WATER QUALITY STATUS REPORT

UPPER ROCK CREEK
(Twin Falls & Cassia Counties)
1976-1977

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

April 1979

Report No. WQ-38

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(Twin Falls & Cassia Counties)

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

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ABSTRACT

Water quality samples were collected monthly at two stations on Upper Rock Creek located in Twin Falls and Cassia County, Idaho, from July 1976 through August 1977.

Most parameters were within Idaho Water Quality Standards at the Sawtooth Forest Service boundary with the exception of elevated phosphorus concentrations. At the lower station near the Rock Creek townsite, bacterial densities exceeded the standards approximately one-half the time. Although phosphorus values recorded at each station exceed accepted criteria, these phosphorus concentrations are probably a natural characteristic of the watershed.

Increased bacterial densities between the two stations are likely due to livestock grazing which occurs in this segment.

INTRODUCTION

This survey was conducted on Upper Rock Creek to determine the water quality status of this stream segment. Earlier studies by IDHW-DOE examined the effect of point sources and irrigation return flows on the lower section of the creek as it flows through Twin Falls.

Upper Rock Creek from the Rock Creek townsite at RM 25.1 to the headwaters is designated for planning purposes by IDHW-DOE as Segment USB-720. The lower segment of the creek is USB-730. Both segments are classified as Class A_2 according to IDHW-DOE Water Quality Standards and Wastewater Treatment Requirements.

Rock Creek is located south of the Snake River near Twin Falls, Idaho, in Twin Falls and Cassia County. The mouth of Rock Creek is located at RM 606.4 on the Snake River (See Figure 1).

Land uses in the Upper Rock Creek drainage are hay and pasture fields in the relatively flat valleys, and cattle grazing on the steeper sagebrush hills. The flat valley areas are privately owned, and the brushlands are managed by the Bureau of Land Management. Streambanks are covered by riparian vegetation and most of the creek is shaded by a dense canopy of deciduous trees. The headwaters of Rock Creek are within the Sawtooth National Forest. Within the forest, the stream channel is confined within a narrow canyon for most of its length. Elevation varies from approximately 7,200 feet at the headwaters to 4,100 feet at the Rock Creek townsite.

Valley soils are of the Kudlac and Nipper series formed in alluvium (SCS, Twin Falls field office). Kudlac soil is a deep, well drained stratified soil that varies from a silty clay loam to a sandy loam. The Nipper soil is also a deep soil-over 60 inches-and varies from loam at the surface to a fine sandy loam. Both soils are on level terraces and receive an average annual precipitation of 8-11 inches.

Soils in the upper section of the drainage are stony loam and silt loam soils that are shallow to moderately deep. Annual precipitation in this area is 10-30 inches. Additional drainage description can be found in an earlier IDHW-DOE report on Rock Creek by Clark, 1975.

Flow records are available for a USGS gaging station located at RM 30.3 which was discontinued in 1974. This gage was located above most irrigation diversions. Mean monthly flows for Water Year 1971 to 1974 are shown in Table 1. The 32 year average discharge at this gage (1910-12, 1944-74) is 34.5 cfs. This survey was conducted during the drought in Water Year 1977 when flows were drastically reduced, so flows may be considerably lower than those shown in the table.

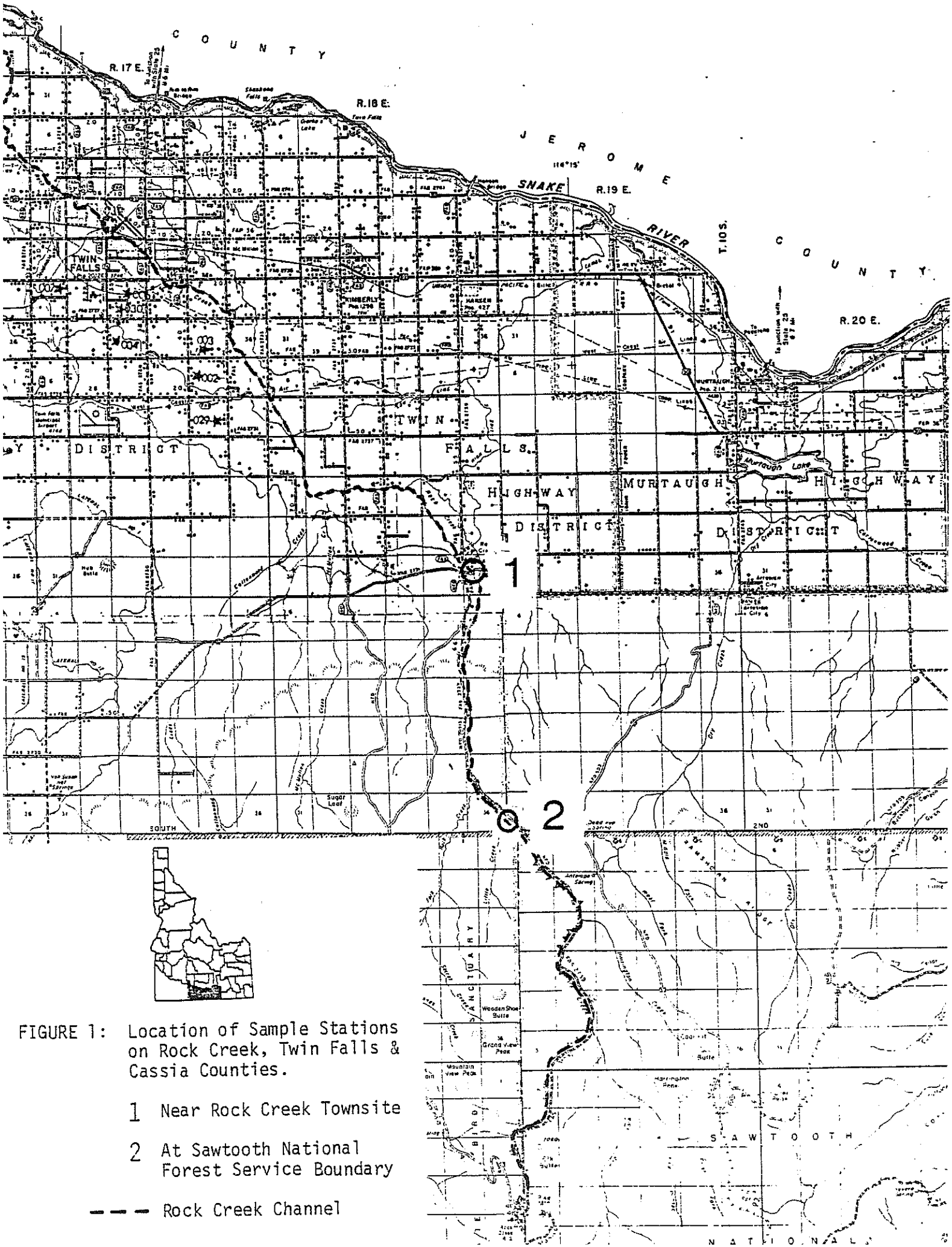

FIGURE 1: Location of Sample Stations on Rock Creek, Twin Falls & Cassia Counties.

1 Near Rock Creek Townsite

2 At Sawtooth National Forest Service Boundary

— — — Rock Creek Channel

Table 1: Monthly mean discharge, in cubic feet per second, for USGS gaging station, Rock Creek near Rock Creek, ID #13092000, Water Year 1971 to 1974.

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1971	10.2	13.2	13.5	44.8	38.4	61.0	149	256	80.5	21.8	10.8	11.6
1972	12.3	11.6	16.7	43.7	34	94.6	136	256	94.7	30.2	13.6	12.9
1973	12.3	14.9	14.1	20.1	19.2	66.9	162	206	71.7	22.6	10.9	9.2
1974	15.5	16.3	18.1	23.1	16.4	32.0	109	154	38.3	16.2	10.0	10.7

MATERIALS AND METHODS

Water quality samples were collected at two locations on Rock Creek. Station #1 was located at the segment boundary (RM 25.1) near the Rock Creek townsite (STORET #2040074). Station #2 was located above the farming area near the Sawtooth National Forest Service boundary at RM 32.3, (STORET #2040094), (See Figure 1). Samples were collected monthly from July 1976 through August 1977.

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

Samples for laboratory analysis were collected in approximately one liter cubitainers. Samples for nutrients were preserved with sulphuric acid, samples for metals with nitric 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:

- Temperature
- Dissolved Oxygen
- pH
- Total Coliform
- Fecal Coliform
- Fecal Streptococcus
- Nitrate-N
- Nitrite-N
- Ammonia-N
- Total Kjeldahl Nitrogen
- Total Phosphorus
- Ortho-Phosphate (as P)
- BOD
- COD
- TOC
- Turbidity
- Total Solids
- Suspended Solids
- Specific Conductance
- Alkalinity
- Chloride
- Hardness
- Sodium
- Potassium
- Total Mercury
- Total Lead
- Total Cadmium
- Total Zinc
- Total Copper

WASTE SOURCES

No permitted point sources occur on the upper segment of Rock Creek.

Nonpoint sources in this segment are mainly agricultural activities which occur between Station #1 and Station #2. Hay and pasture fields are the major landuses along the creek. Some of this land is irrigated by diversions from Rock Creek. Cattle are grazed along the creek and in the surrounding sagebrush hills.

Immediately above Station #2 in the National Forest there are several picnic and recreational sites on the creek. During the survey the road in this area was under construction. Other management activities in the National Forest may be impacting water quality above Station #2.

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
Temperature Deg. C°	19° Max FSB*	13	7.7	0.0-16°	None	None
	R.Cr.	14	11.6	0.0-22°	7	Cold Water Biota

The temperature remained within the range recommended for salmonid species of fish at the upper station, but exceeded the recommended maximum at the Lower Rock Creek station in August.

Dissolved Oxygen: (Figures 3 & 4)

Parameter	Criteria	Number	Mean	Range	% Violation	Protected Uses Affected
Concentration mg/l	6 mg/l Min FSB*	12	10.2	8.6-13.0	None	None
	R.Cr.	15	10.7	8.5-15.5	None	None
Percent Saturation %	90% Sat. FSB	12	101	87-120	8	None
	R.Cr.	13	95	79-112	23	Aquatic Life

*NOTE: FSB-Station at the Forest Service Boundary RM 25.1.
R.Cr.-Station at the Rock Creek townsite RM 32.3.

Dissolved oxygen stayed above the minimum concentration standard throughout the year at both stations. This is due to a combination of low temperature and good reaeration from riffle areas. Dissolved oxygen dropped below 90% saturation at the lower station during the fall.

pH: (Figure 5)

Parameter	Criteria		Number	Mean	Range	% Violation	Protected Uses Affected
pH	6.5-9.0	FSB*	13	--	7.4-8.2	None	None
		R.Cr.	15	--	7.5-8.4	None	None

The pH was within Idaho water quality standards throughout the year and was uniform at both stations.

Bacteria[1/]: (Figures 6 & 7)

Parameter	Criteria		Number	Geometric Mean	Range	% Violation	Protected Uses Affected
Total Coliform	240	FSB*	12	70	8-660	None	Contact Recreation & drinking water supply degraded at lower station
		R.Cr.	13	637	48-40,000	31	
Fecal Coliforms	50	FSB	11	8.2	2-100	18	
		R.Cr.	12	62	2-1,500	58	
Fecal Streptococcus	--	FSB	12	18	2-370	--	
		R.Cr.	13	211	62-2,600	--	

Bacterial densities are fairly low at the upper station near the Forest Service Boundary. The geometric mean of 8.2 for fecal coliform bacteria is well below the Class A_2 standard of 50/100 ml. Bacterial numbers increase at the lower station near the Rock Creek townsite. Single samples for fecal coliforms exceed 50/100 ml approximately one-half the time, and the geometric mean for the sampling period exceeds this limit.

Bacterial densities change seasonally being highest during the irrigation season and lowest during the winter months at the lower station.

*NOTE: FSB-Station at the Forest Service Boundary RM 25.1.
R.Cr.-Station at the Rock Creek townsite RM 32.3.

[1/] Total coliform Class A_2 standard is a geometric mean of 240/100 ml, Class B standard is geometric mean of 1,000/100 ml. Fecal coliform Class A_2 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.

Fecal streptococcus numbers increase significantly downstream. For recent fecal contamination a fecal coliform/fecal streptococcus (FC/FS) ratio above 4 is considered indicative of a human source, whereas a ratio below .7 indicates an animal source (Claussen, 1977). At the upper station the FC/FS ratio is not conclusive since bacteria densities are fairly low. At the lower station fecal streptococcus numbers are high, and the FC/FS ratio is generally below .7 (median of 0.4). This indicates the major source of fecal contamination is of animal origin, and probably due to cattle grazing practices in the watershed.

Trophic: (Figures 8, 9, & 10)

Parameter	Criteria		Number	Mean	Range	Criteria Exceeded-%	Protected Uses Affected
Nitrate-N mg/l	.3	FSB*	13	0.12	0.01-0.32	8	None
		R.Cr.	15	0.17	0.01-0.32	7	None
Ammonia Nitrogen mg/l	.20	FSB	13	0.01	0.01-0.02	None	None
		R.Cr.	15	0.03	0.01-0.10	None	None
Total Phosphorus mg/l (P)	.05	FSB	13	0.09	0.01-0.33	62	Aesthetics
		R.Cr.	15	0.13	0.01-0.62	80	Aesthetics
Ortho-Phosphate mg/l (as P).	.025	FSB	11	0.03	0.02-0.06	55	Aesthetics
		R.Cr.	14	0.03	0-0.16	64	Aesthetics
Chemical Oxygen Demand mg/l	--	FSB	12	13.6	2.4-24.8	NA	
		R.Cr.	15	11.4	2.0-25.0	NA	
Biochemical Oxygen Demand mg/l	--	FSB	12	1.5	0.8-2.3	NA	
		R.Cr.	13	1.6	0.3-2.8	NA	

Nutrient concentrations were similar at the two stations. Nitrogen compounds were fairly low in concentration and rarely exceeded recommended criteria. Phosphorus concentrations are high at both stations. Total phosphorus peaked in April accompanying the peak in suspended solids associated with runoff.

Aesthetic: (Figure 11)

Parameter	Criteria		Number	Median	Range	Criteria Exceeded-%	Protected Uses Affected
Turbidity JTU	25	FSB*	13	3.6	1.2-5.8	None	None
		R.Cr.	15	4.2	2,2-140	7	Aesthetics, Fishery

Turbidity was generally low throughout the sampling period at both stations and did not exceed recommended criteria. Maximum turbidity during this survey was recorded on April 13, 1977, at the Lower Rock Creek station.

*NOTE: FSB-Station at the Forest Service Boundary RM 25.1.
R.Cr.-Station at the Rock Creek townsite RM 32.3.

Solids: (Figures 12 & 13)

Parameter	Criteria		Number	Mean	Range	Criteria Exceeded-%	Protected Uses Affected
Total Solids	--	FSB*	13	163.9	131-257	NA	None
		R.Cr.	15	193.5	142-368	NA	None
Suspended Solids	80	FSB	12	27.8	1-166	8	None
		R.Cr.	15	32.7	2-280	7	None
Conductivity (umhos/cm)	750	FSB	13	184.1	147-222	None	None
		R.Cr.	15	213.5	138-276	None	None
Total Alkalinity	--	FSB	13	85.2	50-188	NA	None
		R.Cr.	15	100.2	54-188	NA	None
Chloride	--	FSB	13	4.3	2-7	NA	None
		R.Cr.	15	5.7	4-12	NA	None

Suspended Solids peaked at both stations during high flows experienced in April. However, the sampling period did not coincide with peak runoff. Higher suspended solids and turbidity would have been recorded during peak flows. The remainder of the year suspended solids stayed at low levels.

Dissolved solids, indicated by conductivity readings, was low at both stations and did not affect any protected uses.

There was a slight increase in total solids at the lower station in comparison to the station at the Forest Service Boundary.

Inorganic Toxicity:

Heavy metal samples were taken twice during the survey. Cadmium, copper, lead, and mercury were below detection limits. A maximum concentration of 100 µg/l total zinc was recorded at the upper station in November 1977.

CONCLUSIONS & RECOMMENDATIONS

1) pH and dissolved oxygen are within Idaho water quality standards.

2) Fecal coliform bacteria concentrations exceed Class A_2 water quality standards at the downstream boundary of the Upper Rock Creek segment approximately one-half the time. Bacterial densities at the upper station were uniformly low. The source of fecal contamination at the lower station appears to be livestock grazing.

3) Phosphorus concentrations exceed accepted criteria a majority of the time. These phosphorus levels, however, appear to be a natural characteristic of the watershed. Phosphorus concentrations did increase slightly between the Forest Service Boundary and the lower station near the Rock Creek townsite.

*NOTE: FSB-Station at the Forest Service Boundary RM 25.1.
R.Cr.-Station at the Rock Creek townsite RM 32.3.

4) Suspended solids and turbidity exceeded criteria for protection of fisheries only during April. However, this survey was conducted during a typical runoff period when flows were extremely low, and is probably not representative of normal conditions.

5) In general, water quality of this segment is high and, with the exceptions listed above, meets instream standards for Class A_2 waters.

Improvements in water quality are expected when Best Management Practices are applied to livestock grazing and farming practices in this watershed.

LITERATURE CITED

Clausen, E. M.; Green, B. L.; and Litsky, Warren. 1977. "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.

Clark, W. H. 1975. Water Quality Status Report - Rock Creek, Twin Falls County, Idaho 1970-74. Idaho Department of Health and Welfare - Division of Environment, Boise, Idaho, 69 p.

Environmental Protection Agency, United States, July 1976. Quality Criteria for Water, U.S. Government Printing Office 1977 0-222-904.

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

U.S. Department of the Interior - Geological Survey. 1972-1975. Water Resources Data for Idaho, Surface Water Records, Water Year 1971-1974, U.S. Government Printing Office.

APPENDIX A

RAW DATA

STORET RETRIEVAL AND INVENTORY

STORET RETRIEVAL DATE 78/02/09

2040074
42 25 36.0 114 17 44.0 5
LOWER ROCK CR. COUNTY RD. BRIDGE
16083 IDAHO
PACIFIC NORTHWEST 130605
UPPER SNAKE RIVER BASIN
USGS 760923
0000 FEET DEPTH CLASS 00

/TYPE/AMOUNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00061 STREAM FLOW, INST-CFS	00300 DO MG/L	00310 BOD 5 DAY MG/L	00335 COD LOWLEVEL MG/L	00400 PH SU	00403 LAB PH SU	31501 TOT COLI MFIMENDO /100ML	31616 FEC COLI MFM-FCBR /100ML	31679 FECSTREP MF M-ENT /100ML	FEC.COLI. / FEC.STREP.
76/07/22			14.0		8.5	0.3	3.5K	7.80	7.2				
76/08/17			19.0	10J	9.2		11.9	8.40		320	230	190	1.2
76/08/19			15.0	10	9.1		5.4	8.00		550	410	200	1.5
76/09/09			10.2		10.2	2.3	9.4	7.80	8.1	350	72	300	.24
76/10/21	10	30 0001	4.0	15J	10.2	1.7	20.0	7.50	6.8	30000	1500	120	12.5
76/11/09	10	15	9.0	35	9.5	0.4	6.4	7.80					
76/12/16	11	30	1.0-	10J	14.0	2.6	22.8	7.60	7.8	100	42	150	128
77/01/25	14	30	2.0	8J	13.5	1.3	18.9	7.70	8.4	80	2K	62	.03
77/04/10			5.0		12.9	2.1	11.5	8.00	8.1	2800	50	94	.53
77/03/18			6.0		12.1	1.0	6.0	8.20	8.0	48	8	86	.09
77/04/13	11	00	8.5		11.1	1.3	25.0	7.60	7.9	220	4	82	.01
77/05/19	14	30	7.0		10.4	1.3	2.0	7.90	8.2	250	160	340	.47
77/06/08	11	50	10.0		8.8	1.7	8.0	7.50	8.1	2800	210	570	.36
77/07/06	12	30	15.0		9.2	2.6	12.5	8.30	8.3	200	70	300	.23
77/08/10	12	00	22.0		9.3	2.5	7.7	8.30	8.4	40000		2000	

.4 Median

DATE FROM TO	TIME OF DAY	DEPTH FEET	00610 PHOS-T TOTAL MG/L	00615 NO2-N TOTAL MG/L	00620 NO3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	70507 PHOS-T DISSOLVED MG/L P	00669 PHOS-TOT HYDRO MG/L P	00680 T ORG C MG/L	00170 TURB JTU
76/07/22			0.023	0.002	0.167		0.100	0.070	0.032			2.9
76/08/17			0.031	0.005	0.124		1.700	0.110	0.029			3.5
76/08/19			0.039	0.005	0.205		0.400	0.060	0.042			2.2
76/09/09			0.010	0.011	0.200		0.900	0.090	0.010		2.5	4.2
76/10/21	10	30 0001	0.025	0.002	0.009		1.100	0.300				4.5
76/11/09	10	15	0.020	0.004	0.020		0.100	0.020	0.027			2.2
76/12/16	11	30	0.020	0.004	0.100		0.700	0.230	0.017			3.0
77/01/25	14	30	0.040	0.006	0.186		1.300	0.060	0.032		0.9	3.9
77/04/10			0.025	0.002	0.140		1.000	0.010K	0.016		1.9	7.4
77/03/18			0.020	0.005	0.320		1.100	0.080	0.027		2.0	6.2
77/04/13	11	00	0.100	0.028	0.260		1.400	0.620	0.160		12.6	140.0
77/05/19	14	30	0.010	0.002	0.050		0.600	0.060	0.026		2.6	4.3
77/06/08	11	50	0.024	0.004	0.290		1.100	0.100	0.030	0.040	3.3	4.2
77/07/06	12	30	0.030	0.004	0.210		0.450	0.050	0.007	0.050	3.5	4.5
77/08/10	12	00	0.120	0.009	0.240		0.700	0.060	0.002	0.040	3.0	7.9

STREET RETRIEVAL DATE 79/02/05

20 0074
42 25 36.0 114 17 44.0
LOWER ROCK CR. COUNTY RD. BRIDGE
16083 IDAHO
PACIFIC NORTHWEST 130604
UPPER SNAKE RIVER BASIN
211DSUEV 760923
0003 FEET DEPTH CLASS 00

/TYPE//AMOUNT/STELAN

DATE TIME	TIME DEPTH	00095 CNDCTVY AT 25C	00530 RESIDUE TOT NFLT	70300 RESIDUE DISS-180 C MG/L	00500 RESIDUE TOTAL MG/L	00505 RESIDUE TOT VOL MG/L	00410 T ALK CACO3 MG/L	00425 HCO3 ALK CACO3 MG/L	00450 CO3 ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00929 SODIUM DA,TOT MG/L
76/07/22		178	7		142		84	84	4K		
76/08/17		212	16		189	140	100	100	4K		
76/08/19		230	31		181	63	148	148	4K		
76/09/09		251	22		218		126	126	4K		
76/10/21	10 30 0001	237	5		223		101			108	
76/11/09	10 55	214	11		148	24	102				
76/12/16	11 30	185	7		168		96			92	5.60
77/01/25	14 20	197	16		155		91			90	5.10
77/04/16		195	33		167		87			84	5.90
77/03/16		208	20		156		18			88	6.10
77/04/13	11 00	136	260		368		54			52	4.00
77/05/18	14 30	205	9		207		89			88	6.90
77/06/08	11 40	242	7		176		90			90	7.80
77/07/06	12 30	231	22		190		62			88	10.00
77/08/10	12 00	276	2		213		108			94	14.70

DATE TIME	TIME DEPTH	00937 PTSSIUM A,TOT MG/L	00940 CHLORIDE CL MG/L	01027 CADMIUM CD,TOT UG/L	01042 COPPER CU,TOT UG/L	01051 LEAD PB,TOT UG/L	01092 ZINC ZN,TOT UG/L	71900 MERCURY HG,TOTAL UG/L	00042 ALTITUDE FEET AP MSL
76/07/22			4						
76/08/17			5	1K	10K	10K	1K	5.0K	
76/08/19			6	1K	10K	10K	16	5.0K	
76/09/09			6						
76/10/21	10 30 0001		6						
76/11/09	10 55		4	1K	10K	10K	12	5.0K	
76/12/16	11 30	3.10	5						
77/01/25	14 30	2.80	6						
77/02/16		2.80	6						
77/03/16		4.00	5						
77/04/13	11 00	3.60	4						
77/05/18	14 30	3.90	5						
77/06/08	11 40	4.30	5						
77/07/06	12 30	5.45	7						
77/08/10	12 00	6.20	12						

STORET DATE 79/02/05

2040074
42 25 36.0 114 17 44.0 5
LOWER ROCK CR. COUNTY RD. BRIDGE
16083 IDAHO
PACIFIC NORTHWEST 130105
UPPER SNAKE RIVER BASIN
211DSURV 760523
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1316001 002740 00740
FILES 0324.20 0606.80 025.60

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	15	10.7133	46.7612	6.83822	.638250	1.76562	22.0000	-.100E+01	76/07/22	77/08/10
00061	STREAM	FLOW,	INST-CFS	6	14.6667	104.667	10.2307	.697546	4.17666	35.0000	8.00000	76/08/17	77/01/25
00070	TURB	JKSN	JTU	15	13.3667	1230.10	35.0728	2.62390	9.05577	140.000	2.20000	76/07/22	77/08/10
00095	CNDUCTVY	AT 25C	MICROMHO	15	213.533	1171.13	33.4833	.156806	8.64534	276.000	138.000	76/07/22	77/08/10
00300	DO		MG/L	15	10.6667	4.31243	2.07664	.194685	.536186	15.5000	8.50000	76/07/22	77/08/10
00310	FOC	5 DAY	MG/L	13	1.62307	.620263	.787568	.485232	.218432	2.80000	.300000	76/07/22	77/08/10
00335	COD	LOW LEVEL	MG/L	15	11.4000	51.1986	7.15532	.627660	1.84749	25.0000	2.00000	76/07/22	77/08/10
00400	PH		SU	15	7.89333	.009251	.298749	.037846	.077137	8.40000	7.50000	76/07/22	77/08/10
00403	LAB	FR	SU	12	7.94166	.233620	.483343	.060862	.139529	8.40000	6.80000	76/07/22	77/08/10
00410	T ALK	CACO3	MG/L	15	100.200	829.886	28.8078	.287503	7.43814	188.000	54.0000	76/07/22	77/08/10
00427	HCO3 ALK	CACO3	MG/L	4	124.500	2091.67	45.7347	.367347	22.8674	188.000	84.0000	76/07/22	76/09/09
00430	CO3 ALK	CACO3	MG/L	4	4.00000	.000000	.000000		.000000	4.00000	4.00000	76/07/22	76/09/09
00900	RESIDUE	TOTAL	MG/L	15	193.533	2985.41	54.6389	.282323	14.1077	368.000	142.000	76/07/22	77/08/10
00905	RESIDUE	TOT VOL	MG/L	3	75.6667	3484.34	59.0283	.780105	34.0800	140.000	24.0000	76/08/17	76/11/09
00920	RESIDUE	TOT MFLT	MG/L	15	32.6667	4769.23	69.0596	2.11407	17.8311	280.000	2.00000	76/07/22	77/08/10
00610	NH3-N	TOTAL	MG/L	15	.029144	.000457	.021379	.733555	.005520	.100000	.010000	76/07/22	77/08/10
00615	NO2-N	TOTAL	MG/L	15	.006190	.000043	.006548	1.05775	.001691	.028000	.002000	76/07/22	77/08/10
00620	NO3-N	TOTAL	MG/L	15	.166546	.008314	.091182	.547491	.023543	.320000	.009000	76/07/22	77/08/10
00625	TOT KJEL	N	MG/L	15	.843333	.216738	.465551	.552037	.120205	1.70000	.100000	76/07/22	77/08/10
00665	PHOS-TOT		MG/L P	15	.128000	.024317	.155940	1.21828	.040263	.620000	.010000	76/07/22	77/08/10
00669	PHOS-TOT	HYDRO	MG/L P	3	.056667	.000433	.020817	.367355	.012019	.080000	.040000	77/06/08	77/08/10
00680	T ORG C	C	MG/L	9	3.58889	12.0511	3.47147	.967285	1.15716	12.6000	.900000	76/09/09	77/08/10
00900	TOT HARD	CACO3	MG/L	10	87.4000	196.493	14.0176	.160384	4.43275	108.000	52.0000	76/10/21	77/08/10
00929	SODIUM	NA,TOT	MG/L	9	7.34444	10.5578	3.24928	.442414	1.08309	14.7000	4.00000	76/12/16	77/08/10
00937	POTASSIUM	K,TOT	MG/L	9	4.02111	1.85560	1.36228	.338782	.454093	6.80000	2.80000	76/12/16	77/08/10
00940	CHLORIDE	CL	MG/L	15	5.74000	3.77115	1.94194	.338318	.501408	12.0000	4.00000	76/07/22	77/08/10
01027	CADMIUM	CD,TOT	UG/L	3	5.00000	.000000	.000000		.000000	5.00000	5.00000	76/08/17	76/11/09
01042	COPPER	CU,TOT	UG/L	3	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/08/17	76/11/09
01051	LEAD	PB,TOT	UG/L	3	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/08/17	76/11/09
01092	ZINC	ZN,TOT	UG/L	3	10.0000	63.0000	7.93725	.793725	4.58257	16.0000	1.00000	76/08/17	76/11/09
31501	TOT COLI	MFILENID	/100ML	13	5901.38	.170E+09	13074.5	2.18586	3626.20	40000.0	48.0000	76/08/17	77/08/10
31616	FEC COLI	MIN-FCFR	/100ML	12	229.833	174659	417.922	1.81837	120.644	1500.00	2.00000	76/08/17	77/07/06
31679	FECSTREP	MF ENT-EIT	/100ML	13	396.461	458712	677.282	1.70832	187.844	2600.00	62.0000	76/08/17	77/08/10
70507	PHOS-T	ORTHO	MG/L P	14	.033166	.001467	.038303	1.15489	.010237	.160000	.002000	76/07/22	77/08/10
71900	MERCURY	HG,TOTAL	UG/L	3	5.00000	.000000	.000000		.000000	5.00000	5.00000	76/08/17	76/11/09

STORET RETRIEVAL DATE 79/02/09

2040094
42 19 30.0 114 16 30.0 5
FOREST SERVICE FOCEPAFY
16031 IDAHO
PACIFIC NORTHWEST 130609
UPPER SNAKE RIVER BASIN
211DSUKV 761104
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE TIME ID	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00061 STREAM FLOW, INST-CFS	00300 DO MG/L	00310 BOD 5 DAY MG/L	00335 COD LOW LEVEL MG/L	00400 PH SU	00403 LAB PH SU	31501 TOT COLI MPN,MMO /100ML	31616 FEC COLI MEM-FCBR /100ML	31679 FEC STREP MF M-ENT /100ML
76/06/17			15.0	10J	8.1		9.0	8.20		310	92	46
76/09/09			7.0		10.4	1.9	24.5	7.70	7.2	120	12	60
76/10/21	10	00 0001	4.0	15J	9.7	1.7	24.8	7.40	7.0	44	14	2M
76/11/09	10	40	7.0	25	9.5	1.3		7.60				
76/12/16	12	00	0.0	10	13.0	2.3	19.3	7.70	8.0	26	2	2
77/01/25	12	00	0.0			1.7	10.0	7.80	8.1	14	2M	8
77/02/16			5.0		11.0	1.3	7.2	7.60	8.1	54	2	2
77/03/16	13	00	6.0		9.9	1.5	9.7	8.10	8.1	94	4	2M
77/04/13	10	30	5.0		13.0	1.1	26.0	7.60	8.0	66	2K	10
77/05/19	12	00	6.0		10.2	1.8	2.4	7.60	7.8	82	100	40
77/06/08			10.0		8.7	1.1	20.0	7.60	8.1	150	20	90
77/07/06	12	00	14.0		9.2	0.8	13.2	8.00	8.3	88	6B	370
77/08/10	11	45	16.0		8.6	1.0	3.0	8.00	8.4	660		210

DATE TIME ID	TIME OF DAY	DEPTH FEET	00615 NO3-N TOTAL MG/L	00625 NO2-N TOTAL MG/L	00620 NO3-N TOTAL MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	70507 PHOS-T ORTHO HYDRO MG/L P	00669 PHOS-TOT MG/L P	00680 T ORG C MG/L	00070 TURB JTSN JTU
76/06/17			0.016	0.001	0.045		0.500	0.050	0.026			3.9
76/09/09			0.004	0.003	0.090		0.400	0.070	0.03M		0.9	3.5
76/10/21	10	00 0001	0.016	0.004	0.009		0.700	0.060				2.3
76/11/09	10	40	0.010	0.003	0.010		0.200	0.010				1.2
76/12/16	12	00	0.020	0.001K	0.170		0.800	0.020	0.019			1.5
77/01/25	12	00	0.020	0.003	0.170		1.000	0.090	0.048		1.5	5.0
77/02/16			0.017	0.002	0.140		1.100	0.010	0.021		1.1	3.5
77/03/16	13	00	0.010	0.002	0.110		0.840	0.050	0.027		1.5	3.3
77/04/13	10	30	0.020	0.007	0.320		0.970	0.330	0.060		6.4	5.0
77/05/19	12	00	0.010	0.001	0.090		0.600	0.040	0.044		2.4	4.7
77/06/08			0.013	0.002	0.220		0.700	0.090	0.023	0.060	2.8	5.0
77/07/06	12	00	0.010	0.001	0.090		0.500	0.040	0.023	0.040	2.3	3.0
77/08/10	11	45	0.010	0.001	0.050		0.100	0.070	0.073	0.040	2.3	4.1

STREET RETRIEVAL DATE 79/02/09

2040094
42 19 30.0 114 16 30.0 6
FOREST SERVICE BOUNDARY
16031 IDAHO
PACIFIC NORTHWEST 130609
UPPER SNAKE RIVER BASIN
211DSUFV 701104
0000 FEET DEPTH CLASS 00

/TYPE/AMBNT/STREAM

DATE FROM TO	TIME	DEPTH	00095 CNDUCTVY AT 25°C	00530 RESIDUE TOT NFLT	70300 RESIDUE DISS-180 C	00500 RESIDUE TOTAL	00505 RESIDUE TOT VOL	00410 T ALK	00425 PCO3 ALK	00430 CO3 ALK	00900 TOT HARD	00929 SODIUM
ID	DAY	FEET	MICROMHO	MG/L	MG/L	MG/L	MG/L	CACO3 MG/L	CACO3 MG/L	CACO3 MG/L	CACO3 MG/L	NA,TOT MG/L
76/08/17			187	20		175	36	92	92	4K		
76/09/09			193	2		185		100	98	4K		
76/10/21	16 00	0001	196	1		175		96				
76/11/09	10 40		206	8		137	20	96				
77/01/16	14 00		166	2		128		56			94	3.60
77/01/25	15 00		187	16		154		69			88	3.30
77/02/16			195	55		121		86			88	4.20
77/03/16	15 00		208	13		134		85			96	4.10
77/04/13	10 30		147	166		257		56			48	3.40
77/05/16	12 00		151			169		78			66	4.20
77/06/08			158	18		168		64			62	4.10
77/07/06	12 00		166	27		155		80			76	4.80
77/08/10	11 45		222	5		197		102			90	4.70

DATE FROM TO	TIME	DEPTH	00937 PTSSIUM E,TOT	00940 CHLORIDE CL	01027 CADMIUM CD,TOT	01042 COPPER CU,TOT	01051 LEAD PB,TOT	01092 ZINC ZN,TOT	71900 MERCURY HG,TOTAL	00042 ALTITUDE
ID	DAY	FEET	MG/L	MG/L	UG/L	UG/L	UG/L	UG/L	UG/L	FEET AB MSL
01/01/01										4550
76/08/17				3	5K	10K	10K	4	5.0K	
76/09/09				2						
76/10/21	16 00	0001		5						
76/11/09	10 40			6	1K	10K	10K	100	5.0K	
77/01/16	14 00		2.40	4						
77/01/25	15 00		2.70	5						
77/02/16			2.10	3						
77/03/16	15 00		2.90	4						
77/04/13	10 30		2.60	5						
77/05/18	12 00		2.40	7						
77/06/08			2.80	2						
77/07/06	12 00		3.13	4						
77/08/10	11 45		3.40	6						

STORET DATE 79/02/05

2040094
42 19 30.0 114 16 30.0 5
FOREST SERVICE BOUNDARY
16031 IDAHO
PACIFIC NORTHWEST 130605
UPPER SNAKE RIVER BASIN
211DSURV 761104
0000 CLASS 00

/TYPA/AMBNT/STREAM

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010 WATER	TEMP	CENT		12	7.76923	32.0257	5.65917	.728402	1.63356	16.0000	.000000	76/08/17	77/08/10
00042 ALTITUDE	FEET	AB MSL		1	4550.00					4550.00	4550.00	01/01/01	01/01/01
00061 STREAM	FLOW,	INST-CFS		4	15.0000	50.0000	7.07107	.471404	3.53553	25.0000	10.0000	76/08/17	76/12/16
00070 TURB	JKSN	JTU		13	3.04615	1.85439	1.36176	.373479	.377684	5.60000	1.20000	76/08/17	77/08/10
00095 CNDUCTVY	AT 25C	MICROMHO		13	184.154	531.818	23.0612	.125228	6.39602	222.000	147.000	76/08/17	77/08/10
00300 DO		MG/L		12	10.2333	2.44243	1.56283	.152715	.451149	13.0000	8.60000	76/08/17	77/08/10
00310 BOD	5 DAY	MG/L		12	1.45833	.189923	.435802	.298836	.125805	2.30000	.800000	76/09/09	77/08/10
00340 COL	COLLEVEL	MG/L		12	13.5933	62.4078	7.89986	.581157	2.28049	24.8000	2.40000	76/08/17	77/08/10
00400 PH		SU		13	7.77692	.055278	.235112	.030232	.065208	8.20000	7.40000	76/08/17	77/08/10
00403 LAB	PH	SU		11	8.00909	.136987	.370118	.046212	.111595	8.40000	7.00000	76/09/09	77/08/10
00410 T ALK	CACO3	MG/L		13	85.2308	248.192	15.7543	.184843	4.36946	102.000	50.0000	76/08/17	77/08/10
00425 PCB/TIK	CACO3	MG/L		2	95.0000	18.0000	4.24264	.044659	3.00000	98.0000	92.0000	76/08/17	76/09/09
00430 CB3/TIK	CACO3	MG/L		2	4.00000	.000000	.000000		.000000	4.00000	4.00000	76/08/17	76/09/09
00500 RESIDUE	TOTAL	MG/L		13	168.923	1070.42	32.7172	.193689	9.07412	257.000	131.000	76/08/17	77/08/10
00505 RESIDUE	TOT VOL	MG/L		2	28.0000	128.000	11.3137	.404061	8.00000	36.0000	20.0000	76/08/17	76/11/09
00530 RESIDUE	TOT NFLT	MG/L		12	27.7500	2119.66	46.0397	1.65909	13.2905	166.000	1.00000	76/08/17	77/08/10
00610 NH3-N	TOTAL	MG/L		13	.013946	.000020	.004488	.321727	.001245	.020000	.008000	76/08/17	77/08/10
00615 NO2-N	TOTAL	MG/L		13	.002385	.000003	.001710	.716972	.000474	.007000	.001000	76/08/17	77/08/10
00620 NO3-N	TOTAL	MG/L		13	.110461	.007749	.088027	.796844	.024414	.320000	.009000	76/08/17	77/08/10
00625 TOT KJEL	N	MG/L		13	.731538	.064964	.254881	.348418	.070691	1.10000	.200000	76/08/17	77/08/10
00665 PHOS-TOT		MG/L P		13	.091538	.007897	.088868	.970824	.024647	.330000	.010000	76/08/17	77/08/10
00669 PHOS-TOT	DYLAD	MG/L P		3	.046667	.000133	.011547	.247440	.006667	.060000	.040000	77/06/01	77/06/10
00680 T ORG C	C	MG/L		9	2.35555	2.71530	1.64782	.699545	.549272	6.40000	.900000	76/09/09	77/08/10
00900 TOT HARD	CACO3	MG/L		9	79.5555	307.782	17.5437	.220522	5.84790	98.0000	48.0000	76/12/16	77/08/10
00929 SODIUM	NA,TOT	MG/L		9	4.04444	.277807	.527074	.130321	.175691	4.80000	3.30000	76/12/16	77/08/10
00937 POTSSIUM	K,TOT	MG/L		9	2.71444	.159142	.398925	.146964	.132975	3.40000	2.10000	76/12/16	77/08/10
00940 CHLORIDE	CL	MG/L		13	4.27692	2.35525	1.53460	.358829	.425644	7.00000	2.00000	76/08/17	77/08/10
01027 CADMIUM	CD,TOT	UG/L		2	5.00000	.000000	.000000		.000000	5.00000	5.00000	76/08/17	76/11/09
01042 COPPER	CU,TOT	UG/L		2	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/08/17	76/11/09
01051 LEAD	PB,TOT	UG/L		2	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/08/17	76/11/09
01092 ZINC	ZN,TOT	UG/L		2	67.0000	2178.00	46.6690	.696553	33.0000	100.000	34.0000	76/08/17	76/11/09
31501 TOT COLI	MFIENDO	/100ML		12	136.167	33934.9	184.214	1.35286	53.1781	660.000	8.00000	76/08/17	77/08/10
31616 FEC COLI	MFM-FCIF	/100ML		11	23.2727	1331.42	36.4886	1.56787	11.0017	100.000	2.00000	76/08/17	77/07/06
31679 FIGSTREP	MF M-ENT	/100ML		12	70.8333	12492.0	111.767	1.57789	32.2645	370.000	2.00000	76/08/17	77/08/10
70507 PHOS-T	ORTHO	MG/L P		11	.031818	.000179	.013393	.420915	.004038	.060000	.019000	76/08/17	77/08/10
71900 MERCURY	HG,TOT/L	UG/L		2	5.00000	.000000	.000000		.000000	5.00000	5.00000	76/08/17	76/11/09

APPENDIX B

FIGURES

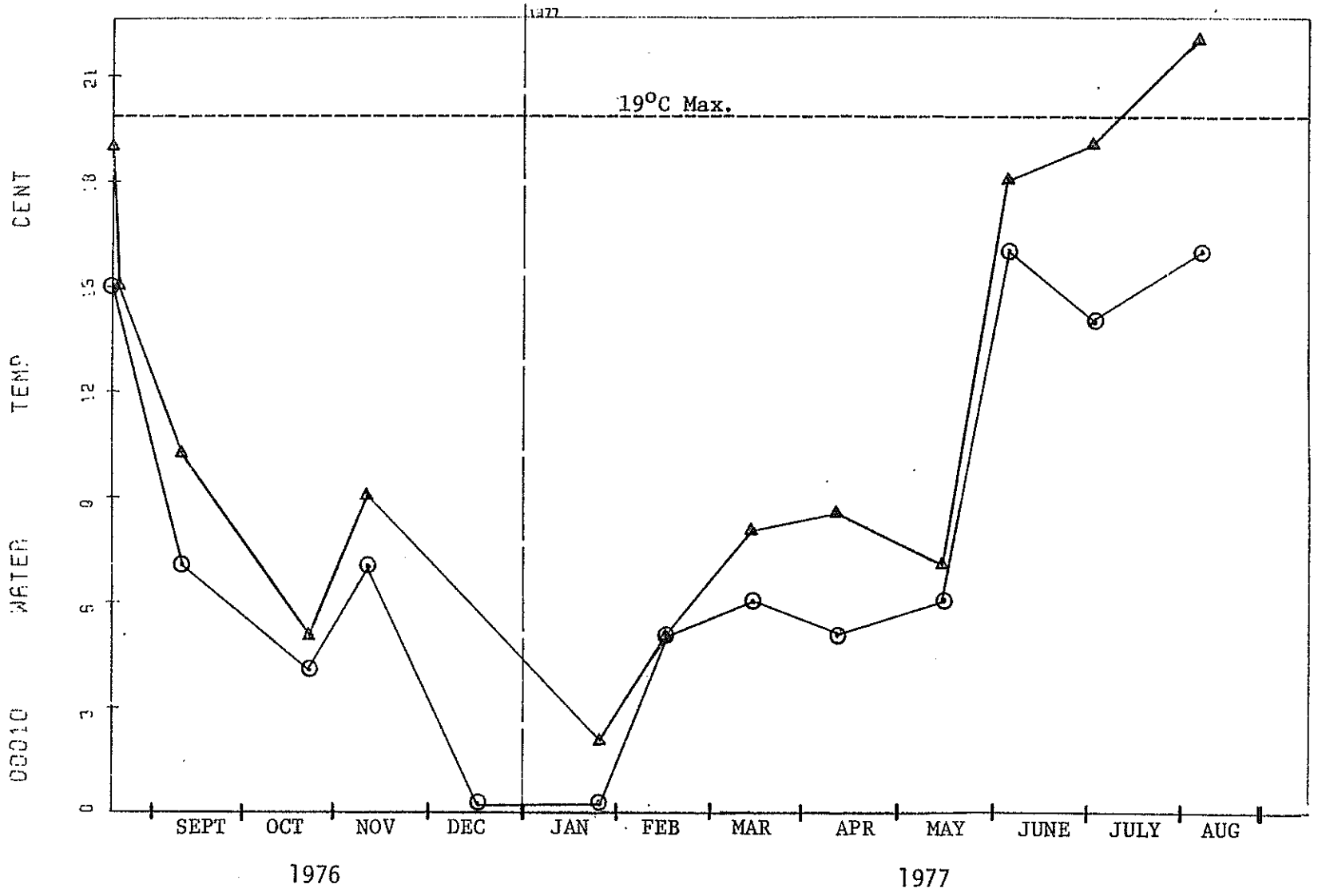

FIGURE 2: Temperature, C°, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

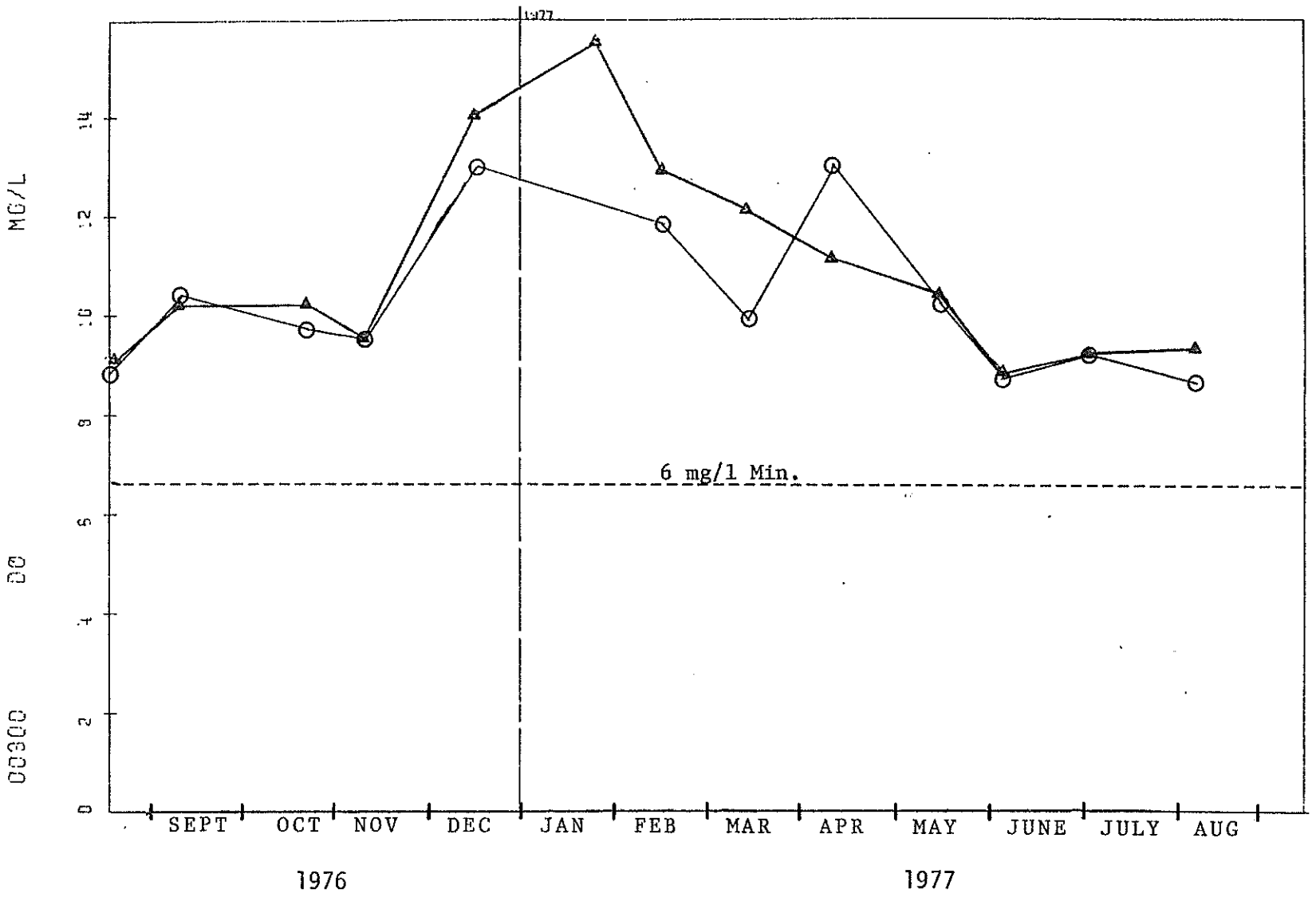

FIGURE 3: Dissolved Oxygen, mg/l, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

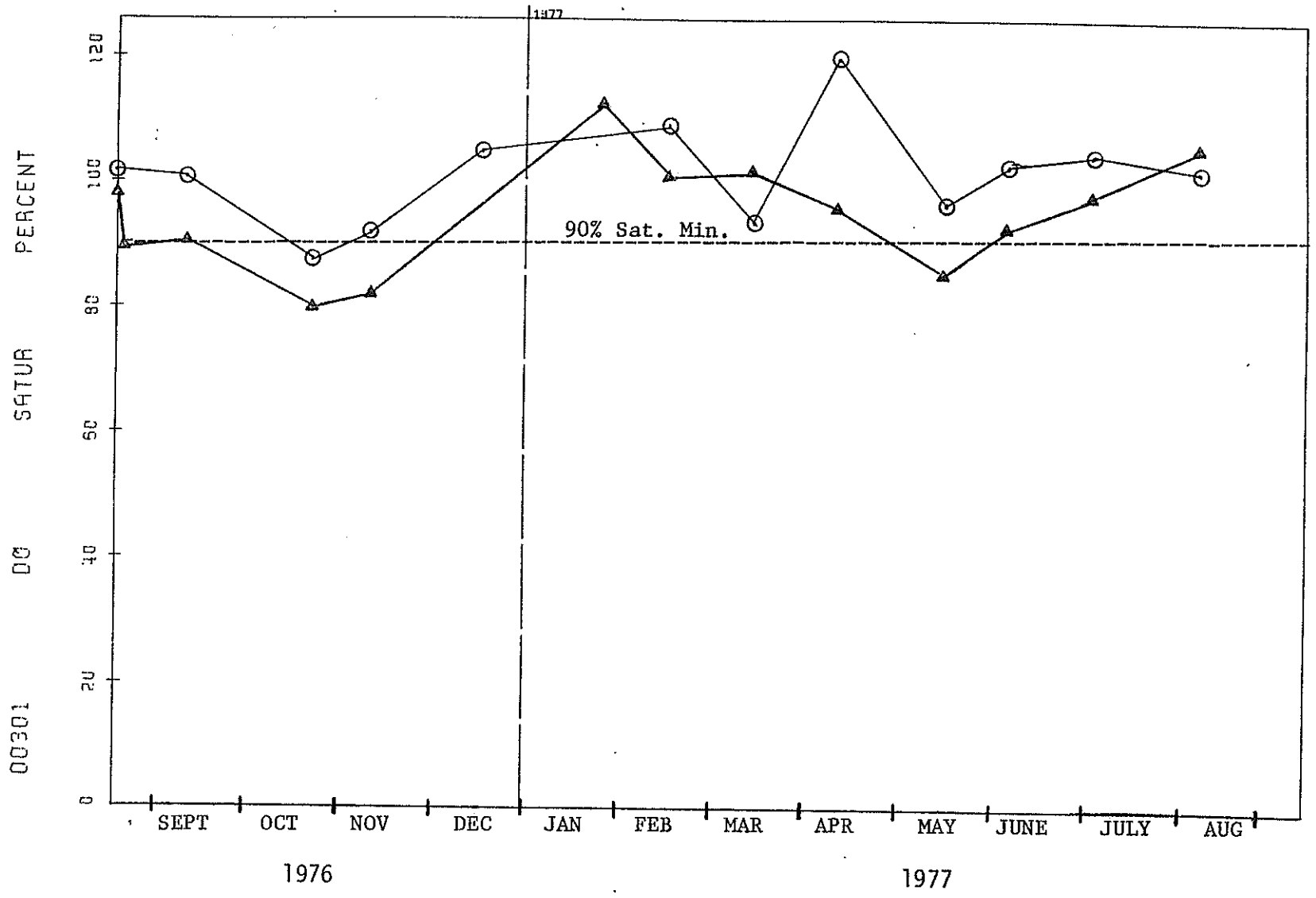

FIGURE 4: Dissolved Oxygen, percent saturation, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

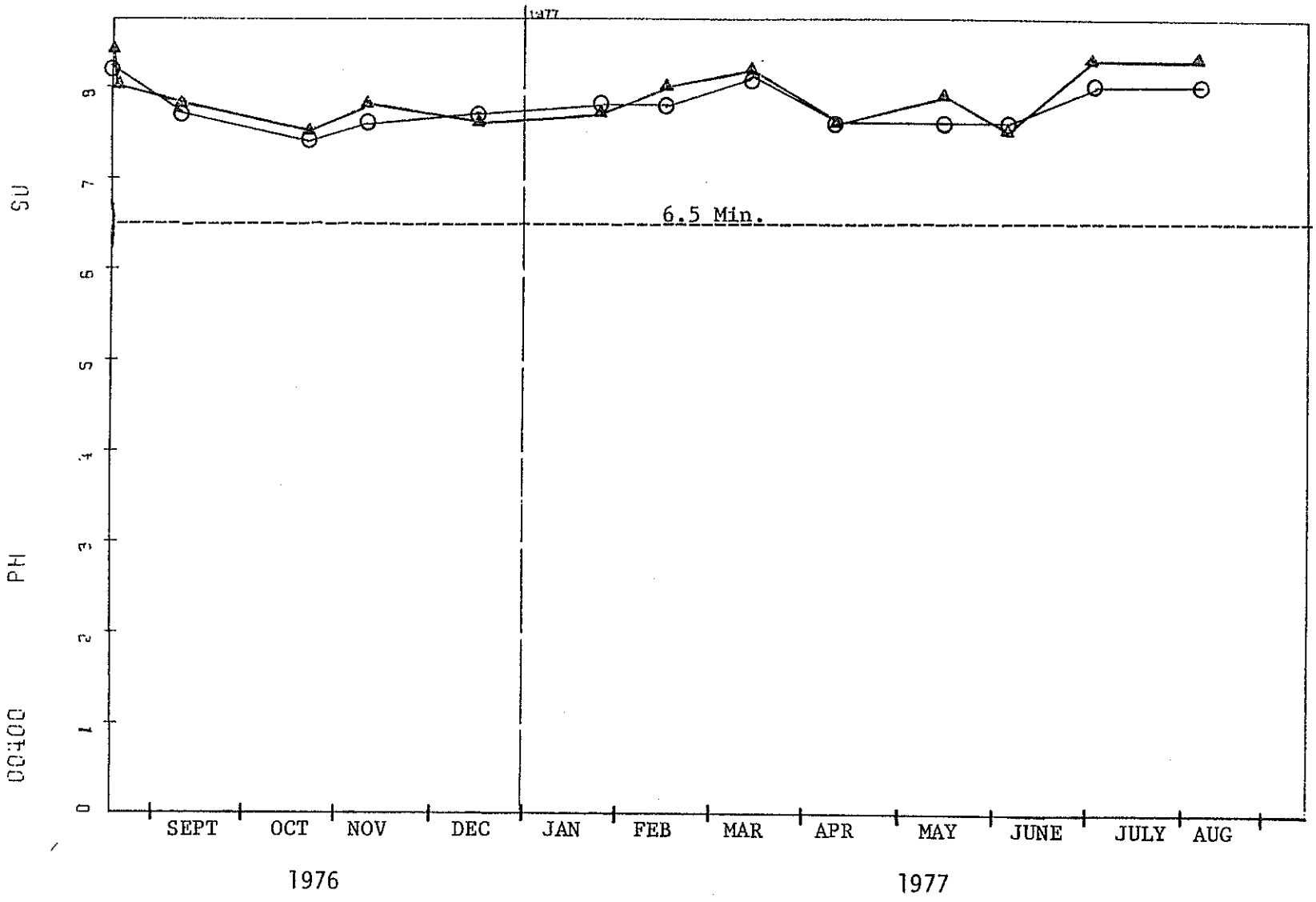

FIGURE 5: pH, standard units, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3

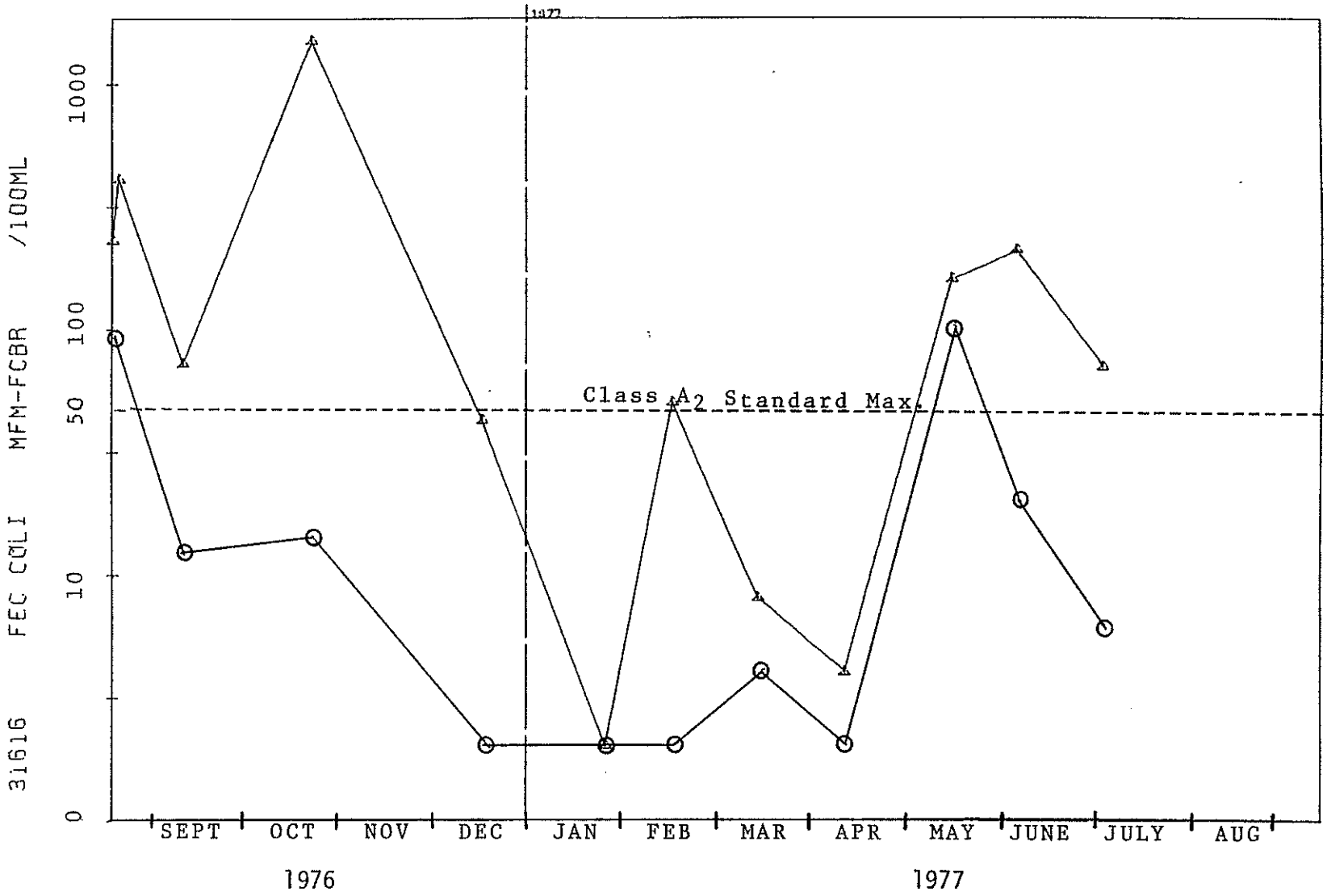

FIGURE 6: Fecal Coliform Bacteria, per 100 ml, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

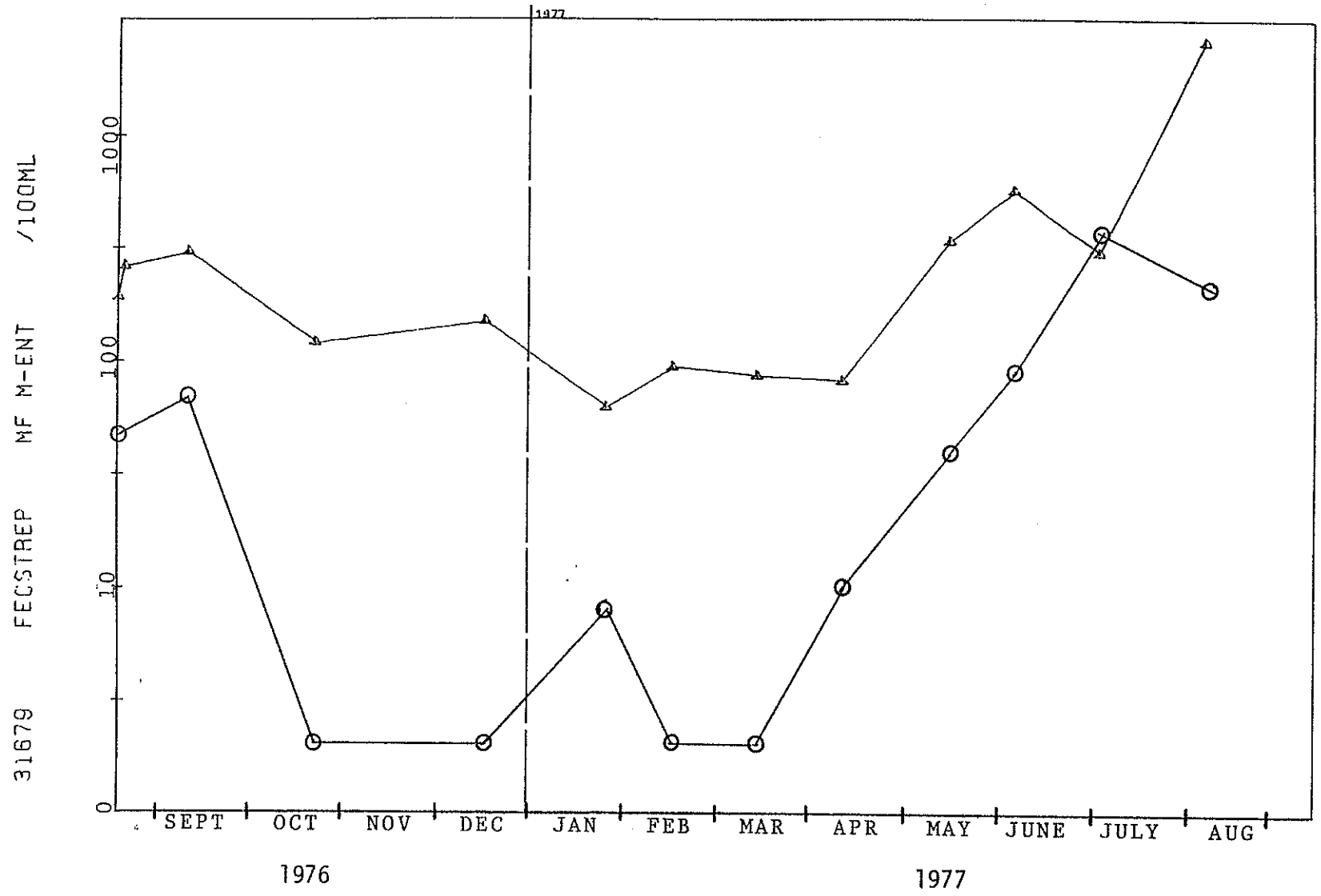

FIGURE 7: Fecal Streptococcus Bacteria, per 100 ml, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

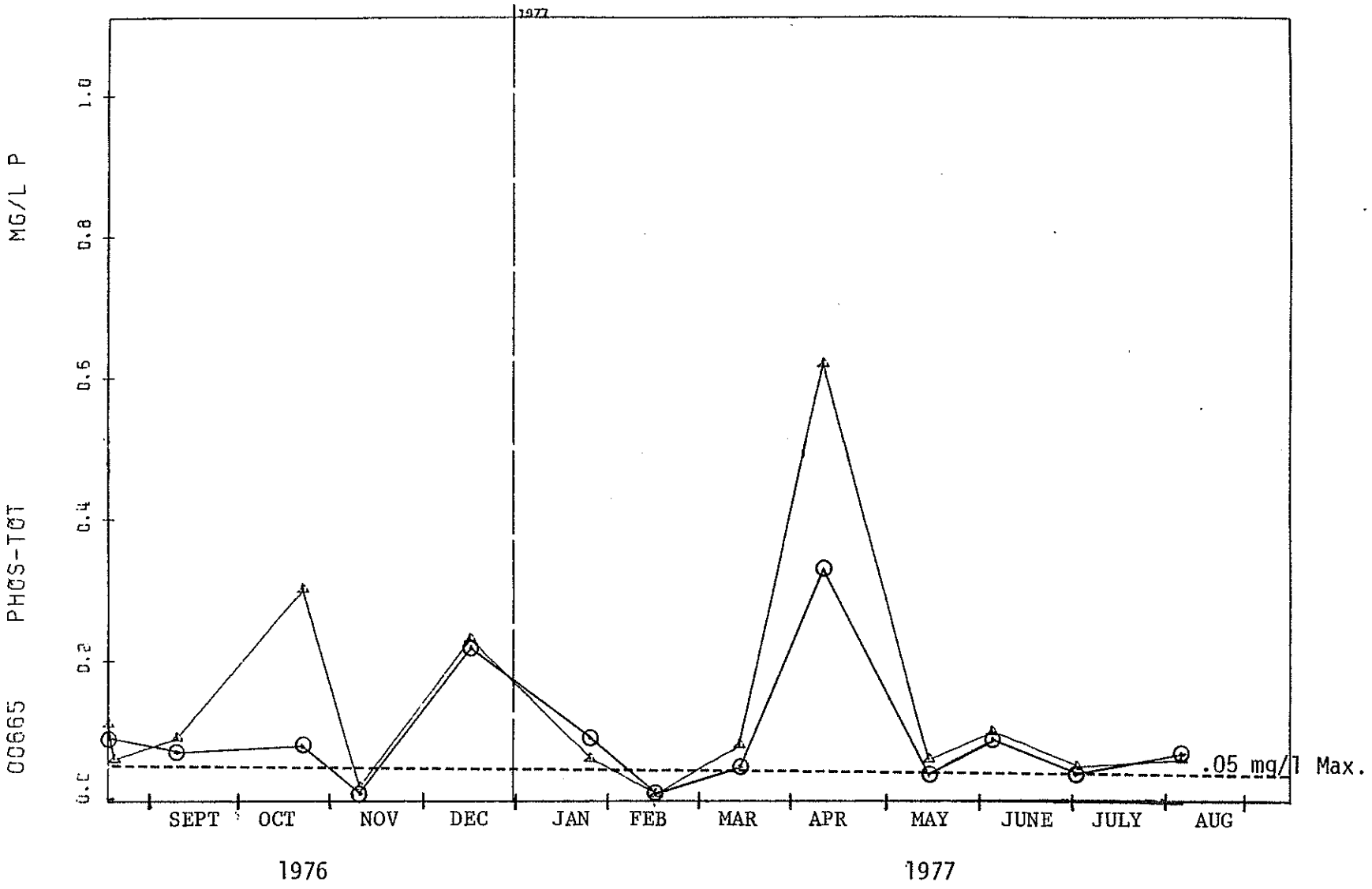

FIGURE 8: Total Phosphorus, mg/l, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

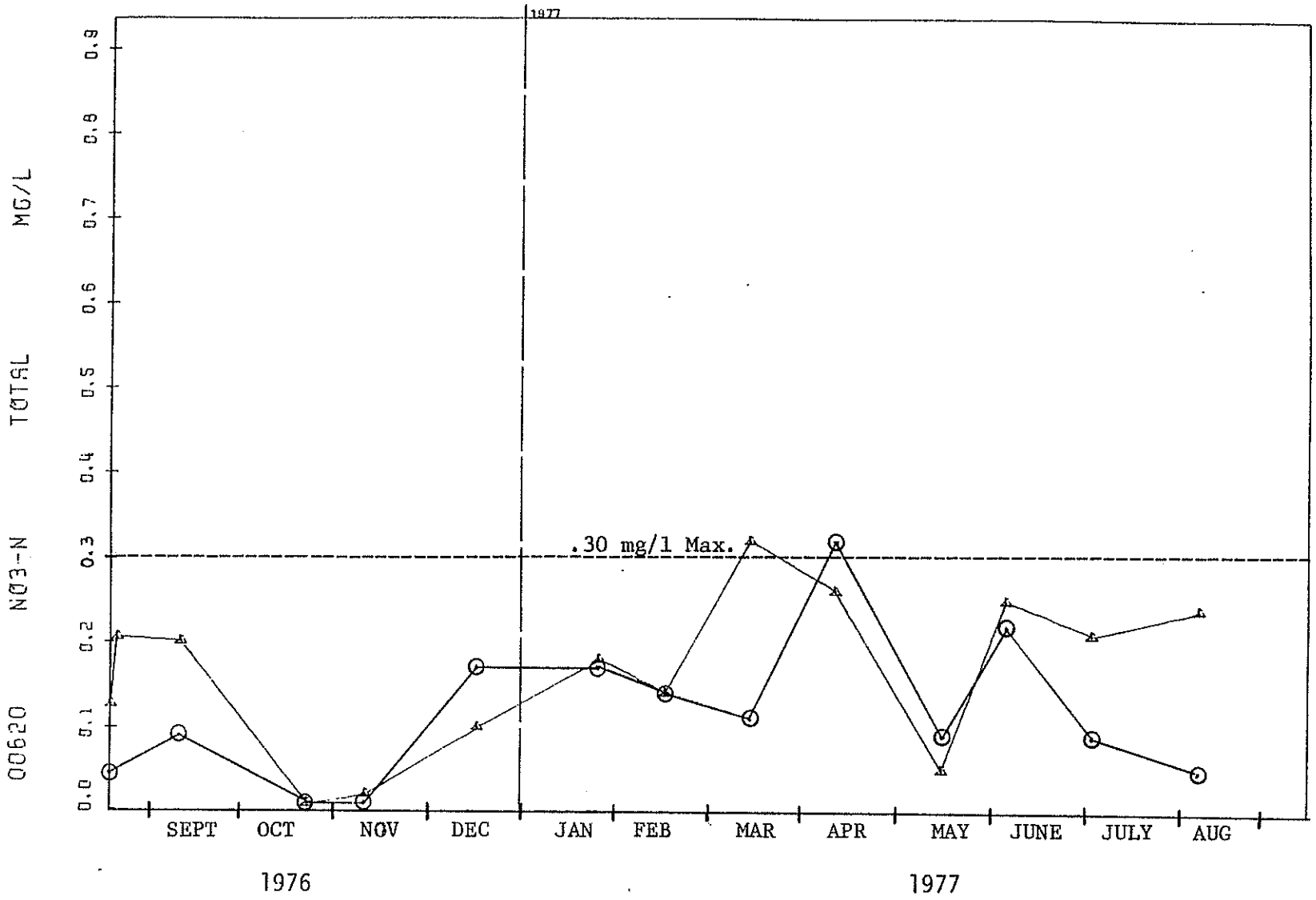

FIGURE 9: Total Nitrate-Nitrogen, mg/l, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

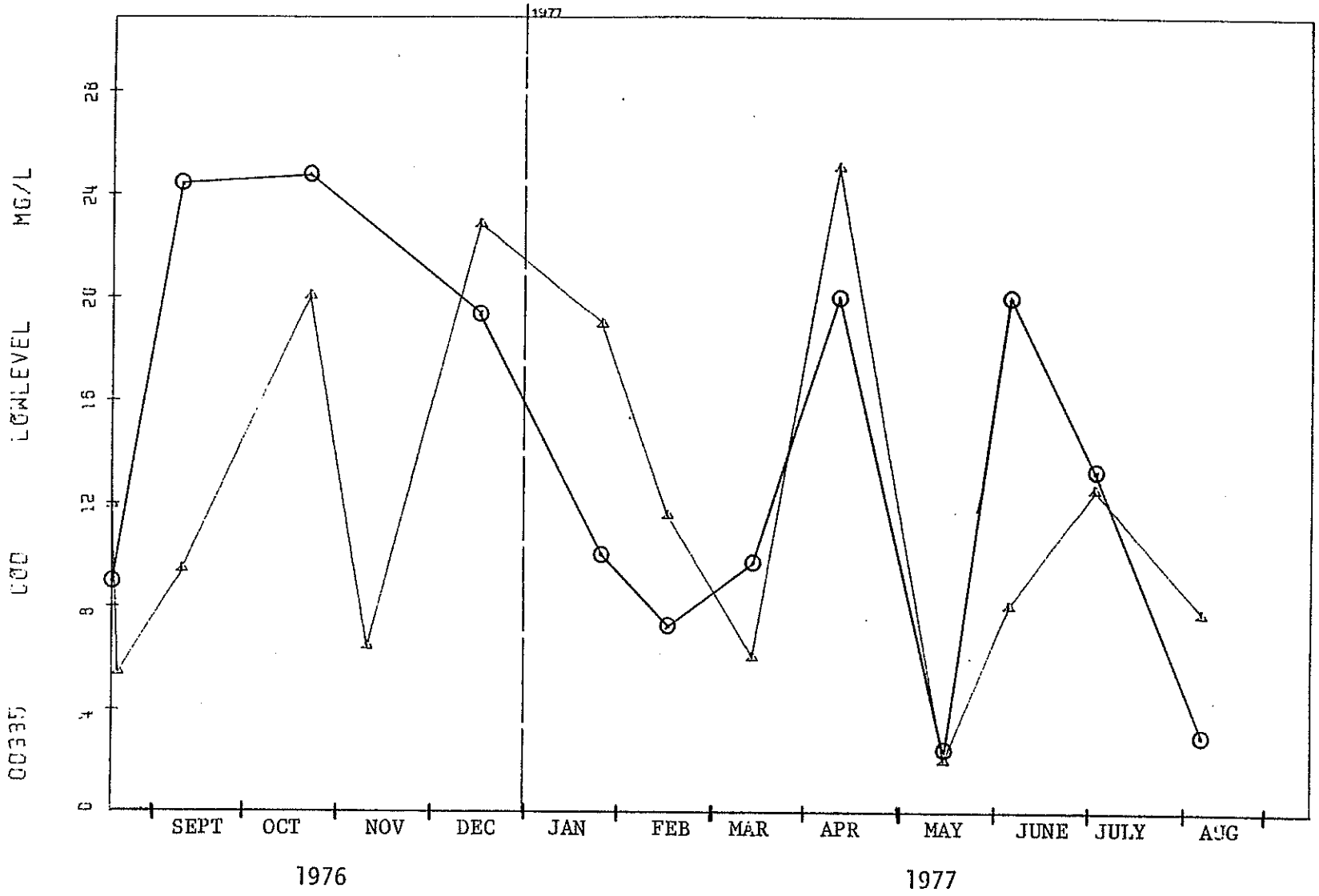

FIGURE 10: Chemical Oxygen Demand, mg/l, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

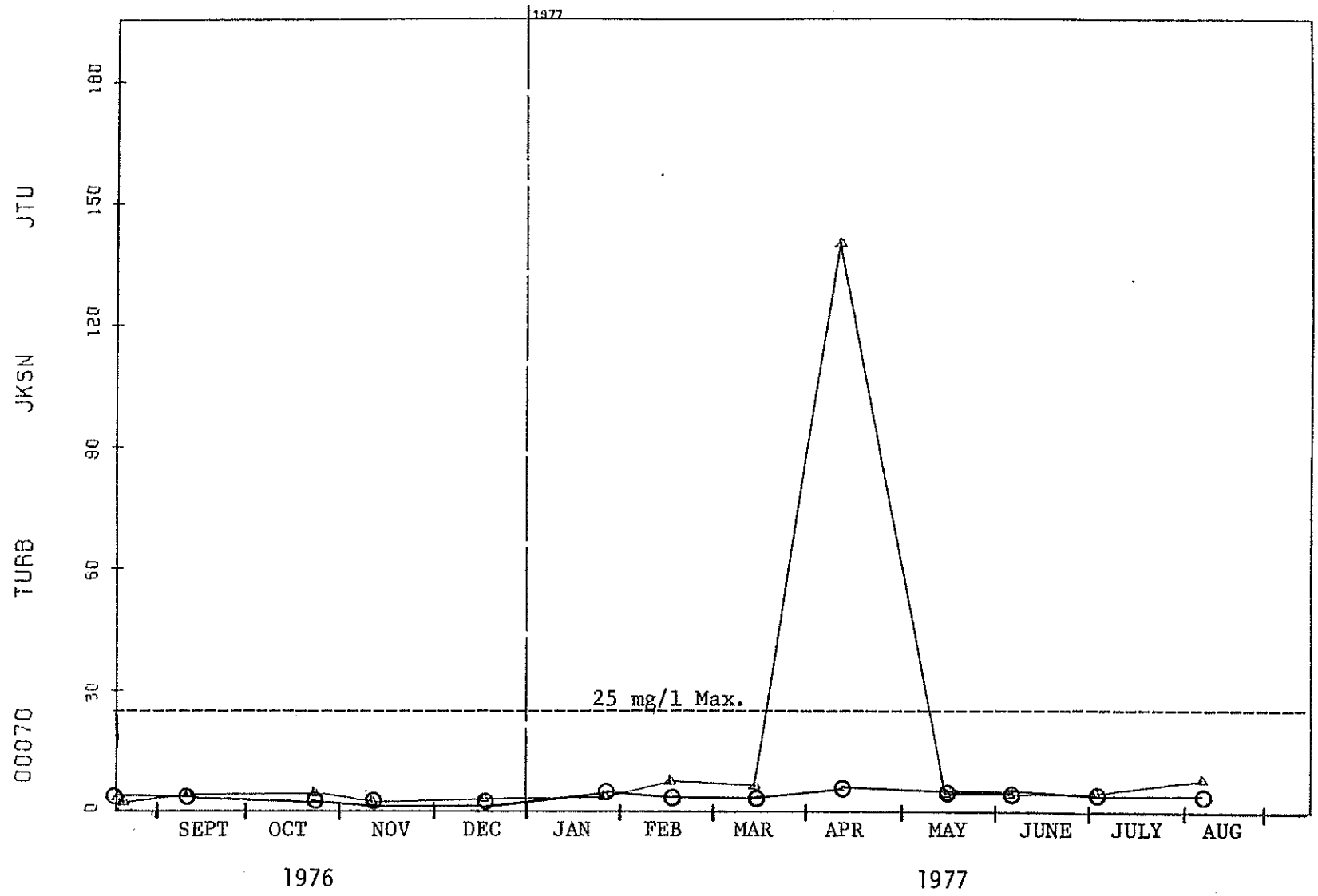

FIGURE 11: Turbidity, JTU's, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

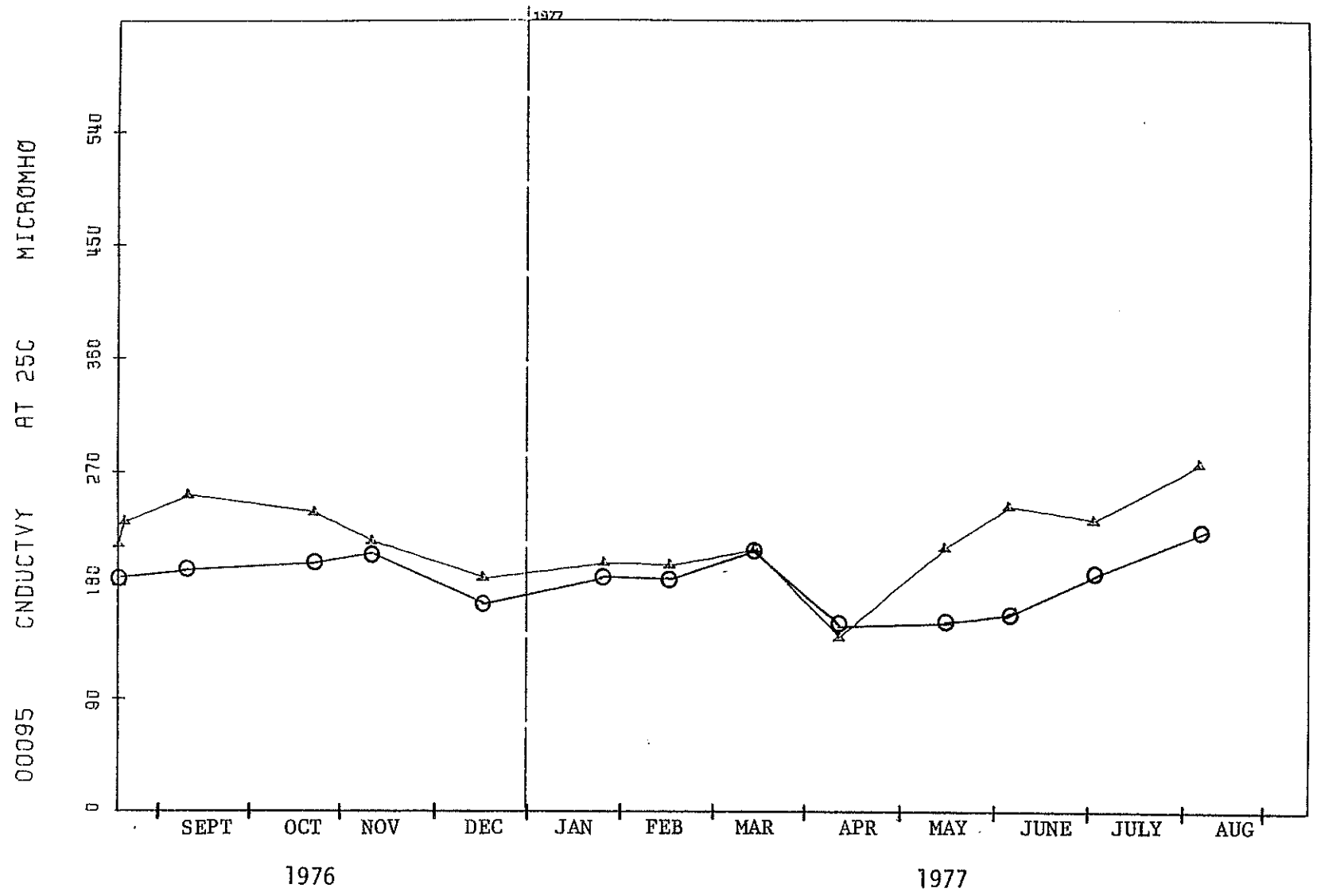

FIGURE 12: Conductivity, micromhos-cm, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

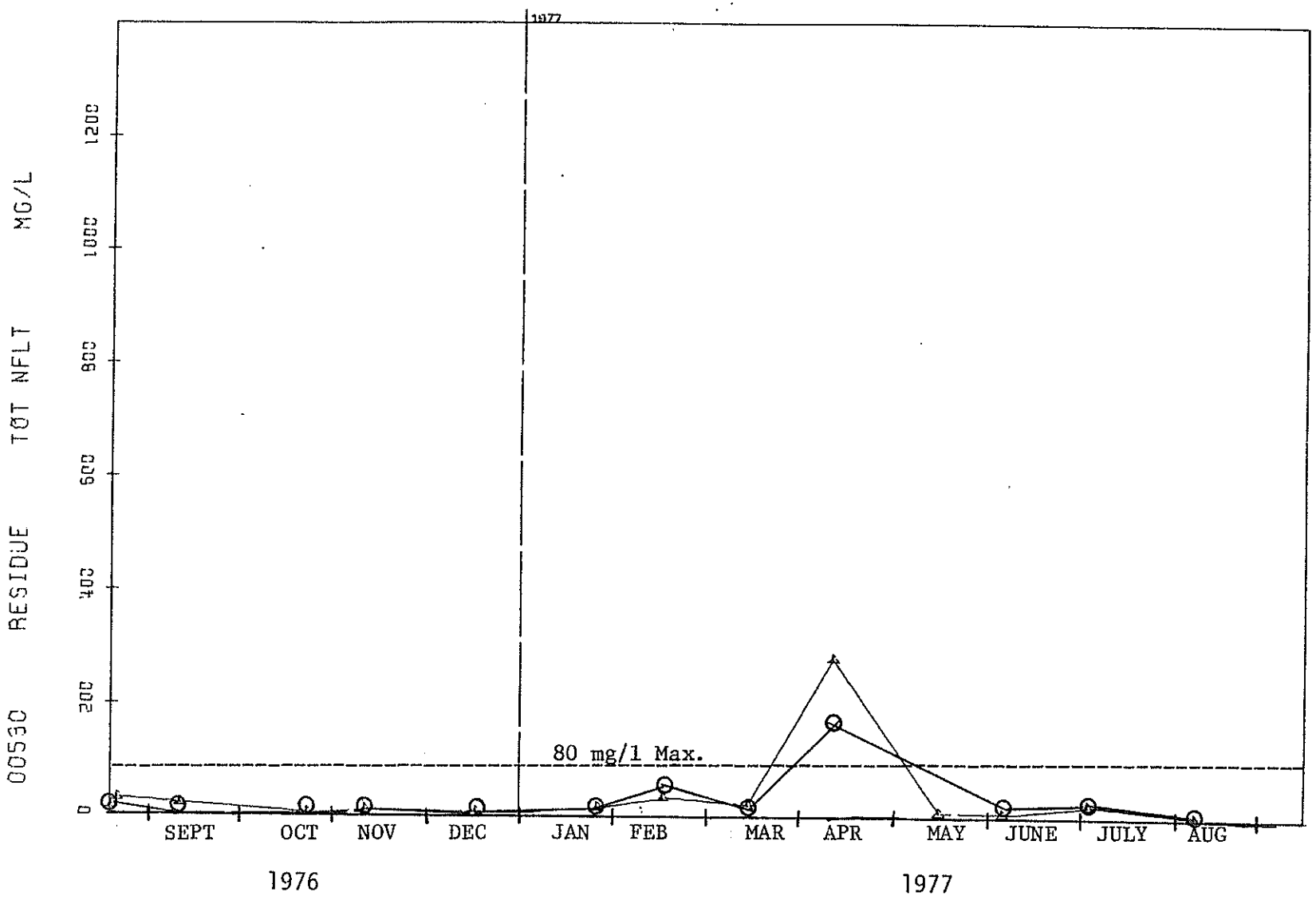

FIGURE 13: Total Nonfilterable Residue (Suspended Solids), mg/l, at Upper Rock Creek.

△ Station #1, near Rock Creek townsite, RM 25.1.
○ Station #2, at Forest Service Boundary, RM 32.3.

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 accidently 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 A_1 and A_2. Class A_1 is restricted to lakes and impoundments in which exceptionally high water quality exists. Waters of all lakes and impoundments shall be class A_1 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 A_2 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 A_2, 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.

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* 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 (A_1), except the following, which are classified as A_2 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 A_2 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 (A_2)

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 <u>total coliform</u> 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 <u>fecal coliform</u> 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:

Parameter	Criteria Level/Units	Environmental Impact and Reference
Temperature	20°C (68°F) MAX	To protect growth and migration routes of salmonids (Federal Water Pollution Control Administration (FWPCA), Water Quality Criteria, 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, Water Quality Criteria, 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, Quality Criteria for Water, 1976).

Parameter	Criteria Level/Units	Environmental Impact and Reference
pH	6.5 MIN 8.5 MAX	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, Quality Criteria for Water, 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, Water Quality Criteria, 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.
Turbidity	25 JTU MAX	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, Water Quality Criteria, 1968).

Parameter	Criteria Level/Units	Environmental Impact and Reference
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, Water Quality Criteria, 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, Water Quality Criteria, 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, Quality Criteria for Water, 1976). Concentrations of total ammonia above 0.20 mg/l as N are indicative of organic pollution (Klein, River Pollution 1., Chemical Analysis, 1959).

Parameter	Criteria Level/Units	Environmental Impact and Reference
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 Quality Criteria for Water, 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, Quality Criteria for Water, 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, Quality Criteria for Water, 1976).

Parameter	Criteria Level/Units	Environmental Impact and Reference
Benthic Invertebrate Biomass	--	Is a measure of the standing crops of the benthic fauna. Typical responses of the standing crop to environmental stress are: Stress — Standing Crop Response Toxic Substance — Reduce Severe Temperature Alterations — Variable Silt — Reduce Inorganic Nutrients — Increase Organic Nutrients (high O_2 demand) — Increase (EPA Biological Field and Laboratory Methods, 1973.)
Chlorophyll a	3 mg/l 3-20 mg/l 20 mg/l	Oligotrophic Mesotrophic Eutrophic (Vollenweider, Dr. R.A., 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).
Species Diversity	<1 polluted 1-3 moderate pollution >3 unpolluted	The species diversity index reflects the response of the benthic macroinvertebrate community to pollutional stress (Wilhelm 1970).

Heavy Metals Toxicity

Metal	Criteria Level	Environmental Impact	Reference
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	Algalcidal concentration for Selenastrum Capriconutum	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).

Pesticide	Criteria Level
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