-1-1					
44	•	NO3, PO4. Zn. Secchi disc.						
		coeff. ext.						
43	12	6 month average DO		व रपञ्चन	245772		- CAN 188-17	1000
41	14	Zn. Cu. Pb. Cd	+			i	1	1
NOAA	2	air temp		ين ۽ طيفونين	and the same of	areas	i Santania pienia	
NOAA	1	*sky cover, dry bulb, wet bulb	Colonia -		ran grass	a iga maganga	SCIENCE C	0.3545
NOAA	1	*evaporation and wind	-	and the second of the second o	n in Salani		1	
NOAA	1	*solar radiation	Married - Mild	and a second	الروع ، المعاملات الم	r hand or still	reingage in the	ሰተ፡ፍኤፕሬፖራን
	1	inflow data: temp	-	1 700	t F M		arial a liver for W	
47	1	DO DO	1	• • •	3 8 83 . 8	: - .		E
		chloride, nitrate						
		coliform			E 12	·	 -	
		TDS, armonia, PO4	1					
				1.7.7.				
STORET	1	inflow data: coliform,	-B-	1		1		
		temp, DO, NH3, NO3, PO4,						
		chloride		1				1 :::::
STORET	1	outflow data: temp		 	A	 		
		DO, NH3, NO2, C1						
	_	coliform	·			ļ		!
USGS	3	daily inflows	12.00			TENESCA.	TEMES !	
USGS	1	daily outflows	THE REAL PROPERTY.	1	57 5 CHIT			
								:
				ــــــــــــــــــــــــــــــــــــــ	L		L	<u></u>

TABLE 33. DATA AVAILABILITY - COEUR D'ALENE LAKE

Source	No. of Stations	Type of Data Recorded	June	Ju1y	Aug.	Sept.	Oct.	Nov.
usgs	1	water surface elevations	MECHEC.		2 2 23	111224	: · :	
5	1	water surface elevations	THE REAL	ā.,				
43	3	6 month average depth		 		1	<u> </u>	 -
41	3	temp, DO, TDS, C1, NO3, PO4, NH3	1	1				
41	2	temp, DO TDS, C1, NO3, PO4, NH3		 	-		-	
STORET	1	temp, DO, NH3-N,	1					
SIONLI	•	PO4, C1, NO3,		1 1111111111111111111111111111111111111			- :====	
	_	coliform	i and all to			1.4		1
STORET	1	temp, DO, NH3-N	1.72					-: ::
		PO4, C1, NO3,		1		 		
	_	coliform		-1			h	ļ
STORET	1	temp, DO, NH3-N,	1		1.77.7			
	•	NO3, coliform, PO4, C1		1				
42	?	18 month average: temp, DO, BOD,	1.:	12:12:		L		
		NO3, 204, Zn, Secchi disc,		ļ				1:- :-
	••	coeff. ext.	П. 1				.:	1
43	12	6 month average DO		1-1				
41	14	Zn, Cu, Pb, Cđ	-		<u> </u>	ा राजसायकारकार) . स्थानसम्बद्धाः	;
NOAA NOAA	2 1	air temp *sky cover, dry bulb, wet bulb	Server Sales	rania.	معاولات المسائل المسائ مسائلات المسائل المسائ	and the second section of the section o	and the second second second	no reveni
NOAA	1	*evaporation and wind	· L	ASTRALT.	مان تسافست معرامات	Sandara Como	and results	
NOAA	1	*solar radiation		.,	ليان ۾ ڪاند ٿاناليان ۾ 1977 هندي ج	Takena	in the least of	a Sestimate
47	î	inflow data: temp	1333-46-46-4	1		1	;	:
47	•	DO .	1:::::		153			
		chloride, nitrate	ļ		(= _	 		
		coliform	1		2.22	:	-:	
e TODET	1	TDS, ammonia, PO4 inflow data: coliform,			111	7.174		1. ": ":
STORET	1	temp, DO, NH3, NO3, PO4,		i - ·	1			
		chloride		j.,.	1 : :		1	1 1
STORET	1	outflow data: temp	1::			::		
STORET		DO, NH3, NO2, C1				1 .		_
		coliform						
USGS	3	daily inflows			1: 1.2]
USGS	1	daily outflows		n es	***	7,000,000		:
9 303	-			:	-	1	}	j
				į.		İ		i

Long Lake

From Tables 22 through 26 it was readily seen that 1971 had the most available data. In this year, crucial information, such as inflows and discharges and temperature profiles, was also available. Water quality data spanned the entire period including inflow and outflow quality data. Starting conditions were also very good; 1971 is, therefore, strongly recommended for simulation on Long Lake.

Spokane Arm of F.D. Roosevelt Lake

Nineteen hundred and seventy was the obvious choice for a simulation period on the basis of data availability (see Tables 27 through 29). There was one major deficiency, namely, temperature profiles, of which only two were available in 1971. Starting conditions in 1970 were also poor but better than in any other year. Due to the scarcity of data in any year besides 1970, that year is recommended for simulation; the 1971 temperature profiles could be adapted to help fill this part of the 1970 data requirement.

Coeur d'Alene Lake

The charts of data availability (Tables 30 through 33) showed that there was more data for 1971 than in other years. A comparison with other years further reveals that there is no type of data available in other years that is not available in 1971. Unfortunately, there are no temperature profiles in any of the years.

Summary: Lakes

To summarize the above review, the following years are recommended for model simulation from June through November:

Long Lake: 1971

Spokane Arm of F. D. Roosevelt Lake: 1970

Coeur d'Alene Lake: 1971.

SECTION V

DATA PROCESSING

Processing of data did not require a major effort. For the most part, data were received in a form which was immediately adaptable to the program codes. There were a few cases, however, where data had to be interpreted in order to be useful.

In cases where recording stations were not identified by river mile, specific locations had to be estimated from the information given. On occasion, river widths and elevations had to be determined from large-scale maps where no other physical data was available. Some hydrothermographs were received from which temperatures and humidity readings had to be extracted.

Raw data readings taken at the USGS Gauging Stations had to be processed in order to determine cross-sectional information, corresponding to particular discharge values. Interpolations were then made to estimate important physical quantities from discharge readings during the low flow periods of interest.

Except for processing identified above and some minor unit conversions, the water quality data generally was provided in readily usable forms. No other significant processing of data was required.

APPENDIX I

consisting of

ATTACHMENT 1: DATA QUESTIONNAIRE

ATTACHMENT 2: REQUEST FOR ALTERNATIVE DATA SOURCES

ATTACHMENT 3: INITIAL LIST OF DATA SOURCES

ATTACHMENT 4: FOLLOW-UP LETTER REQUESTING DATA

APPENDIX I - Continued

ATTACHMENT 1

DATA QUESTIONNAIRE

SYSTEMS CONTROL, INC.

260 SHERIDAN AVENUE PALO ALTO, CALIFORNIA 94306

ATTACHMENT 1

TELEPHONE (415) 327-9333

Job No. 6984-02

Dear Sir:

RE: SPOKANE RIVER BASIN MODEL PROJECT - DATA SURVEY

The Environmental Protection Agency has appointed Systems Control, Inc. as project contractor (EPA Contract No. 68-01-0756) to adapt three existing general mathematical (computer) models of rivers and reservoirs to the specific characteristics of the Spokane River Basin. The adapted models will be useful in evaluating water quality management strategies, establishing priorities, and scheduling investments in pollution abatement facilities.

The extent to which these models will be uniquely applicable to the Spokane River Basin will depend on the quantity and quality of the data available for their adaptation. The purpose of this letter and attachments is to locate and survey the data available.

All data contributed to the STORET system will be obtained directly from EPA. The data now desired is that which is not entered into that system. Similarly, data available in the USGS Water Supply Records should not be identified as this will be obtained elsewhere.

The area covered by this project is the entire Spokane River Basin. Figure 1 depicts the numerous rivers to be modeled, an important ground water flow, and three lakes (Coeur D'Alene L., Long L., and the Spokane R. arm of Roosevelt L.) included in the study. The months of interest are June through November.

Attachment 1 to this letter lists our data needs under the following four catagories: physical; meteorological/climatic; water quantity; and water quality. On this you are requested to report any appropriate data you have available. Attachment 2 invites you to suggest alternative sources for these data. Even if you are unable to help us in this survey, please return Attachments 1 and 2 so stating.

These data are urgently needed immediately—during the next week or two. Upon receiving your reply, we will at once notify you which data, if any, we would like to obtain.

Thank you for your cooperation.

Sincerely yours

James Owen 💛 Senior Engineer

JÖ: fw

Attachments (3)

ATTACHMENT 1 Cont'd

ATTACHMENT 1

Spokane River Basin Model Project DATA REQUIREMENTS

	e and address of agency responding, with branch, etc.: icer replying: Phone:	Frequency , of Records (daily, monthly)	Years of Record (dates)	Form of Record (mag. tape, reports, punched cards, etc.)	Ease of providing copies?
PHY	SICAL data needs:				
1.	Locations: River mileages to dams, tributaries, outfalls, other inflows, diversions; general areas of non-point waste sources and groundwater accretions.				
2.	Reservoirs: sounding maps, cross-sections for lakebed topographies; volume and surface area vs. elevation relations; full pool and dam intake elevations; spillway crest elevations lengths, positions, types; reservior operating schemes.	,			
3.	Channels (by reach): average depths, widths, areas, mean slopes, average Manning's roughness coefficients.				
MET	EOPOLOGICAL data needs				
4.	Solar radiation; cloud cover.				
5.	Air temperature, humidity.		}		
6.	Wind speeds and directions.				
7.	Evaporation rates, coefficients.				

/cont.

Attachment 1 cont.	Frequency of Records (daily, monthly)	Years of Record (dates)	Form of Record (mag. tape, reports, punched cards, etc.)	Ease of providing copies?
WATER QUANTITY data needs				
 Streamflows: inflow and outflow rates (other than USGS published Surface Water Records); stage/discharge relations at gaging stations; discharge correlations with depth and mean velocity. 				
 Withdrawals: rates and locations for irrigation, water supply, industry. 				
 Return flows: rates and locations, e.g. for agricultural drains, industry; municipal and other wastewater outfalls; groundwater accretions. 				
11. Downstream outlet conditions: weir elevations, coefficients.				
12. Lakes: histories of water surface elevations.				
WATER QUALITY data needs				
Water quality data will be required for:				
Total Nitrogen Coliforms Carbonaceous BOD Chlorides Ammonia Chlorophyll a Heavy metals, ions Nitrite Dissolved Oxygen Phosphorus Nitrate Temperature				
13. Concentrations of the above at various times throughout the system of rivers and lakes (other than EPA STORET data); general areas of non-point sources; past monitoring programs or stream surveys for biological and chemical data.				
14. Concentrations and loading rates or patterns of the above mentioned constituents in all inflows into the system (in tributary flows, effluents, non-point sources, etc.); plant and process data that will enable their estimation when measurements are unavailable; land use and surface runoff data that might enable the estimation of unmeasured non-point waste loads (e.g., from mill tailings).				

ATTACHMENT 1 Cont'd ...

Attachment 1 cont.

45. Past analyses of field data to determine degradation rates, reaeration coefficients, and decay coefficients for non-

16. Water temperatures: of rivers, tributaries, effluents; of lake interiors and release waters; depths of short wave extinctions in lakes or solar radiation extinction coefficients;

conservative constituents above.

secchi disk measurements in lakes.

Ease of providing copies?	
	-

ATTACHMENT 1 Cont'd

Form of Record (mag. tape, reports, punched cards, etc.)

Frequency of Records (daily, monthly)

Years of Record (dates)

APPENDIX I - Continued

ATTACHMENT 2

REQUEST FOR ALTERNATIVE DATA SOURCES

ATTACHMENT 2

Spokane River Basin Model Project SUGGESTED ALTERNATIVE DATA SOURCES*

- 1. Name and address of agency responding with branch, etc.:
- 2. Officer replying:
- 3. The following agencies or institutions not listed in the distribution list (Attachment 3) should be able to provide data on some of the 16 items listed in Attachment 1 (stressing those sources less likely to be known):

Agency (address, branch, official) For Item Nos.

 $[\]star$ This form accompanied the initial data questionnaire.

APPENDIX I - Continued

ATTACHMENT 3

INITIAL LIST OF DATA SOURCES

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ATTACHMENT 3

INITIAL LIST OF DATA SOURCES

Col. Velter O. Backus District Engineer U.S. Atmy Engineer District 1519 Alaskan Kuy South Scattle, Washington 98134

Mr. Mike McMusters
Acquatic Biologist
Environmental Protection Division
Idaho Dept. of Environmental
Protection and Health
1307 G. Street
Leviston, Idaho 83501

Mr. Albert L. Hartin Chief of Resource Programs Bureau of Land Hanagement Room 551, U.S. Court House Spokane, Washington

Mr. Charles Chambers Field Supervisor Spokane Area Office Fureau of Sports Fisheries & Wildlife Room 317, Federal Bldg/U.S. Post Office Spokane, Washington

Mr. Don Reese Regional Supervisor Fish and Wildlife Service P.C. Box 3737 Portland, Oregon 97208

Dr. Robert D. MacNish Bydologist/Goologist Water Resources Division U.S. Geological Survey 1305 Taccoma Ave., S. Tacoma, Washington 98402

Mr. Don Corson

D.S. Bureau of Mines

Boise, Idaho

Mr. Robert F. Vining Pacific Northwest River Basins Commission 1 Columbia River Vancouver, Vashington 98660 (206) 694-2581

Dr. Allen Agnew, Director Water Research Center Washington State University Pullmin, Washington 99163

Dr. George W. Himmen, Director Environmental Presentch Center Washington State University Pullman, Washington 99163

Dr. Frenk D. Micol Director of Environmental Studies Eastern Washington State College Chency, Washington 98019 Mr. E. F. Suilfvan, Regional Director U. S. Boreau of Reclamation Federal Building, U.S. Court House Box 0-1 Botee, Idaho 83702

Mr. Haurice A. Vogel Area Representative U.S. Forest Service Room 176 U.S. Court House Spokene, Washington

Mr. John Savini Hydrologist-In-Charge D.S. Geological Survey Room 694, U.S. Court Bouse Spokane, Washington

State Climatologist for Washington 909 First Avenue Seattle, Washington

Regional Flood Forecast Center NOAA Portland, Oregon

Seadat Massoumth
Bob Bishop
Washington Department of Ecology
P.O. Box 829
Olympia, Washington

Mr. Guy W. Nott State Conservationist Soil Conservation Service Room 345 304 North 8th Street Loise, Idaho 83702

Mr. Donald L. Winder State Director Farmers Home Administration Room 418, Federal Building 304 N. Eighth Street Boise, Idaho 83702

Mr. Vayne T. Haas Idaho Vater Resource Board Scatchouse Boise, Idaho 83707

Mr. John beber Bureau of Indian Affairs P.O. Box 3785 Portland, Oregon 97208

Mr. Arthur Ven't Hul, P.F. Pegforal Ferincer Environ-ertal improvement Div. Idaho Department of Pealth 1007 C. Street Lewisten, Idaho 80501 Mr. Dick Appling, Chief Spokane Office of Hineral Resources Bureau of Mines West 222 Mission Ave. Spokane, Washington 93201

Mr. Robert T. Small Meteorologist In Charge Boom 217, Terminal Bidg. Spokane International Airport Spokane, Washington

Mr. Ray T. Sipinen Area Planning Officer P.O. Box 2225 U.S. Court House W. 920 Riverside Avenue Spokane, Washington 99210

Mr. Richard Wilson Regional Office Bureau of Outdoor Recreation 1000 Second Avenue Seattle, Washington

Mr. Tim M. Vaughan, Hanager Environmental Affairs Washington Water Power Co. F.O. Box 1445 Spokane, Washington 99210

Mr. Theodore Buffman Washington Department of Game Olympia, Washington

Mr. Calen Bridge State Conservationist Soil Conservation Service W. 920 Riverside Avenue Spokane, Washington 99201

Mr. Michael C. Boran State Director Farmers Home Administration 127 S. Mission Street Wenatchee, Washington 98801

Mr. Robert Turner County Engineer County of Spokane N. 811 Jefferson Spokane, Vashington 99201

Mr. Reger James Director of Public Utilities Room 303 City Hall Spokane, Vashington 99701

Mr. Vern Brospard Soil Conservationist Soil Conservation Service Federal Indicing St. Harice, Idaho 83861

ATTACHMENT 3 (Cont'd)

Mr. T. C. Tollefson, Director Washington Dept. of Fisheries 115 General Administration Bidg. Olympia, Washington 98501

Hr. Roger James Spokane Regional Office Washington Pept. of Health West 924 Sinto Spokane, Washington 99201

Mr. D. Rodoey Mack, Planner Intersgency Committee for Outdoor Recreation 4800 Capitol Blvd. Olympia, Washington 98501

Hr. Clyde Sacco District Manager Utilities & Transportation Commission 110 S. Sheridan Spokene, Washington 99204

County Surveyer

Kootenai County

Coeur D'Alcae, Idaho

Mr. Doyle Scott
Administrative Officer
Soil Conservation Commission
-- -- Capitol Amex #1
Boise, Idaho

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> > Mr. Robert R. Lee Director Idaho Water Resources Board State Rouse Boise, Idaho 83707

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APPENDIX I - Continued

ATTACHMENT 4

FOLLOW UP LETTER REQUESTING DATA

November 15, 1972

Job 6984-02

Mr. Glenn K. Brackett U. S. Fish & Wildlife Service Div. River Basin Studies 317 Federal Bldg. Spokane, Washington 99201

Dear Sir:

DATA REQUIREMENTS FOR SPOKANE RIVER BASIN MODELING PROJECT

Thank you for returning our recent data survey questionairre on the Spokane River Basin.

We have reviewed these replies and found certain information, which you indicated was available, of particular interest to us. These records are urgently needed so that we may proceed with the Spokane River Basin Modeling Project.

The area covered by this project is the entire Spokane River Basin. Figure 1 depicts the numerous rivers to be modeled, an important ground water flow, and three lakes (Coeur D'Alene L., Long L., and the Spokane R. arm of Roosevelt L.) included in the study.

Please send us at your earliest opportunity a copy of all pertinent data in each of the documents listed on Attachment #1, marking transmittals and any invoices for my attention and with the above job number. We need this information no later than November 27, 1972.

Thank you for your cooperation.

James Owen Senior Engineer

JH/bec

Attachments

Attachment 1

(as noted in previous letter)

PHY	SICAL data needs:			
1.	Locations: River mileages to dams, tributaries, outfalls, other inflows, diversions; general areas of non-point waste sources and groundwater accretions.	1911- PREVIT	FILE NOTES	En:4
2,	Reservoirs: sounding maps, cross-sections for lakebed topographies; volume and surface area vs. elevation relations; full pool and dam intake elevations; spillway crest elevations, lengths, positions, types; reservior operating schemes.	1960 -	File works Reports	,,

WATER OUALITY data needs					
Chlorides Egavy retals, loas Phosphorus	Coliforns Carbonaceous BOD Ammonia Chlorophyll a Nitrite Dissolved Carben Nitrate Temperature	SINGLE MENTUKE MENT	1972	File Note	SACY
system of rivers and general areas of non-	above at various times throughout the lakes (other than EPA STORET data); point sources; past monitoring programs biological and charical data.				

APPENDIX II

REPRODUCTION OF DATA USED

REPRODUCTION OF DATA USED

Data used in this study comprised a STORET retrieval current as of October, 1972, regular publications of water quantity data by the U.S. Geological Survey, and meteorological data published by NOAA. In addition to these standard data sources which are readily available to planners, a considerable volume of information was acquired from numerous plans, reports, maps, and other miscellaneous sources which contained potentially valuable data. Unlike the standard sources of data which are updated as part of ongoing programs of agencies, many of the materials collected are likely to become increasingly difficult to obtain in future years. This Appendix presents a reproduction and consolidation of salient water quality data from other sources which may be of interest to future planners. The material is reproduced directly from the source publications to avoid any errors of translation. It is presented within the Appendix as a series of Attachments. Number in parentheses following the Attachment number refers to the source as designated in APPENDIX V - Bibliography.



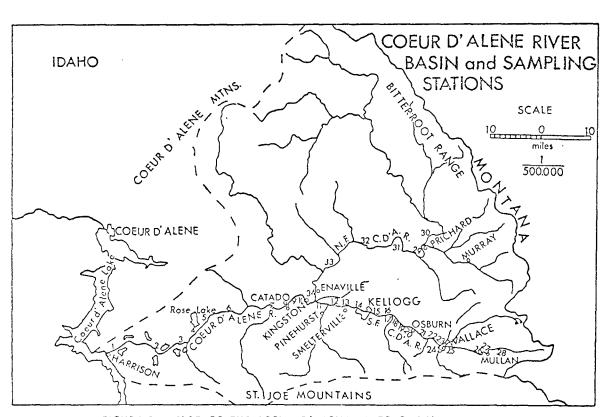


FIGURE 2. MAP OF THE COEUR D'ALENE RIVER BASIN

August 19, 1969

\$ample	Temp.	рН	E.C.	Cl	^{NO} 3	PO ₄	D.O.	B.O.D.
1 2 3 4	20.0 19.5 19.5 19.0	7.20 7.25 7.40 7.40	120 170 180 175	0.0 0.0 0.0	- - -	- - -	7.5 7.6 7.5 7.7	1.3 1.0 0.7 1.0
5 6 7 8 9	19.0 19.0 17.5 16.0 15.5	7.50 7.55 7.55 7.60 7.55	170 170 170 170 175	0.0 0.0 0.0 0.0	- - -	-	7.7 8.2 8.1 7.6 7.5	1.3 0.7 1.2 0.9 1.2
10	17.5	7.55	165	0.0	-	-	8.5	1.0
11 12 13 14	21.0 17.0 17.5 16.5	6.90 6.85 6.55 8.80	365 450 435 180	1.0 0.5 3.0 0.0	- - -	- - -	8.2 7.6 8.2 7.9	1.7 1.8 4.5 0.9
15 16 17	17.0 16.5 16.5	9.10 8.90 8.90	170 175 180	0.0 0.0 0.0	<u>-</u> - -	-	8.2 7.8 7.3	1.4 1.1 4.2
18 19 20 21	16.0 18.0 18.0 16.0	9.15 9.50 9.60 7.75	295 155 150 160	2.0 0.0 0.0 6.0	- - -	- - -	8.3 8.3 8.2 8.9	2.9 6.5 1.7 2.4
22 23 24	16.0 17.5 18.5	8.60 8.10 8.20	150 155 120	0.0 0.0 0.0	- - -	-	8.6 7.8 7.9	3.4 1.7 1.7
25 26 28	18.0 15.0 15.5	8.80 8.50 8.50	120 105 84	0.0 0.0 0.0	- -	- - -	7.9 7.9 8.1	1.8 1.9 1.2
29 30 31 32	20.5 19.0 20.0 17.5	8.70 8.80 8.50 8.40	55 60 56 54	0.0 0.0 0.0	- - -	- - -	8.1 8.2 8.0 8.3	0.9 0.8 1.0 1.0
33 34	18.5 19.0	8.40 8.30	53 50	0.0	-	-	8.1 7.6	1.0 0.9

 $[\]ensuremath{^{\star}}$ Samples taken from corresponding stations on map.

August 19, 1969 cont.

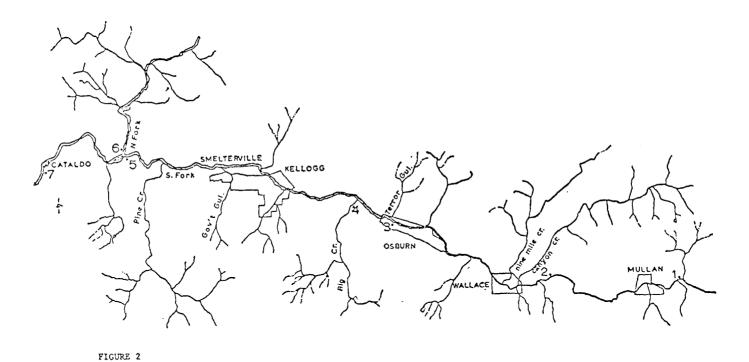
Sample	As	Ca	Cđ	Cr	Cu	Fe	K	Mg	Mn	Na	N1	Pb	Zn
1	_	11.2				0.2	1.0	3.5	0.5	3.8			2.6
2	_	11.5	_	_	<0.1	0.2	0.9	3.5	0.5	3.7	_	-	2.6 1.8
3	_	14.2		_	<0.1	0.2	1.0	3.6	0.5	4.0	_	_	1.7
4	_	12.7	_	_	0.0	0.2	1.0	3.4	0.5	4.0	_	_	1.6
5.	_	12.4	_	_	<0.1	0.2	1.0	3.5	0.5	4.2	_	_	1.7
6	_	12.5	_	_	<0.1	0.2	0.9	3.5	0.5	4.1	-	-	1.7
7	_	12.3	-	-	<0.1	0.2	1.0	3.5	0.5	4.1	-	_	1.8
8	_	12.4		-	0.0	0.1	1.0	3.4	0.6	4.2	-		2.0
9	-	12.7	-	-	0.0	0.1	0.9	3.4	0.5	4.2	_	-	2.0
10	_	11.7	-	-	0.0	0.1	0.9	3.2	0.5	4.4	-	-	1.9
11	_	27.8		_	0.0	0.1	2.2	+4.5	1.7	10.4	_	_	5.1
12	-	31.2		-	0.0	0.2	2.5	+4.5	2.0	13.5	-	_	6.8
13	-	29.6	-	-	0.0	0.1	2.4	+4.5	2.0	13.8	-		6.5
14	_	15.0	-	-	0.0	0.1	1.0	3.6	<0.1	7.2	-	-	0.5
15	-	14.6	-	-	0.0	0.2	1.0	3.7	<0.1	7.4	-	-	0.3
16		15.7	-	-	0.0	0.1	1.0	3.7	0.0	7.8	-	. –	0.3
17	-	15.1		-	<0.1	0.2	1.1	3.7		10.2	-	-	0.2
18	-	15.3	-	-	<0.1	0.2	1.7		<0.1		-	-	0.2
19	-	15.1	_	-	0.1		1.0	3.7	0.0	3.4	-	-	0.4
20	-	15.0	-	-	<0.1	0.1	0.9	3.6	0.0	3.4	-	-	0.6
21	-	15.1	-		<0.1	0.1	1.0	3.7	0.0	3.5	-	-	0.6
22	_	14.3	-	-	<0.1	0.1	0.9		<0.1	3.6	-	-	0.7
23	_	14.7	-	-	0.0	0.1	0.9	3.6	<0.1	3.4	-	-	0.8
24	-	15.5	-	-	0.0	0.2	0.9		<0.1	2.9	-	-	1.0
25	-	13.3	-	-	0.0	0.1	0.8	3.1 2.6	0.0	2.6 1.8			1.0 <0.1
26	_	12.9 9.4	_	_	0.0	0.1	0.4	2.7	0.0	1.5	_	_	<0.1
28	_	9.4	_	-	0.0	0.1	0.4	2.7	0.0	1.5	_	_	10.1
29	-	5.9	-	-	0.0	0.2	0.4	1.8	0.0	1.4	-	-	<0.1
30	-	6.0	-	_	0.0	0.2	0.4	2.0	0.0	1.4	-	-	<0.1
31	-	5.8	-	-	0.0	0.1	0.4		< 0.1	1.4	-	-	<0.1
32	-	5.7	-	-	0.0	0.1	0.3	1.7	0.0	1.4	-	-	<0.1
33	•-	5.4	-	-	<0.1	0.1	0.5	1.7	0.0	1.5	-	-	<0.1
34	-	5.3	-	-	0.0	0.2	0.5	1.6	<0.1	1.5			<0.1

September 13, 1969

Sample	Temp.	рН	E.C.	Cl	NO 3	PO ₄	D.O.	B.O.D.
1	17.5	5.75	36	1.5	0.00	0.06	-	-
2	16.5	5.95	93	0.0	0.24	0.51	9.0	1.6
3	16.5	6.00	103	0.0	0.00	0.06	9.5	1.6
4 .	16.0	6.01	72	0.0	0.00	0.02	-	-
5 6	16.5	6.01	76	0.0	0.24	0.45	9.3	1.4
6	16.5	6.15	88	0.0	0.00	0.00	9.0	1.3
7	17.0	6.15	94	0.0	0.00	0.06	8.6	0.7
8	15.5	6.20	97	0.0	0.00	0.00	9.0	1.1
9	15.0	6.20	113	0.0	0.00	0.00	9.0	1.6
10	15.0	6.20	101	0.0	0.00	0.16	9.2	1.2
11	10.0	6.15	181	0.0	0.24	1.14	8.6	1.1
12	11.0	6.15	111	2.0	1.16	0.74	8.6	1.8
13	11.0	6.20	220	0.0	0.24	0.79	8.8	1.4
14	8.5	6.35	92	0.0	0.00	0.56	9.3	1.3
15	8.5	6.65	79	0.5	. 0.24	0.12	10.2	1.8
16	8.5	6.70	89	0.0	0.00	0.00	9.5	1.5
17	9.0	6.80	100	0.0	0.24	0.00	9.1	1.4
18	9.5	6.95	200,	1.0	0.00	0.16	2.5	>2.5
19	8.5	6.95	85	0.5	0.24	0.00	10.7	2.1
20	8.5	6.95	85	0.5	0.24	0.08	10.3	1.6
21	9.0	6.90	68	1.0	0.44	0.22	10.3	1.7
22	8.5,	6.90	57	0.0	0.86	0.12	10.0	1.3
23	8.5	6.90	94	0.0	0.00	0.12	10.0	1.7
24	8.0	6.95	82	0.0	0.58	0.06	9.8	1.3
25	8.0	7.00	68	0.0	0.58	0.00	9.8	1.5
26	8.0	7.00	72	0.0	0.58	0.16	9.5	1.6
28	8.0	7.10	69	0.0	0.00	0.08	9.6	1.0
29	13.5	7.15	32	0.0	0.00	0.00	9.0	0.9
30	13.5	7.15	31	0.0	0.24	0.06	9.1	1.0
31	13.5	7.15	27	0.0	0.00	0.00	8.9	1.0
32	13.5	7.20	32	0.0	0.00	0.00	9.3	1.7
33	14.0	7.20	34	0.0	0.00	0.02	8.8	0.5
34	14.0	7.20	29	0.0	0.00	0.06	8.8	0.6

September 13, 1969 cont.

Sample	As	Ca	Cd	Cr	Cu	Fe	ĸ	Mg	Mn	Na	Ni	Рь	Zn
1	_	2.4	_	_	<0.1	· <0.1	0.3	1.4	0.8	1.1	_	<0.1	2.6
2	-	10.7	-		<0.1	0.2	1.2	5.0	1.6	4.7	_	<0-1	4. I
3	-	9.4	-	-	<0.1	<0.1	1.1	4.5	1.4	4.4	_	<0.I	3.5
. 4	-	8.0	-	-	<0.1	<0.1	0.9	4.0	1.0	3.8	_	<0.L	2.7.
5	-	7.7	-	-	<0.1	<0.1	0.9	3.7	1.3	3.6	-	<0.1	3.0
6	-	10.1	-	-	<0.1	0.1	1.2	4.6	1.5	4.5	-	<0.I	3.5
7	-	10.1	-		<0.1	<0.1	1.3	4.8	1.9	4.7	_	<0.1	4.8
8	-	10.7		-	<0.1	<0.1	1.3	5.2	2.1	5.3	-	<0.I	5.3
9	_	10.7	-	-	<0.1	0.2	1.3	5.2	2.1	5.3	-	<0-L	5.3
10	-	8.0	-	-	<0.1	<0.1	1.0	4.2	1.9	4.0	-	<0.I	4-7
												·	
11	_	30.0	_	_	<0.1	0.4	2.9	10.5	5.7	12.2	_	<0.I	15.0
12	_	12.8	_	-	<0.1	0.2	0.9	4.5	3.4	4.4	_		ົ 7 - 3
13	_	28.0	_	-	<0.1	0.2	2.9		6.2	12.2	_		21.0
14		11.9	_	_	<0.1	<0.1	1.5	5.1	0.2	8.5	_		- 2-0
15	_	11.5		_	<0.1	<0.1	1.2	4.7	0.2	7.8	_		2.1
16	_	10.1	_	_	<0.1	<0.1	1.4	5.0	0.1	8.5	_	<0.L	1.1
17	_	11.5	_	_	<0.1	<0.1	1.4	4.9	0.2	10.7	-	<0.L	1.0
18	-	11.6	-	-	<0.1	<0.1	2.0	4.7		55.0	-	<0.1	0.9
91	-	12.5	-	-	<0.1	<0.1	1.1	5.2	0.2	3.2	-	<0.1	
20	_	12.5	-	-	<0.1	<0.1	1.1	5.2	0.2	3.3	-	<0.I	1.5
21	_	10.8		_	<0.1	0.1	0.8	4.2	0.2	2.7	-	<0.1	1.3
22	_	5.8	_	-	<0.1	<0.1	0.6	2.8	0.1	1.6		<0.L	
23		11.8	_	-	<0.1	<0.1	1.1	5.2	0.2	3.3	_	<0.1	2.8
24	_	10.1	-	-	<0.1	<0.1	0.9	4.5	0.2	2.7	-	<0.I	2.7
25	-	11.2	-	-	<0.1	0.1	0.9	4.5	<0.1	3.1	-	<0.1	0:3
26	_	9.1	-	_	<0.1	<0.1	1.1	4.4	<0.1	3.8	-	<0.1	0.2
28		6.6	-	-	<0.1	<0.1	0.4	3.4	<0.1	1.3		<0.1	<0.1
29	-	3.8	-	-	<0.1	<0.1	0.4	2.4	<0.1	1.5	-		<0.1
30		4.1	-	-		<0.1	0.4	2.6	<0.1	1.3	-		<0.1
31	-	3.9	-	-	<0.1	0.1	0.4	2.0	<0.1	1.3	-		<0.1
32	-	3.6	-	_		<0.1	0.4	2.1	<0.1	1.5	-		<0.1
33	-	3.5	-			<0.1	0.4	2.2	<0.1	1.5	-		<0.1
34	-	3.4	-	-	<0.1	<0.1	0.5	2.0	<0.1	1.6	-	<0.1	<0.1



BIOLOGICAL SAMPLING STATIONS-CD'A RIVER SYSTEM

TABLE I
PHYSICAL AND CHEMICAL FACTORS - COEUR D'ALENE RIVER SYSTEM

Sta.	Date	°c	pН	DO 1	TS ² .	TDS ³	Alk ⁴	Hard- ness	Ca	Mg	Fe	Mn	Na	C1	504	to3	ėо ₄	F	///
1	8-19-70	10.0	7.3	9.4	96	79	56	56	6	10	0.01	0.02	1	7	3	0.9	0.03	0.01	0.30
	12-16-70		7.4		88	65	40	36	8	4	0.02	0.03	1	2	2	0.4	0.01	0.01	0.01
	3-16-71	2.0	7.5	12.4	140	138	52	124	16	20	*	0.05	1	9	3	0.1	0.17	*	0.10
	7-12-71	11.0	7.3	10.2	66	48	36	24	5	3	*	*	1	8	1	0.1	0.07	*	< 0.10
2	5-26-70		7.6		84	70	44	48	6	6	0.34	0.10	1	2	4	0.4	0.02	0.01	0.40
	8-19-70	14.0	8.0	9.4	116	101	56	76 -	13	11	0.04	0.04	2	7	5	1.1	0.17	0.01	0.30
	12-16-70		7.4		100	62	48	48	14	3	0.18	0.12	3	2	6	0.7	0.12	0.01	0.12
	3-16-71	3.0	7.5	11.6	104	105	64	84	21	8	0.17	0.09	2	11	,6	0.3	0.20	*	< 0.10
	7-12-71	12.0	7.4	10.2	88	52	40	32	10	2	0.27	0.02	2	8	1	< 0.1	0.07	*	< 0.16
3	5-26-70	9.0	7.5		88	75	36	40	10	8	0.41	0.18	1	4	4	0.5	0.30	0.01	0.50
	8-19-70	18.2	8.3	10.6	152	118	60	72	14	9	0.10	0.06	4	7	19	1.6	0.41	0.02	0.40
	12-16-70	3.0	7.2	11.2	120	102	48	48	16	2	0.08	0.11	3	2	24	2.0	0.15	0.01	0.15
	3-16-71	4.0	7.2	11.0	132	132	52	88	21	9	*	0.11	3	9	22	3.1	0.26	*	*
	7-14-71	13.0	7.2	10.6	104	58	36	44	14	2	0.06	0.06	3	2	5	0.2	0.06	*	0.10
4	5-27-70	7.5	7.4		76	68	44	36	5	6	0.18	0.03	3	6	4	0.3	0.12	0.01	0.40
	8-19-70	18.2	7.2	6.7	222	174	44	156	11	7	0.08	0.12	21	7	51	1.2	1.04	0.06	0.60
	12-16-70		6.4		144	128	44	32	10	2	0.24	0.63	4	22	49	1.1	0.16	0.01	0.36
	3-16-71	5.4	9.3	10.4	236	232	40	92	13	14	0.68	0.05	`27	11	90	3.9	0.50	*	3.00
	7-14-71		8.8		176	152	28	56	10	8	0.05	0.04	38	6	36	6.7	0.28	*	< 0.10
5	5-27-70		7.1		92	03	32	44	10	4	1.34	0.68	1	4	9	0.5	0.07	0.01	0.40
	8-19-70	20.4	7.1	10.2	440	371	20	120	27	13	0.84	4.85	9	7	180	1.3	0.27	1.02	0.60
	12-16-70		6.5		240.	215	24	60	24	5	0.36	1.18	15	4	90.	1.6	1.60	0.45	G.28
	3-16-71	4.0	6.3	10.8	356	358	28	180	42	18	1.21	2.19	5	7	125	1.9	20.00	1.44	0,20
	7-14-71	17.1	6.9	10.4	176	164	28	88	18	11	0.24	1.06	6	6	50	0.2	0.03	*	0.10
6	8-19-70	18.0	7.7	9.1	83	74	36	56	11	7	0.01	0.01	1	10	2	0.7	0.06	0.01	0.30
	12-16-70		7.1		84	73	28	40	6	6	0.27	0.69	4	4	3	0.4	0.02	0.01	0.02
	3-16-71	2.0	7.0	11.8	100	90	36	72	8	13	*	0.19	1	7	6	0.4	0.22	*	< 0.10
	7-14-71	16.0	7.4	9.6	72	56	36	44	6	7	*	0.61	1	4	2	< 0.1	0.08	*	< 0.10

TABLE I cont'd.

PHYSICAL AND CHEMICAL FACTORS - COEUR D'ALENE RIVER SYSTEM

Sta	Date	°c	pН	100	TS ²	TDS 3	Alk ⁴	Hard- ness	Ca	Мg	řе	Mn	Na	C1	so ₄	NO ₃	P04	P	кн ³
7	8-20-70 12-16-70 3-16-71 7-14-71	16.6 2.0 16.2	6.9 6.9 6.7 7.0	5.4 	204 108 180 112	162 94 188 88	32 28 28 32	68 44 116 64	16 11 26 10	7 4 13 10	0.25 0.45 0.29 0.05	1.66 0.57 0.57 0.35	4 3 2 2	10 2 7 6	50 20 52 11	0.9 0.6 1.6 0.1	0.10 0.48 1.68 0.07	0.42 0.01 0.83 0.01	0.40 0.24 0.20 < 0.10
8	5-27-70 8-20-70 12-15-70 3-15-71 7-13-71	23.2 4.5 2.5 17.8	7.4 7.4 7.1 7.0 7.3	8.6 10.6 13.6 9.8	80 96 88 112 68	72 84 73 106 48	32 32 24 36 28	36 60 48 84 36	6 8 14 10	5 11 7 12 3	0.31 0.01 1.18 0.03 0.01	0.05 0.01 0.50 0.23 0.01	1 1 3 2	4 10 2 7 6	4 4 5 8 1	0.5 1.1 0.6 0.5 0.1	0.02 0.05 0.05 0.16 0.07	0.01 0.01 0.01	0.40 0.30 0.10 0.20

^{1 -} All results are reported in parts per million
2 - Total solids
3 - Total dissolved solids
4 - Alkalinity
* - Element less than 0.01 ppm

TABLE III
HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Cu	Pb	Cd
1	5-26-70	*	0.010	n *	*
*	8-19-70	**	**	*	0.016
	12-16-70	0.116	**	*	**
	3- 16-71	**	*	*	**
	7-12-71	0.009	**	*	**
2	5-26-70	0.040	0.010	0.03	*
	8-19-70	0.158	**	*	**
	12-16-70	0.414	**	*	**
	3-16-71	0.205	*	*	**
	7-12-71	0.059	**	*	**
3	5-26-70	0.080	0.010	0.07	*
	8- 19-70	0.276	**	*	**
	12-16-7 0	0.566	**	*	**
	3-16-71	0.388	*	*	**
	7-12-71	0.085	**	*	**
4	5-26-70	1.190	*	2.24	0.010
	8-19-70	3.134	**	0. 09	0.008
	12-16-70	4.110	**	*	0.022
	3-16-71	5.640	*	*	**
	7-12- 71	1.918	**	*	**
5	5-26-70	1.980	0.840	0.28	0.010
	8-19-70	0.600	0.349	0.13	0.035
	12-16-70	0.633	1.421	*	**
	3-16-71	8.701	0.230	0.12	**
	7-1 2-71	6.125	0.261	0.28	0.039
6	5- 26-70	2.410	0.010	0.98	0.030
	8-19-70	6.940	**	*	0.089
	12-16-70	16.410	**	0.17	0.100
	3-16-71	6.910	0.030	*	0.011
	7- 12-71	2.459	**	0.12	0.015
7	5-26-70	2.580	0.010	1.23	*
	8-19-70	7.800	**	0.14	0.057
	12-16-70	15.7 50	**	0.18	0.063
	3-1 6-71	5.004	*	0.03	0.024
	7-12-71	2.350	**	0.01	0.009
8	5-26-70	*	*	*	*
	8-19-70	0.020	0.014	*	**
	12-16-70	0.117	**	*	**
	3-16-71	9.051	*	*	**
	7-12-71	0.027	0.010	*	**

TABLE III cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Zn	Cu	Cđ
9	5-26-70	*	ppi *	m	*
-	12- 16-70	0.009	**	*	0.008
	3-16-71	**	*	*	**
	7-12-71	0.019	**	*	**
10	5-26-70	0. 950	0.010	0.79	*
	8-19-70	1.733	**	*	0.017
	.12-16-70	3.242	**	*	0.012
	3-16-71	2.922	*	0.02	0.009
	7-12- 71	0.937	**	*	**
11	5-26-70	*	*	*	*
	8-19-70	**	**	*	**
	12-16-70	0.020	**	*	**
	3-16-71	**	*	*	**
	7-12-71	**	**	*	**
12	8-19-70	**	**	*	**
	12-1 6-70	0.013	* **	*	**
	3-16-71	**	*	*	**
	7-1 2-71	**	*	*	**
13	5-26-70	0.260	0.020	0.28	*
	12-16-70	0.203	**	*	**
	3-16-71	**	*	*	**
	7– 12–71	0.008	**	*	0.008
14	12-16-70	52.100	0.017	7.67	2.744
	3-16-71	107.300	0.120	7.57	3.102
•	7-12-71	312.000	0.133	9.08	3. 586
14A	5-26-70	168.800	0.040	2.31	1.050
	8-19-70	309.400	0,333	8.78	2.960
	· 12-1 6-70	122.900	0.216	3.68	1.605
	3-16-71	183,100	0.120	3.45	1.386
	7– 12–71	967.000	0.240	6.55	1.966
14B `	12-16-70	1.730	**	*	0.047
	3-16-71	,**	*	*	**
	7-1 2-71	0.036	**	*	**
15	5-26-70	0.880	*	0.68	0.010
	8-19-70	1.685	**	0.08	**
	12-16-70	2.440	**	0.03	0.003
	7-12-71	0.996	**	*	0.014
16	5-26-70	2,550	0.010	0.87	0.020
=: =	8-19-70	16.125	**	0.13	0.212
	12-16-70	9.820	**	0.83	0.252

TABLE III cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alene River System

Station	Date	Zn	Cu	РЬ	Cd
			pp	m	
16	3-16-71	11.490	*	3.70	0.240
(cont'd.)	7-12-71	12.780	**	0.07	0.480
17	5-26-70	1.650	0.020	0.70	0.010
	8-19-70	22.720	0.011	0.92	0.201
	12-16-70	7.160	**	0.04	0.284
	3-16-71	5.293	*	1.01	0.075
	7-1 2-71	8.072	**	*	0.366
18	5-26-70	*	*	*	0.010
	8-19-70	**	**	*	0.006
	12-16-70	0.002	**	*	**
	3-16-71	**	*	*	**
	7-1 2-71	0.086	**	*	0.002
19	8-19-70	3.940	. **	0.18	0.023
	12-16-70	1.897	**·	*	0.018
	3-16-71	2.196	*	*	0.018
	7-12-71	1.941	**	*	0.020
20	5-26-70	0.600	0.010	0.06	0.060
	8-19-70	3.210	**	0.18	0.021
	12-16-70	1.870	**	*	**
	3-16-71	1.589	*	*	0.025
	7- 12-71	1.617	**	*	0.018
21	8-19-70	0.100	**	*	**
	3-16-71	0.423	*	0.12	**
22	5-26-70	0.230	*	*	*
	8-19-70	0.014	**	0.06	**
	12-16-70	0.403	**	*	**
	3-16-71	0.388	*	*	**
	7-12-71	0.228	**	*	**

^{* -} less than .01 ppm

^{** -} less than .001 ppm

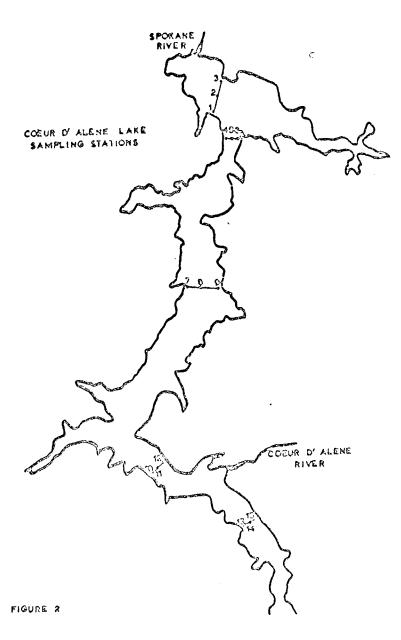


TABLE II
PHYSICAL AND CHEMICAL FACTORS 1 - COEUR D'ALENE LAKE

Sta.	Date	°c	pН	DO	TS ²	TDS3	Alk ⁴	Hard- ness	Ca	Mg	Рe	Mn	Na	C1	504	₁₀ 3	PO ₄	Ť	NE3
2	9-11-69 8-21-70	20.0	7.5 7.5	- 8,7	160 80	132 64	32 32	72 43	11	11	0.19	0.01	1	19	3	0.9	0.01	0.01	0.42
, ;	12-15-70 7-14-71	18.5	6.8	10.2	87 104	-59 96	32 32	40 80	10 5	4 16	0.14	0.07	2	3 3 8	6	1.0 0.3 0.1	0.03 0.07	0.01	0.30 0.06 0.10
:	8-21-70 12-15-70 7-14-71	19.0	7.5 6.9 7.5	10.2	84 80 76	71 58 68	32 28 28	56 40 56	5 10 5	11 4 11	0.03 0.01 0.06	0.01 0.04 0.02	1 2 1	<u>7</u> 2 8	3 5 2	1.0 0.4 0.1	0.14 0.01 0.08	0.01 0.01	0.30 0.10 0.10
. 8 :	9-11-69 8-21-70 12-15-70 7-14-71	20.2	6.9	9.3 20.0	164 96 76 84	140 <u>82</u> 59 76	24 24 32 32	84 56 40 60	18 5 10 8	10 11 4 10	0.24 0.09 0.03 0.03	0.02 0.01 0.05 0.02	2 1 2 1	29 13. 2 8	4 4 6 2	0.9 1.0 0.8 0.1	0.01 0.09 0.01 0.07	0.01 0.01 0.01	0.42 0.30 0.10 0.10
111	9-11-69 8-21-70 12-15-70 7-14-71	17.0	7.6 7.5 7.0 7.3	 9.8	160 88 76 84	128 _78_ 61 74	32 28 28 32	80 60 28 56	14 8 8 5	11 10 2 11	0.03 0.08 0.13 0.07	0.06 0.05 0.14 0.02	1 1 2 1	25 _7	5 3 6 2	0.5 0.9 0.6 0.1	0.01 0.09 0.06 0.08	0.01 0.01 0.06	0.56 0.30 0.10 0.10
14	8-21-70 12-15-70 7-14-71	19.8	7.3 6.9 7.3	8.4 9.5	84 80 76	7.1 61 66	28 28 32	56 32 52	6 8 6	10 3 9	0.08 0.07 0.04	0.03 0.11 0.01	1 2 1	. <u>7_</u> 2 8	3 5 2	1.1 0.7 0.1	0.04 0.04 0.07	0.01 0.01	0.30 0.04 0.10

⁻ All results are reported in parts per million - Total solids

⁻ Total dissolved solids

⁻ Alkalinity

^{: -} Indicates element was less than 0.01 ppm

TABLE IV
HEAVY METALS CONCENTRATIONS
Coeur d'Alene Lake

Station	Date	Zn	Cu	Pb	Cd
1	5-29-70	0.230	*	*	*
-	8-21-70	0.181	0.007	*	0.016
	12-1 5-70	0.412	**	*	**
2	5-29-70	0.230	*	*	*
	8-21-70	0.164	**	*	*
	12-15-70	0.387	**	*	**
	7–1 3–71	0.153	**	*	**
2A	5-29-70	0.250	0.020	0.07	*
	8-21-70	0.169	**	*	0.002
2B	12- 15-70	0,387	**	*	**
2C	7-1 3-71	0.300	**	*	**
3	5-2 9-70	0.190	*	0.03	.*
nd.	8-21-70	0.114	**	ź	**
	12-15-70	0.522	** .	*	**
4	5-29-70	0.260	*	*	*
	8-21-70	0.120	**	*	**
	12-15-70	0.512	**	*	**
5	· 5-2 9-70	0.190	*	*	*
	8-21-70	0.159	**	*	**
	12-15-70	0.525	**	*	**
	7-1 3-71	0.187	**	*	**
5A	5- 29 - 70	0.190	0.020	*	·*
	8-21-70	0.190	**	*	**
5 B	7– 13–71	0.237	**	*	**
5C	12-15-70	0.583	**	*	**
	7-13-71	0.281	**	*	**
6	5-29-70	0.180	0.020	*	<u> </u>
	8-21-70	0.179	**	*_	**
	12-15-70	0.512	**	*	**
7	5-29-70	0.270	*	*	*
	8-21-70	0.271	**	*	**
	12-15-70	0.566	**	*	**

TABLE IV cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alene Lake

Station	Date	Zn	Cu	РЪ	Cd
8	5-29-70	0.180	*	*	
o .	8-21-70	0.252	**	*	0.007
	12-15-70	0.616	**	*	**
	7-13-71	0.221	**	*	**
8A	5-29-70	0.190	*	*	*
OA.	8-21-70	0.243	**	*	**
8 B	8-21-70	0.475	*	*	**
ΟD	7-13-71	0.248	**	*	**
8C	12-15-70	0.556	**	*	**
00	7-13-71	0.380	**	*	**
9	5-29-70	0.170	*	*	*
•	8-21-70	0.213	**	*	**
	12-15-70	0.560	**	0.04	**
10	5-29-70	0.090	*	*	*
	8-21-70	0.548	**`	*	**
	12-15-70	0.739	**	*	**
11	5-29-70	0.070	0.030	* .	<u>*</u>
	8-21-70	0.687	**	*	0.007
	12-15-70	0.733	**	*	0.004
	7-13-71	0.306	**	*	**
11A	5-29-70	0.220	*		*
	8-21-70	0.492	**	*	**
	7-13-71	0.287	**	*	**
11 B	12-15-70	0.872	**	*	0.002
	7-1 3-71	0.213	**	*	**
12	5-29-70	0.170	*.	 *	<u>*</u> .
	8-21-70	0.809	**		0.017
	12-15-70	0.316	**	*	0.005
13	5-29-70	*	*	*	*
	8-21-70	0.330	0.006	*	**
	12-15-70	0.741	**	*	**
14	5-29-70	*	*	*	*
•	8-21-70	0.237	**	<u>*</u>	0.005
	12-15-70	0.670	**	*	**
	7-13-71	0.129	**	٠ *	**

TABLE IV cont'd.
HEAVY METALS CONCENTRATIONS
Coeur d'Alone Lake

Station	Date	Zn	Cu	Pb	Cd
				m	
14B	12-15-70	0.916	**	*	**
	7-13-71	0.192	**	*	**
14C	7– 13–71	0.296	**	*	**
15	5-29-70	*	*	0.02	*
	8-21-70	0.262	**	*	**
	12-15-70	0.383	**	*	**

A. Sample from 20 feetB. Sample from 50 feetC. Sample from 100 feet

^{*} Less than 0.01 * Less than 0.001

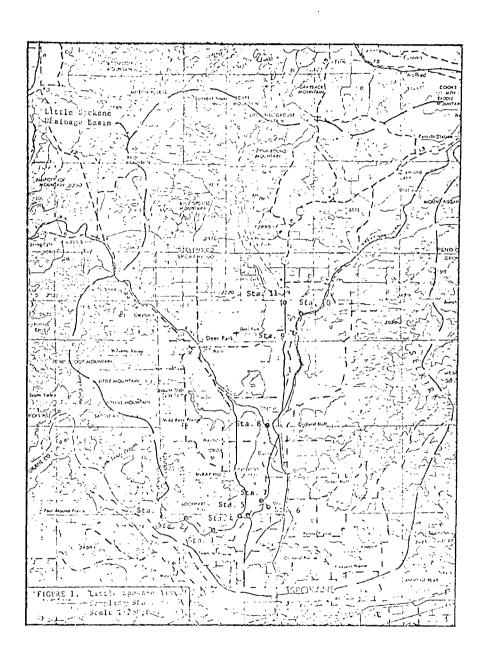


Table III. Laboratory and field results for Little Spokane River Study - February through September, 1968

Constituent	Date (1968)	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11
Biochemical	2/13	1.5	1.8	1.3	1.9	1.6	1.7	1.5	2.8	2.2	1.8	2.5
Oxygen	3/5	0.7	0.8	0.8	1.1	0.9	0.7	1.2	1.2	1.3	1.0	1.1
Demand	5/14	0.8	0.9	0.2	1.3	0.9	1.2	1.0	2.6	1.2	1.0	1.7
(mg/l)	8/20	0.4	0.7	0.6	0.6	0.6	0.5	0.9	0.7	0.7	0.6	0.8
Chemical	2/13	6.4	3.2	4.8	7.2	7.2	1.0	8.0	22.4	1.5	4.0	7,2
Ожудеп	5/14	10.2	6.4	9.0	11.5	14.1	9.0	12.8	21.1	9.0	10.2	11.5
Demand	6/4	5.6	5.6	5.6	6.4	11.2	11.2	8.0	16.0	9.6	5.6	14.4
(mg/1)	8/20	4.6	5.6	1.9	4.9	8.0	0.5	7.8	11.0	6.1	5.6	16.6
Dissolved	2/13	10.5	10.4	10.3	12.2	12.1	9.8	12.5	12.4	12.8	12.2	11.7
Oxygen	3/5	10.5	9.4	9.6	10.7	10.4	10.0	10.6	10.6	10.8	10.8	10.8
(mg/l)	5/14	8.1	8.3	8.4	9.9	9.9	9.8	9.4	10.8	10.1	9.8	9.7
	6/4	8.1	8.3	8.4	9.6	9.6	9.9	9.0	8.8	9.1	9.1	8.8
	8/20	9.8	8.7	8.6	9.9	9.4	9.7	9.9	9.7	10.4	9.7	9.3
	9/10	8.6	8.6	8.2	9.8	9.6	9.5	9.4	9.8	10.6	9.8	9.7
% Saturation	2/13	91	91	90	101	100	100	101	97	103	98	97
of Dissolved	3/5	96	85	86	94	91	93	93	9 3	93	95	93
Oxygen	5/14	83	85	86	104	104	107	99	113	105	100	104
	6/4	83	85	87	105	106	109	106	102	105	102	106
	8/20	99	89	84	105	101	111	106	104	114	105	106
	9/10	87	87	83	105	103	110	100	104	117	106	117
Temperature	2/13	5.5	6.0	6.0	4.0	4.0	12.6	3.0	2.0	3.0	3.0	4.0
(°C)	3/5	7.4	7.4	7.2	6.2	6.2	8.6	6.0	6.0	5.4	6.0	5.0
	5/14	12.5	12.5	12.9	14.0	14.0	16.0	14.0	14.0	12.9	12.5	15.0
	6/4	12.4	12.2	13.7	16.2	16.6	16.7	20.0	18.4	18.4	17.2	21.1
	8/20	12.3	12.5	12.9	15.0	14.9	18.0	14.9	15.1	16.0	15.2	18.0
	9/10	12.0	12.0	12.2	15.0	15.0	19.0	14.5	14.5	16.5	15.5	21.2
Flow	2/13					264						
(cfs)	3/5					473						
	5/14	445	442	422		203	_ 34	161	32	124	61	55
	6/4					183						
	8/20					1 30						
	9/10	369	376	304		124	13	98	14	49	36	13

Table III. Laboratory and field results for Little Spokane Kiver Study - (continued)

lable III.		,							,			
Constituent	Date (1968)	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11
Alkalinity	2/13	90	87	87	64	64	89	58·	69	36	64	23
CaCO3	3/5	100	100	94	78	80	72	74	94	64	94	44
(mg/l)	5/14	114	107	106	96	98	86	101	144	75	100	44
(0,)	6/4	109	107	108	99	100	96	97	138	72	88	41
	8/20	114	116	115	116	117	120	115	144	87	94	44
	9/10	116	114	113	112	112	127	117	143	81	92	42
Hardness	2/13	114	114	114	98	98	138	90	106	64	88	42
CeCO3	3/5	120	104	100	77	82	74	75	87	58	82	52
(mg/l)	5/14	82	110	90	78	74	60	88	110	36	56	34
	6/4	108	104	104	90	92	98	86	124	58	84	24
	8/20	130	120	130	120	120	130	110	140	86	88	32
	9/10	126	128	124	120	118	150	108	144	80	88	40
рН	2/13	8.1	8.2	8.0	8.2	8.1	8.3	8.2	8.1	7.7	8.0	7.4
	3/5	7.8	7.8	7.9	7.8	7.8	7.8	7.7	7.7	7.7	7.8	7.4
	5/14	7.7	8.1	8.2	8.3	8.0	8.6	8.1	8.8	8.0	8.1	8.5
	6/4	8.0	8.2	8.3	8.4	8.4	8.8	8.4	8.8	8.3	8.2	8.9
	8/20	8.0	8.2	8.2	8.3	8.1	, 8.5	8.2	8.4	8.3	8.0	8.1
Conductivity	2/13	225	220	223	200	205	290	187	230	138	188	100
(micromhos	3/5	190	190	180	150	150	150	145	180	120	175	88
at 25°C)	5/14	240	240	2 30	200	210	200	1 9 3	260	145	188	89
	6/4	230	230	219	210	222	200	200	270	150	180	90
	8/20	260	250	255	245	260	285	230	270	175	190	86
	9/10	250	245	248	240	230	308	219	2 64	160	174	90.
Total	2/13	7,500	5,200	7,900	12,000	8,600	1,100	14,700	23,400	1,200	400	410
Coliform	3/5	1,220	1,100	1,200	1,000	1,000	1,000	1,400	1,100	3, 500	580	580
(sheen col-	5/14	2,700	2,100	390	1,300		2,000	630	320	210	190	170
onics/100 ml		1,000	840	50 0	1,300	730	2,100	490	670	750	540	620
	8/20	6,200	3,600	2,200	5,300		12,000		24,000	11,000	13,000	5,200
	9/10	2,100	1,300	5,000	5,400	7,000	16,000	3,100	11,000	630	450	700

Table III. Laboratory and field results for Little Spokane River Study - (continued)

Constituent	Date (1968)	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11
Total Phosphate PO ₄ -P (mg/1)	2/13 3/5 5/14 6/4 8/20	0.03 0.05 0.03 0.10 0.20	0.02 0.05 0.03 0.03 0.20	0.01 0.04 0.04 0.24 0.22	0.02 0.06 0.04 0.10 0.22	0.03 0.04 0.04 0.10 0.22	0.02 0.07 0.03 0.12 0.23	0.02 0.03 0.04 0.12 0.22	0.05 0.13 1.20 0.09 0.31	nil 0.02 0.03 0.09 0.21	0.01 0.02 0.02 0.10 0.21	0.003 0.01 0.03 0.10 0.20
	9/10	0.04	0.04	0.04	0.06	0.05	0.05	0.03	0.11	0.04	0.06	0.03
Ortho Phosphate PO ₄ -P (mg/1)	2/13 3/5 5/14 6/4 8/20 9/10	0.003 0.01 0.01 0.05 0.02 0.01	0.003 0.01 0.01 0.04 0.01 0.01	0.003 0.01 0.01 0.04 0.003 0.01	0.01 0.01 0.04 0.07 0.02	0.003 0.01 0.01 0.04 0.01	0.003 0.02 0.01 0.03 0.02 0.02	0.01 0.01 0.01 0.02 0.01 0.01	0.003 0.07 0.08 0.02 0.07 0.06	0.003 nil 0.01 0.02 0.01 0.01	0.003 nil 0.01 0.01 0.01 0.01	0.003 nil 0.01 0.02 0.003 0.01
Nitrate Nitrogen NO ₃ -N (mg/1)	2/13 3/5 5/14 6/4 8/20 9/10	0.54 0.61 0.70 0.63 nil	1.06 0.59 0.47 0.66 1.20 0.23	0.54 0.41 0.34 0.32 1.40 0.11	0.52 0.34 0.20 0.29 0.66 0.20	0.50 0.38 0.29 0.36 1.06 1.11	0.59 0.47 0.34 0.72 nil 0.95	0.32 0.25 0.14 0.81 0.70	0.50 0.61 0.47 0.77 0.15 1.24	0.20 0.16 0.20 0.36 0.52 0.18	0.32 0.16 0.23 0.32 nil	0.32 0.23 0.36 0.38 nil 0.81
Kjeldahl Nitrogen N (mg/1)	3/5 5/14 6/4 8/20 9/10	0.5 0.4 0.2 0.2 0.34	0.3 0.2 0.3 0.1 0.25	0.3 0.4 0.2 0.1 0.25	0.4 0.4 0.3 0.2 0.45	0.4 0.4 0.3 0.1 0.50	0.2 0.3 0.2 0.2 0.31	0.5 0.4 0.3 0.1 0.36	0.6 0.5 0.5 0.3 0.45	0.7 0.5 0.3 0.2 0.31	0.3 0.2 0.2 0.3 0.28	0.6 0.4 9.3 0.4 0.81

Ammonia

Nitrogen Values were \underline{nil} for all dates and all stations during the survey. NH $_3$ (mg/1)

Table III. Laboratory and field results for Little Spokane River Study - (continued)

Constituent	Date (1968)	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11
Chloride	2/13	4.0	4.0	3.0	5.0	5.0	13.0	4.0	5.0	3.0	3.0	4.0
Cl	3/5	2.2	2.4	2.7	1.7	2.7	nil	0.2	nil	nil	nil	1.5
(mg/l)	5/14	2.7	2.7	2.7	2.7	3.5	5.7	2.0	2.7	1.7	1.7	1.5
	6/4	3.0	3.0	3.0	2.8	3.5	7.0	3.0	2.5	1.5	1.3	1.5
	8/20	2.5	2.8	2.5	3.0	3.5	7.5	1.2	2.0	1.2	1.2	1.2
	9/10	1.5	1.0	1.0	1.5	1.0	13.5	0.5	1.0	0.5	2.0	0.5
Turb1d1ty (JTU)	5/14 6/4 8/20 9/10	5.6 4.2 1.8 6.0	5.4 4.0 1.5 4.0	4.4 3.0 1.5 3.0	5.2 4.5 1.5 5.0	5.2 3.8 1.1 5.0	9.0 3.1 1.4 5.0	5.0 4.0 1.0 4.0	6.6 5.7 1.2 3.0	3.9 3.6 0.5 3.0	3.4 3.2 0.5 5.0	4.2 3.2 0.5 4.0

Water	Year	19.71	Test TEMPERATURG
		(Page 2 of 3)	Units

	Collection Point	Nove	mbe r	Feb	ruery	М	ay	Aug	ust
-		7/7	15/3	5/4	15/11	2/13	7/13	7/14	17/19
1	River at Chatcolet R.R. Bridge		18				15		18
2	River at Mission Point								
3	Benewah Cr. at Highway 5		7		 -				
4	Hells Gulch at 95A Bridge		5		 		<u> </u>		1
5	River at Bud Fountains Landing		3				11	<u> </u>	17
6	Cherry Cr. at Highway 5		6						
7	River at Outflow (St. Maries Lagoon)					<u> </u>	14		16
8	River at St. Maries Bridge	5	8				14		16
9	St. Maries River at Sportsman Park	5							
10	River at St. Joe City Bridge	4					1/		16
11	River at Falls Cr. Bridge		1	l					
12	River at Calder Bridge			6			11		16
13	Big Cr. at Road Bridge			6					
14	River at Marble Cr. Bridge			6				1/	16
15	Marble Cr. at Road Bridge			6]		
16	River at Hoyt Flat Bridge			6				10	14
17	Fishhook Cr. at Road Bridge			6					
18	River at P.F.I. Bridge below Avery			6				10	14
19	N. Fk. St. Joe at Road Bridge				6				
20	River at Prospector Cr. Bridge					5		10	12
21	Eagle Cr. at Road Bridge					G			
22	Quartz Cr. at Road Bridge					4			
23	River at Bluff Cr. Bridge					6			
24	Gold Cr. at Road Bridge		:			5			
25	Simmons Cr. at Road Bridge		i			4			
26	River at Beaver Cr. Bridge					1-			
27	River at Red Ives Bridge		ļ			5		91	11
28	Red Ives Cr. at Road Bridge			ļ	ļ	3			
29	River at California Cr.		1			<u> </u>			
30	Sherlock Cr.			<u></u>		<u> </u>		<u> </u>	

Water Year 1971 Test TEMPERATURE - WATER

Units - C

		,,, ,						
	Collection Point	Neve	infrat	Feb	ruery		a 9	August
		7/16	3/3	3/9	5/17	3/20	2/20	8/26
1	River at Chatcolet R.R. Bridge	24	26	23	20	15	27.6	
2	River at Mission Point							
3	Benewah Cr. at Highway 5		i i			21		
4	Hells Gulch at 95A Bridge		i			23	†- -	
5	River at Bud Fountains Landing	24	26	23	19	22	22.5	
6	Cherry Cr. at Highway 5					21		
7	River at Outflow (St. Maries Lagoon)	22	23	23	19	20		
8	River at St. Maries Bridge	22	22	23	19	20	22	
9	St. Maries River at Sportsman Park					20	225	
10	River at St. Joe City Bridge	15	20	22	20	19	125	
11	River at Falls Cr. Bridge					18		
12	River at Calder Bridge	15	19	19	17	17	17.5	
13	Big Cr. at Road Bridge					Ì		15
14	River at Marble Cr. Bridge	15	17	15	15			13
15	Marble Cr. at Road Bridge							11
16	River at Hoyt Flat Bridge	15	16	17	13			12
17	Fishhook Cr. at Road Bridge							10
18	River at P.F.I. Bridge below Avery	16	16	17	12		L	12
19	N. Fk. St. Joe at Road Bridge		<u> </u>					13
20	River at Prospector Cr. Bridge	16	16	16	10		<u> </u>	11
21	Eagle Cr. at Road Bridge	1		ļ	ļ			
22	Quartz Cr. at Road Bridge							10
23	River at Bluff Cr. Bridge			İ				11
24	Cold Cr. at Road Bridge							10
25	Simmons Cr. at Road Bridge	<u> </u>						11
26	River at Beaver Cr. Bridge			<u> </u>	-			10
27	River at Red Ives Bridge	15	11.	14	10		ļ	9
28	Red Ives Cr. at Road Bridge		ļ	14	16	ļ		1
20	River at California Cr.	1				<u> </u>		
30	Sherlock Cr.			<u> </u>		İ		

Water Year 1971 Test DISSULVED OXYGEN
Units P2 m

		November	F=1		Ι
	Collection Point	Kovember	February //	3 4 19	August 2011/2 26
1	River at Chatcolet R.R. Bridge		/3	10.8	95-9
2	River at Mission Point				ļ
3	Benewah Cr. at Highway 5			10.2	15.9
4	Hells Gulch at 95A Bridge			4.4	9.7
5	River at Bud Fountains Landing		12.8	1015	9.8 9
6	Cherry Cr. at Highway 5			<i>]],</i> Z	11.2
7	River at Outflow (St. Maries Lagoon)		12.9		9.6
8	River at St. Maries Bridge		12,7	10.9	1.5. 9
9	St. Maries River at Sportsman Park		12.1		16.1 9.5
10	River at St. Joe City Bridge		12,7	. —	7.5 7
11	River at Falls Cr. Bridge		1217	11.4	7.2
12	River at Calder Bridge		12.9	11.2	1616 9.5
13	Big Cr. at Road Bridge			16.9	10.4
14	River at Marble Cr. Bridge		12.5	//. Z	9.4
15	Marble Cr. at Road Bridge)1.2	15.0
16	River at Hoyt Flat Bridge		13.2	<i>j</i> 1.4	ルフ
17	Fishhook Cr. at Road Bridge			//·z	12,3
1,8	River at P.F.I. Bridge below Avery		1311	71.1	12.2
19	N. Fk. St. Joe at Road Bridge		12.4	5 1216-8	12.7
20	River at Prospector Cr. Bridge			11.3	12.1
21	Eagle Cr. at Road Bridge			11.1.	12.3
22	Quartz Cr. at Road Bridge			11.5	12.6
23	River at Bluff Cr. Bridge			//.7	12.2
24	Gold Cr. at Road Bridge			11.2	12.5
25	Simmons Cr. at Road Bridge			11.2	12.9
26	River at Beaver Cr. Bridge			17,12	12.5
27	River at Red Ives Bridge			11.1	12.4
28	Red Ives Cr. at Road Bridge			11.9	12.2
29	River at California Cr.	1			
30	Sherlock Cr.				

Water Year 1971 Test NITAATE

Units npm1

	***	1470	1971		
	Collection Point	November	February	liay	August
		9	Jr 11	3 4 B	20/26
1	River at Chatcolet R.R. Bridge	1350	1.08	·c6	102 13
2	River at Mission Point	_			
3	Benewah Cr. at Highway 5			.ds	.02
4	Hells Gulch at 95A Bridge			.05	•04
5	River at Bud Fountains Landing	C	1.06	.05	.05 2
6	Cherry Cr. at Highway 5	-		:04	.22
7	River at Outflow (St. Maries Lagoon)	Ü	1.05		:06
8	River at St. Maries Bridge	C	4.05	.04	.02.2
9	St. Maries River at Sportsman Park	C	:06	N.E	101.2
10	River at St. Joe City Bridge	0	.66	<i>i</i> 7	109 12
11	River at Falls Cr. Bridge	Ĉ	104	. <i>c</i> l,	.04
12	kiver at Calder Bridge	0	45.04	.03	154.2
13	Big Cr. at Road Bridge	_		cE'	·cl
14	River at Marble Cr. Bridge	Ü	103	155	.66
15	Marble Cr. at Road Bridge			.66	102
16	River at Hoyt Flat Bridge	0	icle	, 69	.04
17	Fishhook Cr. at Road Bridge			.05	,02
18	River at P.F.I. Bridge below Avery	U	105	1.64	£3
19	N. Fk. St. Joe at Road Bridge	0	108	50-104	105
20	River at Prospector Cr. Bridge	Ü	}	112	:02
21	Eagle Cr. at Road Bridge	-		,05	.67
22	Quartz Cr. at Road Bridge	_		.1/	.64
23	River at Bluff Cr. Bridge	0		.05	.64
24	Gold Cr. at Road Dridge			,14	. (1)
25	Simmons Cr. at Road Bridge	_		.17	164
26	River at Beaver Cr. Bridge	G.		10%	.6.5
2 7	River at Red lves Bridge	U		./ /	: 6 5
28	Red Ives Cr. at Road Bridge			-5/_	163
50	Siver of California Cr.		ļ		
2.	mil con	1		• • • • • • • • • • • • • • • • • • • •	-
		.1			

Water	Year 1971 Test	CHUCA	ND E		_
		s 1), 12	_		
		1410			
Collection Point		November	February	May	August
		9	11	3 4 13	
1	River at Chatcolet R.R. Bridge	2.5	2,5	3.5	104
2	River at Mission Point		 		
3	Benewah Cr. at Highway 5			3.5	7.5
4	Hells Gulch at 95A Bridge			3.1	7.5
5	River at Bud Fountains Landing	2,5	2.1	3 5	5 4
6	Cherry Cr. at Highway 5		2.)	3.5	16
7	River at Outflow (St. Maries Lagoon)	3,5	4		7,5
8	River at St. Maries Bridge	2,5	3	3:5	7.5 6
9	St. Maries River at Sportsman Park	2.5	2		7152
10	River at St. Joe City Bridge	2:5	7		5 4
11	River at Falls Cr. Bridge	2.5	2	3,5	5
1.2	River at Calder Bridge	2,,	2.		5 4
13	Big Cr. at Road Bridge			3.5	5
14	River at Marble Cr. Bridge	3:5	7.5	3.5	5
15	Marble Cr. at Road Bridge			3.)	7.5
16	River at Hoyt Flat Bridge	3,5	3.5	3.5	7.5
17	Fishhook Cr. at Road Bridge			35	7.5
18	River at P.F.I. Bridge below Avery	3,5	3.)	3,5	5
19	N. Fk. St. Joe at Road Bridge	2,5	2.5	5 1215	5
20	River at Prospector Cr. Bridge	2.)	2.5	2.5	5
21	Eagle Cr. at Road Bridge			2.5	5
22	Quartz Cr. at Road Bridge			2.5	.5
23	River at Bluff Cr. Bridge	2.5		2.5	2.15
24	Gold Cr. at Road Bridge			21,5	5
25	Simmons Cr. at Road Bridge			2)	5
26	River at Beaver Cr. Bridge	Ü		2-5	,
2.7	River at Red Ives Bridge	l'		21)	1
28	Red Ives Cr. at Road Bridge				
10	Misser of California Cr	,	!		:
	and of the Co	1	!	:	

. .

	1470	1971) 						
Collection Point	1.07	F	MILY		JULY		A	.UGUS1	1
	19	18	118	13	19	26.27	3-4	17	20
1 + River & Chatcolet R.R. Bridge	52	72	52	50	36	44	52	60	3/2
4 Mella Gulch O 95A Bridge		†				1	-		
5 River C Bud Fountain's Landing		150	44	36	20	20	48	24/63	20
5 Cherry Creek G Highway 5	-				•				
7 River & Cutflow(St. Haries Lagoon)	300	240		340	190	264	200	int/ EC	.]
8 River & St. Maries Bridge	32	40	72	38	36	136	100	145	200
9 St. Maries River @ Sportsman Park]_:	72] '.	36
10 River O St. Joe City Bridge	6	32	Δ.	24	20	16	45	184	
12 River C Calder Bridge	12	200	(20	20	36	12	20	48	134
125 St. Joe River Below Calder				20	26	16	24	102	
14 River G Marble Creek Bridge	16	<u>52</u>	32	16	20	16	56	20	
143 St. Joe River Below Ragan's	.			ļ ₋	_			1/22	
16 River & Hoyt Flat Bridge	52	96	24	16		56	76	169	
16: River Below Hoyt Flat Ranger Station				6	32	30	40	51/2°C	
18 River O P.F.I. Bridge Below Avery	24	11:0	40	148	125	154	142	745/17	
20 Pivor & Prospector Creek Bridge					4	1_	5	1	
27 River C Red Ives Bridge			\mathcal{E}	4	O	<u>ک</u> 	2	3	
27A River Balow Red Ives Lagoon		<u> </u>		_ '	0		٦,	12	
26 Red Ives Croek at Road Bridge	.				0	1	4	2	
29 River O Callifornia Creek Bridge	-\ -								
		}			-				
	i								1
	:	!		!		l		_	1
PSE 114 SE HOSE THE MEDITIFIED TO SEE TOOK SE	ر. اوران الم	4	:	!		•		:	
* Karana San	;		•	:				;	

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Butter detach	wir.v. al Forest	Idaha Deportn		Station 1	
· Carr An	× 407	-	ing & Sandotron Divisions LITY REPORT	•	
St. Marie	as, Idaho 83861.	Code		Code	
Location: County	(Name)	(2-	3) Municipality	eme / a	(4-
Name of Owners	1/3/2	77.81 500	· ·		9-
Sample taken from: (1		Deep Well	3 Shallow Well	4- Infiltration Collector	
(Check one)	5 Lake 6		7 Reservoir	8 Creek 9 Distribution Sy	151
Sampling point location:		2.6 3 6 62	,	me mesters	
	111 Bld	7 {12-13 Year	7) Date received:		_
Card 3 (1) Physical:	Field Testing		Card 4 (1)	Special Laboratory	
Temp. *F C	0.0. 9.0	(18.10)	Chemical (Part 2): (mg,	/L)	
Odor Isual MF 36	23	(20)	The state of the s		
1.eld pH 7.4	7.8	(21-23)	☐ Aluminum (Al)	(1)	8-
7. E/3 pr 7. –	Laboratory	(21-25)	L Zinc (Zn)	. 12	20-
(Check analysis desired):	,		Phenols	. [2	22-
Color (s.u.)		(24-25)	Cypnide (CN)	. (2	25-
☐ Turbidity (s.u.)	3	(26-27)			27-
Chemical: (Results expre			Copper (Cu)		30-
Tor routine analysis of the mum sample one liter	l l		Arsenic (As)	├ ─- ├ ├ ─- ├	12-
☐ Total solids	76.	(28-31)	☐ Barium (Ba)		35-
Jayotogen-Sulfide (5)	68.	(32-34)	Codmium (Cd)		17-
Alkalinity (as CaCO ₃)	32	(35-37)	Chromium (Cr)		10-
☐ Hardness (as CaCO₃)	48	(38-40)	Leod (Pb)		3-
Calcium (Ca)	6	(41-43)	Silver (Ag)	- 14	
☐ Magnesium (Mg)	8.	(44-46)	Selenium (Se) B		9-
☐ Iron* (Fe)	00	/ (47-50)	Radiological activity: (p		2-
Manganese (Mn)	400	/ (51-53)	(tyrumum samble one dallou)	oci/iller)	
Sodium (Na)	.2	(54-56)	Gross alpha	(S	ī5-
Chloride (CI)	4.	(57-59)	Gross beta		8-
Sulphate (SO ₄)		(60-62)	Radium 226	16	2-
Mitrate (NOs)	0.3	(63-65)	Strontium 90	16	. 6-
☐ Phosphate (PO₁)	0 0	.2 (56-68)	Strontium 89	17	0-
□ Silica (SiOz)	6.0	{69-70}	lodine 131	17	4-
Tluoride (F)	1 0 0	/ (71-74)	:		
(i) Ammonia* (N) *35 st all sampling protodure	2 0 1	(75-77)	: 		=
Copies of report to.			Date reported	2-7/	
			Chemist	2007	_

Rutine Betweek	Loboratories	-	ent of Hoolih ng & Sanitation Divisions LITY REPORT	Station 5	
Sample taken from: (11) (Check one) Sampling point location.	Name Name River Lake According to the control of the control o	(7-8) Source Deep Well Springs	3 Shallow Well 7 Reservoir	Name (a.e. Kraine 4 Infiltration Collector 8 Creek 9 Distrib y:	[4-
Physical: D. Temp. :FC -Odor-ts-u-t Mr 20.	Field Testing	(18-19) (20)	Card 4 (1) Chemical (Part 2): (m (Minimum sample one liter)	Special Laboratory 19/L)	(18-
	aboratory t sed in ppm) (mg/L)	(24-25) (26-27)	☐ Zinc (Zn) ☐ Phenols ☐ Cyonide (CN) ☐ CCE ☐ Copper (Cu) ☐ Arsenic (As)		(20- (22- (25- (27- (30- (32-
Total solids 705 Alkalinity (as CoCO ₃) Hardness (as CaCO ₃) Colcium (Ca) Magnesium (Mg) Iron* (Fe)	92 76 44 4 4 6 4 . 8	(28-31) (32-34) (35-37) (38-40) (41-43) (44-46)	Barium (Bo) Cadmium (Cd) Chromium (Cr) Leod (Pb) Silver (Ag) Selenium (Se)	· · · · · · · · · · · · · · · · · · ·	(35- (37- (40- (43- (46- (49- (52-
Monganese (Mn) Sodium (Na) Chloride (Cl) Sulphate (SO ₄) Nitrate (NO ₃) Phosphate (PO ₄) Silica (SiO ₂) Fluoride (F) Ammonia* (N)	2 0 · 0 / 2 · 4 · 0 · 3 0 · 6 · 4 · 6 / 2 · 7	ا (69-70)	Radiological activity: (Minimum sample one gallon Gross alpha Gross beta Radium 226 Strontium 90 Strontium 89 Iodine 131	(pCr/liter)	(55- (58- (62- (66- (70- (74-
*Special sampling procedure Comes of report to:			Date reported:	(2-2) (4-2)	

Partine Victoria Idaha Department of Health Station 10 es and Engineering & Sanitation Divisions WATER QUALITY REPORT w Kine Name of Owner: (7-8) Source Nome & Number: (11) Sample taken from: Deep Well 3 Shallow Well 4 Infiltration Collector (Check one) 5 Loke Springs 7 | Reservoir 6 Creek 9 Distribution Syst Circ Sampling point location Sample submitted by: 7 (12-17) 56 8 Date of Collection: Date received Card 3 (1) Field Testing Cord 4 (1) Special Laboratory Physical: D.O. 9.0 Chemical (Part 2): (mg/L) Temp. of C (18-19):5 Odor (SU) PIF 52 (20) Aluminum (AI) (18 Field pH 7.4 (21-23) Zinc (Zn) (20 Laboratory Phenols (Check analysis desired): (22 ☐ Cyanide (CN) (25 Color (s.u.) (24-25)CCE (26-27) (27 ☐ Turbidity (s.u.) Copper (Cu) (30 Chemical: (Results expressed in ppm) (mg/L) For routine analysis check here
(Minimum sample one liter) Arsenic (As) (32 ☐ Borium (Ba) 135 (28-31) Total solids Otyphogen Sulfide (S) Cadmium (Cd) (37 (32-34) 6 Chromium (Cr) (40 (35-37) ☐ Alkalinity (as CaCO₃) 3 6 lead (Pb) (43 ☐ Hardness (as CaCO₃) (38-40) 4 4 ☐ Silver (Ag) (46 (41-43) Calcium (Ca) 1 0 (45 (44-46) ☐ Magnesium (Mg) 6 8 (52 □ A-3.5. 0 ☐ Iron* (Fe) (47-50) 0 Radiological activity: (pCi/liter) (51-53) Manganese (Mn) 0 (54-56) Sodium (Na) Gross alpha (55 (57-59) Chloride (CI) 6 Gross beta (58 Sulphate (SO.) (60-62) 🗔 Radium 226 (62 ☐ Nitrate (NO₃) (63-65) C Strontium 90 160 (86-68) Phosphate (PO_) 0 0 Strontium 89 (70 (69-70) 8 Silico (SiO2) 4 🗔 lodine 131 (71-74) Fluoride (7) O 0 (75-77) Ammonia* (N) Special sampling procedure Copies of report to: Date reported

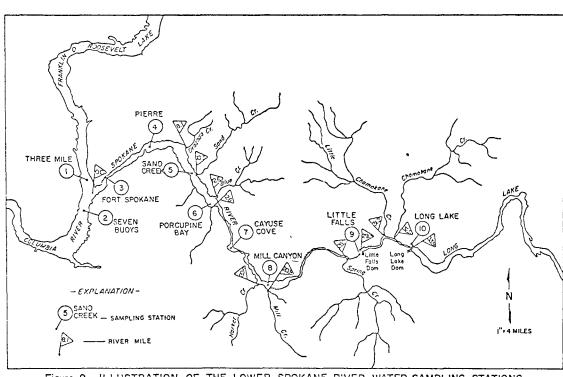


Figure 2. ILLUSTRATION OF THE LOWER SPOKANE RIVER WATER SAMPLING STATIONS AND RELATED LANDMARKS, WDE, 1970 AND 1971

Table 5. Total and fecal coliform bacteria counts per 100 π1, stations 1 - 10, at one-foot depth, WDE, 1970 and 1971.

1970	Total	coliform	counts.

Station	6/23	6/29	7/7	7/15	7/21	7/28	8/4	8/18	9/1	9/15	9/22	9/29	10/6	10/13	10/27	11/24
									•	•	• • • •				7.0	
1	0	80	12	23	6	17	140	88	24	34	180	100	80	52	72	4
2	0	10	12	10	6	5	28	10	7	40	140	140	160	104	32	2
3	0	72	14	81	7	9	4	22	4	72	420	560	600	18	36	8
4	0	50	30	2	3	10	22	50	12	14	740	360	1000	200	260	4
5	4	4	14	0	2	12	2	12	2	26	1020	420	1200	100	60	4
6	6	4	20	2	3	22	24	16	4	20	980	760	1000	240	100	4
7	104	64	48	12	6	70	4	45	4	TNTC	500	TNTC	1600	200	160	62
8	166	34	600	0	8	50	140	0	0	86	540	2000	8000	4200	30	80
9	320	2 500	210	TNTC	46	TNTC	TNTC	50 -	55	180	200	1800	2200	600	50	160
10	188	3070	144	TNTC	35	TNTC	TNTC	80	0	420	1000	2000	3400	1200	220	0

TNTC: Too numerous to count - plate overgrown with non-specific organism.

1971 Total coliform counts.

Station	4/13	5/18	6/15	7/20	8/17	8/31	9/14	9/17	12/8
1	2	4	10	0	46	_	0		
2	2	4	0	ŏ	24	_	42		
3	14	44	0	0	108	490	14		
4	2	18	0	0	8	<200	12		
5	30	24	20	0	0	200	12		
6	20	36	0	0	4	<200	100		
7	_	-	190	0	14	<200	7 50		
8	_	-	310	10	TNTC	460	460		
9	230	380	360	14	_	370	-	500	9
10	126	680	64	2	-	2900	-	2300	10

1971	Fecal	colifo	rm cout	its.						
					Stat:	lons				
Date	1	2	3	4	5	6	7	- 8	9	10
									•	
9/31	_	_	< 20	<20	<20	<20	<20	<20	<20	<20

Table 8. Dissolved oxygen concentrations in mg/1 at Stations 1 - 10, at one-foot depth, WDE, 1970 and 1971.

1970

Station	6/23	6/29	7/7	7/15	7/21	7/28	8/4	8/18	9/1	9/15	9/22	9/29	10/6	10/13	10/27	11/24
1	11.5	11.0	9.8	9.7	9.6	9.8	10.1	8.9	9.1	8.6	8.4	7.7	8.1	9.2	9.5	9.8
2	11.7	11.0	9.6	9.8	10.5	9.4	9.3	9.0	9.6	7.6	8.5	8.5	9.0	8.9	9.6	10.2
3	10.5	10.7	8.9	8.9	9.5	9.2	9.1	8.3	9.4	7.0	7.0	6.9	8.7	7.7	8.2	9.4
4	12.2	10.4	9.1	8.8	9.4	9.2	9.2	9.0	8.9	5.0	5.7	6.7	7.3	6.8	7.5	8.4
5	10.6	10.8	9.1	9.6	10.5	9.8	9.6	9.5	8.5	5.7	5.6	6.5	7.2	7.2	7.8	8.8
6	11.5	11.0	9.2	9.8	11.2	9.7	9.6	9.4	8.6	5.4	6.0	6.5	7.0	7.2	8.1	9.2
7	11.1	10.6	10.0	10.0	12.2	9.3	10.5	9.9	9.8	7.0	6.2	7.0	7.2	7.5	8.4	9.1
8	10.0	10.2	10.0	11.0	11.4	9.6	12.3	11.0	8.9	6.5	8.4	9.1	9.2	9.3	9.0	9.1
9	10.0	9.2	8.6	8.6	8.3	7.3	8.3	5.3	5.4	5.2	3.4	5.8	5.5	5.8	7.2	8.7
10	10.7	9.2	8.5	7.4	7.2	6.2	5.5	4.8	4.5	5.2	2.9	5.4	6.3	5.7	7.3	8.7

1971

Station	4/13	5/18	6/15*	7/20*	8/17	8/31	9/14	9/22	12/8
1	12.0	12.2	12.9	11.7	10.2	-	9.2		
2	12.4	12.3	12.2	11.3	10.1	-	8.6		
3	12.2	12.2	11.9	9.5	9.8	8.0	8.7		
4	12.6	12.5	12.1	9.9	9.5	8.1	8.5		
5	12.6	12.5	11.8	10.4	9.5	8.0	8.7		
6	12.4	12.4	11.9	9.9	9.5	7.7	8.1		
7	-	_	11.8	11.3	9.4	12.6	7.6		
8	-	-	11.8	11.8	9.6	11.0	8.2		
9	12.2	14.0	11.7	8.0	3.1	7.0	3.5		9.0
10	12.8	14.2	11.6	8.0	2.8	5.5	3.9	3.5	9.3

^{*} Stations 1 - 8 sampled at 3 feet.

Table 10. Temperature in °C, stations 1 - 10, at one+foot depth, WDE, 1970 and 1971.

-	•	-	-

Station	6/23	6/29	7/7	7/15	7/21	7/28	8/4	8/18	9/1	9/15	9/22	9/29	10/6	10/13	10/27	11/24
1	19.0	15.5	24.4	23.3	22.2	19.5	22.8	21.1	20.0	18.3	17.4	16.9	16.3	15.5	13.0	9.5
2	21.0	15.5	24.6	19.4	20.6	20.0	22.2	21.1	21.1	19.5	18.4	17.2	16.4	15.1	13.0	9.6
3	21.5	19.4	26.1	26.6	25.6	21.1	24.4	22.2	21.8	18.3	17.6	17.1	16.0	15.2	13.0	9.0
4	23.0	20.0	27.8	26.6	23.8	22.2	23.8	21.1	21.8	18.3	17.6	17.1	16.4	15.0	12.8	8.5
5	24.5	20.0	26.6	26.6	23.8	21.8	23.8	21.1	21.8	18.3	17.7	17.1	16.3	15.8	12.9	9.0
6	24.4	19.4	26.6	25.6	23.3	21.8	23.8	21.1	21.1	20.0	17.6	17.2	16.2	15.6	13.0	9.0
7	~	19.4	24.4	25.6	22.8	20.0	23.8	21.8	21.1	18.9	17.4	17.4	15.9	15.4	12.2	7.0
8	~	19.4	23.8	23.3	21.8	20.0	23.8	21.1	20.0	17.8	15.9	17.0	14.5	12.9	10.4	6.5
9	16.7	16.7	19.4	-	21.1	13.3	21.1	19.4	19.4	17.2	16.1	14.6	13.4	12.9	10.4	6.8
10	16.7	17.2	19.4	18.9	21.1	18.3	19.4	19.5	19.4	17.8	15.5	14.9	13.7	13.0	10.4	6.9

1971

Station	4/13	5/18	6/15*	7/20*	8/17	8/31	9/14	12/8
1	7.1	9.8	10.9	13.4	22.0	_	19.0	
2	7.7	10.8	12.0	19.4	22.0	-	18.5	
3	7.6	11.9	15.0	21.9	22.5	22.0	18.5	
4	9.1	12.7	15.6	23.0	23.5	22.0	19.0	
5	8.9	12.2	14.9	25.0	22.5	21.5	19.0	
6	9.0	12.4	15.0	25.6	22.5	20.5	19.0	
7	-	-	15.0	24.8	22.0	21.0	19.5	
8	-	-	14.4	22.7	21.5	20.5	18.5	
9	7.0	10.6	15.0	23.0	20.5	20.3	-	4.3
10	7.3	10.6	15.0	22.9	20.0	20.0	-	5.3

^{*} Measured at 3 feet.

Table 17. Nitrate concentration as mg/l nitrogen, stations 1 - 10, WDE, 1970 and 1971.

					stations	1 - 10,	WDE, 19	70 and 1	971.			
1970, n	t one-f	oot dep	<u>th</u>				№3-	N				
Station	1	6/22	7/21	8/4	8/18	9/1	9/15	9/29	10/8	10/13	10/27	11/24
1		0.02	0.04	0.04	0.07	0.00	0.00	0.09	0.06	0.07	0.17	0.15
2		0.04	0.01	0.03	0.09	0.02	0.00	0.05	0.06	0.11	0.09	0.03
3		0.03	0.03	0.03	0.04	-	0.00	0.29	0.13	0.22	0.33	0.13
4		0.02	0.02	0.04	0.04	-	0.33	0.46	0.41	0.51	0.56	0.48
5		0.04	0.02	0.05	0.03	0.01	0.33	0.31	0.42	0.41	0.68	0.34
6		0.06	0.01	0.03	0.03	0.13	0.31	0.32	0.44	0.75	0.36	0.38
7		0.08	0.02	0.03	0.06	-	0.33	0.30	0.61	0.77	0.46	0.42
8		0.09	0.04	0.06	0.04	0.16	-	0.20	0.46	0.62	0.54	0.25
9		0.09	0.22	0.34	0.99	0.34	0.63	0.52	0.58	0.80	0.69	0.43
10		0.07	0.20	0.40	0.77	0.41	0.75	0.36	0.75	0.87	0.44	0.30
1971, a	at one-f	oot dep	th		NO	3-N						
Station	1	4/13	5/18	6/15	7/20	8/17	8/31	9/14	12/8			
1		0.63	0.12	0.19	0.07	0.08	_	0.05				
2		0.51	0.12	0.19	0.01	0.02	_	0.06				
3		0.58	0.06	0.06	0.00	0.02	0.21	0.04				
4		0.60	0.05	0.03	0.01	0.03	0.11	0.09				
5		0.59	0.04	0.09	0.01	0.03	0.13	0.07				
6		0.71	0.09	0.11	0.03	0.05	0.19	0.14				
7		-	-	0.13	0.01	0.10	0.04	0.11				
8		_	-	0.09	0.10	0.15	0.06	0.53				
9		0.66	0.13	0.11	0.11	0.63	0.35	0.33	0.63			
10		0.72	0.05	0.12	0.23	0.74	0.36	0.45	0.58			
1971		De	pth	NO	1 7- N							
	Station	<u> 1</u> n	ft.	8/31	9/14							
	1		00		0.07							
	2		0		0.06							
	3		50	0.15	0.08							
	4		50	0.08	0.06							
	5		30	0.14	0.29							
	6		30	0.21	0.26							
	7		70	0.02	0.25							
	8	4	0	0.35	0.36							

Table 18. Dissolved orthophosphate concentration as mg/1 phosphorus, stations 1 - 10, WDE, 1970 and 1971.

1970 at one-foot depth.

					P→D	, ortho	o*				
Stations	6/22	7/21	8/4	8/18	9/1	9/15	9/29	10/8	10/13	10/27	11/24
1	<0.01	0.04	0.14	0.02	<0.01	0.01	0.01	0.01	0.00	0.00	0.01
2	0.01	0.01	0.03	0.01	<0.01	<0.01	<0.01	0.01	0.00	<0.01	0.00
3	0.01	0.01	0.03	0.01	-	0.01	0.01	0.01	0.00	<0.01	0.03
4	<0.01	0.01	0.03	0.01		0.01	0.01	0.01	0.01	0.01	0.01
5	<0.01	0.03	0.01	0.00	0.05	0.00	0.02	0.01	0.01	<0.01	0.00
6	0.01	0.01	0.01	0.00	<0.01	0.00	.0.01	0.01	0.01	0.02	0.01
7	10.0	0.01	<0.01	<0.01		0.00	0.01	0.01	0.01	0.01	0.02
8	0.01	0.01	0.01	0.01	0.00	0.02	<0.01	0.01	0.00	<0.01	0.00
9	0.03	<0.01	0.04	0.02	0.03	0.01	0.01	0.01	0.01	0.02	0.02
10	<0.01	<0.01	0.01	0.07	0.02	0.01	0.02	0.01	0.01	0.02	0.02

*Inorganic phosphorus in the sample filtrate after filtration through 0.45 micron pore size, phosphorus free filters.

1971 at one-foot depth.

	P-D, ortho								
Stations	4/13	5/18	6/15	7/20	8/17	8/31	9/14	12/8	
1	0.05	0.00	0.03	<0.01	0.00	_	0.01		
2	0.04	0.00	0.01	<0.01	0.00	_	0.01		
3	0.03	0.00	0.01	<0.01	0.00		0.01		
4	0.04	0.00	0.01	0.00	0.00	0.00	0.02		
5	0.03	0.00	0.01	0.00	0.00	<0.01	0.02		
6	0.03	0.00	0.01	0.00	0.00	0.02	0.02		
7	_	0.00	0.01	0.01	<0.01	<0.01	0.03		
8		0.00	0.01	0.01	<0.01	0.01	0.04		
9	0.04	0.00	0.01	0.00	0.05	0.01	0.08	0.04	
10	0.04	0.00	0.01	0.01	0.05	0.04	0.06	0.05	

P-D, ortho

Station	Depth in ft.	8/31	9/14
1	90		0.01
2	90		0.01
3	60	<0.01.	0.01
4	60	<0.01	0.02
5	80	0.01	
6	80	0.01	0.05
7	70	0.04	0.05
8	40	0.04	

Table 19. Phosphorus concentration in mg/l, stations 1 $\,$ 10, WDE, 1970 and 1971.

1970 at one	-foot	depth.									
						(P)*					
Stations	6/22	7/21	8/4	8/18	9/1	9/15	9/29	10/8	10/13	10/27	11/24
1	0.02	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.02	0.01	0.02
2	0.02	0.04	0.02	0.01	0.04	0.02	0.01	0.01	0.01	<0.01	<0.01
3	0.02	0.03	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.61	0.03
4	0.02	0.04	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.02
5	0.03	0.04	0.04	0.02	0.02	0.03	0.01	0.01	0.01	0.01	0.01
6	0.04	0.03	0.02	0.03	0.01	0.02	0.02	0.01	0.02	0.02	0.01
7	0.04	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02
8	0.01	0.05	0.02	0.01	0.02	0.04	0.01	0.01	0.01	<0.01	0.01
9	0.04	0.09	0.03	0.03	0.04	0.04	0.02	0.02	0.03	0.03	0.04
10	0.03	0.12	0.04	0.07	0.05	0.02	0.02	0.01	0.03	0.02	0.03

*All of the phosphorus present in the sample, regardless of form.

1971 at one-foot.

(P)

Stations	4/13	5/18	6/15	7/20	8/1.7	8/31	9/14	12/8
1	0.08	0.06	0.04	0.03	0.10		0.05	
2	0.09	0.06	0.04	0.04	0.05		0.02	
3	0.15	0.06	0.06	0.02	0.08	-0.01	0.01	
4 5	0.10 0.10	0.05	0.02	0.01	0.07	<0.01 0.01	0.02	
6	0.13	0.05	0.03	0.02	0.07	0.03	0.02	
7 8	-	-	0.07	0.02	0.08	0.01	0.03	
9	0.10	0.05	0.10	0.03	0.17	0.05	0.09	0.07
10	0.08	0.07	0.05	0.04	0.10	0.36	0.08	0.05

(P)

Stations	Depth in ft.	8/31	9/14
1	90		0.02
2	90		0.02
3	60	0.01	0.02
4	60	0.01	0.04
5	80	0.01	
6	80	0.02	0.06
7	70	0.05	0.06
8	40	0.07	0.05

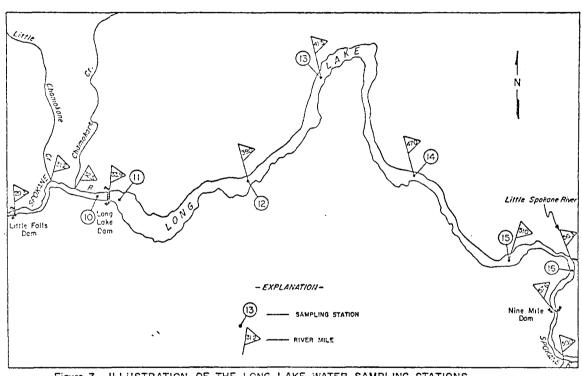


Figure 3. ILLUSTRATION OF THE LONG LAKE WATER SAMPLING STATIONS AND RELATED LANDMARKS, WDE, 1971

Table 12 Dissolved oxygen concentration and temperature, Long Lake, station 11, WDE, 1971.

Date	Depth in ft.	DO mg/1	Temp °C
7/27	3	10.5	25.6
	40	7.5	18.0
	75	5.4	16.0
	140	(bottom depth)	
8/10	3	10.3	26.0
	20	4.8	20.8
	40	4.4	19.5
	80	1.8	16.0
8/18	3	9.4	23.0
	40	0.3	20.0
	80	1.7	16.0
8/23	3	9.6	21.0
	20	4.5	19.5
	40	1.6	19.0
	70	3.6	15.5
9/1	3	10.2	20.5
	20	0.1	19.5
	4Ó	0.1	18.5
	70	0.0	17.0
	100	0.0	16.5
9/15	3	5.6	18.0
	20	5.2	17.5
	40	3.8	17.5
	70	0.0	16.5
	100	0.0	16.0
9/21	3	9.8	18.0
	45	6.0	17.0
	75	0.5	16.0

Table 13. Dissolved oxygen concentration and temperature, Long Lake, station 12, WDE, 1971.

Date	Depth in ft.	DO mg/l	Temp °C
Date	In It.	mg/ 1	<u>C</u>
7/27	3	11.9	24.0
	50	5.5	16.7
	60	(bottom depth)	
8/10	3	11.2	27.0
	20	4.1	22.0
	45	2.0	19.0
8/23	3	9.0	21.8
	20	7.8	21.3
	45	3.0	18.5
9/1	3	. 5.7	19.5
	20	5.6	19.5
	40	3.8	19.5
	50	2.8	19.5
9/15	3	7.9	18.5
	20	7. 7	18.0
	40	5.4	17.5
	50	5.5	16.5
9/21	3	7.2	17.9
	25	8.1	16.2
	50	6.8	15.8

Table 14. Dissolved oxygen concentration and temperature, Long Lake, station 13, WDE, 1971.

Date	Depth in ft.	DO mg/l	Temp.
<u> </u>	111 10.	mg/1	
7/27	3	11.2	24.0
	30	4.6	19.0
	70	2.6	15.5
	75	(bottom depth)	
8/10	3	10.8	26.0
	30	4.8	20.0
	50	2.2	18.7
8/18	3	10.4	24.0
	20	4.5	22.0
	42	3.7	20.0
9/1	3	6.8	19.5
	20	6.3	19.5
	40	4.5	20.0
	70	4.0	17.5
9/15	3	8.1	18.0
•	20	8.1	18.0
	48	6.2	17.5
9/21	3	9.1	17.9
	25	7.4	16.8
	50	6.8	15.0

Table 15. Dissolved oxygen concentration and temperature, Long Lake, station 14, WDE, 1971.

Date	Depth in ft.	DO mg/l	Temp.
7/26	3	11.2	
7720			23.8
	20	6.4	20.0
	40	1.8	16.0
	50	(bottom depth)	
8/9	3	12.2	26.0
	25	7.3	-
	40	5.2	20.0
8/19	3	9.8	24.2
	20	6.6	22.6
	40	6.1	18.6
9/1	3	7.0	19.0
	18	5.8	19.0
	45	5.6	18.0
9/15	3	10.0	18.0
	20	9.6	18.0
	40	7.5	15.5
9/22	3	10.8	16.5
	20	8.0	15.5
	40	8.0	13.5

Table 16. Dissolved oxygen concentration and temperature, Long Lake, stations 15 and 16, WDE, 1971.

	Statio	n 15	
	Depth	DO	Temp.
Date	in ft.	mg/1	°c'
7/26	3	6.9	20.8
	25 (t	ottom der	oth)
8/9	3	14.6	24.0
	_. 10	6.8	20.0
	20	6.3	20.0
8/18	3	11.8	22.5
	10	7.4	20.0
	20	6.9	18.5
9/1	3	7.0	16.0
	10	6.2	16.5
	20	6.2	16.5
9/15	3	7.8	15.5
	10	7.5	15.0
	20	7.8	15.0
9/22	3	8.0	13.5
	20	7.8	13.5

Station 16							
Depth DO Temp.							
Date	in ft.	mg/1	°C				
7/26	5	7.8	18.7				
	15	(bottom dep	oth)				
8/9	5	7.6	21.5				
8/24	10	8.0	16.8				
9/8	5	8.8	16.0				
9/22	5	9.0	13.5				

TABLE 20. Nitrate concentration as mg/l nitrogen, Long Lake, stations 11 - 16, WDE, 1971.

	Depth		NO ₃ -N		
Station	in ft.	7/21	8/23	9/1	9/15
11	3	0.00	0.02	0.12	0.46
	80	0.28	0.02		
	90				0.11
	100			0.06	
12	3	0.00		0.32	0.25
	50	0.25	0.44	0.48	0.47
13	3	0.00	0.05	0.19	0.19
	42	0.19			0.55
	60			0.46	
14	3	0.00	0.07	0.12	0.13
	40	0.29	0.56	0.48	0.49
15	3	0.45	0.39	0.50	0.65
	20	0.47	0.60	0.72	0.44
16	3		0.51		0.33

TABLE 21 Dissolved orthophosphate concentration as mg/1 phosphorus, Long Lake, stations 11 - 16, WDE, 1971.

Station	Depth in ft.	retire. Since the contrastic contrasting and couply colored	P-D, orth	0	
		7/21	8/23	9/1	9/15
11	3	<0.01	0.01	0.01	0.03
	68	0.04	0.00		
	90				0.08
•	100			0.10	
12	3	<0.01	` -	0.02	0.01
	50	0.03	0.04	0.06	0.05
13	3	<0.01	0.00	0.01	0.01
	42	0.04			0.06
	60			0.07	
14	3	0.01	0.00	0.01	0.01
	40	- 0.04	0.04	0.07	0.05
15	3	0.04	0.02	0.10	0.06
	20	0.04	0.02	0.10	0.07
16	3				0.08

TABLE 22. Phosphorus concentration in mg/1, Long Lake, stations 11 - 16, WDE, 1971.

	(P)				
Station	Depth in ft.	7/21	8/23	9/1	9/15
11	3	0.01	0.02	0.02	0.08
	80	0.06	0.02		
	90				0.12
	100			0.12	
12	3	0.03	0.08	0.04	0.03
	50	0.08	0.17	0.09	0.09
13	3	0.03	0.03	0.05	0.02
	42				0.08
	60	0.04	0.15	0.11	
14	3	0.04	0.04	0.05	0.02
	40	0.12	0.13	0.10	0.07
15	3	0.04	0.06	0.13	0.09
	20	0.04	0.09	0.12	0.10
16	3.		0.11		0.10



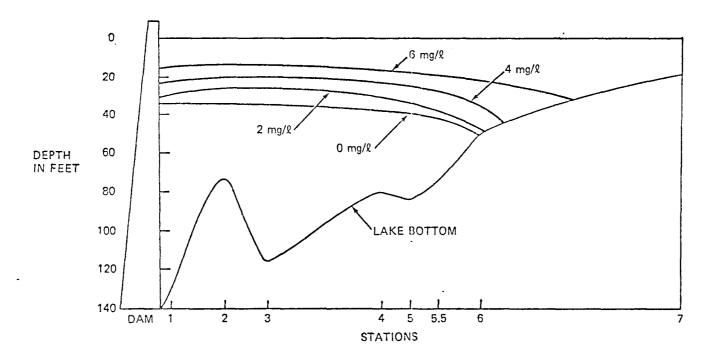


Figure 4. Dissolved oxygen profile estimations in Long Lake based on average concentrations measured at the 10' and 35' depths. Lake bottom profile based on average depth at each station.

APPENDIX III

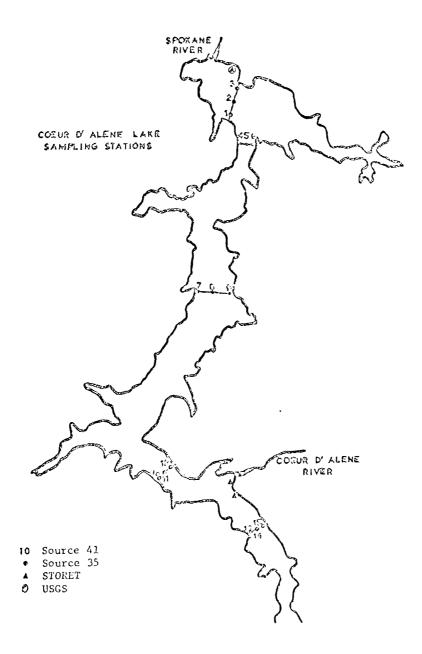
LOCATIONS OF LAKE SAMPLING STATIONS

ATTACHMENT 1: SAMPLING STATIONS ON COEUR D'ALENE LAKE

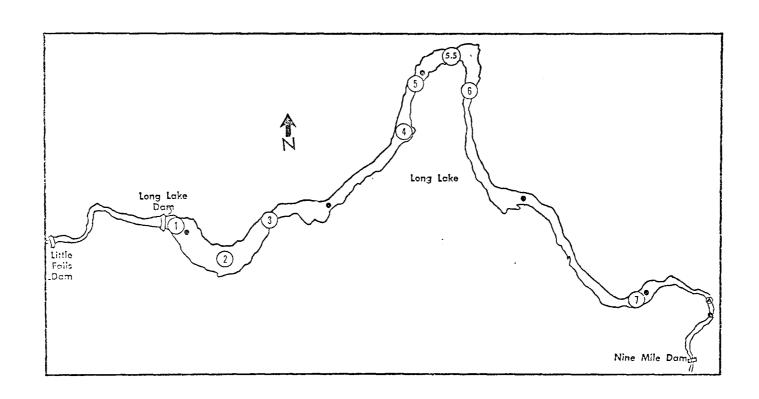
ATTACHMENT 2: SAMPLING STATIONS ON LONG LAKE

ATTACHMENT 3: SAMPLING STATIONS ON F.D. ROOSEVELT LAKE

SAMPLING STATIONS ON COEUR D'ALENE LAKE

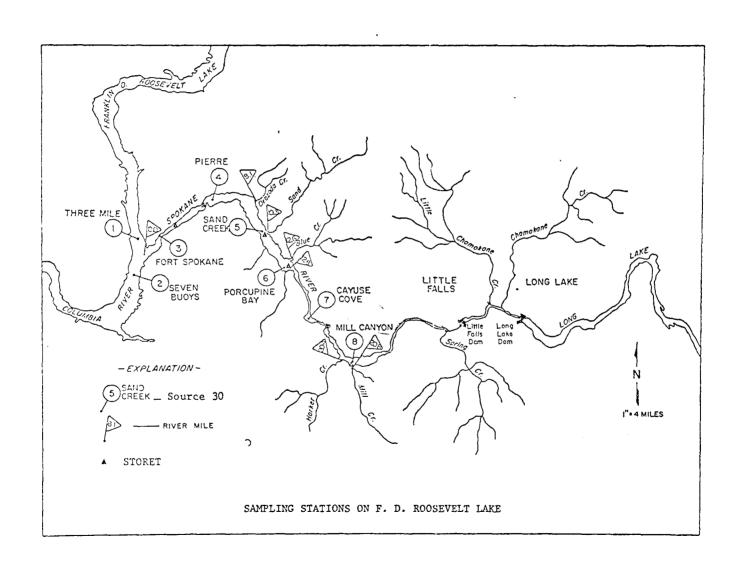






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SAMPLING STATIONS ON LONG LAKE



APPENDIX IV

RELATED PLANNED AND CURRENT STUDIES

RELATED PLANNED AND CURRENT STUDIES

Several studies related to the water resources of the Spokane River Basin are either presently underway or anticipated to begin in the near future. Completion of these studies will hopefully add to the available information necessary for more accurate verification of the several models and for their use in planning. The studies underway and anticipated include Level A type framework studies, Basin studies, project studies, and scientific investigations.

Broad Framework Studies

Western U.S. Water Plan, coordinated by the U.S. Bureau of Reclamation, Department of Interior

Columbia-North Pacific Comprehensive Framework Study of Water and Related Lands, conducted under the auspices of the Pacific Northwest River Basins Commission

Washington State Water Plan, being prepared by the Washington Department of Ecology

Wild and Scenic Rivers Study, by the Pacific Northwest River Basins Commission.

Basin Studies

Columbia River and Tributaries, Review Study by the North Pacific Division, U.S. Army Corps of Engineers

Regional Wastewater Management and Urban Drainage Study, Spokane River Basin, by the Seattle District, U.S. Army Corps of Engineers.

Local Studies

Water Resources of the Spokane Indian Reservation, a study sponsored by the Spokane Indian Tribe and conducted by Mr. Walter L. Woodward

A Study of the Underground Flows Between the Pend Oreille and Spokane River Systems, by the Water Resources Division, U.S. Geological Survey (Tacoma, Washington).

Scientific Investigations

An Integrated Study on the Impact of Metallic Trace Element Pollution in Coeur d'Alene, Spokane River-Lake Drainage System, sponsored by the Office of Water Resources Research through Washington State University, Pullman, Washington

The Biological Impact of Combined Metallic and Organic Pollution in the Coeur d'Alene and Spokane River-Lake Drainage System, sponsored by the Office of Water Resources Research and conducted by William Funk, Fred Rabe, and B. Filby.

Scheduling, coordination, and funding of water resources planning studies is complex and subject to frequent change. The list presented is based on information presently available and the user is advised to investigate the current status of study completion in updating data contained in this report. The Pacific-Northwest River Basins Commission has major responsibilities for coordination among federal, state, and local agencies and private groups or individuals undertaking water resources planning, and should be an initial point of contact.

APPENDIX V - BIBLIOGRAPHY consisting of

ATTACHMENT 1: PUBLICATIONS OF VALUE FOR PHYSICAL DATA
ATTACHMENT 2: PUBLICATIONS OF VALUE FOR WATER QUALITY DATA
ATTACHMENT 4: PUBLICATIONS OF VALUE FOR METEOROLOGICAL DATA

BIBLIOGRAPHY

Included within the bibliography are references to the large number of items reviewed during the course of the study. For ease of reference, the listing has been categorized. Within each category (Physical, Quality, Quantity, and Meteorological) there are publications or materials which provide other types of information as well. Their inclusion in a particular category reflects the predominate type of information contained or the principal use of the material for this study.

Similarly, of the numerous materials acquired during the course of the study, only a portion were of immediate value to the study. However, in view of the fact that future users of this report and the other study results may well be engaged in more comprehensive studies, all materials of a substantial nature which were received are listed. Those which were of principal value to the study are indicated by an asterisk.

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Spokane River Basin Model Projec	October, 1974 R. Pr formi Organ ition				
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and lakes, have been modified and and Idaho. The resulting models w Dynamic Stream Model, and the Strapredicting water quality levels remanagement schemes, and are design organizations to evaluate water questionities and schedules for investive Physical data and historical hydrocollected, assessed and used for tomodified models are all capable of tosixteen different water quality ducted with all three models to defindividual model parameters. The card decks in FORTRAN IV language, work on, and applications made with permit their easy utilization and potential users. A user's manual each model.	adapted to the ere named the tified Reservo sulting from a led to assist E lality managements in abatelogic, water quite model calibility simulating the constituents. Itermine the remodels were provided with accompanting the these model duplication of	ir Model. They are capable of Iternative basinwide wastewater PA, State, and local planning Int strategies and to establish Itement facilities in the basin. Itement and meteorologic data were Itemations and verifications. The Itemeter behavior of various subsets of up Sensitivity analyses were con- Italive importance of a number of Itemeter of a number of a number of Itemeter of a number o			
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