

WATER QUALITY STATUS REPORT

ROCK CREEK

(Kootenai County)

1977-1978

**Department of Health & Welfare
Division of Environment
Boise, ID 83720**

April 1979

Report No. WQ-40

WATER QUALITY STATUS REPORT

Rock Creek
(Kootenai County)

1977-1978

Data Collected By:

David R. Johann

Report Prepared By:

Donald M. Martin

April 1979

Department of Health & Welfare
Division of Environment
Statehouse
Boise, Idaho 83720

TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES.....	ii
ABSTRACT.....	iii
INTRODUCTION.....	1
MATERIALS AND METHODS.....	1
WASTE SOURCES	
Point Sources.....	3
Nonpoint Sources.....	4
RESULTS.....	4
Temperature.....	5
Dissolved Oxygen.....	5
pH.....	6
Bacteria.....	6
Trophic.....	7
Aesthetic.....	8
Solids.....	8
Inorganic Toxicity.....	9
Dissolved Gas, Radioactivity, Organic Toxicity.....	9
OBSERVATIONS.....	9
CONCLUSIONS.....	9
RECOMMENDATIONS.....	10
LITERATURE CITED.....	11
APPENDICES	
Appendix A - Raw Data: STORET Retrieval and Inventory.....	A-1
Appendix B - Figures.....	B-1
Appendix C - Idaho Water Quality Standards and Appropriate Criteria.....	C-1

LIST OF FIGURES

		<u>Page</u>
FIGURE 1	Sampling Site Locations.....	2
FIGURE 2	Temperature °C.....	B-1
FIGURE 3	Dissolved Oxygen mg/l.....	B-2
FIGURE 4	Dissolved Oxygen Sat. %.....	B-3
FIGURE 5	Fecal Coliforms per 100 ml.....	B-4
FIGURE 6	Fecal Streptococcus per 100 ml.....	B-5
FIGURE 7	Nitrate-Nitrogen mg/l.....	B-6
FIGURE 8	Total Phosphorus mg/l P.....	B-7
FIGURE 9	Turbidity HACH FTU.....	B-8
FIGURE 10	Residue, Total NFLT mg/l.....	B-9
FIGURE 11	Conductivity, Field, Micromho.....	B-10

ABSTRACT

A water quality survey was conducted on Rock Creek, Kootenai County, between October 1977 and September 1978. Samples were collected at monthly intervals at two stations except during the six months the stream had no flow. The sample sites were located above and below Worley, Idaho.

The City of Worley's sewage lagoon is the only known point source to Rock Creek. The effluent does not discharge directly into Rock Creek, but flows into a marsh area which adjoins the creek. Nonpoint sources which affect the water quality of Rock Creek are dryland agriculture, livestock winter feeding, grazing, construction, urban runoff, and individual on-site sewage disposal systems.

Nutrients were present in levels which stimulate nuisance algal and fungal growth. Turbidity sharply increased during snowmelt and somewhat during major storm events. Fecal coliform bacteria levels exceed Idaho's standards for primary contact recreation. Rock Creek should be classified as water quality limiting due to the excessive nutrients and bacterial levels.

I. INTRODUCTION

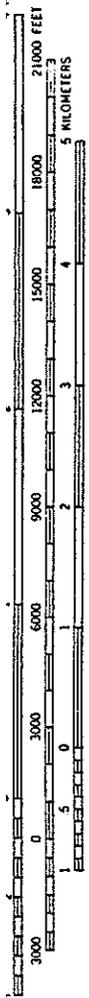
A water quality survey was conducted on Rock Creek, Kootenai County, between October 1977 and September 1978. Samples were collected at monthly intervals at two stations except during six months of the survey when the stations had no flow. The survey was conducted to determine if Rock Creek should be classified as water quality limiting or effluent limiting. Rock Creek is a Class A stream according to Idaho Water Quality Standards and Wastewater Treatment Requirements and is protected for primary contact recreation and all other beneficial uses.

Rock Creek originates in the southwest corner of Kootenai County (Figure 1) and flows in a northwesterly direction into Washington where it enters Hangman Creek, a tributary of the Spokane River. The stream had a measurable flow only six months of the survey period (one year). About 35 square miles of the upper portion of the watershed lie in Idaho. Land use is primarily agricultural with 80% of the available acreage planted in grass for seed production and in small grains. Worley, population 240, is the only community within the watershed.

II. MATERIALS AND METHODS

The sampling stations were located above and below the City of Worley and STORET numbers for the stations are 2000094 and 2000095, respectively. The station above Worley has a latitude of 47°22'48" and longitude of 116°52'54"; the station below Worley has a latitude of 47°25'07" and longitude of 116°58'48". The stream was inspected monthly from October 1977 to September 1978; due to some zero flow conditions during a portion of the study period, water samples were only taken from February 1978 to July 1978.

Temperature and dissolved oxygen were measured in the field with a Yellow Springs Instruments Dissolved Oxygen Meter, Model 54A. pH was measured with a Model 404 Orion pH meter.

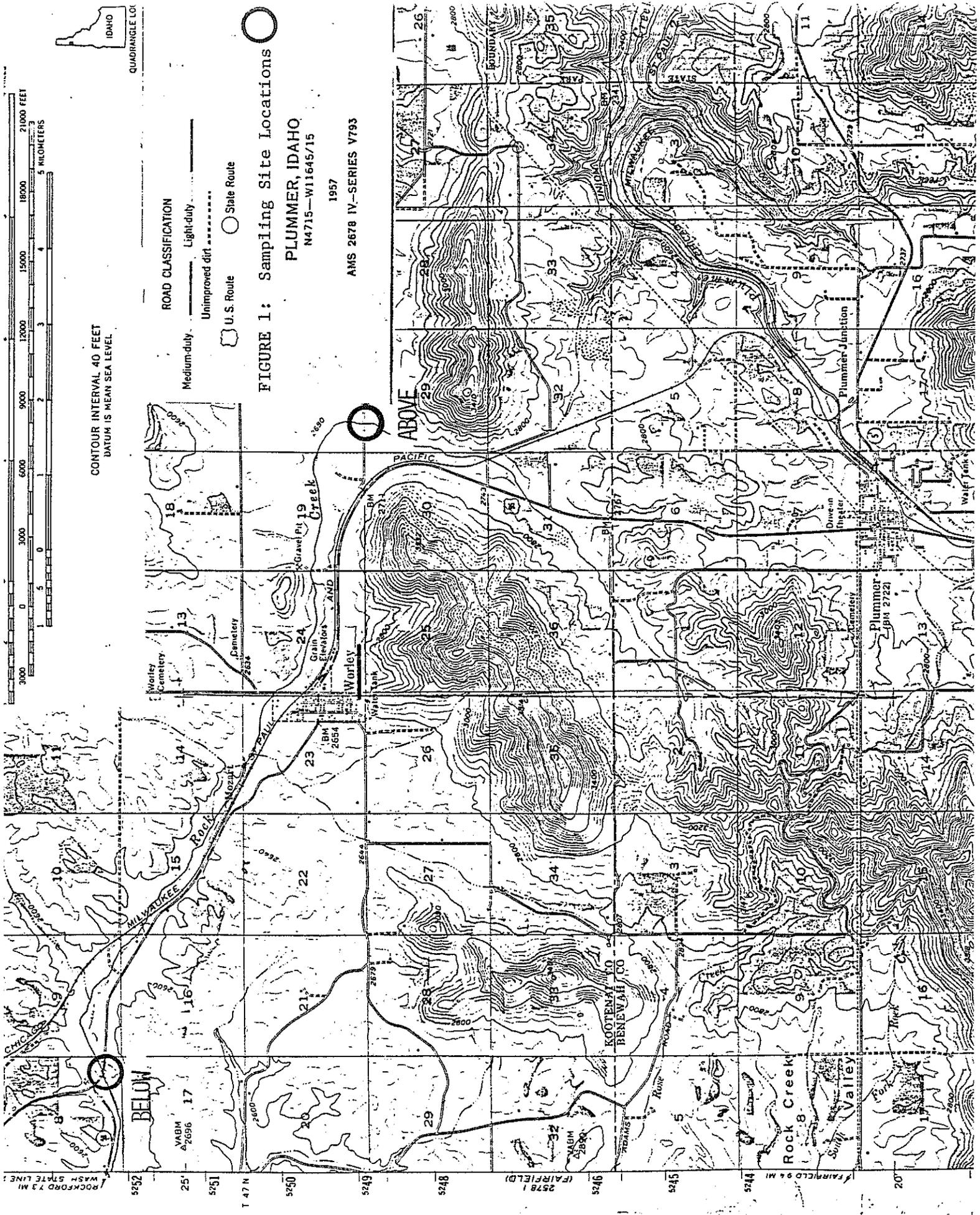


CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOC

ROAD CLASSIFICATION
 Medium-duty ——— Light-duty ———
 Unimproved dirt - - - - -
 U. S. Route State Route

FIGURE 1: Sampling Site Locations
PLUMMER, IDAHO
 N4715—W11645/15
 1957
 AMS 2678 IV—SERIES V793



Samples for laboratory analysis were collected in approximately one liter cubitainers. Samples for nutrients were preserved with sulphuric acid, and samples for minerals and solids were untreated and put on ice according to the Idaho Department of Health and Welfare, Division of Environment, Technical Procedures Manual. Laboratory analyses were performed according to EPA, Methods for Chemical Analysis of Water and Wastes.

Field and laboratory analyses were:

Flow	Total Kjeldahl Nitrogen
Temperature	Total Phosphorus
Dissolved Oxygen	Ortho-Phosphate (as P)
pH	Turbidity
Total Coliform	Total Solids
Fecal Coliform	Suspended Solids
Fecal Streptococcus	Specific Conductance
Nitrate-N	Alkalinity
Nitrite-N	Chloride
Ammonia-N	

III. WASTE SOURCES

Point Sources:

1) Worley Sewage Lagoon ID-002271-3

The City of Worley sewage lagoon is 0.75 acre in size and serves approximately 240 people. Actual flow ranges from 0 to 0.140 MGD, with an average of 0.04 MGD, according to 1975-76 discharge monitoring data. Year-round discharge is allowed to Rock Creek under the present permit.

The present permit requires monthly monitoring of the effluent for the following parameters: BOD, pH, suspended solids, and total flow. A review of the monitoring data indicates violations of limitations for BOD and suspended solids in lbs/day (quarterly), during the reporting periods of January-March, and April-June in 1975 and 1976. Quantities reported were up to six

times greater than allowed in the discharge permit. The values for BOD range from 0.9 to 43 lbs/day, and for suspended solids from 2 to 70 lbs/day.

Total coliform densities range from 54,000 to 700,000/100 ml. Fecal coliform densities have been 40,000 to 310,000/100 ml. Chlorination is not required in the permit.

The effluent does not discharge directly into Rock Creek. At the outfall, a ditch carried the effluent into an overgrown marsh which adjoins the creek. After meandering about 200 yards, the effluent can enter the creek. At the time of this survey, no actual discharge entering Rock Creek could be found. The meander is overgrown with brush and marsh vegetation which restricts flow causing it to back up and spread throughout the marsh.

Nonpoint Sources:

Nonpoint sources which may affect water quality are agriculture, highway runoff, and storm runoff from Worley, which may include drainage from a fertilizer distribution plant and other agricultural businesses.

The agricultural sources may contribute nutrients from fertilizer and sediment. Fertilizer is commonly spread by helicopter and drifts will carry some nutrients into the creek. Many adjoining fields are tilled right up to the creek, allowing surface runoff to enter. The soil of the area is a clay which easily erodes. The surface runoff from Highway 95 may contain road soil and salt as a possible but undocumented nonpoint source.

Worley does not have a storm sewer, but ditches throughout the town direct surface runoff towards the creek.

IV. RESULTS

Idaho Water Quality Standards and Wastewater Treatment Requirements include specific instream standards for total and fecal coliform bacteria,

dissolved oxygen, and pH. The other parameter categories fall into the "General Water Quality Standards" section and are evaluated according to EPA Quality Criteria for Water and other sources. The rationale for the criteria used are listed in Appendix C. Raw data, means, and variance are listed in STORET printouts in Appendix A. Figures of parameters versus time in months are shown in Appendix B.

Temperature: (Figure 2)

Parameter	Criteria	Number	Mean	Range	Criteria Exceeded- %	Protected Uses Affected
Above Worley						
Temperature Deg. C°	19° Max.	6	12.5	2.0-26.0	33.0	Fisheries
Below Worley						
Temperature Deg. C°	19° Max.	6	10.8	3.0-20.0	17.0	Fisheries

The temperature was generally within the range recommended for fish and other aquatic life. The station above Worley exceeded the 19°C criteria in May and June 1978 and the below Worley station exceeded the same standard only in May.

Dissolved Oxygen: (Figures 3 and 4)

Parameter	Criteria	Number	Mean	Range	% Violation	Protected Uses Affected
Above Worley						
Concentration mg/l	6 mg/l Min.	5	10.8	8.0-14.3	0	None
Percent Sat- uration %	90% Min.	5	112	96-124	0	None
Below Worley						
Concentration mg/l	6 mg/l Min.	5	9.5	7.0-12.2	0	None
Percent Sat- uration %	90% Min.	5	94	84-104	20	Fisheries

Dissolved oxygen was above the minimum criteria most of the time at both stations and only violated the 90% standard on one occasion at the station below Worley.

pH:

Parameter	Criteria	Number	Mean	Range	% Violation	Protected Uses Affected
Above Worley						
pH	6.5-9.0	3	8.2	7.8-8.9	0	None
Below Worley						
pH	6.5-9.0	2	7.7	7.5-7.8	0	None

The pH at both stations was within the Idaho water quality standards of 6.5-9.0 on all sample dates.

Bacteria*: (Figures 5 and 6)

Parameter	Criteria	Number	Mean	Range	% Violation	Protected Uses Affected
Above Worley						
Total Coliform	240	6	399	210-640	0	Drinking Water Supplies & Contact Recreation
Fecal Coliforms	50	6	34	0-114	33	
Fecal Streptococcus	--	6	194	0-1000	--	
Below Worley						
Total Coliform	240	5	376	200-630	--	Drinking Water Supplies & Contact Recreation
Fecal Coliforms	50	6	73	0-240	50	
Fecal Streptococcus	--	6	210	4-1100	--	

Fecal bacterial concentrations exceeded Idaho's standards for primary contact recreation at both stations. Secondary contact recreational standards for fecal coliforms were violated only at the below Worley station on one occasion.

For recent fecal contamination, a fecal coliform/fecal streptococcus ratio above 4 is considered indicative of a human source, whereas animal sources are characterized by a ratio which does not exceed .7 (Claussen, 1977).

*Total coliform Class A2 standard is a geometric mean of 240/100 ml, Class B standard is geometric mean of 1000/100 ml. Fecal coliform Class A2 standard is geometric mean of 50/100 ml, single sample of 500/100 ml; Class B standard is geometric mean of 200/100 ml, single sample of 800/100 ml.

The average ratios for both stations exceeded 0.7 and are as follows:
 above Worley = 1.0 and below Worley = 0.8, respectively. However, the ratios
 from both stations did vary, above Worley ranged from 0-3.9 and below Worley
 ranged from 0-1.6. It appears from the differing ratios that the bacterial
 load in Rock Creek may be predominately of animal origin with some contami-
 nation from human wastes.

Trophic: (Figures 7 and 8)

Parameter	Criteria	Number	Mean	Range	Criteria Exceeded- %	Protected Uses Affected
Above Worley						
Nitrate-N mg/l	.3	6	0.295	0.020-0.650	50	Recreation
Nitrite-N mg/l	--	6	0.004	0.001-0.011	--	--
Total Kjeldahl Nitrogen	--	6	0.988	0.590-1.650	--	--
Ammonia Nitrogen mg/l	.20	6	0.021	0.010-0.039	0	None
Total Phosphorus mg/l (P)	.05	6	0.102	0.020-0.270	67	Recreation
Ortho-Phosphate mg/l (as P)	.025	6	0.040	0.010-0.110	50	Recreation
Chemical Oxygen Demand mg/l	--	--	--	--	--	--
Biochemical Oxygen Demand mg/l	--	--	--	--	--	--
Below Worley						
Nitrate-N mg/l	.3	6	0.927	0.020-2.900	50	Recreation
Nitrite-N mg/l	--	6	0.006	0.001-0.019	--	--
Total Kjeldahl Nitrogen	--	6	1.038	0.400-1.800	--	--
Ammonia Nitrogen mg/l	.20	6	0.029	0.001-0.068	0	None
Total Phosphorus mg/l (P)	.05	6	0.188	0.110-0.320	100	Recreation
Ortho-Phosphate mg/l (as P)	.025	6	0.073	0.040-0.160	100	Recreation
Chemical Oxygen Demand mg/l	--	--	--	--	--	--
Biochemical Oxygen Demand mg/l	--	--	--	--	--	--

Nutrients such as total phosphorus, ortho-phosphate and nitrates were generally present at both stations in levels which stimulate nuisance algal

and fungal growths. Total phosphorus and ortho-phosphorus levels consistently exceeded the recommended criteria throughout the study period. Nitrate levels were above the recommended criteria February through April.

Aesthetic: (Figure 9)

Parameter	Criteria	Number	Mean	Range	Criteria Exceeded- %	Protected Uses Affected
Above Worley						
Turbidity JTU	25	6	23.5	1.9-68.0	33	Fisheries & Other Aquatic Life
Below Worley						
Turbidity JTU	25	6	35.8	10.0-83.0	66	

Turbidity was generally above 25 JTU's (the maximum criteria) throughout the sampling period. The high turbidity values were associated with snowmelt and spring storm events carrying sediment principally from nonpoint sources.

Solids: (Figures 10 and 11)

Parameter	Criteria	Number	Mean	Range	Criteria Exceeded- %	Protected Uses Affected
Above Worley						
Total Solids	--	6	117.5	99-188	--	--
Suspended Solids	80	6	19.3	3.4-79.4	0	None
Conductivity (umhos/cm)	750	6	88.0	40-155	0	None
Total Alkalinity	--	1	17.7	--	--	--
Chloride	--	2	1.75	1.1-2.4	--	--
Below Worley						
Total Solids	--	6	193.8	129-352	--	--
Suspended Solids	80	6	41.7	7-168	17	--
Conductivity (umhos/cm)	750	6	135.3	72-255	0	None
Total Alkalinity	--	--	--	--	--	--
Chloride	--	2	1	1-1	--	--

Suspended solids only exceeded the recommended maximum of 80 mg/l during one sampling period and at one location (below Worley). Dissolved solids never exceeded the desirable concentration for domestic drinking water supplies as is indicated by the low conductivity levels. These differences in values above and below Worley are probably due mainly to the influence of nonpoint sources upon the stream and not the City of Worley's discharge.

Inorganic Toxicity:

Samples were not tested for heavy metals.

Dissolved Gas, Radioactivity, Organic Toxicity:

The above parameters were not examined in this study.

V. OBSERVATIONS

A bulk fertilizer distribution plant owned by Cenex Cooperative was built in the fall of 1975. No known discharge exists from this facility, but spillage on the ground near the plant could possibly enter Rock Creek during certain surface runoff conditions. This has not been documented.

The stream was noticeably turbid following storm events and snowmelt.

VI. CONCLUSIONS

- 1) Rock Creek meets Idaho's instream water quality standards for dissolved oxygen and pH.
- 2) Dissolved solids are low as indicated by the conductivity values which do not exceed acceptable levels for domestic water supplies.
- 3) Turbidity increases sharply during snowmelt and somewhat during major storm events. The major source of this turbidity is probably silts washed from dryland farming areas which comprise a large percentage of the land use activities.
- 4) Nutrients in the forms of nitrates, total and ortho-phosphorus were present in levels which stimulate nuisance algal and fungal growth. The source of these nutrients is probably dryland farming since the highest levels were recorded during periods of runoff.
- 5) Rock Creek should be classified as water quality limiting because of the bacterial, nutrient, and temperature violations. Rock Creek does not presently

meet Class A₂ standards for primary contact recreation.

6) Fecal coliform bacteria levels exceeded standards for primary contact recreation only. Analysis of bacterial ratios indicates that the source may be predominately of animal origin.

7) It appears that nonpoint sources are the principal sources of the degradation of water quality in Rock Creek. Nonpoint sources which may be responsible for this degradation of water quality include such activities as dryland farming, grazing and livestock winter feeding, construction, urban runoff and poorly functioning septic tanks.

VII. RECOMMENDATIONS

Rock Creek is classified as water quality limiting because of bacteria, temperature, and nutrient violations attributable to nonpoint sources. Sampling at two locations does not allow for adequate identification of specific pollution sources. However, the following general recommendations can be made:

- 1) Best Management Practices as identified in the 208 agricultural abatement program should be applied to reduce erosion from the dryland farms and reduce pollutants from summer livestock grazing and winter feeding operations.
- 2) Failing septic tank and drainfield systems should be identified and replaced or hooked to a community sewer system.

LITERATURE CITED

Clausen, E. M.; Green, B. L.; and Litsky, Warren. "Fecal Streptococci: Indicators of Pollution" in Bacterial Indicators/Health Hazards Associated with Water, ASIM STP 635, A. W. Hoadley and B. J. Dutka, Eds., American Society for Testing and Materials, 1977, pp. 247-264.

Environmental Protection Agency, United States, July 1976. Quality Criteria for Water, U.S. Government Printing Office 1977 O-222-904, 256 p.

Idaho Department of Environmental and Community Services, June 1973. Water Quality Standards and Wastewater Treatment Requirements, 19 p., and Appendix.

APPENDIX A

STORET RETRIEVAL AND INVENTORY

2000094
 47 22 48.0 116 52 54.0 2
 ROCK CREEK ABOVE WORLEY
 16055 IDAHO
 PACIFIC NORTHWEST 130300
 SPOKANE
 21IDSURV 780104
 0000 CLASS 00

/TYPA/AMBNI/STREAM

INDEX 1310001 006500 01310 0250
 MILES 0643.00 0072.40 020.20 023.00

PARAMETER	TEMP	CENT	NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010 WATER			7	13.3429	84.2629	9.17948	.687970	3.46952	26.0000	2.00000	77/07/27	78/07/12
00042 ALTITUDE	FEET	AB MSL	1	2680.00					2680.00	2680.00	01/01/01	01/01/01
00061 STREAM	FLOW	INST-CFS	6	.000000	.000000	.000000		.000000	.000000	.000000	77/10/15	78/09/15
00076 TURB	TRBDNTR	HACH FTU	7	20.4714	543.135	23.3053	1.13843	8.80856	68.0000	1.90000	77/07/27	78/07/12
00094 CNDUCTVY	FIELD	MICROMHO	6	88.0000	2374.00	48.7237	.553678	19.8914	155.000	40.0000	78/02/09	78/07/12
00095 CNDUCTVY	AT 25C	MICROMHO	7	80.4286	2379.62	48.7814	.606518	18.4376	155.000	35.0000	77/07/27	78/07/12
00116 INTNSVE	SURVEY	IDENT	13	771609	.000000	.000000		.000000	771609	771609	77/07/27	78/09/15
00300 DO		MG/L	6	10.4667	7.12676	2.66960	.255057	1.08986	14.3000	8.00000	77/07/27	78/07/12
00400 PH		SU	4	8.02500	.449137	.670177	.083511	.335089	8.90000	7.30000	77/07/27	78/06/05
00403 LAB	PH	SU	3	6.86666	.023445	.153118	.022299	.088403	7.00000	6.70000	78/02/09	78/07/12
00410 T ALK	CACO3	MG/L	1	17.0000					17.0000	17.0000	77/07/27	77/07/27
00500 RESIDUE	TOTAL	MG/L	7	107.871	1662.23	40.7704	.377954	15.4098	188.000	50.1000	77/07/27	78/07/12
00530 RESIDUE	TOT NFLT	MG/L	6	19.3833	877.241	29.6183	1.52803	12.0916	79.0000	3.00000	78/02/09	78/07/12
00610 NH3-N	TOTAL	MG/L	7	.018143	.000145	.012034	.663277	.004548	.039000	.003000	77/07/27	78/07/12
00615 NO2-N	TOTAL	MG/L	7	.003571	.000014	.003735	1.04588	.001412	.011000	.001000	77/07/27	78/07/12
00620 NO3-N	TOTAL	MG/L	7	.255714	.084862	.291311	1.13921	.110105	.650000	.020000	77/07/27	78/07/12
00625 TOT KJEL	N	MG/L	7	.904285	.193495	.439881	.486441	.166259	1.65000	.400000	77/07/27	78/07/12
00665 PHOS-TOT		MG/L P	7	.091428	.007181	.084740	.926849	.032029	.270000	.020000	77/07/27	78/07/12
00669 PHOS-TOT	HYDRO	MG/L P	1	.030000					.030000	.030000	77/07/27	77/07/27
00940 CHLORIDE	CL	MG/L	2	1.50000	.500000	.707107	.471404	.500000	2.00000	1.00000	78/03/13	78/04/04
31501 TOT COLI	MFIMENDO	/100ML	6	398.666	30930.8	175.872	.441150	71.7993	640.000	210.000	78/02/09	78/07/12
31616 FEC CCLI	MFIM-FCBR	/100ML	6	34.3333	1973.87	44.4282	1.29403	18.1377	114.000	.000000	78/02/09	78/07/12
31679 FECSTREE	MF M-ENT	/100ML	6	193.833	157434	396.779	2.04701	161.984	1000.00	.000000	78/02/09	78/07/12
70300 RESIDUE	DISS-180	C MG/L	5	78.4000	482.306	21.9615	.280121	9.82146	98.0000	41.0000	78/02/09	78/07/12
70507 PHOS-T	ORTHO	MG/L P	7	.037143	.001324	.036384	.979574	.013752	.110000	.010000	77/07/27	78/07/12

I-V

2000094
 47 22 48.0 116 52 54.0 2
 ROCK CREEK ABOVE WORLEY
 16055 IDAHO
 PACIFIC NORTHWEST 130300
 SPOKANE
 21IDSURV 780104
 0000 FEET DEPTH CLASS 00

/TYP/A/AMONT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00116 INTNSVE SURVEY IDENT	00061 STREAM FLOW, INST-CFS	00300 DO MG/L	00400 PH SU	00403 LAB PH SU	31501 TOT COLI MFIMENDQ /100ML	31616 FEC COLI MFH-FCBR /100ML	31679 FECSTREP MF M-ENT /100ML	00610 NH3-N TOTAL MG/L	
77/07/27			18.6	771609		8.8	7.30					0.003	
77/10/15				771609	0								
77/11/15				771609	0								
77/12/15				771609	0								
78/01/15				771609	0								
78/02/09			2.0	771609					6.7	270	0	10	0.039
78/03/13			3.0	771609		14.3			6.9	640	4	0	0.010
78/04/04			7.8	771609		13.4	8.10			400	52	40	0.017
78/05/08			20.0	771609		8.0	7.80			580	35	9	0.010
78/06/05			26.0	771609		9.1	8.90			292	114	104	0.025
78/07/12			16.0	771609		9.2			7.0	210	1K	1000	0.023
78/08/15				771609	0								
78/09/15				771609	0								

DATE FROM TO	TIME OF DAY	DEPTH FEET	00615 NO2-N TOTAL MG/L	00620 NO3-N TOTAL MG/L	00625 TOT KJEL N MG/L	70507 PHOS-T ORTHO MG/L P	00665 PHOS-TDT MG/L P	00076 TURB TRB IDMTR HACH FTU	00094 CONDUCTVY FIELD MICROMHO	00095 CONDUCTVY AT 25C MICROMHO	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L
77/07/27			0.001K	0.020	0.400	0.020	0.030	2.4		35		
78/02/09			0.003	0.650	1.650	0.060	0.270	68.0	40	40	80	79
78/03/13			0.006	0.540	0.800	0.110	0.100	30.0	40	40		16
78/04/04			0.011	0.500	1.330	0.030	0.100	21.0	60	60	41	3
78/05/08			0.001	0.040	0.590	0.020	0.070	13.0	103	103	89	10
78/06/05			0.002	0.020K	0.660	0.010	0.050	7.0	155	155	84	4
78/07/12			0.001	0.020K	0.900	0.010K	0.020	1.9	130	130	98	4

DATE FROM TO	TIME OF DAY	DEPTH FEET	00500 RESIDUE TOTAL MG/L	00940 CHLORIDE CL MG/L
77/07/27			50	
78/02/09			188	
78/03/13			99	1
78/04/04			111	2
78/05/08			101	
78/06/05			99	
78/07/12			107	

200009
 47 25 07.0 116 58 40.0 2
 ROCK CREEK BELOW WORLEY HWY 95
 16055 IDAHO
 PACIFIC NORTHWEST 1303
 SPARKANE
 2110SUFV 780104
 0000 CLASS 00

/TYPE/ANALYZ/STREAM

INDEX 1310001 006500 01310 0250
 MILLS 045.00 0072.40 020.20 017.50

PARAMETER	NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	REC DATE	END DATE
00010 WATER TEMP CNT	6	10.7833	55.3137	7.43732	.689705	3.03027	20.0000	3.00000	78/02/09	78/07/12
00001 STREAM FLOW INST-CFS	6	.000000	.000000	.000000		.000000	.000000	.000000	77/10/15	78/09/15
00070 TURB JKSJN JIU	2	18.5000	144.500	12.0208	.649774	8.50000	27.0000	10.0000	78/02/01	78/06/05
00070 TURB TURBIDMTR H/CH FTU	6	25.8333	696.917	25.4380	.737804	10.7933	83.0000	10.0000	78/02/09	78/07/12
00094 CONDUCTIV FJELD MICROMHO	6	135.333	5008.67	70.7720	.522946	28.6925	255.000	72.0000	78/02/09	78/07/12
00094 CONDUCTIV AT 25C MICROMHO	6	144.400	5644.21	75.1286	.520281	33.5985	255.000	72.0000	78/02/09	78/07/12
00116 INTENSIV SURVEY HCENT	12	771607	.1901406	.000000		.000000	771609	771602	77/10/15	78/09/15
00300 DO MG/L	5	9.51999	5.41205	2.22638	.244368	1.04039	12.2000	7.00000	78/02/12	78/07/12
00400 PH SU	2	7.65000	.044598	.217128	.027729	.149997	7.80000	7.50000	78/02/08	78/06/05
00400 SAL PH SU	3	7.10000	.070129	.264820	.037299	.152894	7.40000	6.90000	78/02/09	78/07/12
00500 RESIDUE TOTAL MG/L	6	193.933	6604.58	81.2686	.419270	33.1778	252.000	129.000	78/02/09	78/07/12
00500 RESIDUE TOT NFLT MG/L	6	41.7167	3088.38	62.2569	1.45477	25.4571	168.200	7.40000	78/02/09	78/07/12
00610 NH3-N TOTAL MG/L	6	.029500	.000552	.023501	.791647	.009594	.048000	.001000	78/02/09	78/07/12
00610 NH3-N TOTAL MG/L	6	.006333	.000050	.007090	1.11946	.002894	.019000	.001000	78/02/09	78/07/12
00620 NH3-N TOTAL MG/L	6	.926666	1.27183	1.12775	1.21700	.460403	2.90000	.020000	78/02/09	78/07/12
00620 TOT NITR N MG/L	6	1.03833	.235578	.485364	.467446	.198149	1.60000	.400000	78/02/09	78/07/12
00600 PHOS-PHOS-TOT MG/L P	6	.118333	.005717	.072227	.383506	.029487	.320000	.110000	78/02/09	78/07/12
00980 CHLORIDE CL MG/L	2	1.10000	.020001	.141421	.128569	.100003	1.20000	1.00000	78/02/12	78/04/04
31901 TOT COLI MF/100ML	5	276.000	22230.0	179.527	.477466	80.2870	630.000	200.000	78/02/12	78/07/12
21810 FEC COLI MF/100ML	6	73.0000	8054.00	89.7441	1.22927	36.6379	240.000	.000000	78/02/09	78/07/12
21670 FECSTRE MF/100ML	6	209.500	190900	437.021	2.08602	178.413	1100.00	4.00000	78/02/09	78/07/12
70300 RESIDUE DIS-110 C MG/L	5	118.400	1726.31	41.5489	.350920	18.5812	166.000	52.0000	78/02/09	78/07/12
70300 PHOS-T LEITHO MG/L P	6	.073333	.001987	.044572	.607802	.018196	.160000	.040000	78/02/09	78/07/12

2000095
 47 25 07.0 116 58 48.0 2
 ROCK CREEK FIELDS WORLEY HWY 95
 16055 IDAHO
 PACIFIC NORTHWEST 1303
 SPOKANE
 2110SUPV 780104
 0000 FEET DEPTH CLASS 00

/TYPE//DEPTH//STREAM

DATE Y- M- D	TIME OF DAY	DEPTH FEET	WATER TEMP CENT	00010 INTENSIVE SURVLY IDENT	00116 STREAM FLOW, INST-CFS	00300 DO MG/L	00400 PH SU	00403 LAB PH SU	31501 TOT COLI MFIM/HDD /100ML	31616 FEC COLI MFN-FCDR /100ML	31679 FECSTREP MF P-ENT /100ML	00710 NH3-N TG/TI MG/L
77/10/15				771609	0							
77/11/15				771609	0							
77/12/15				771609	0							
77/01/15				771609	0							
77/02/09			3.0	771609				6.6		52	46	0.075
77/03/13			3.0	771602		12.2		7.0	630	0	6	0.001
77/04/04			7.0	771602		11.6			470	100	73	0.021
77/04/08			14.3	771602		9.2	7.50		200	2	4	0.012
77/06/09			20.6	771602		7.0	7.80		360	44	20	0.022
77/07/17			17.4	771609		7.6		7.4	220	240	1100	0.041
77/08/15				771609	0							
77/09/15				771609	0							

A-4

DATE Y- M- D	TIME OF DAY	DEPTH FEET	00615 NH3-N TOTAL MG/L	00620 FOS-N TOTAL MG/L	00625 TOT KJEL N MG/L	70507 PHOS-T AS THO MG/L P	00665 PHOS-TOT MG/L P	00076 TURB TRIPIDMTP HACH FTU	00054 CONDUCTIVY FIELD MICROMHO	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00100 RESIDUE TOTAL MG/L
77/02/09			0.001K	1.160	1.800	0.160	0.320	83.0	10	132	160	312
77/03/13			0.000	2.900	0.400	0.040	0.200	39.0	72		22	174
77/04/04			0.019	1.320	1.230	0.070	0.190	42.0	50	52	17	162
77/05/08			0.001	0.070	0.680	0.070	0.110	10.0	140	117	7	124
77/05/09			0.001K	0.090	1.170	0.040	0.190	27.0	175	125	10	161
77/07/12			0.005	0.020K	0.950	0.060	0.140	14.0	255	166	26	205

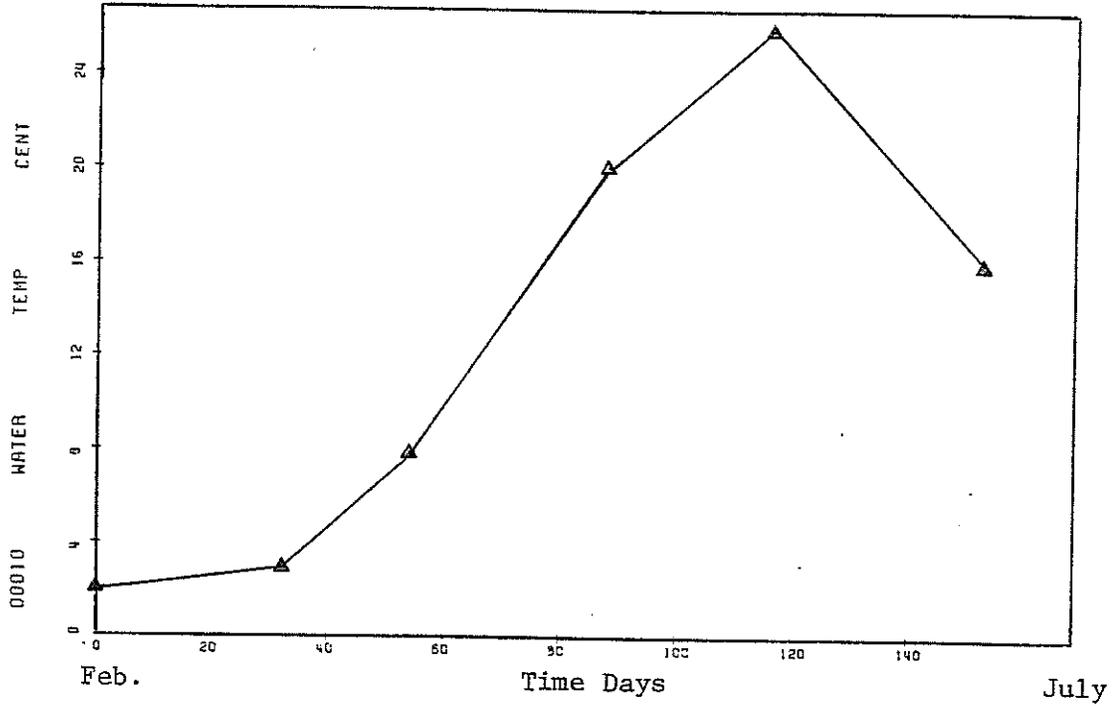
DATE Y- M- D	TIME OF DAY	DEPTH FEET	00940 CHLORIDE CL MG/L
77/03/13			1K
77/04/04			1

APPENDIX B

FIGURES

FIGURE 2: Temperature °C

STORET
2000094
47 22 48.0 116 52 54.0 2
ROCK CREEK ABOVE WORLEY
16055 IDAHO



STORET
2000095
47 25 07.0 116 58 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 IDAHO

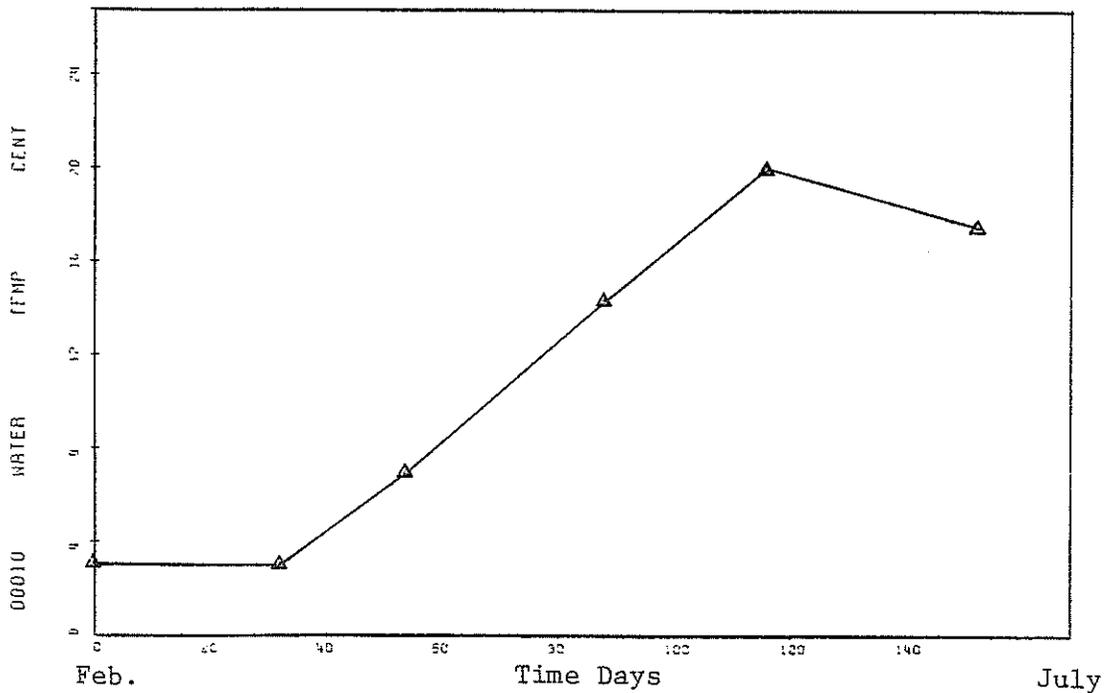
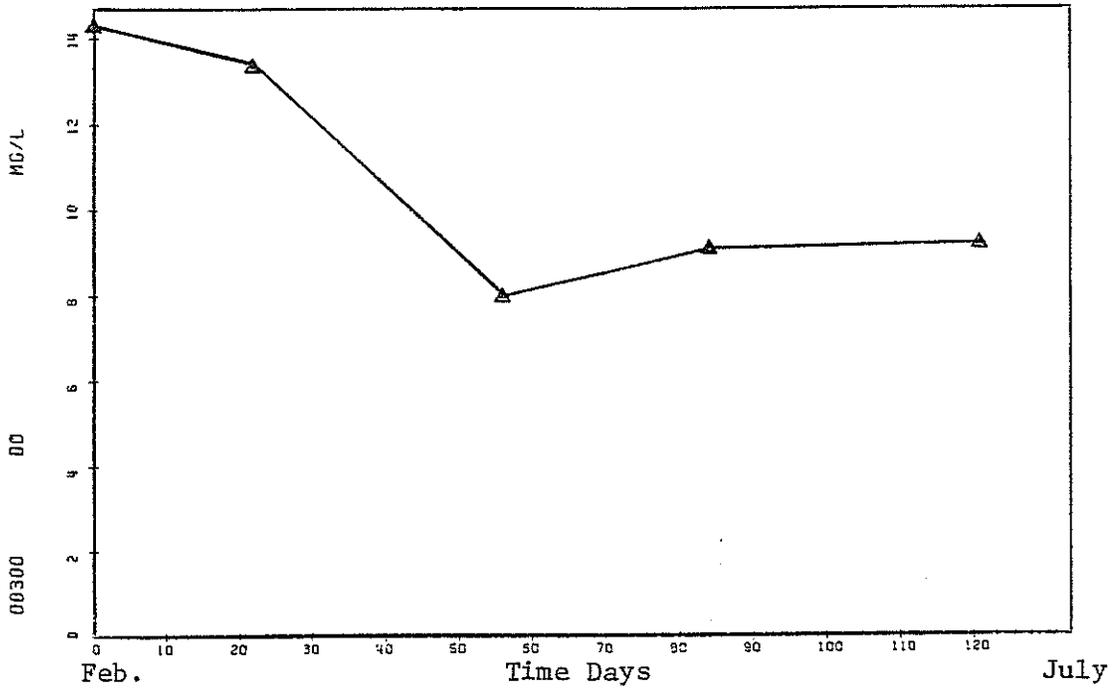
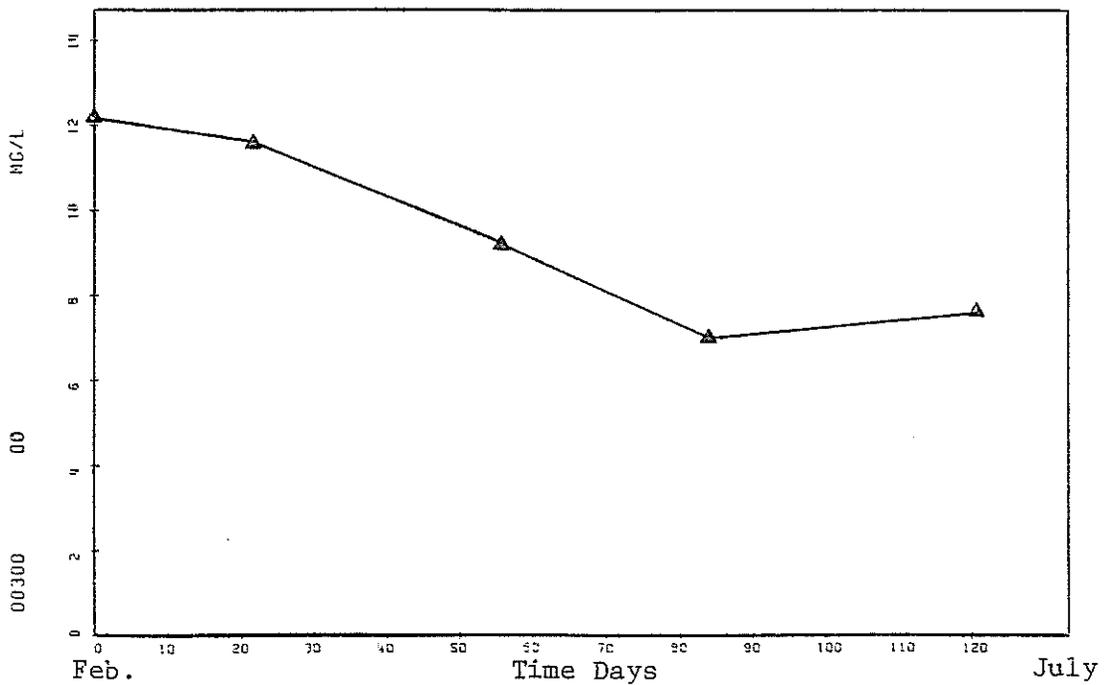


FIGURE 3: Dissolved Oxygen mg/l

STORET
2000094
47 22 48.0 116.52 54.0 2
ROCK CREEK ABOVE WORLEY
16055 IDAHO

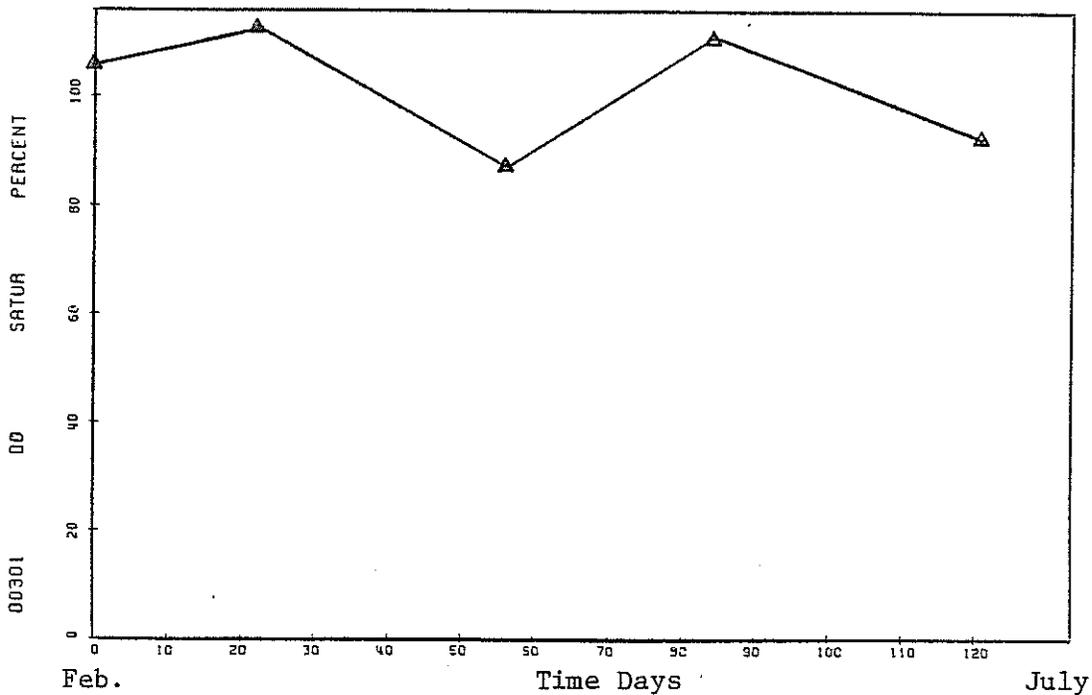


STORET
2000095
47 25 07.0 115.58 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 IDAHO



SECRET
2000094
47 22 48.0 116 52 54.0 2
ROCK CREEK ABOVE WORLEY
16055 IDAHO

FIGURE 4: Dissolved Oxygen
Sat. %



SECRET
2000095
47 25 07.0 116 58 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 IDAHO

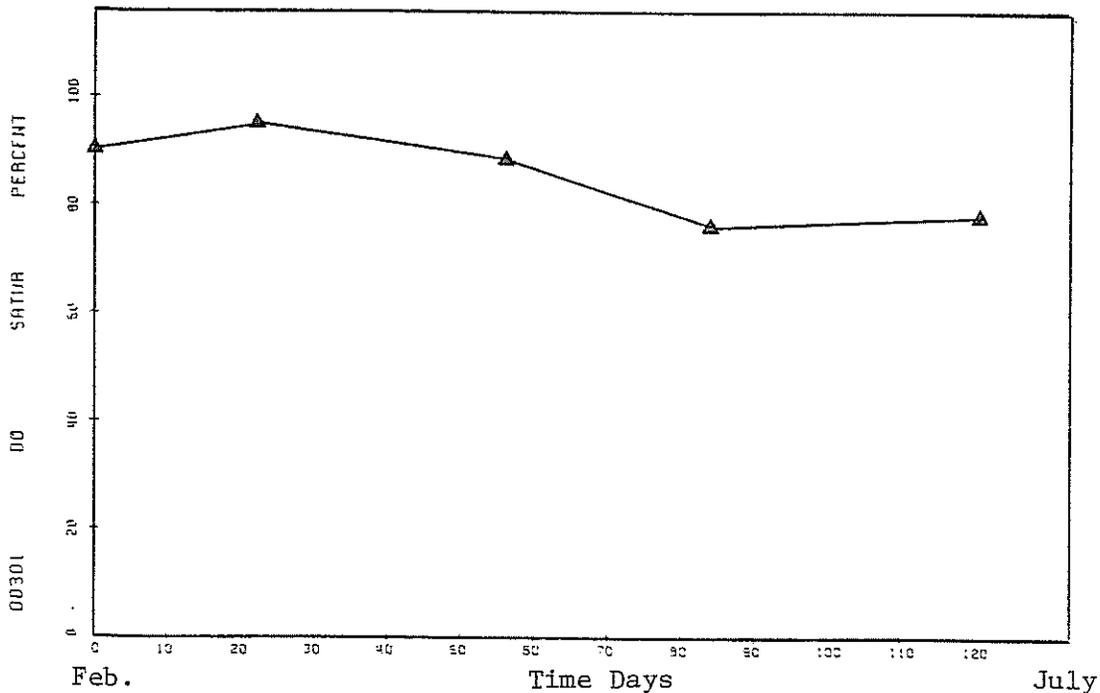
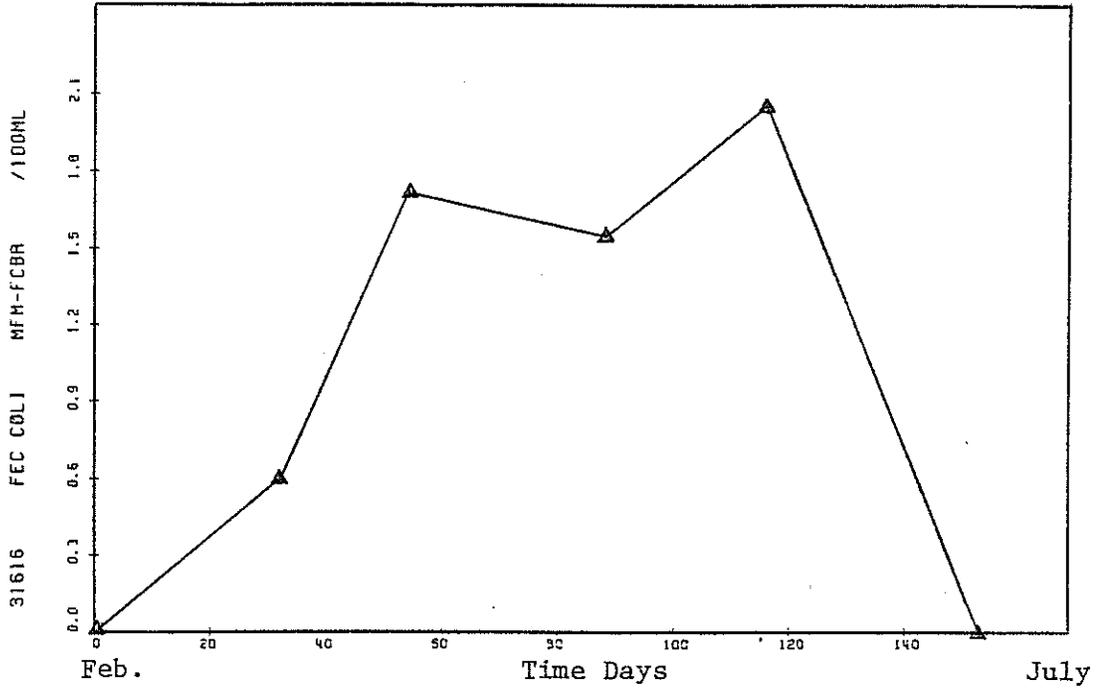


FIGURE 5: Fecal Coliforms
per 100 ml

STORET
2000094
47 22 48.0 116 52 54.0 2
ROCK CREEK ABOVE WORLEY
19055 10AHO



STORET
2000095
47 25 07.0 116 58 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
19055 10AHO

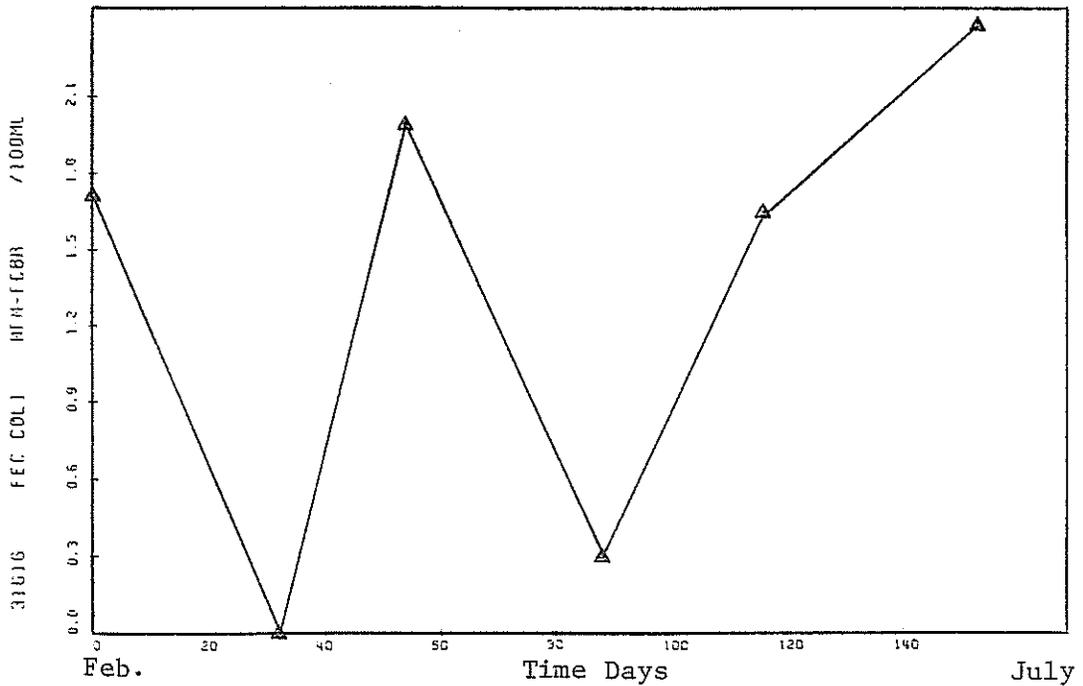
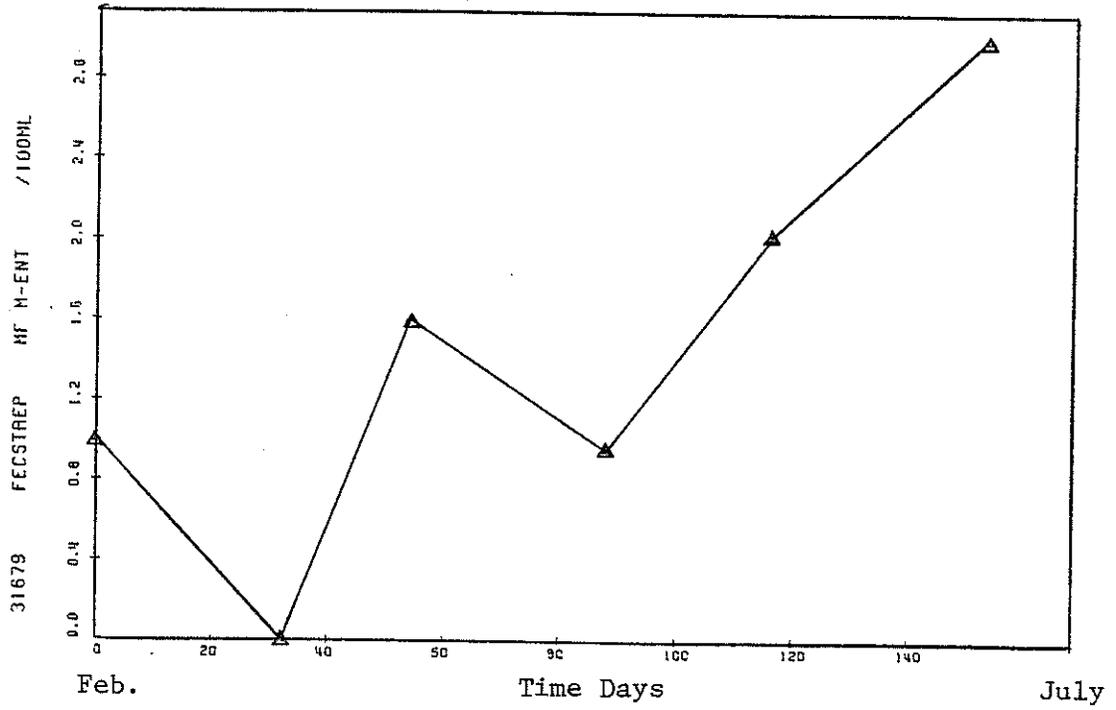


FIGURE 6: Fecal Streptococcus
per 100 ml

STORET
2000094
47 22 48.0 116 52 54.0 2
ROCK CREEK ABOVE WORLEY
16055 IDAHO



STORET
2000095
47 35 67.0 115 53 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 IDAHO

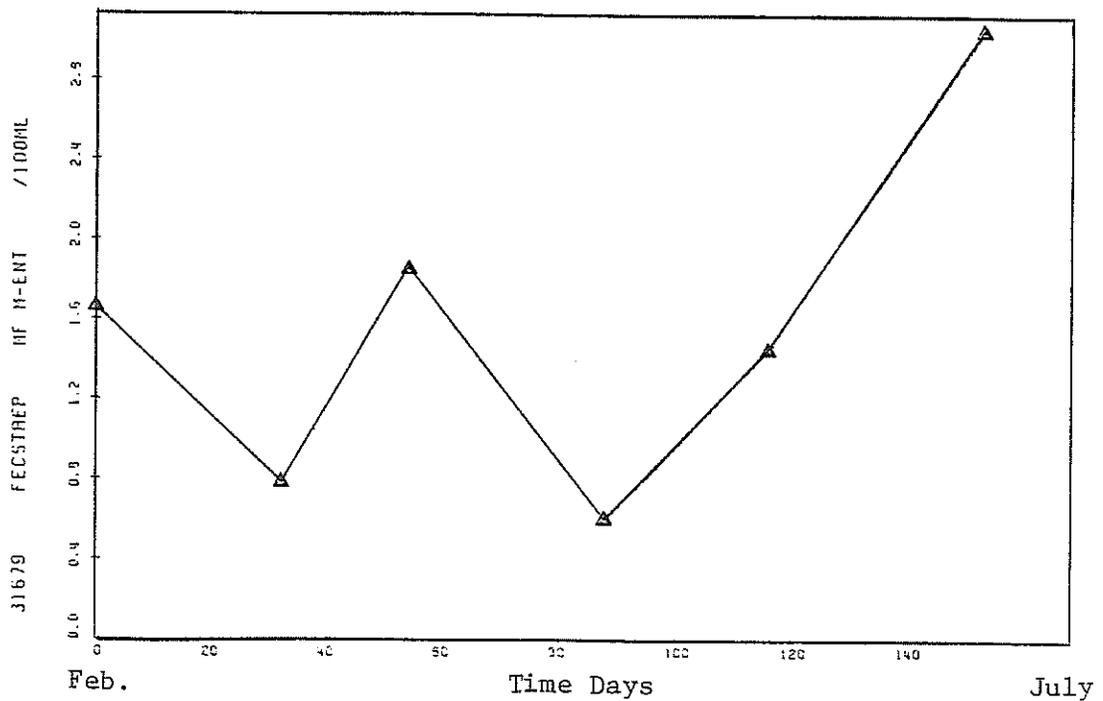
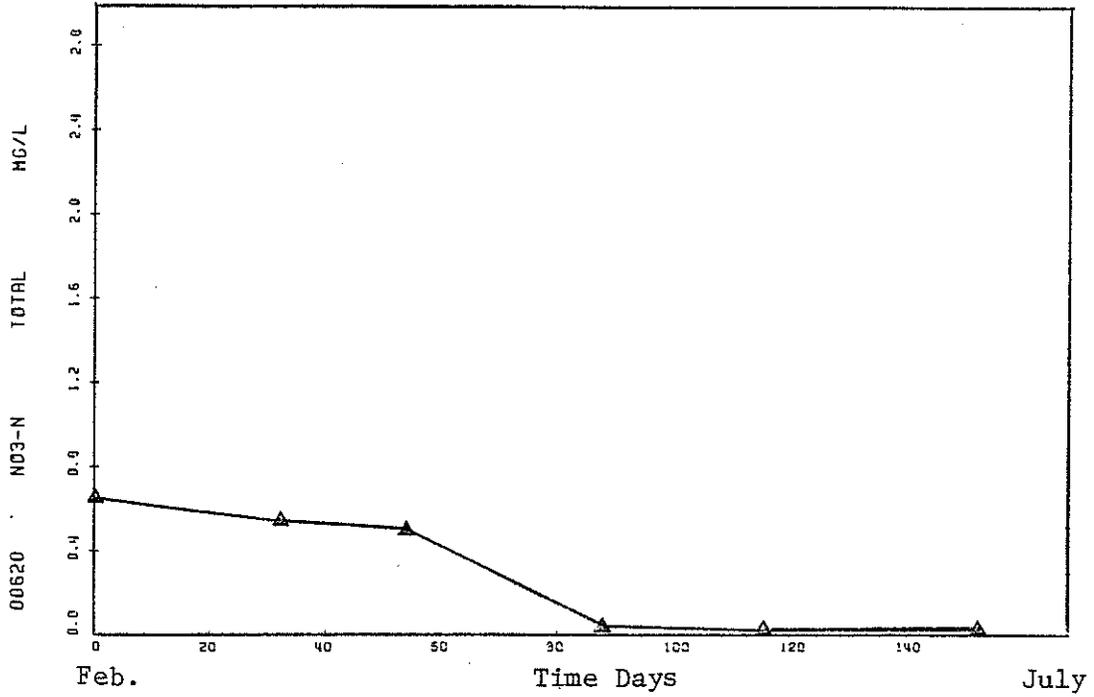


FIGURE 7: Nitrate-Nitrogen
mg/l

STORET
2000094
47 22 48.0 116 52 54.0 2
ROCK CREEK ABOVE WORLEY
16935 IDAHO



STORET
2000095
47 25 07.0 116 59 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16955 IDAHO

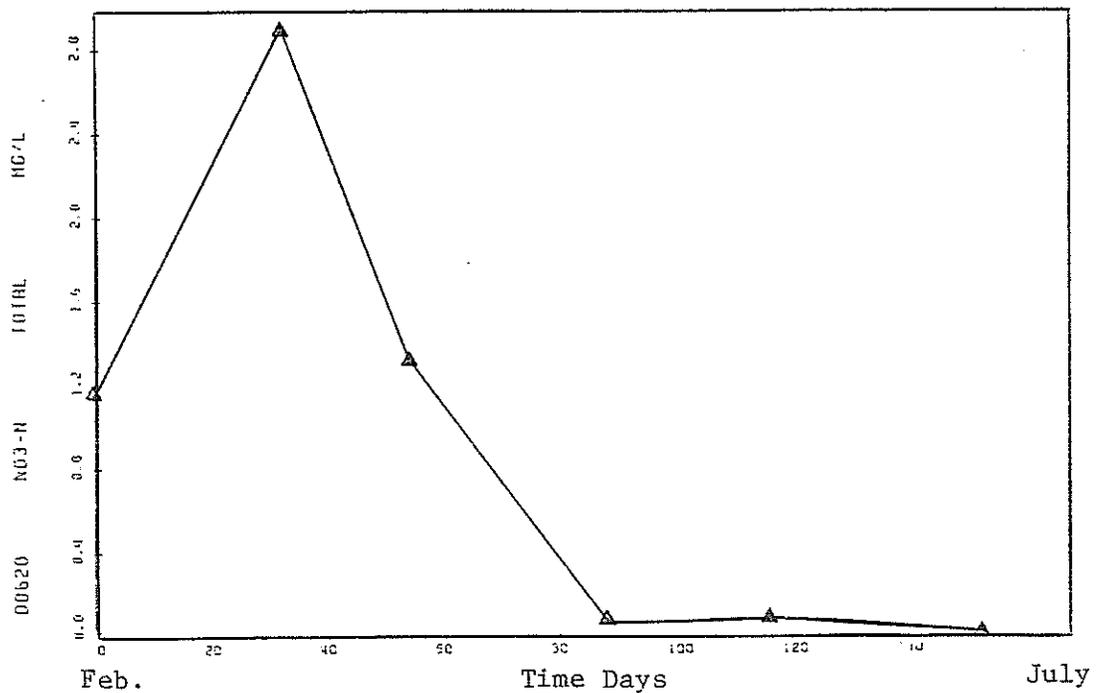
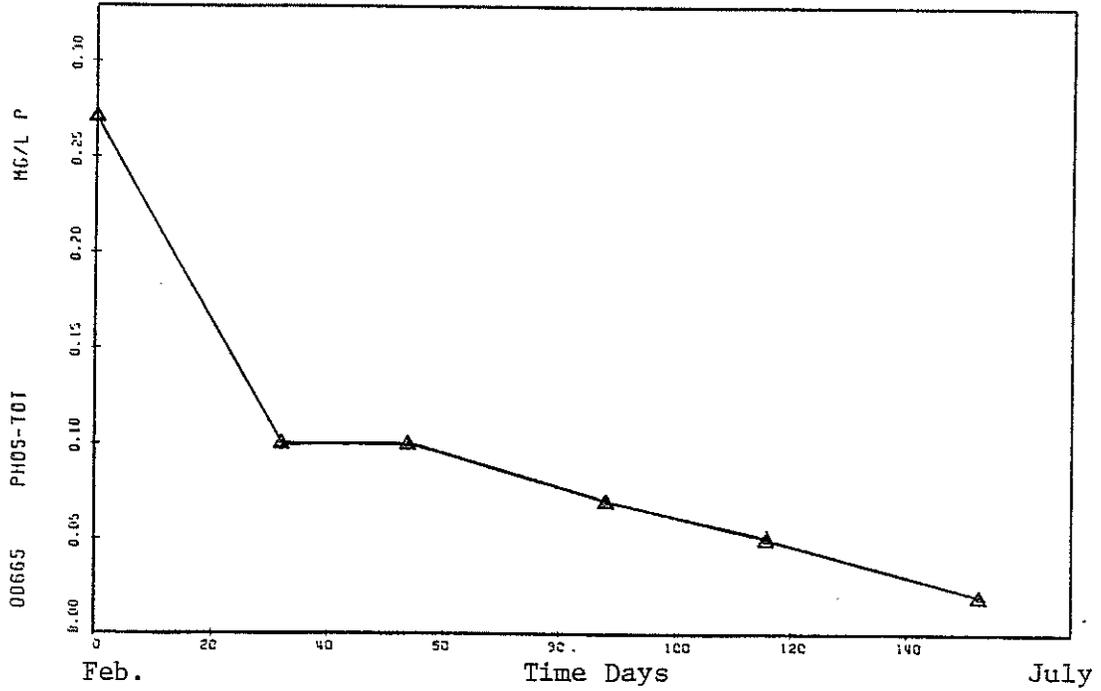


FIGURE 8: Total Phosphorus
mg/l P

SECRET
2000094
47 23 48.0 116 52 54.0 2
ROCK CREEK ABOVE WORLEY
16055 10AHO

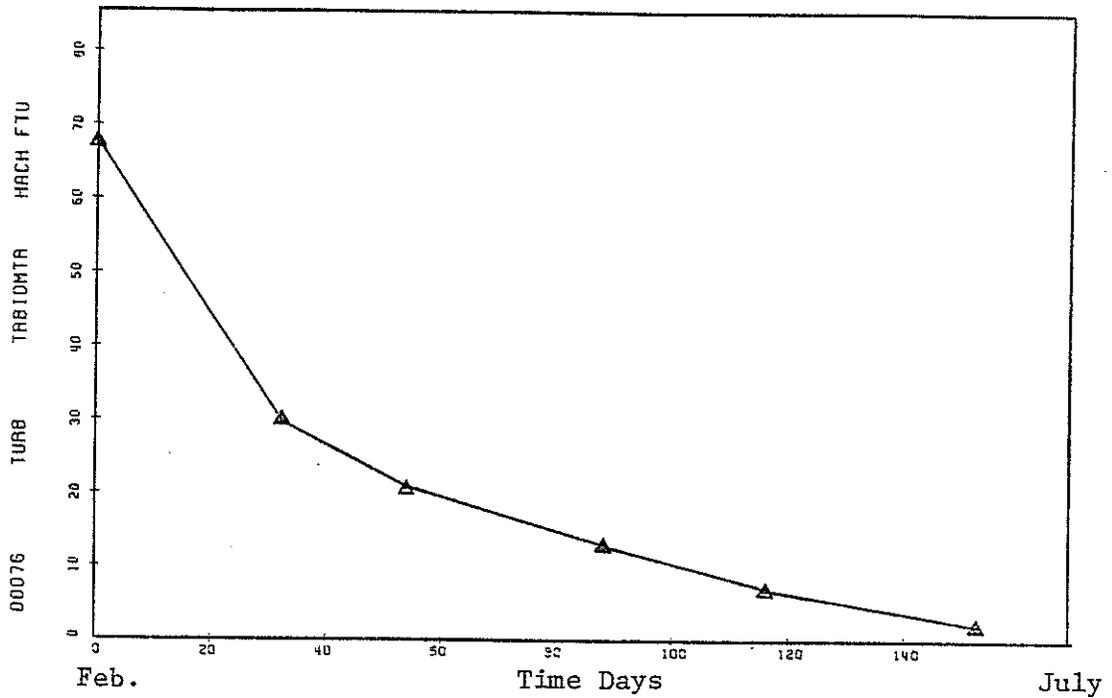


SECRET
2000095
47 29 07.0 116 58 46.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 10AHO



FIGURE 9: Turbidity BACH FTU

STORET
 2000094
 47 22 49.0 116 52 54.0 2
 ROCK CREEK ABOVE WORLEY
 16055 IDAHO



STORET
 2000095
 47 25 07.0 116 53 49.0 2
 ROCK CREEK BELOW WORLEY HWY 95
 16055 IDAHO

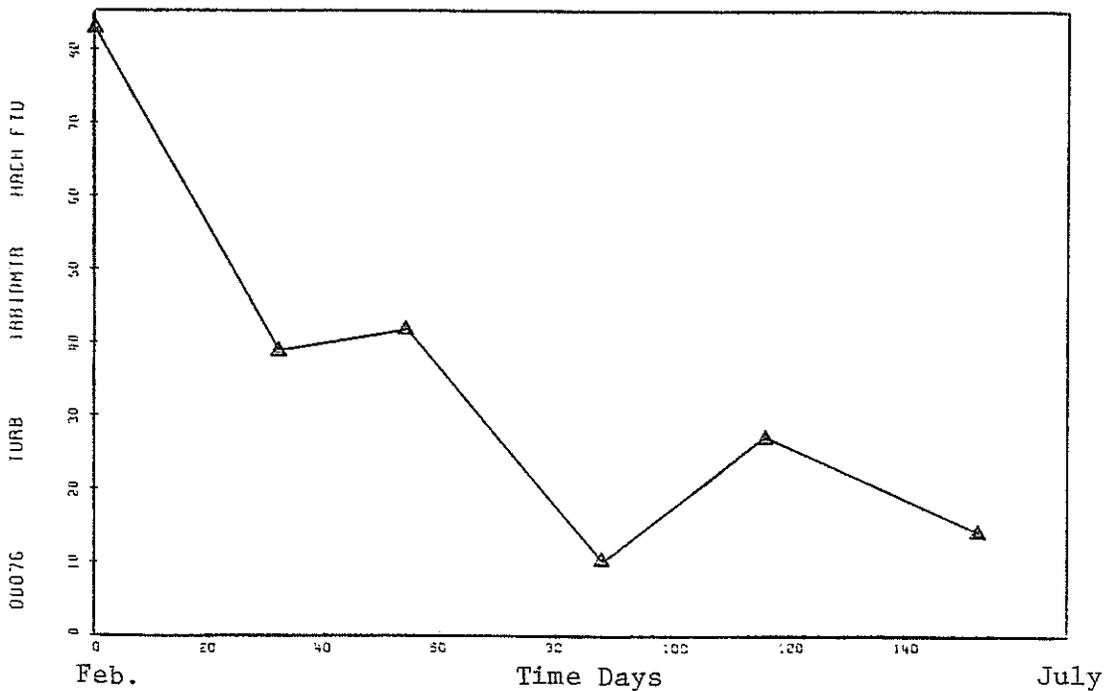
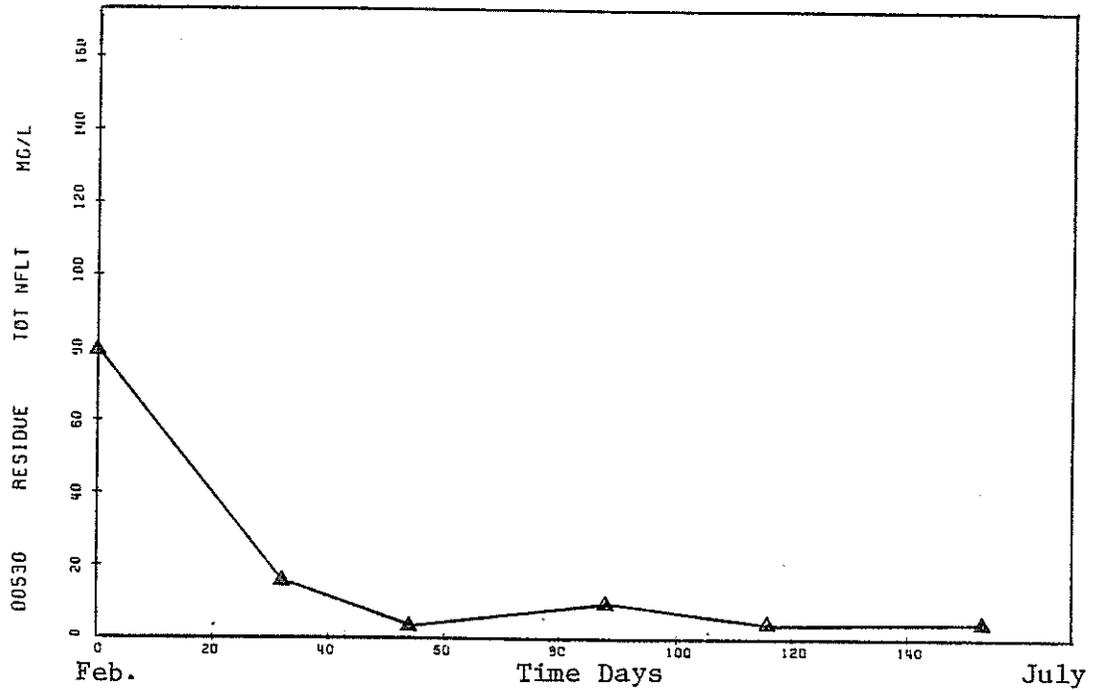


FIGURE 10: Residue, Total NFLT mg/l

SECRET
2000094
47 22 48.0 116 S2 54.0 2
ROCK CREEK ABOVE WORLEY
16055 IDAHO



SECRET
2000095
47 25 07.0 116 58 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 IDAHO

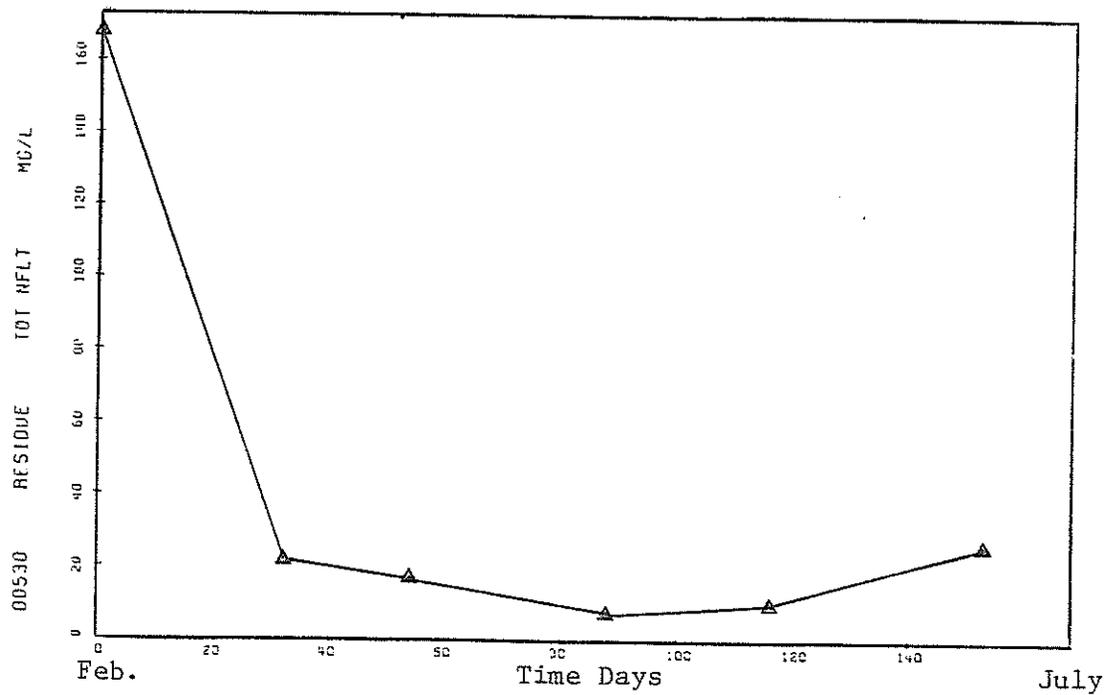
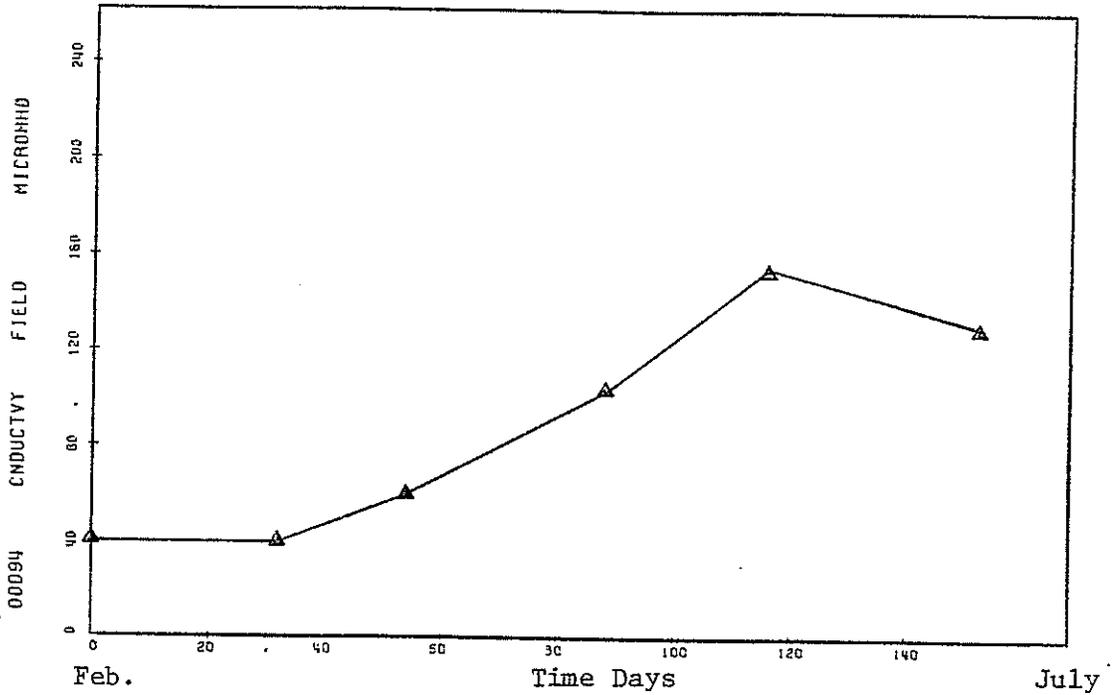
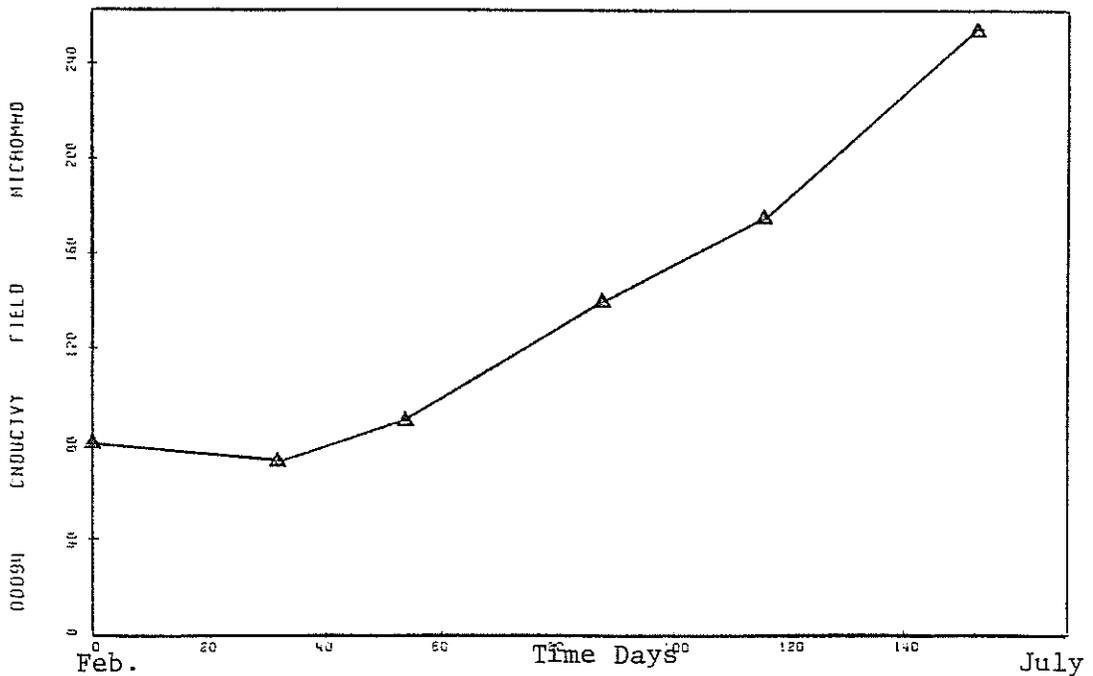


FIGURE 11: Conductivity, Field Micromho

STORET
2000094
47 22 48.0 115 52 54.0 2
ROCK CREEK ABOVE WORLEY
16055 IDAHO



STORET
2000095
47 25 07.0 110 58 48.0 2
ROCK CREEK BELOW WORLEY HWY 95
16055 IDAHO



APPENDIX C

Idaho Water Quality Standards
and Appropriate Criteria

III. GENERAL REQUIREMENTS

A. Interstate Compacts, Court Decrees and Adjudicated Water Rights

It shall be the policy of the Board that the adoption of water quality standards and the enforcement of such standards is not intended to conflict with the apportionment of water to the State of Idaho through any of the interstate compacts or court decrees, or to interfere with the rights of Idaho appropriators in the utilization of the water appropriations which have been granted to them under the statutory procedure or to interfere with water quality criteria established by mutual agreement of the participants in interstate water pollution control enforcement procedures.

B. Waters of the State Protected

All waters of the State to be protected for appropriate beneficial use shall include all recreational use in and/or on the water surface and for preservation and propagation of desirable species of aquatic biota shall include all natural streams and lakes, reservoirs or impoundments on natural streams and other specified waterways unless excepted on the basis of existing irreparable conditions which preclude such uses. Man-made waterways, unless otherwise specified, shall be protected for the use for which the waterways were developed.

C. Highest and Best Practicable Treatment and Control Required

Notwithstanding the water quality standards contained herein, where a higher standard can be achieved, the highest and best practicable treatment and/or control of wastewaters, activities and flows shall be provided so as to maintain dissolved oxygen at the highest desirable levels and overall water quality as good as possible, and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor and other deleterious factors at the lowest desirable levels. Such policy to apply not only to existing wastewater sources but to future wastewater sources as they may develop, and for such other streams not listed herein.

D. Antidegradation of State Waters

Waters whose existing quality is better than the established standards as of the date on which such standards become effective will be maintained at their existing high quality. These and other waters of Idaho will not be lowered in quality unless and until it has been affirmatively demonstrated to the Department and the Federal Environmental Protection Agency that such change is justifiable as a result of necessary economic or social development and will not interfere with or become injurious to any assigned uses made of, or presently possible in, such waters. This will require that any industrial, public or private project or development which would constitute a new source of water pollution or an increased source

of water pollution to high quality waters will be required, as part of the initial project design, to provide the highest and best degree of wastewater treatment available under existing technology, and, since there are also Federal standards, these wastewater treatment requirements will be developed cooperatively.

IV. RESTRICTIONS ON THE DISCHARGE OF SEWAGE AND INDUSTRIAL WASTEWATERS AND HUMAN ACTIVITIES WHICH AFFECT WATER QUALITY IN THE WATERS OF THE STATE

- A. No wastewaters shall be discharged and no activities shall be conducted in such a way that said wastewaters or activities either alone or in combination with other wastewaters or activities will violate or can reasonably be expected to violate the water quality standards contained herein.
- B. It is noted that from time to time certain short-term activities which are deemed necessary to accommodate essential activities and protect the public interest may be authorized by the Department under such conditions as the Department may prescribe, even though such activities may result in a reduction of water quality below the standards contained herein.

V. MAINTENANCE OF STANDARDS OF QUALITY

- A. The degree of sewage or wastewater treatment required to restore and maintain the standards of quality shall be determined in each instance by the Board and shall be based upon the following:
 - 1. The uses which are or may likely be made of the receiving stream.
 - 2. The size and nature of flow of the receiving stream.
 - 3. The quantity and quality of the sewage or wastewater to be treated.
 - 4. The presence or absence of other sources of water pollution on the same watershed.
- B. The water quality standards are subject to revision (following public hearings and concurrence of the Administrator of the EPA) as technical data, surveillance programs, and technological advances make such revisions desirable. Further, public hearings for the purpose of reviewing water quality standards shall be initiated in accordance with Title 67, Chapter 52, Idaho Code.
- C. Established water quality standards shall not be applicable in the receiving waters within the mixing zone of limited size adjacent to and/or surrounding a wastewater discharge outfall as defined by specific mixing zone boundaries. Aesthetic values of receiving waters shall be protected irrespective of mixing zone boundaries.

Receiving water quality outside the mixing zone will be maintained at water quality standards contained herein, or existing water quality levels, whichever is higher.

- D. In the application of the use classification, the most stringent criterion of a multiple criteria shall apply.
- E. Sample collection, preservation and analytical procedures to determine compliance with these standards shall conform to the procedures prescribed by the latest edition of Standard Methods For The Examination Of Water And Wastewater, and other superseding methods published by the Department following consultation with adjacent states, and the concurrence of the Environmental Protection Agency.

VI. WATER USE CLASSIFICATION

The designated use(s) for which the waters of the State are to be protected shall include, but not necessarily limited to domestic and industrial water supply, irrigation and stock watering, recreation and/or aesthetic qualities. (See appendix, USES TO BE PROTECTED.) Recreational waters are further divided into two classes: (1) primary contact, and (2) secondary contact. Primary contact recreational waters (Class A) are for uses where the human body may come in direct contact with the raw water to the point of complete submergence. The raw water may be accidentally ingested and certain sensitive organs such as eyes, ears, nose, etc. may be exposed to the water. These waters may be used for swimming, water skiing, skin diving, support and propagation of fish, aquatic and semi-aquatic life, and other forms of wildlife.

Primary contact recreational waters are further divided into sub-classes A₁ and A₂. Class A₁ is restricted to lakes and impoundments in which exceptionally high water quality exists. Waters of all lakes and impoundments shall be class A₁ unless otherwise excepted. In the instances where a flowing stream is classified and subsequently becomes an impoundment, that impoundment shall carry the same classification as the flowing stream. Class A₂ includes the remainder of the primary contact recreational waters.

Secondary contact recreational waters (Class B) are for uses in which the raw water supply is suitable for support and propagation of fish and other aquatic and semi-aquatic life, and other forms of wildlife. These waters may be used for boating, wading and other activities where ingestion of the raw water is not probable.

Waters classified as excepted (Class E) are waters in which, due to natural and/or man-made cause, the quality is not compatible with recreational uses. These waters are protected for the use(s) specified. The numerical value of the various parameters for specific Water Quality Standards contained herein under Section VIII shall apply to all Class E waters unless an alternate value for a given parameter is specified in Section IX for the waters under consideration.

Natural tributaries to the stream reaches are classified as primary recreational waters, Class A₂, unless otherwise specified. Waterways defined as a point source in Section 502(14), Public Law 92-500, are a means of conveyance for waters with no use classification. Canals and other man-made waterways excluded as a point source are protected for agricultural uses and aesthetic qualities and may be protected for other uses when specified.

In the instance where a flowing stream is classified and subsequently becomes an impoundment, that impoundment shall carry the same classification as the flowing stream. The criteria established for the various use-classifications may be modified by the Administrator for limited periods when receiving waters fall below their assigned water quality standards due to natural causes or if, in the opinion of the Administrator, the protection of the overall interest and welfare of the public requires such a modification.

VII. GENERAL WATER QUALITY STANDARDS FOR WATERS OF THE STATE

The following general water quality standards will apply to waters of the State, both surface and underground, in addition to the water quality standards set forth for specifically classified waters. Waters of the State shall not contain:

- A. Toxic chemicals of other than natural origin in concentrations found to be of public health significance or to adversely affect the use for which the waters have been classified.*
- B. Deleterious substances of other than natural origin in concentrations that cause tainting of edible species of fish or tastes and odors to be imparted to drinking water supplies.
- C. Radioactive materials or radioactivity other than of natural origin which
 - 1. Exceed 1/3 of the values listed in Column 2, Table II, Appendix A, Idaho Radiation Control Regulations as adopted by the Board on May 9, 1973.
 - 2. Exceed the concentrations specified in the 1962 U. S. Public Health Service Drinking Water Standards for waters used for domestic supplies.

* Guides such as the Water Quality Criteria published by the State of California Water Quality Control Board (Second Edition, 1963) and more recent research papers will be used in evaluating the tolerances of the various toxic chemicals for the use indicated.

3. Have a demonstrable effect on aquatic life.

The concentration of radioactive materials in these waters shall be less than those required to meet the Radiation Protection Guides for maximum exposure of critical human organs recommended by the former Federal Radiation Council in the case of foodstuffs harvested from these waters for human consumption.

- D. Floating or submerged matter not attributable to natural causes.
- E. Excess nutrients of other than natural origin that cause visible slime growths or other nuisance aquatic growths.
- F. Visible concentrations of oil, sludge deposits, scum, foam or other material that may adversely affect the use indicated.
- G. Objectionable turbidity which can be traced to a man-made source.

VIII. SPECIFIC WATER QUALITY STANDARDS

No wastewaters shall be discharged and/or no activity shall be conducted in waters of the State which either alone or in combination with other wastewaters or activities will cause in waters of any specified reach, lake or impoundment, or in general surface waters of the State

- A. The organism concentrations of the coliform group
 1. In waters of lakes and impoundments (A₁), except the following, which are classified as A₂ waters:

American Falls Reservoir	R.M. 738.0 to R.M. 714.0
Lake Walcott	
Milner Lake	R.M. 675.0 to R.M. 640.0
Murtaugh Lake	R.M. 690.0 to R.M. 675.0
Crane Falls Reservoir	
C. J. Strike Reservoir	R.M. 514.0 to R.M. 492.0
Lake Lowell	
Brownlee Reservoir	R.M. 338.0 to R.M. 285.0
Oxbow Reservoir	R.M. 285.0 to R.M. 273.0
Hells Canyon Reservoir	R.M. 273.0 to R.M. 247.0

- a. Total coliform concentrations where associated with a fecal source(s) to exceed a geometric mean of 50/100 ml., nor shall more than 20 percent of total samples during any 30-day period exceed 200/100 ml. (as determined by multiple-tube fermentation or membrane filter procedures and based on not less than 5 samples for any 30-day period).

- b. Fecal coliform concentrations to exceed a geometric mean of 10/100 ml., nor shall more than 10 percent of total samples during any 30-day period exceed 20/100 ml.; or greater than 50/100 ml. for any single sample.

Coliform criteria for shoreline waters shall conform with that of Class A₂ waters. Shoreline water waters shall be defined as the 100 feet of water surface as measured from the shoreline.

2. In waters protected for primary contact recreation (A₂)

- a. Total coliform concentrations where associated with a fecal source(s) to exceed a geometric mean of 240/100 ml., nor shall more than 20 percent of total samples during any 30-day period exceed 1000/100 ml. (as determined by multiple-tube fermentation or membrane filter procedures and based on not less than 5 samples for any 30-day period).
- b. Fecal coliform concentrations to exceed a geometric mean of 50/100 ml., nor shall more than 10 percent of total samples during any 30-day period exceed 200/100 ml.; or greater than 500/100 ml. for any single sample.

3. In waters protected for secondary contact recreation (B)

- a. Total coliform concentrations where associated with a fecal source(s) to exceed a geometric mean of 1000/100 ml., nor shall more than 20 percent of total samples during any 30-day period exceed 2400/100 ml. (as determined by multiple-tube fermentation or membrane filter procedures and based on not less than 5 samples for any 30-day period).
- b. Fecal coliform concentrations to exceed a geometric mean of 200/100 ml., nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 ml.; or greater than 800/100 ml. for any single sample.

B. Dissolved Oxygen

The DO concentration to be less than 6 mg/l or 90 percent of saturation, whichever is greater.

1. The DO standard shall apply to all flowing waterways.
2. The DO standard shall apply to the waters of all natural lakes and reservoirs except as excluded below:
 - a. In depths of water less than 100 feet in natural lakes or reservoirs, the bottom 20 percent of water depth shall

be excluded from application of the DO standard. In water depths greater than 100 feet, the bottom 20 feet of water depth shall be excluded for application of the DO standard.

- b. Waters below a thermocline in stratified lakes or impoundments shall be excluded from application of the DO standard.
 - c. No wastewaters shall be discharged and/or no activity shall be conducted in waters excluded by a. and b. above, which either alone or in combination with other wastewaters or activities will cause the DO concentration in these waters to be less than 4 mg/l.
3. Notwithstanding exclusion of a. and b. above, the DO standard shall always apply to the top two feet of any lake or reservoir.

C. Hydrogen Ion Concentration (pH)

The pH values to be outside the range of 6.5 to 9.0. The induced variations shall not be more than 0.5 pH units.

D. Temperature

1. Any measurable increase when water temperatures are 66°F or above, or more than 2°F increase other than from natural causes when water temperatures are 64°F or less (unless otherwise specified).
2. Any increase exceeding 0.5°F due to any single source, or 2°F due to all sources combined.

For purposes of determining compliance, a "measurable increase" means no more than 0.5°F rise in temperature of the receiving water as measured immediately outside of an established mixing zone. Where mixing zone boundaries have not been defined, cognizance will be given to the opportunity for admixture of wastewater with the receiving water.

3. Any measurable increase when water temperatures are 68°F or above, or more than 2°F increase other than from natural causes when the water temperatures are 66°F or less in the following waters:
 - a. The main stem of the Snake River from the Oregon-Idaho border (R.M. 407) to the interstate line at Lewiston, Idaho (R.M. 139).
 - b. The Spokane River from Coeur d'Alene Lake outlet to the Idaho-Washington border.

- c. The Palouse River from Princeton to the Idaho-Washington border.
- d. The Pend Oreille River from the Pend Oreille Lake outlet to the Idaho-Washington border.

E. Turbidity

The turbidity other than of natural origin to exceed 5 Jackson Turbidity Units (JTU). Whenever the receiving water is greater than 5 JTU, due to conditions other than those caused by man, then no discharge and/or activity either alone or in combination with other wastewater or activity shall cause an increase of more than 5 JTU.

F. Total Dissolved Gas

The total concentration of dissolved gas shall not exceed 110 percent of saturation at atmospheric pressure at the point of sample collection due to non-natural causes. (In compliance with this standard Paragraph C, Section III, General Requirements shall apply.)

IX. SPECIFIC WATER QUALITY STANDARDS FOR CLASS E WATERS

Specific water quality standards contained herein under Section VIII shall apply to all Class E waters except as enumerated in this Section.

- A. No wastewater shall be discharged and/or no activity shall be conducted which either alone or in combination with other wastewaters will cause the organism concentration of the coliform group in waters of the South Fork Coeur d'Alene River, Mullan to Enaville, or Paradise Creek, upper reaches to State line.
 - 1. The total coliform concentrations where associated with a fecal source(s) to exceed a geometric mean of 240/100 ml., nor shall more than 20 percent of total samples during any 30-day period exceed 1000/100 ml. (as determined by multiple-tube fermentation or membrane filter procedures and based on not less than 5 samples for any 30-day period); or greater than 2400/100 ml. for any single sample.
 - 2. The fecal coliform concentrations to exceed a geometric mean of 50/100 ml., nor shall more than 10 percent of total samples during any 30-day period exceed 200/100 ml.; or greater than 500/100 ml. for any single sample.
- B. No wastewaters shall be discharged and/or no activity shall be conducted which either alone or in combination with other wastewaters will cause the DO concentration to be less than 75 percent of saturation in waters of Paradise Creek, upper reaches to the State line.

The states are responsible for the monitoring of and reporting data for interstate streams which include most tributaries to the major rivers.

3. PARAMETRIC COVERAGE:

The parametric coverage for the stations in the NWQSS network is shown on Table 2. At the present time there is some discrepancy among the various agencies' parametric coverage; however, negotiations are presently underway to develop a uniform parameter package. Station parameters covered by this report include a selection of those constituents which are, 1. considered significant in ambient station analysis and/or, 2. collected at each NWQSS station in the river basin under consideration.

4. REGION 10 WATER QUALITY CRITERIA:

<u>Parameter</u>	<u>Criteria Level/Units</u>	<u>Environmental Impact and Reference</u>
Temperature	20°C (68°F) MAX	To protect growth and migration routes of salmonids (Federal Water Pollution Control Administration (FWPCA), <u>Water Quality Criteria</u> , 1968).
Dissolved Oxygen	6 mg/l MIN 90% SAT MIN	For good growth and the general well-being of trout, salmon, and other species of cold water aquatic life, DO concentrations should not be below 6 mg/l (FWPCA, <u>Water Quality Criteria</u> , 1968). In addition, state water quality standards normally require 90% saturation for dissolved oxygen (Idaho and Oregon).
Dissolved Gas	110% SAT MAX	To prevent fish fatalities by "gas bubble disease", in which dissolved gases in their circulatory system come out of solution to form bubbles (emboli), which block the flow of blood through the capillary vessels (Environmental Protection Agency, <u>Quality Criteria for Water</u> , 1976).

<u>Parameter</u>	<u>Criteria Level/Units</u>	<u>Environmental Impact and Reference</u>
pH	6.5 MIN 8.5 MAX	<p>The pH range of 5 to 9 is not directly lethal to fish. However, the toxicity of several common pollutants is markedly affected by pH changes within this range, and increasing acidity or alkalinity may make these poisons more toxic. Therefore, a pH range of 6.5 to 9.0 is desirable to protect freshwater aquatic life (EPA, <u>Quality Criteria for Water</u>, 1976). In primary contact recreation waters, the pH should be within the range of 6.5-8.3 (except when due to natural causes) to prevent the possibilities of eye irritations in humans (FWPCA, <u>Water Quality Criteria</u>, 1968). State pH standards range from 6.5 to 9.0 for Idaho and 6.5 to 8.5 for Oregon and Washington. In light of the above information, our criteria has been set at 6.5 to 8.5.</p>
Turbidity	25 JTU MAX	<p>Most state standards have a turbidity standard of "not to exceed 5 JTU over background or natural conditions". This is rather ambiguous as to what "background or natural conditions" are. Also, this type of standard does not relate to the fishable/swimmable concept. Excessive turbidity reduces photosynthesis by aquatic plant life and damages the spawning grounds of fish and habitat of aquatic invertebrates. Buck (1956) observed that maximum production in hatchery ponds and reservoirs occurred where the average turbidity was less than 25 JTU (FWPCA, <u>Water Quality Criteria</u>, 1968).</p>

C-11

<u>Parameter</u>	<u>Criteria Level/Units</u>	<u>Environmental Impact and Reference</u>
Phosphorus	Total 0.05 mg/l-P Total 0.15 mg/l-PO ₄ Ortho 0.025 mg/l-P Ortho 0.075 mg/l-PO ₄ Diss. Ortho 0.01 mg/l-P	Limited studies made to date indicate that different species of algae have somewhat different phosphorus requirements, with the range of available phosphorus usually falling between 0.01 and 0.05 mg/l as P. At these levels, when other conditions are favorable, blooms may be expected. While there is no set relationship between total and available phosphorus (because the ratio varies with season, temperature, and plant growth), the total phosphorus is governing, as the reservoir supplies the available phosphorus. A desirable guideline for total phosphorus is 0.05 mg/l as P where streams enter lakes or reservoirs (FWPCA, <u>Water Quality Criteria</u> , 1968). The other criteria levels for different units and forms of phosphorus have been determined by unit conversion and relationships found between the phosphorus forms in Region 10. The other forms of phosphorus are used only as indicators when data for total phosphorus is lacking.
Nitrate Nitrogen	0.30 mg/l-N 1.33 mg/l-NO ₃	Mackenthum (1965) cited results indicating that inorganic nitrogen at 0.30 mg/l and inorganic phosphorus at 0.01 mg/l, at the start of an active growing season, subsequently permitted algal blooms (FWPCA, <u>Water Quality Criteria</u> , 1968).
Ammonia Nitrogen	Unionized 0.02 mg/l-N Total 0.20 mg/l-N Total 0.26 mg/l-NH ₄	The amount of unionized ammonia is very much dependent upon pH, temperature, and concentration of total ammonia. A maximum level of 0.02 mg/l as unionized ammonia is recommended to minimize toxicity to freshwater aquatic life (EPA, <u>Quality Criteria for Water</u> , 1976). Concentrations of total ammonia above 0.20 mg/l as N are indicative of organic pollution (Klein, <u>River Pollution I., Chemical Analysis</u> , 1959).

<u>Parameter</u>	<u>Criteria Level/Units</u>	<u>Environmental Impact and Reference</u>
Bacteria	Total Coliform 1000/100 ml Fecal Coliform 240/100 ml	Total and fecal coliform are microbiological indicators used to determine or indicate the safety of water for drinking, swimming, and shellfish harvesting. A fecal coliform log mean of 200 per 100 ml for bathing waters and 14 per 100 ml for shellfish harvesting waters is recommended by <u>Quality Criteria for Water</u> , EPA, 1976. State standards range from 240 total/50 fecal per 100 ml for primary contact recreation in Idaho, 1000 total per 100 ml in Oregon for general beneficial use, and 1000 total per 100 ml in Washington for Class B general recreation. From the above discussion, the suggested criteria level based on general recreation is 1000 per 100 ml for total coliform and 240 per 100 ml for fecal coliform.
Dissolved Solids Conductivity	TDS 500 mg/l Cond. 750 umho/cm	High levels of dissolved solids are a hazard for irrigation water. A maximum level of 500 mg/l is indicated for water from which no detrimental effects will usually be noticed. For domestic water supply, the maximum level is 250 mg/l (EPA, <u>Quality Criteria for Water</u> , 1976). A relationship exists between dissolved solids and conductivity where total dissolved solids = .6 to .8 times the conductivity.
Boron	750 ug/l	For long term irrigation, a maximum level of 750 ug/l is recommended for sensitive crops (EPA, <u>Quality Criteria for Water</u> , 1976).

C-13

<u>Parameter</u>	<u>Criteria Level/Units</u>	<u>Environmental Impact and Reference</u>												
Benthic Invertebrate Biomass	--	<p>Is a measure of the standing crops of the benthic fauna. Typical responses of the standing crop to environmental stress are:</p> <table border="1"> <thead> <tr> <th><u>Stress</u></th> <th><u>Standing Crop Response</u></th> </tr> </thead> <tbody> <tr> <td>Toxic Substance</td> <td>Reduce</td> </tr> <tr> <td>Severe Temperature Alterations</td> <td>Variable</td> </tr> <tr> <td>Silt</td> <td>Reduce</td> </tr> <tr> <td>Inorganic Nutrients</td> <td>Increase</td> </tr> <tr> <td>Organic Nutrients (high O₂ demand)</td> <td>Increase</td> </tr> </tbody> </table> <p>(EPA Biological Field and Laboratory Methods, 1973.)</p>	<u>Stress</u>	<u>Standing Crop Response</u>	Toxic Substance	Reduce	Severe Temperature Alterations	Variable	Silt	Reduce	Inorganic Nutrients	Increase	Organic Nutrients (high O ₂ demand)	Increase
<u>Stress</u>	<u>Standing Crop Response</u>													
Toxic Substance	Reduce													
Severe Temperature Alterations	Variable													
Silt	Reduce													
Inorganic Nutrients	Increase													
Organic Nutrients (high O ₂ demand)	Increase													
Chlorophyll a	3 mg/l 3-20 mg/l 20 mg/l	<p>Oligotrophic Mesotrophic Eutrophic (Vollenweider, Dr. R.A., <u>Water Management Research, Scientific Fundamentals of the Eutrophication of Lakes and Flowing Waters with Particular Reference to Nitrogen and Phosphorus as Factors in Eutrophication, DAS/CSI/68.27</u>).</p>												
Species Diversity	<1 polluted 1-3 moderate pollution >3 unpolluted	<p>The species diversity index reflects the response of the benthic macroinvertebrate community to pollutional stress (Wilhelm 1970).</p>												

Heavy Metals Toxicity

<u>Metal</u>	<u>Criteria Level</u>	<u>Environmental Impact</u>	<u>Reference</u>
Cadmium	30 ug/l	Aquatic life protected in hard water	1
	3 ug/l	Eggs and larvae of salmon in hard water	
Chromium	50 ug/l	Mixed aquatic populations protected	1
Copper	20 ug/l	96 hour TL ₅₀ to Chinook salmon in soft water was 31 ug/l at hatch and 18 ug/l at 1 month old	2
Lead	30 ug/l	Aquatic life protected	1
Mercury	0.2 ug/l	Selected species of fish and predatory aquatic organisms protected	1
Zinc	100 ug/l	96 hour TL ₅₀ to Chinook salmon in soft water at 1 month old	2
	80 ug/l	Algacidal concentration for Selenastrum Capricornutum	3

References:

1. EPA R3.73.033, Ecological Research Series, Water Quality Criteria 1972, U.S. Government Printing Office, 1973.
2. EPA, Quality Criteria for Water, 1976.
3. Green, et. al., Report to Region X on the Results of the Spokane River Algal Assays, 1973.
4. Wilhelm, J.L. 1970. "Range of Diversity Index in Benthic Macroinvertebrate Populations" JWPCF, 42(S); R221-R224.

Pesticide Toxicity

The following criteria levels are recommended to protect the freshwater aquatic life (EPA, Quality Criteria for Water, 1976).

<u>Pesticide</u>	<u>Criteria Level</u>
Aldrin	.003 ug/l
Dieldrin	.003 ug/l
Chlordane	.010 ug/l
DDT	.001 ug/l
Endrin	.004 ug/l
Heptachlor	.001 ug/l
Lindane	.010 ug/l
Malathion	.100 ug/l
Parathion	.040 ug/l