BOISE RIVER STUDY

Ada County

Data Collected 1978

Final Summary October 1980

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

Water Quality Summary
No. 2

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SUMMARY OF BOISE RIVER STUDY

In Water Year 1978 a water quality study was conducted on the Boise River (Ada County, Idaho) from Lucky Peak Dam near the Ada/Boise County line southeast of Boise to the Star Bridge near the Ada/Canyon County line south of Star. The purpose of the study was to assess the impact of present point sources on the river and to obtain background information to develop effluent limitations for the City of Boise wastewater treatment facilities. The study provided monitoring at 14 mainstem river stations and at both Boise treatment plants on a monthly frequency. An intensive survey in November of 1977 included three additional point sources and eight tributaries. The parameter categories covered in the study are listed as follows:

Temperature	Solids
Dissolved oxygen	Nutrients
pH	Trace Inorganic Toxins
Flow (Some taken)	Macroinvertebrates
Bacteria	Periphyton
Oxygen Demand	Algal Assays

The water quality of the Boise River in Ada County was found to fluctuate with seasonal conditions. The river above Star was generally the best quality during the irrigation season, but some water quality problems were still evident. Sporadic bacterial violations of the primary contact recreation standard were recorded from the Capitol Boulevard Bridge in

Boise to the Star Bridge at all but two stations. Nutrient concentrations exceeded the recommended algal bloom potential of 0.02 mg/l for ortho phosphorous and 0.3 mg/l for total inorganic nitrogen from below the discharge of the City of Boise Lander Street wastewater treatment plant to the Star Bridge. In addition, trace or toxic amounts of total residual chlorine were noted at one sampling time below both the Lander Street and West Boise discharges. Irrigation return flows do not appreciably impact the Boise River until below Star.

During the non-irrigation season the water quality problems were generally worse except for bacteria. Bacterial violations for the secondary contact recreation standard occurred less often than irrigation season violations, and fewer river miles were impacted with violations found only from the Capitol Boulevard Bridge to the Linder Road Bridge on both the North and South Channels of the river. Nutrient concentrations were found to be considerably higher in the non-irrigation season, and concentrations exceeded trophic levels from Lucky Peak Dam to the Star Bridge. Turbidity values were abnormally high during the winter of 1978 from Barber Bridge to the Star Bridge.

Toxicity problems were also more evident during the non-irrigation season. Ammonia concentrations exceeded the unionized ammonia criteria of 0.02 mg/l in March of 1978 below the Lander Street facility, but at no time was the 0.04 mg/l criteria exceeded. The total residual chlorine concentration below the Lander Street discharge was always measurable and reached 0.2 mg/l in three out of five samplings. A trace of chlorine

was measured four out of five samplings at the Glenwood Bridge which is 2.8 river miles below the Lander Street discharge. The chlorine concentration below the West Boise facility was measured at 0.2 mg/l on one occasion. Iron and aluminum concentrations were also elevated in the river during the winter of 1978. The iron concentrations ranged from a low of 150 ug/l at Lucky Peak Dam in March of 1978 to a high at 2200 ug/l at Capitol Boulevard Bridge in December of 1977. Aluminum concentrations ranged from 100 ug/l at Lucky Peak Dam to 1400 ug/l at Barber Bridge in November of 1977. Fluoride concentrations exceeded recommended instream criteria on two occasions below the discharge for the Boise Geothermal Demonstration project.

A cursory examination of fecal coliform/fecal strep ratios (FC/FS) during bacterial violations indicate a varying origin for the bacteria. Some FC/FS ratios were considerably over four which would indicate a human source, but on other occasions or at other station locations for the same date, the ratios could be in the range of one to four or even under one which indicates a mixed source or a livestock source for FC/FS values under one. The major source for human pathogenic bacteria would be the sewage treatment plant discharges for the City of Boise, but an adequate disinfection process at the West Boise facility and planned improvements at the Lander Street facility will eliminate their impact on river bacterial numbers. Other bacterial sources include nonpoint sources on small tributaries, livestock operations along the river, urban storm runoff, and the duck ponds in Ann Morrison Park. In addition, the river is impacted by a high primary contact recreation (tubing)

usage during the summer months. Of these sources only tributary nonpoint sources, livestock operations and urban storm runoff would experience any future reductions from control measures.

If wastewater flows at the Lander Street facility are not increased in size and dechlorination and aeration improvements are made, the chlorine and ammonia toxicity problems will be eliminated below the Lander Street discharge in all but extreme low flow conditions. At the West Boise facility dechlorination, nitrification, and advanced secondary BOD_5 removal may be necessary to meet instream criteria and downstream dissolve oxygen standards.

The high iron and aluminum concentrations in the winter of 1978 appear to be abnormal since samples collected by the Water and Power Resources Service (previously U.S. Bureau of Reclamation) during the preceding year were considerably lower than the Water Year 1978 samples. The high concentrations for the two metals and elevated turbidity levels during the winter period were caused by road construction activities on Idaho Highway 21 between the diversion dam for the New York Canal and Discovery State Park. Heavy equipment which was operating in and near the river above the diversion dam was resuspending fine clay materials which increased turbidity and the iron and aluminum concentrations. When the road construction work was completed and irrigation water was released from Lucky Peak Dam in the spring of 1978, the turbidity, iron, and aluminum problems disappeared.

The City of Boise wastewater treatment plants were found to cause a substantial increase in river nutrient concentrations. As high as a ten fold increase in the concentration of total phosphorus was noted below the Lander Street discharge in both the irrigation and non-irrigation seasons, and phosphorus levels were as much as doubled by the West Boise discharge. The nitrate concentrations below Lander Street exhibited a maximum of a five fold increase and a three fold increase was common below West Boise. Although no notable trophic problems have been discovered or reported for the Boise River in Ada County, a diel study in November of 1977 found dissolved oxygen concentrations to fall below 90% saturation and 6.0 mg/l both above and below the City of Boise discharges under night time algal respiration. During a similar study in August of 1978, the dissolved oxygen never dipped below 6.6 mg/l. The discrepancy between the two studies would raise a question as to whether the November 1977 study represents a normal circumstance for the Boise River under fall conditions. A comprehensive study on algal productivity in the river is needed before nutrient limitations should be considered for the Boise discharges.

Algal assays conducted by the Environmental Protection Agency (Manchester, WA) indicate that nitrogen was the primary limiting nutrient below the Geothermal Discharge and phosphorus was limiting above the Geothermal Discharge on December 27, 1977. On August 8, 1978, phosphorus limitation was found above the Geothermal Discharge and at Caldwell and the mouth of the Boise River. Nitrogen was limiting from below the Lander Street WTP to Star and at Notus. Metal inhibition did not appear to be a

problem with these two algal assay periods. All of the December 1977 samples assayed could be considered to be "highly productive." The results of the August 1978 assays are as follows: waters above the Geothermal Discharge and below Lander Street WTP appeared to be "moderatel highly productive"; Star appeared to be "moderately" to "highly productive and the stations at Caldwell, Notus, and the mouth of the Boise River appeared to be "highly productive" reflecting elevated NO_3-N+NO_2-N concentrations.

In summary, with disinfection, dechlorination, and aeration improvements at the present Lander Street treatment facility, the water quality of the Boise River above the Glenwood Bridge will improve. Under increased wastewater flows at the West Boise treatment facility, careful consideration must be given to adequate treatment processes which will maintain or protect the present water quality of the Boise River.

DATA INVENTORY

Boise River Below Lucky Peak Dam	2040138
Boise River Below Lander Street	2040121
S. Channel Boise R. at Linder Rd.	2040127
Boise River at Star Bridge	2040128

(Inventories for remaining stations (25) are available on request)

43 31 31.0 116 03 46.0 2
BOISE RIVER BELOW LUCKY PEAK DAM
16001 IDAHO
PACIFIC NORTHWEST 130700
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150
MILES 0324.30 0391.30 063.10

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	22	9.50000	22.6905	4.76345	.501416	1.01557	17.0000	2.00000	76/12/06	78/09/19
00042	ALTITUDE	FEET	AB MSL	1	2780.00					2780.00	2780.00	01/01/01	01/01/01
00061	STREAM	FLOW,	INST-CFS	17	2379.12	4628394	2151.37	.904272	521.784	7000.00	100.000	76/12/06	78/09/19
00076	TURB	TRBIDMTR	HACH FTU	10	4.11999	6.78181	2.60419	.632086	.823518	10.0000	1.20000	77/12/14	78/09/19
00095	CNDUCTVY	AT 25C	MICROMHO	10	85.0000	656.222	25.6168	.301374	8.10076	119.000	53.0000	77/12/14	78/09/19
00116	INTNSVE	SURVEY	IDENT	12	771603	-.190E+06	.000000		.000000	771603	771603	01/01/01	78/09/19
00300	DO		MG/L	22	10.5591	1.93878	1.39240	.131867	.296861	12.9000	7.80000	76/12/06	78/09/19
00310	BOD	5 DAY	MG/L	11	.590909	.142909	.378033	.639749	.113981	1.20000	.100000	77/11/15	78/09/19
00335	COD	LOWLEVEL	MG/L	11	7.21818	10.1876	3.19181	.442191	.962367	16.0000	4.50000	77/11/15	78/09/19
00400	PH		SU	11	7.65454	.094775	.307856	.040219	.092822	8.10000	7.20000	77/11/15	78/09/19
00410	T ALK	CACO3	MG/L	11	37.4545	112.274	10.5959	.282901	3.19479	54.0000	25.0000	77/11/15	78/09/19
00425	HCO3 ALK	CACO3	MG/L	11	37.4545	112.274	10.5959	.282901	3.19479	54.0000	25.0000	77/11/15	78/09/19
00430	CO3 ALK	CACO3	MG/L	11	1.00000	.000000	.000000		.000000	1.00000	1.00000	77/11/15	78/09/19
00500	RESIDUE	TOTAL	MG/L	11	77.1818	459.566	21.4375	.277753	6.46365	117.000	50.0000	77/11/15	78/09/19
00530	RESIDUE	TOT NFLT	MG/L	11	5.72727	35.4182	5.95132	1.03912	1.79439	18.0000	1.00000	77/11/15	78/09/19
00610	NH3+NH4-	N TOTAL	MG/L	11	.032909	.001571	.039634	1.20436	.011950	.146000	.005000	77/11/15	78/09/19
00615	NO2-N	TOTAL	MG/L	11	.004545	.000004	.002115	.465273	.000638	.009000	.003000	77/11/15	78/09/19
00620	NO3-N	TOTAL	MG/L	11	.308545	.030846	.175631	.569222	.052955	.511000	.100000	77/11/15	78/09/19
00625	TOT KJEL	N	MG/L	11	.522727	.087122	.295164	.564662	.088995	1.12000	.010000	77/11/15	78/09/19
00665	PHOS-TOT		MG/L P	11	.052727	.000682	.026112	.495221	.007873	.100000	.020000	77/11/15	78/09/19
00720	CYANIDE	CN-TOT	MG/L	10	.014000	.000160	.012649	.903509	.004000	.050000	.010000	76/12/06	77/10/18
00940	CHLORIDE	CL	MG/L	10	3.30000	1.56667	1.25167	.379294	.395812	5.00000	2.00000	77/12/14	78/09/19
00951	FLUORIDE	F,TOTAL	MG/L	23	.373043	.007149	.084554	.226660	.017631	.520000	.220000	76/12/06	78/09/19
01002	ARSENIC	AS,TOT	UG/L	23	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/12/06	78/09/19
01022	BORON	B,TOT	UG/L	21	189.524	12274.8	110.792	.584578	24.1767	500.000	50.0000	76/05/06	78/09/19
01027	CADMIUM	CD,TOT	UG/L	23	1.86956	2.84585	1.68696	.902330	.351756	5.00000	1.00000	76/12/06	78/09/19
01032	CHROMIUM	HEX-VAL	UG/L	22	26.3636	405.195	20.1295	.763532	4.29162	50.0000	10.0000	76/12/06	78/09/19
01034	CHROMIUM	CR,TOT	UG/L	23	25.6522	398.420	19.9605	.778120	4.16204	50.0000	10.0000	76/12/06	78/09/19
01042	COPPER	CU,TOT	UG/L	23	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/12/06	78/09/19
01045	IRON	FE,TOT	UG/L	22	209.091	22713.5	150.710	.720786	32.1314	500.000	10.0000	76/12/06	78/09/19
01051	LEAD	PB,TOT	UG/L	11	80.0000	9900.00	99.4987	1.24373	30.0000	380.000	50.0000	77/11/15	78/09/19
01067	NICKEL	NI,TOTAL	UG/L	21	50.0000	.000000	.000000		.000000	50.0000	50.0000	76/12/06	78/09/19
01077	SILVER	AG,TOT	UG/L	23	1.78261	6.72332	2.59294	1.45457	.540665	10.0000	1.00000	76/12/06	78/09/19
01092	ZINC	ZN,TOT	UG/L	23	20.6087	809.340	28.4489	1.38043	5.93201	95.0000	1.00000	76/12/06	78/09/19
01105	ALUMINUM	AL,TOT	UG/L	21	181.429	10442.9	102.190	.563254	22.2997	400.000	10.0000	76/12/06	78/09/19
31501	TOT COLI	MFIMENDO	/100ML	11	54.0909	13585.5	116.557	2.15483	35.1432	400.000	2.00000	77/11/15	78/09/19
31616	FEC COLI	MFM-FCBR	/100ML	11	1.81818	7.36364	2.71360	1.49248	.818182	10.0000	1.00000	77/11/15	78/09/19
31679	FECSTREP	MF M-ENT	/100ML	11	1.90909	7.29091	2.70017	1.41437	.814132	10.0000	1.00000	77/11/15	78/09/19
70507	PHOS-T	ORTHO	MG/L P	10	.017000	.000314	.017714	1.04198	.005602	.045000	.001000	77/11/15	78/09/19

2040138
43 31 31,0 116 03 46,0 2
BOISE RIVER BELOW LUCKY PEAK DAM
16001 IDAHO
PACIFIC NORTHWEST 130700
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150
MILES 0324.30 0391.30 063.10

PARAMETER			NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
71900 MERCURY	HG,TOTAL	UG/L	11	.536364	.014546	.120605	.224857	.036364	.900000	.500000	77/11/15	78/09/19

43 38 25.0 116 14 43.0 2
BOISE RIVER BELOW LANDER STREET
16001 IDAHO
PACIFIC NORTHWEST 1307
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150
MILES 0324.30 0391.30 049.90

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	23	10.7609	17.9516	4.23693	.393735	.883461	19.5000	5.00000	77/11/15	78/09/19
00042	ALTITUDE	FEET	AB MSL	1	2640.00					2640.00	2640.00	01/01/01	01/01/01
00061	STREAM	FLOW,	INST-CFS	2	171.800	.042969	.207289	.001207	.146575	171.800	171.800	77/11/15	77/11/15
00076	TURB	TRBIDMTR	HACH FTU	20	8.41499	77.7571	8.81800	1.04789	1.97176	32.0000	1.70000	77/12/14	78/09/19
00095	CNDUCTVY	AT 25C	MICROMHO	20	155.300	3578.86	59.8236	.385213	13.3770	233.000	94.0000	77/12/14	78/09/19
00116	INTNSVE	SURVEY	IDENT	24	771603	911805	954.885	.001238	194.915	771603	771603	01/01/01	78/09/19
00300	DO		MG/L	23	9.88695	1.48670	1.21930	.123325	.254243	12.1000	8.00000	77/11/15	78/09/19
00310	BOD	5 DAY	MG/L	22	1.61136	2.98666	1.72819	1.07251	.368452	6.40000	.100000	77/11/15	78/09/19
00335	COD	LOWLEVEL	MG/L	22	10.7909	22.8047	4.77543	.442542	1.01812	24.0000	6.10000	77/11/15	78/09/19
00400	PH		SU	23	7.60869	.051702	.227381	.029884	.047412	8.00000	7.30000	77/11/15	78/09/19
00410	T ALK	CACO3	MG/L	22	54.3636	315.481	17.7618	.326722	3.78683	77.0000	34.0000	77/11/15	78/09/19
00425	HCO3 ALK	CACO3	MG/L	22	54.3636	315.481	17.7618	.326722	3.78683	77.0000	34.0000	77/11/15	78/09/19
00430	CO3 ALK	CACO3	MG/L	22	1.00000	.000000	.000000		.000000	1.00000	1.00000	77/11/15	78/09/19
00500	RESIDUE	TOTAL	MG/L	22	133.864	2782.51	52.7495	.394054	11.2462	232.000	79.0000	77/11/15	78/09/19
00530	RESIDUE	TOT NFLT	MG/L	21	16.8095	441.363	21.0086	1.24981	4.58446	74.0000	2.00000	77/11/15	78/09/19
00610	NH3+NH4-N	N TOTAL	MG/L	22	.620545	.420616	.648549	1.04513	.138271	2.28000	.081000	77/11/15	78/09/19
00615	NO2-N	TOTAL	MG/L	22	.066454	.001066	.032655	.491394	.006962	.152000	.024000	77/11/15	78/09/19
00620	NO3-N	TOTAL	MG/L	22	.686272	.196167	.442908	.645382	.094428	1.64000	.160000	77/11/15	78/09/19
00625	TOT KJEL	N	MG/L	22	1.48545	.593242	.770222	.518511	.164212	3.50000	.560000	77/11/15	78/09/19
00665	PHOS-TOT		MG/L P	21	.674762	.129126	.359341	.532545	.078415	1.60000	.190000	77/11/15	78/09/19
00940	CHLORIDE	CL	MG/L	20	9.00000	11.3684	3.37171	.374634	.753937	14.0000	3.00000	77/12/14	78/09/19
00951	FLUORIDE	F,TOTAL	MG/L	22	.589545	.091519	.302521	.513143	.064498	1.57000	.250000	77/11/15	78/09/19
01002	ARSENIC	AS,TOT	UG/L	22	10.0000	.000000	.000000		.000000	10.0000	10.0000	77/11/15	78/09/19
01022	BORON	B,TOT	UG/L	21	158.571	2542.86	50.4268	.318007	11.0040	210.000	50.0000	77/11/15	78/09/19
01027	CADMIUM	CD,TOT	UG/L	22	1.54545	1.97403	1.40500	.909118	.299547	5.00000	1.00000	77/11/15	78/09/19
01032	CHROMIUM	HEX-VAL	UG/L	22	40.9091	294.373	17.1573	.419401	3.65795	50.0000	10.0000	77/11/15	78/09/19
01034	CHROMIUM	CR,TOT	UG/L	22	40.9091	294.373	17.1573	.419401	3.65795	50.0000	10.0000	77/11/15	78/09/19
01042	COPPER	CU,TOT	UG/L	22	10.0000	.000000	.000000		.000000	10.0000	10.0000	77/11/15	78/09/19
01045	IRON	FE,TOT	UG/L	22	403.182	113623	337.080	.836050	71.8657	1470.00	80.0000	77/11/15	78/09/19
01051	LEAD	PB,TOT	UG/L	22	50.0000	.000000	.000000		.000000	50.0000	50.0000	77/11/15	78/09/19
01067	NICKEL	NI,TOTAL	UG/L	22	50.0000	.000000	.000000		.000000	50.0000	50.0000	77/11/15	78/09/19
01077	SILVER	AG,TOT	UG/L	22	2.22727	9.99351	3.16125	1.41934	.673981	10.0000	1.00000	77/11/15	78/09/19
01092	ZINC	ZN,TOT	UG/L	22	7.90909	109.515	10.4649	1.32315	2.23113	39.0000	1.00000	77/11/15	78/09/19
01105	ALUMINUM	AL,TOT	UG/L	22	336.364	86233.8	293.656	.873032	62.6077	1000.00	100.000	77/11/15	78/09/19
31501	TOT COLI	MFIMENDO	/100ML	22	3626.82	.135E+08	3686.49	1.01645	785.963	10000.0	100.000	77/11/15	78/09/19
31616	FEC COLI	MFM-FCBR	/100ML	22	59.0909	7570.56	87.0090	1.47246	18.5504	350.000	10.0000	77/11/15	78/09/19
31679	FECSTREP	MF M-ENT	/100ML	22	182.091	198193	445.189	2.44487	94.9146	2000.00	10.0000	77/11/15	78/09/19
50060	CHLORINE	TOT RESD	MG/L	20	.120000	.010105	.100525	.837709	.022478	.200000	.000000	77/11/15	78/09/19
70507	PHOS-T	ORTHO	MG/L P	22	.575590	.082282	.286848	.498354	.061156	1.25000	.133000	77/11/15	78/09/19

43 38 25.0 116 14 43.0 2
BOISE RIVER BELOW LANDER STREET
16001 IDAHO
PACIFIC NORTHWEST 1307
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150
MILES 0324.30 0391.30 049.90

PARAMETER			NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
71900 MERCURY	HG,TOTAL	UG/L	22	.963636	2.16623	1.47181	1.52735	.313792	5.80000	.500000	77/11/15	78/09/19

43 40 26.0 116 24 46.0 2
S CHANNEL BOISE R AT LINDER ROAD
16001 IDAHO ADA
PACIFIC NORTHWEST 130700
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150 0420
MILES 0324.30 0391.30 038.00 000.90

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	23	14.9565	21.7482	4.66350	.311804	.972406	20.0000	5.00000	77/11/15	78/09/19
00042	ALTITUDE	FEET	AB MSL	1	2510.00					2510.00	2510.00	01/01/01	01/01/01
00061	STREAM	FLOW,	INST-CFS	1	128.000					128.000	128.000	77/11/15	77/11/15
00070	TURB	JKSN	JTU	6	.000000	.000000	.000000		.000000	.000000	.000000	77/11/15	78/04/27
00076	TURB	TRBIDMTR	HACH FTU	23	3.12173	5.69171	2.38573	.764232	.497459	11.0000	1.20000	77/11/15	78/09/19
00094	CNDUCTVY	FIELD	MICROMHO	12	119.833	12.5227	3.53875	.029531	1.02155	126.000	117.000	78/08/09	78/08/10
00095	CNDUCTVY	AT 25C	MICROMHO	11	224.273	16280.2	127.594	.568923	38.4710	381.000	93.0000	77/11/15	78/09/19
00116	INTNSVE	SURVEY	IDENT	25	771603	1048576	1024.00	.001327	204.800	771603	771603	01/01/01	78/09/19
00300	DO		MG/L	23	9.21304	2.63302	1.62266	.176126	.338348	12.4000	7.30000	77/11/15	78/09/19
00310	BOD	5 DAY	MG/L	11	.863636	.348546	.590377	.683595	.178005	1.90000	.100000	77/11/15	78/09/19
00335	COD	LOWLEVEL	MG/L	11	6.90909	7.15293	2.67450	.387098	.806391	10.8000	.500000	77/11/15	78/09/19
00400	PH		SU	23	7.65652	.077082	.277636	.036261	.057891	8.20000	7.20000	77/11/15	78/09/19
00410	T ALK	CACO3	MG/L	11	87.0000	2447.60	49.4732	.568658	14.9167	147.000	36.0000	77/11/15	78/09/19
00425	HCO3 ALK	CACO3	MG/L	11	87.0000	2447.60	49.4732	.568658	14.9167	147.000	36.0000	77/11/15	78/09/19
00430	CO3 ALK	CACO3	MG/L	10	1.00000	.000000	.000000		.000000	1.00000	1.00000	77/11/15	78/09/19
00500	RESIDUE	TOTAL	MG/L	11	164.727	7329.22	85.6109	.519713	25.8126	274.000	79.0000	77/11/15	78/09/19
00530	RESIDUE	TOT NFLT	MG/L	11	8.00000	36.2000	6.01664	.752080	1.81409	22.0000	2.00000	77/11/15	78/09/19
00610	NH3+NH4-	N TOTAL	MG/L	11	.074000	.004035	.063525	.858443	.019153	.211000	.023000	77/11/15	78/09/19
00615	NO2-N	TOTAL	MG/L	11	.020727	.000167	.012931	.623878	.003899	.053000	.005000	77/11/15	78/09/19
00620	NO3-N	TOTAL	MG/L	11	1.43982	2.50220	1.58183	1.09864	.476941	5.58000	.282000	77/11/15	78/09/19
00625	TOT KJEL	N	MG/L	11	.898181	.238476	.488340	.543699	.147240	2.17000	.480000	77/11/15	78/09/19
00665	PHOS-TOT		MG/L P	11	.261818	.020837	.144349	.551333	.043523	.500000	.080000	77/11/15	78/09/19
00940	CHLORIDE	CL	MG/L	10	7.00000	12.2222	3.49603	.499433	1.10554	13.0000	2.00000	77/12/14	78/09/19
00951	FLUORIDE	F,TOTAL	MG/L	11	.398181	.010036	.100182	.251599	.030206	.520000	.250000	77/11/15	78/09/19
01002	ARSENIC	AS,TOT	UG/L	11	10.0000	.000000	.000000		.000000	10.0000	10.0000	77/11/15	78/09/19
01022	BORON	B,TOT	UG/L	11	160.909	4169.10	64.5686	.401273	19.4681	230.000	70.0000	77/11/15	78/09/19
01027	CADMIUM	CD,TOT	UG/L	11	1.72727	2.61819	1.61808	.936784	.487870	5.00000	1.00000	77/11/15	78/09/19
01032	CHROMIUM	HEX-VAL	UG/L	11	42.7273	261.820	16.1808	.378701	4.87871	50.0000	10.0000	77/11/15	78/09/19
01034	CHROMIUM	CR,TOT	UG/L	11	42.7273	261.820	16.1808	.378701	4.87871	50.0000	10.0000	77/11/15	78/09/19
01042	COPPER	CU,TOT	UG/L	11	10.0000	.000000	.000000		.000000	10.0000	10.0000	77/11/15	78/09/19
01045	IRON	FE,TOT	UG/L	11	240.000	13840.0	117.644	.490181	35.4709	450.000	120.000	77/11/15	78/09/19
01051	LEAD	PB,TOT	UG/L	11	50.0000	.000000	.000000		.000000	50.0000	50.0000	77/11/15	78/09/19
01067	NICKEL	NI,TOTAL	UG/L	11	50.0000	.000000	.000000		.000000	50.0000	50.0000	77/11/15	78/09/19
01077	SILVER	AG,TOT	UG/L	11	2.63636	13.2546	3.64068	1.38095	1.09771	10.0000	1.00000	77/11/15	78/09/19
01092	ZINC	ZN,TOT	UG/L	11	2.54545	12.4727	3.53168	1.38744	1.06484	13.0000	1.00000	77/11/15	78/09/19
01105	ALUMINUM	AL,TOT	UG/L	11	218.182	29636.4	172.152	.789031	51.9058	700.000	100.000	77/11/15	78/09/19
31501	TOT COLI	MFIMENDO	/100ML	11	574.545	219868	468.900	.816124	141.379	1700.00	120.000	77/11/15	78/09/19
31616	FEC COLI	MFM-FCBR	/100ML	11	60.9091	4469.09	66.8513	1.09756	20.1564	230.000	10.0000	77/11/15	78/09/19
31679	FECSTREP	MF M-ENT	/100ML	11	47.2727	4121.82	64.2014	1.35811	19.3574	230.000	10.0000	77/11/15	78/09/19

43 40 26.0 116 24 46.0 2
S CHANNEL, BOISE R AT LINDER ROAD
16001 IDAHO ADA
PACIFIC NORTHWEST 130700
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150 0420
MILES 0324.30 0391.30 038.00 000.90

PARAMETER			NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
50060 CHLORINE	TOT RESD	MG/L	1	.000000					.000000	.000000	77/12/14	77/12/14
70507 PHOS-T	ORTHO	MG/L P	11	.212091	.019240	.138707	.653999	.041822	.450000	.008000	77/11/15	78/09/19
71900 MERCURY	HG,TOTAL	UG/L	11	.536364	.014546	.120605	.224857	.036364	.900000	.500000	77/11/15	78/09/19

43 40 47.0 116 29 34.0 2
BOISE RIVER AT STAR BRIDGE
16001 IDAHO
PACIFIC NORTHWEST 1307
MIDDLE SNAKE
211DSURV 771222
0000 CLASS 00

/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150
MILES 0324.33 0391.30 033.90

PARAMETER				NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
00010	WATER	TEMP	CENT	42	13.7976	43.2204	6.57422	.476475	1.01442	23.0000	2.00000	76/12/06	78/09/19
00042	ALTITUDE	FEET	AB MSL	1	2460.00					2460.00	2460.00	01/01/01	01/01/01
00061	STREAM	FLOW,	INST-CFS	17	204.882	5167.12	71.8827	.350848	17.4341	400.000	120.000	76/12/06	78/08/09
00076	TURB	TRBIDMTR	HACH FTU	28	4.37857	18.4217	4.29205	.980240	.811121	15.0000	.900000	77/12/14	78/09/19
00094	CNDUCTVY	FIELD	MICROMHO	12	143.750	13.8409	3.72034	.025881	1.07397	147.000	136.000	78/08/09	78/08/10
00095	CNDUCTVY	AT 25C	MICROMHO	16	172.625	4693.98	68.5126	.396887	17.1282	264.000	88.0000	77/12/14	78/09/19
00116	INTNSVE	SURVEY	IDENT	43	771601-	.199E+07	.000000		.000000	771603	771603	01/01/01	78/09/19
00300	DO		MG/L	41	9.84386	3.12933	1.76899	.179705	.276270	12.6000	6.60000	76/12/06	78/09/19
00310	BOD	5 DAY	MG/L	17	.941176	.543818	.737441	.783531	.178856	2.90000	.100000	77/11/15	78/09/19
00335	COD	LOWLEVEL	MG/L	16	10.5500	33.9747	5.82878	.552491	1.45719	31.4000	4.50000	77/11/15	78/09/19
00400	PH		SU	30	7.74666	.117726	.343113	.044292	.062643	8.30000	7.20000	77/11/15	78/09/19
00410	T ALK	CACO3	MG/L	17	65.4118	469.512	21.6682	.331259	5.25531	98.0000	37.0000	77/11/15	78/09/19
00425	HCO3 ALK	CACO3	MG/L	17	65.4118	469.512	21.6682	.331259	5.25531	98.0000	37.0000	77/11/15	78/09/19
00430	CO3 ALK	CACO3	MG/L	17	1.00000	.000000	.000000		.000000	1.00000	1.00000	77/11/15	78/09/19
00500	RESIDUE	TOTAL	MG/L	17	168.588	21750.8	147.481	.874802	35.7695	709.000	82.0000	77/11/15	78/09/19
00530	RESIDUE	TOT NFLT	MG/L	17	12.9706	125.015	11.1810	.862027	2.71179	40.0000	2.00000	77/11/15	78/09/19
00610	NH3+NH4-	N TOTAL	MG/L	17	.093353	.008595	.092709	.993101	.022485	.301000	.020000	77/11/15	78/09/19
00615	NO2-N	TOTAL	MG/L	17	.020353	.000200	.014151	.695266	.003432	.061000	.005000	77/11/15	78/09/19
00620	NO3-N	TOTAL	MG/L	17	.696941	.208695	.456832	.655482	.110798	1.47000	.280000	77/11/15	78/09/19
00625	TOT KJEL	N	MG/L	17	1.20764	2.89165	1.70048	1.40810	.412428	7.70000	.290000	77/11/15	78/09/19
00665	PHOS-TOT		MG/L P	17	.262941	.024097	.155232	.590367	.037649	.550000	.080000	77/11/15	78/09/19
00720	CYANIDE	CN-TOT	MG/L	10	.014000	.000160	.012649	.903509	.004000	.050000	.010000	76/12/06	77/10/18
00940	CHLORIDE	CL	MG/L	16	7.00000	9.86667	3.14112	.448732	.785281	12.0000	2.00000	77/12/14	78/09/19
00951	FLUORIDE	F,TOTAL	MG/L	29	.421034	.012424	.111462	.264735	.020698	.570000	.090000	76/12/06	78/09/19
01002	ARSENIC	AS,TOT	UG/L	30	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/12/06	78/09/19
01022	BORON	B,TOT	UG/L	28	169.286	8303.20	91.1219	.538273	17.2204	500.000	50.0000	76/12/06	78/09/19
01027	CADMIUM	CD,TOT	UG/L	30	1.80000	2.64828	1.62735	.904086	.297113	5.00000	1.00000	76/12/06	78/09/19
01032	CHROMIUM	HEX-VAL	UG/L	29	29.3103	413.794	20.3419	.694019	3.77740	50.0000	10.0000	76/12/06	78/09/19
01034	CHROMIUM	CR,TOT	UG/L	30	28.6667	411.955	20.2967	.708024	3.70565	50.0000	10.0000	76/12/06	78/09/19
01042	COPPER	CU,TOT	UG/L	29	10.0000	.000000	.000000		.000000	10.0000	10.0000	76/12/06	78/09/19
01045	IRON	FE,TOT	UG/L	28	286.071	17661.9	132.898	.464563	25.1154	570.000	100.000	76/12/06	78/09/19
01051	LEAD	PB,TOT	UG/L	19	47.8947	84.2116	9.17669	.191601	2.10528	50.0000	10.0000	77/05/02	78/09/19
01067	NICKEL	NI,TOTAL	UG/L	30	50.0000	.000000	.000000		.000000	50.0000	50.0000	76/12/06	78/09/19
01077	SILVER	AG,TOT	UG/L	30	1.90000	7.54138	2.74616	1.44535	.501377	10.0000	1.00000	76/12/06	78/09/19
01092	ZINC	ZN,TOT	UG/L	30	10.7000	195.252	13.9732	1.30591	2.55115	54.0000	1.00000	76/12/06	78/09/19
01105	ALUMINUM	AL,TOT	UG/L	29	196.897	23779.4	154.206	.783181	28.6352	600.000	10.0000	76/12/06	78/09/19
31501	TOT COLI	MFIMENDO	/100ML	17	432.941	90084.6	300.141	.693261	72.7949	1000.00	40.0000	77/11/15	78/09/19
31616	FEC COLI	MFM-FCBR	/100ML	17	66.4706	3624.27	60.2019	.905892	14.6011	200.000	10.0000	77/11/15	78/09/19
31679	FECSTREP	MF M-ENT	/100ML	17	29.4118	268.383	16.3824	.557002	3.97332	60.0000	10.0000	77/11/15	78/09/19

43 40 47.0 116 29 34.0 2
BOISE RIVER AT STAR BRIDGE
16001 IDAHO
PACIFIC NORTHWEST 1307
MIDDLE SNAKE
21IDSURV 771222
0000 CLASS 00

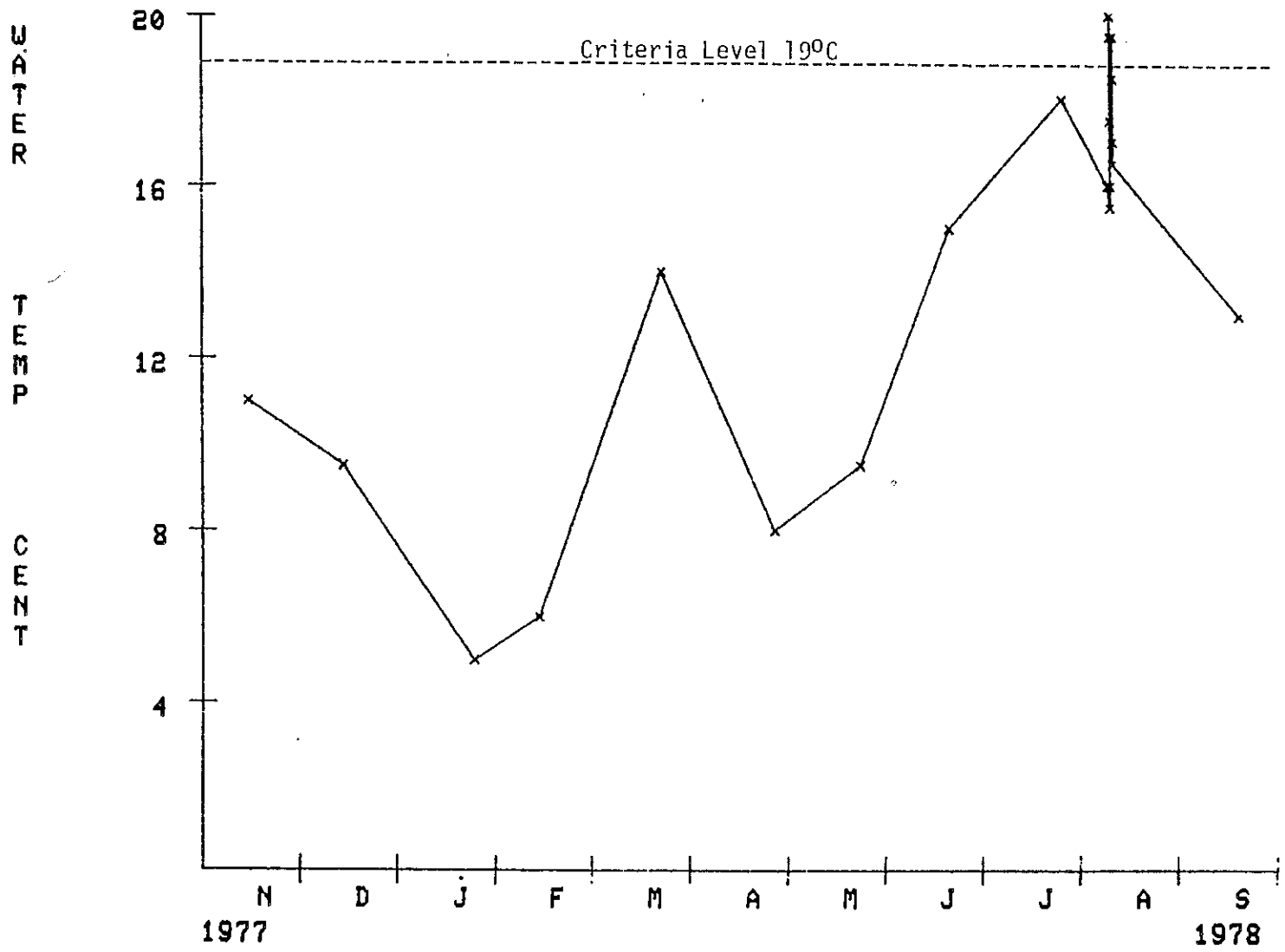
/TYPA/AMBNT/STREAM

INDEX 1310001 002740 06150
MILES 0324.33 0391.30 033.90

PARAMETER			NUMBER	MEAN	VARIANCE	STAN DEV	COEF VAR	STAND ER	MAXIMUM	MINIMUM	BEG DATE	END DATE
50060 CHLORINE	TOT RESD	MG/L	2	.000000	.000000	.000000		.000000	.000000	.000000	77/12/14	77/12/14
70507 PHOS-T	ORTHO	MG/L P	17	.192411	.021649	.147136	.764693	.035686	.518000	.022000	77/11/15	78/09/19
71900 MERCURY	HG,TOTAL	UG/L	18	.500000	.000000	.000000		.000000	.500000	.500000	77/11/15	78/09/19

GRAPHICS

STORET STATION 2040127
S CHANNEL BOISE R AT LINDER ROAD



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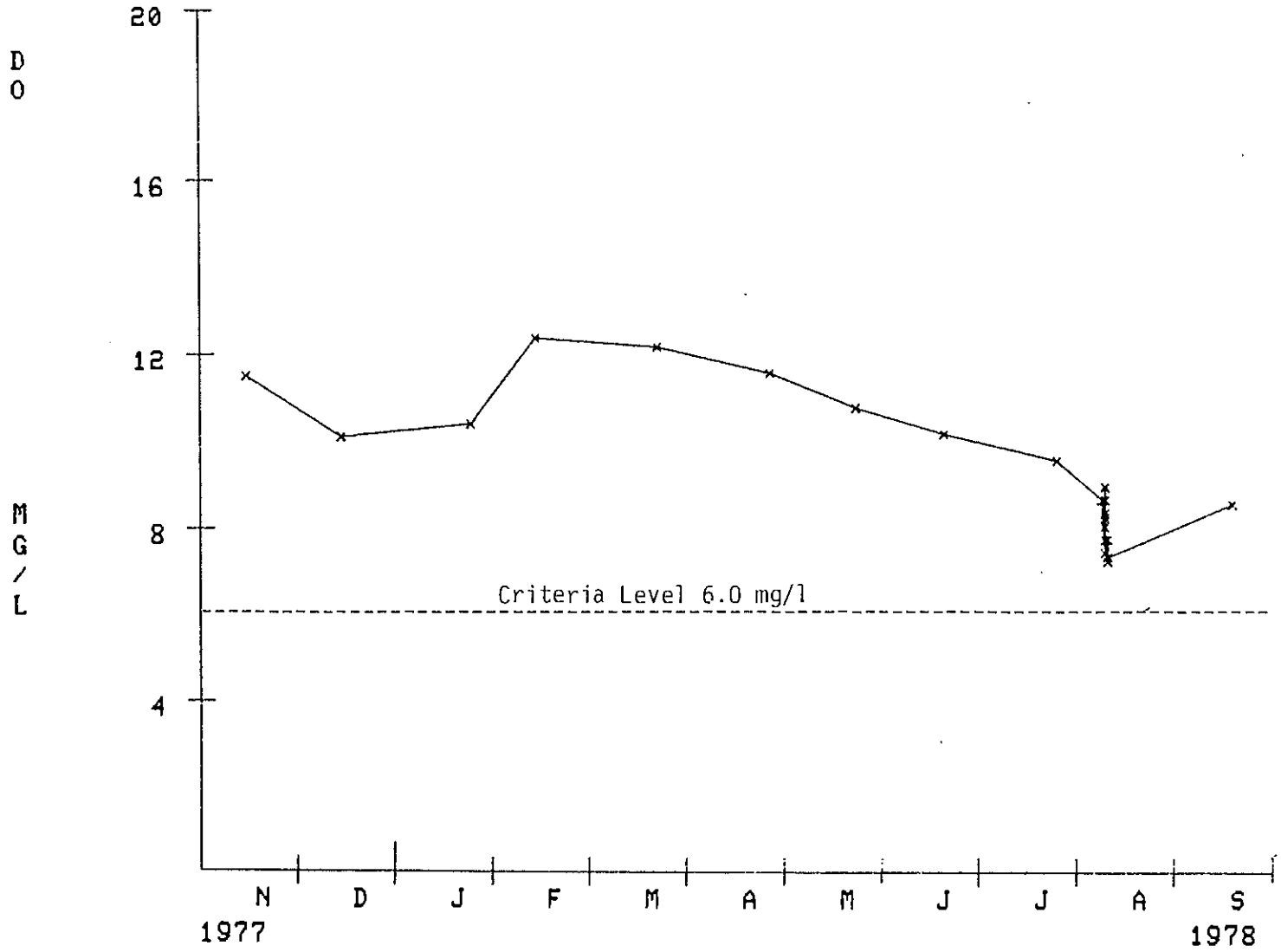

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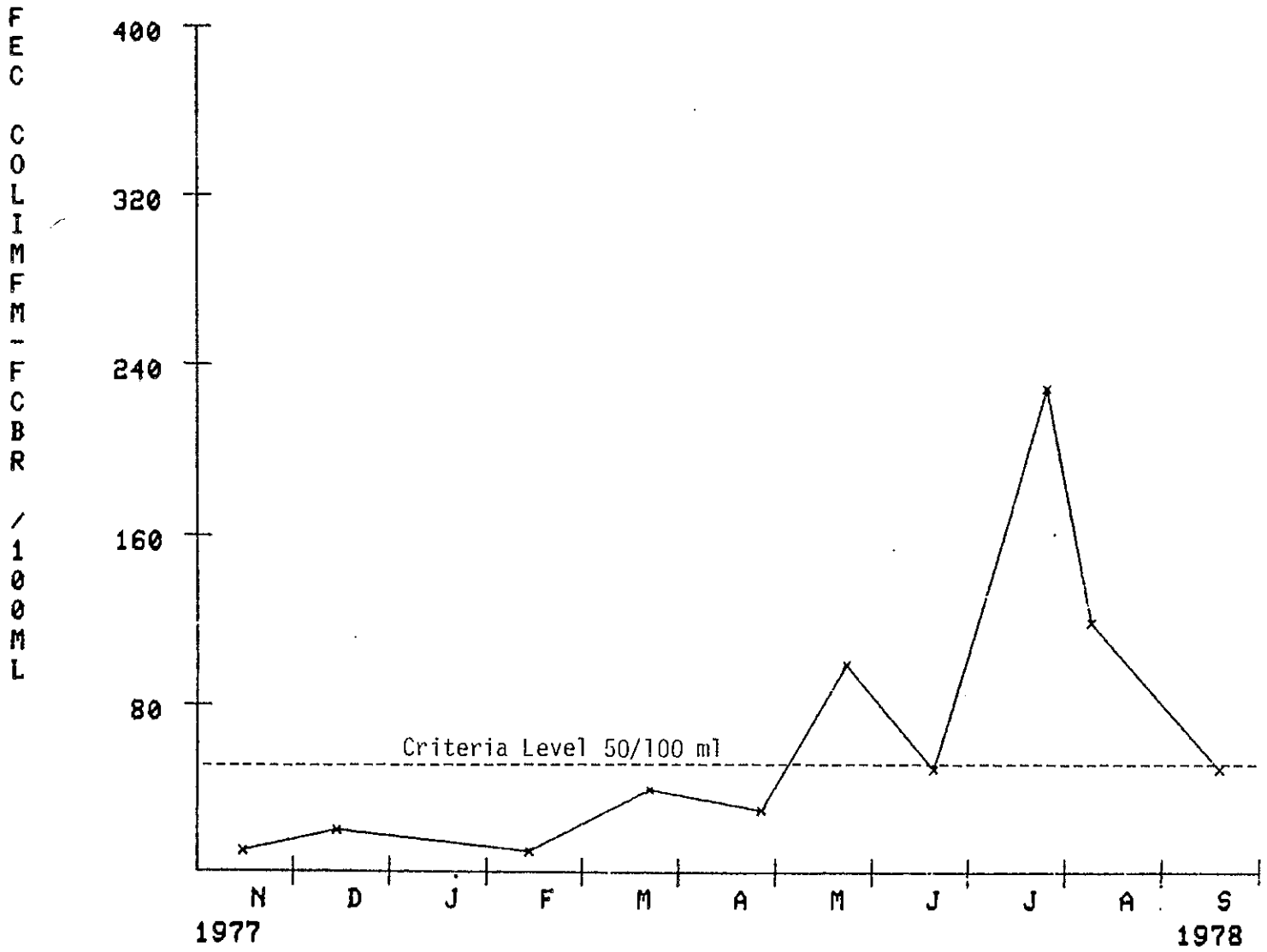

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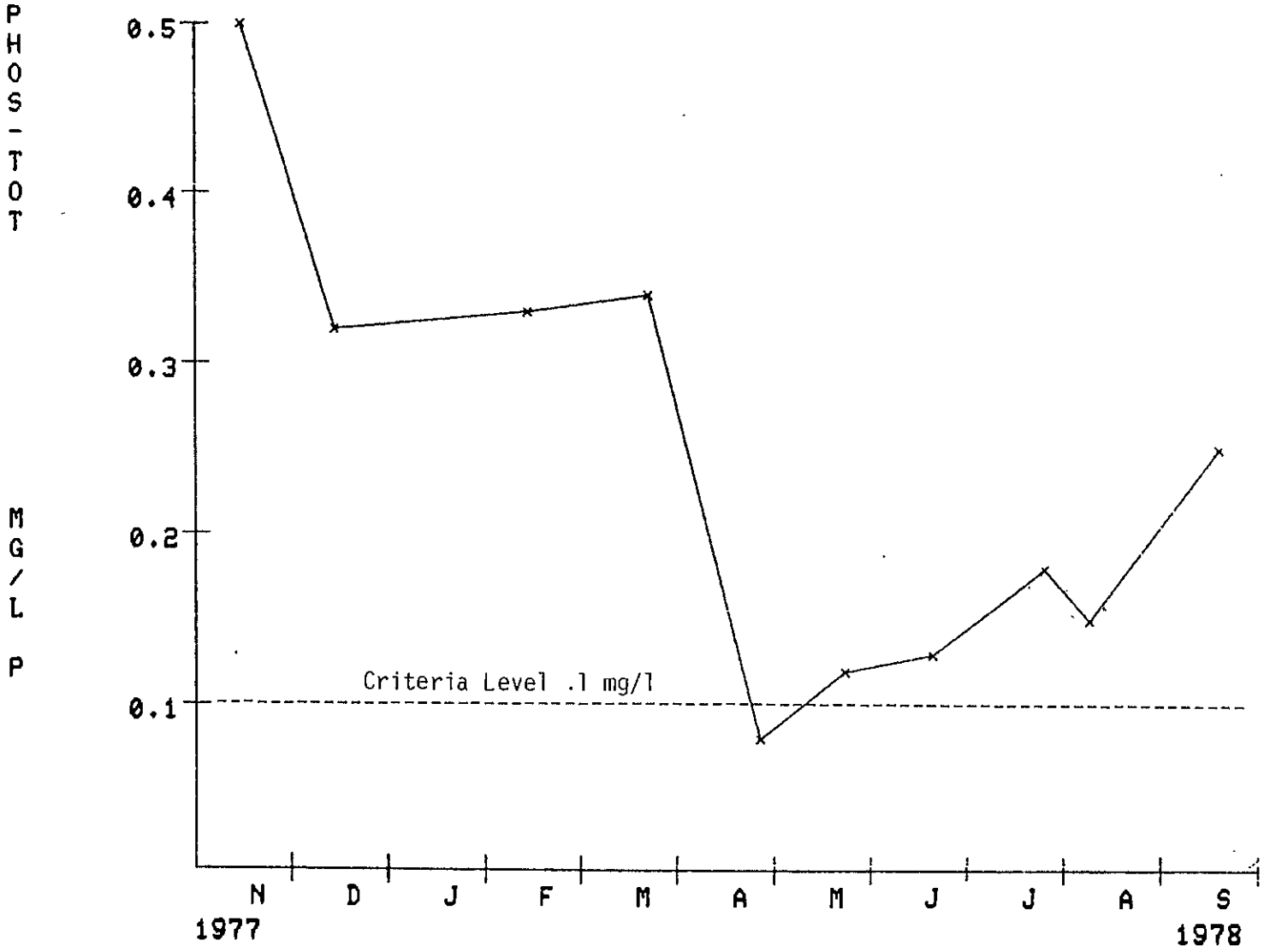

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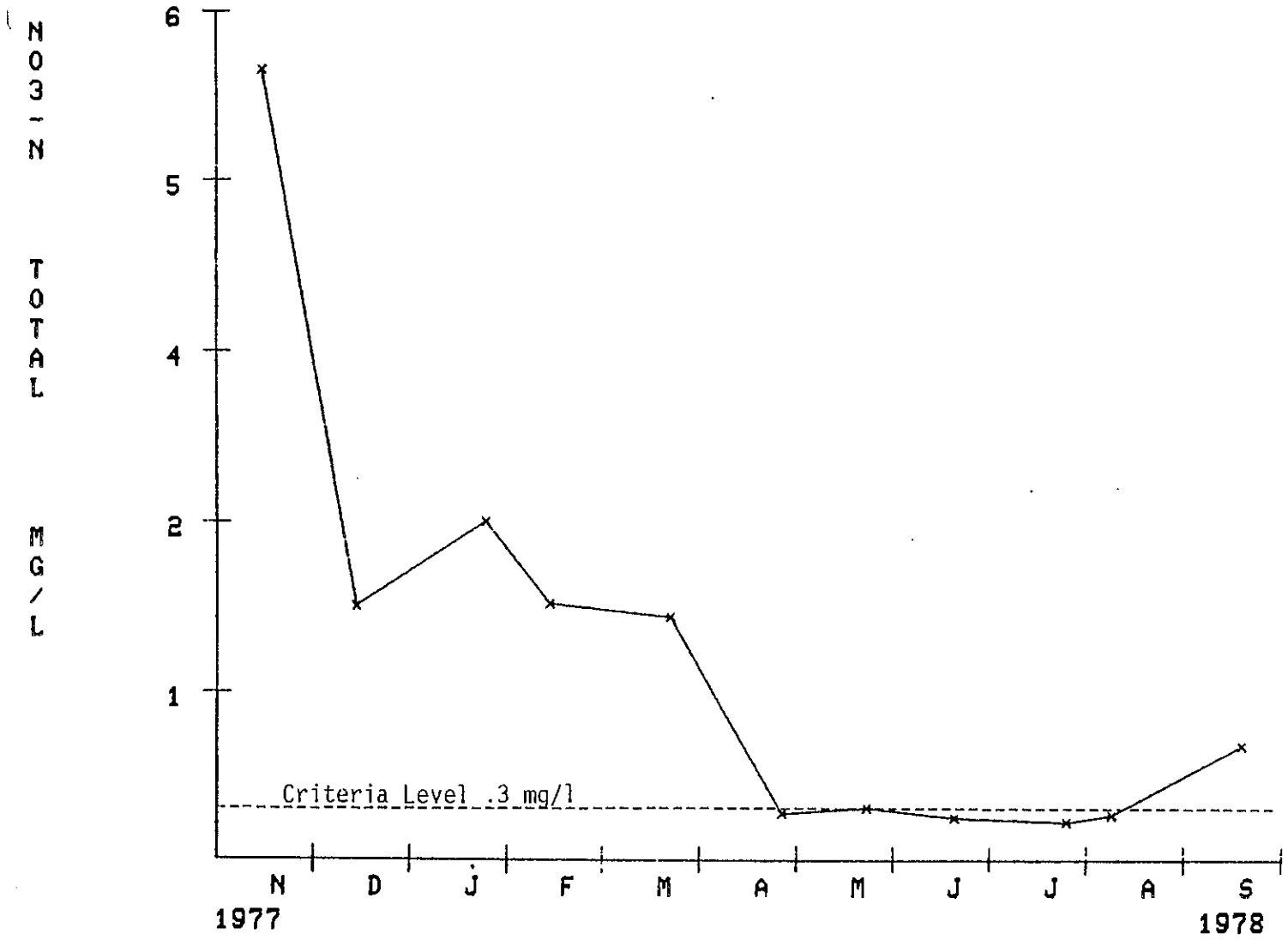

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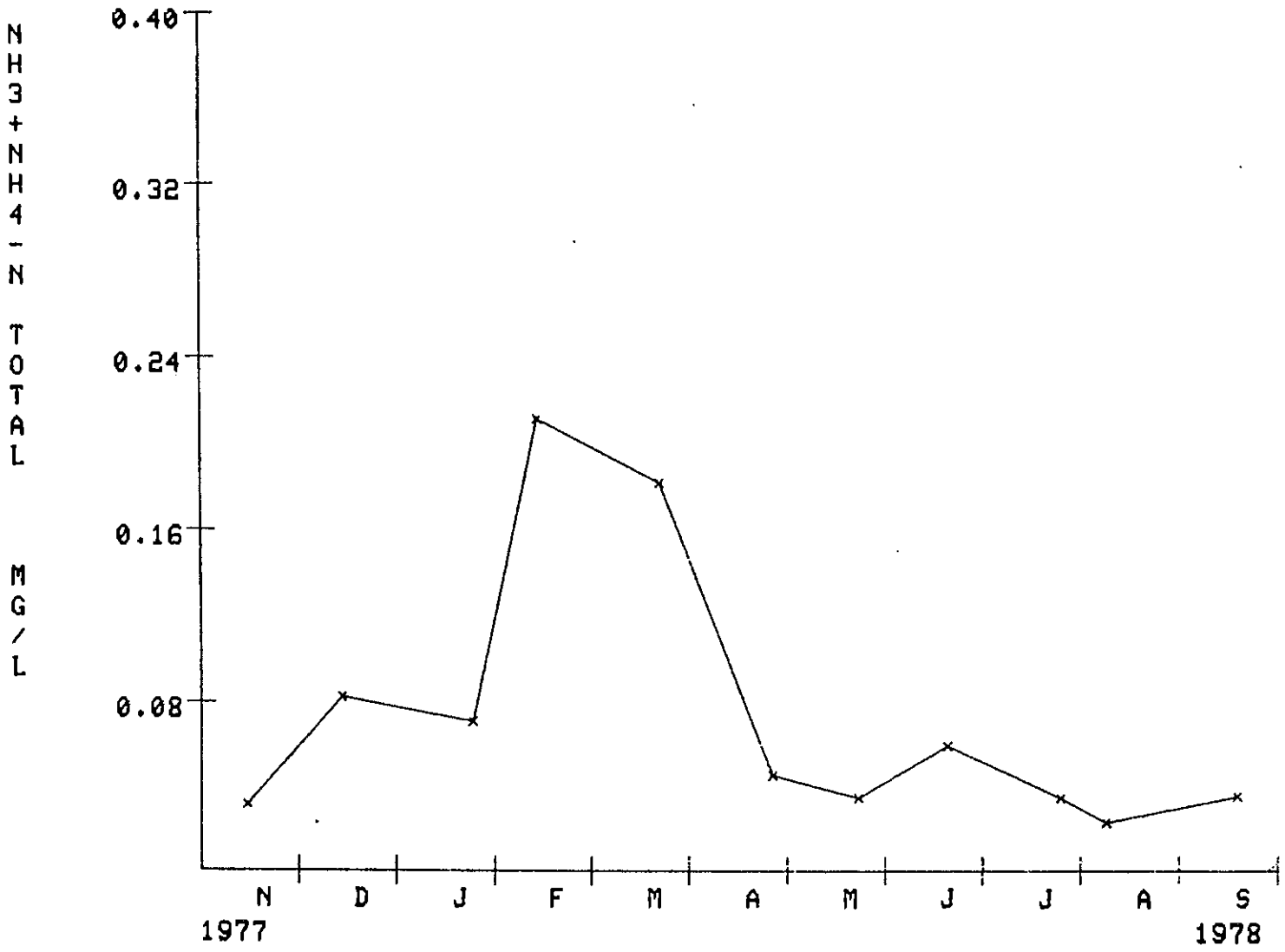

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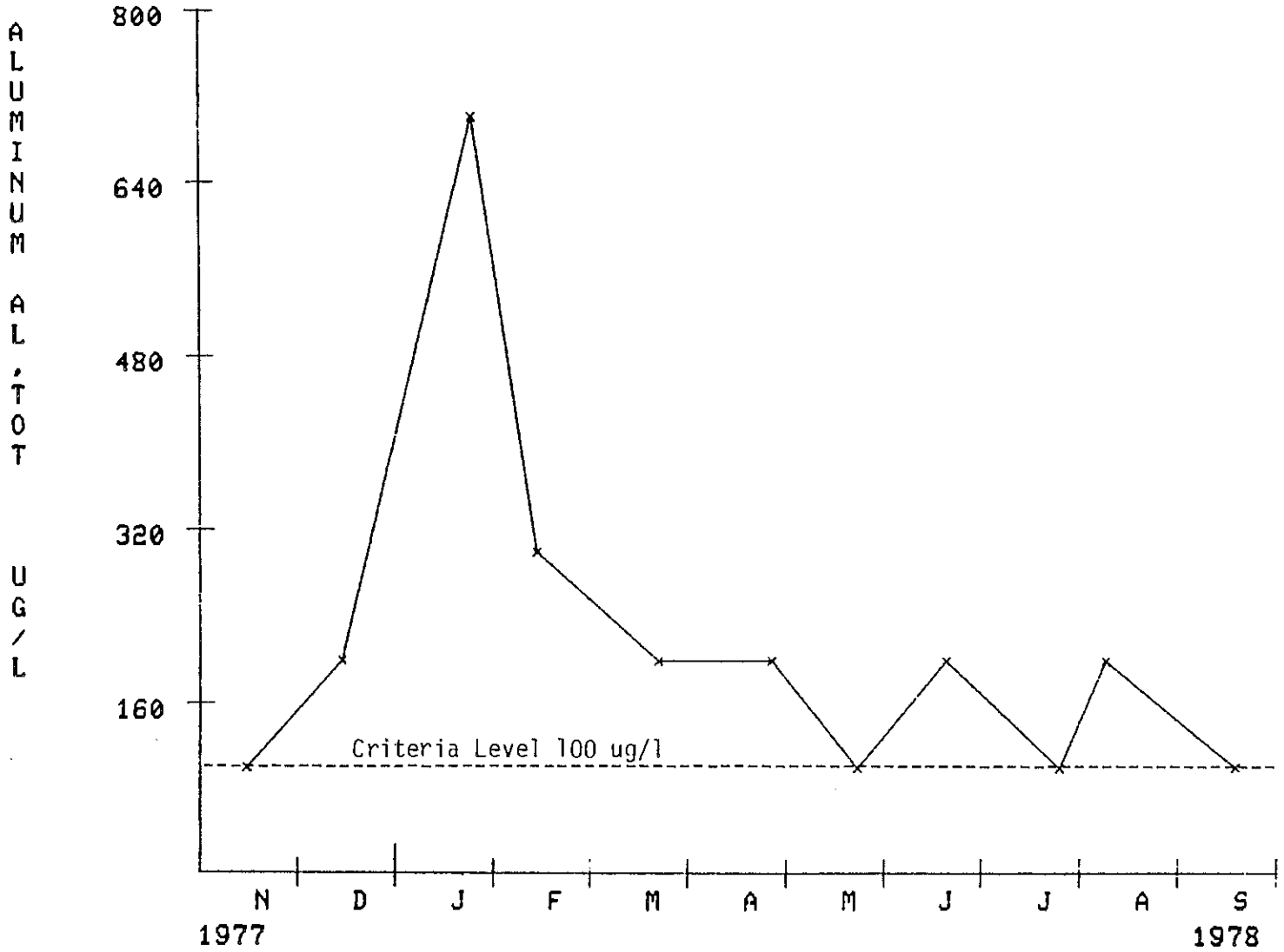

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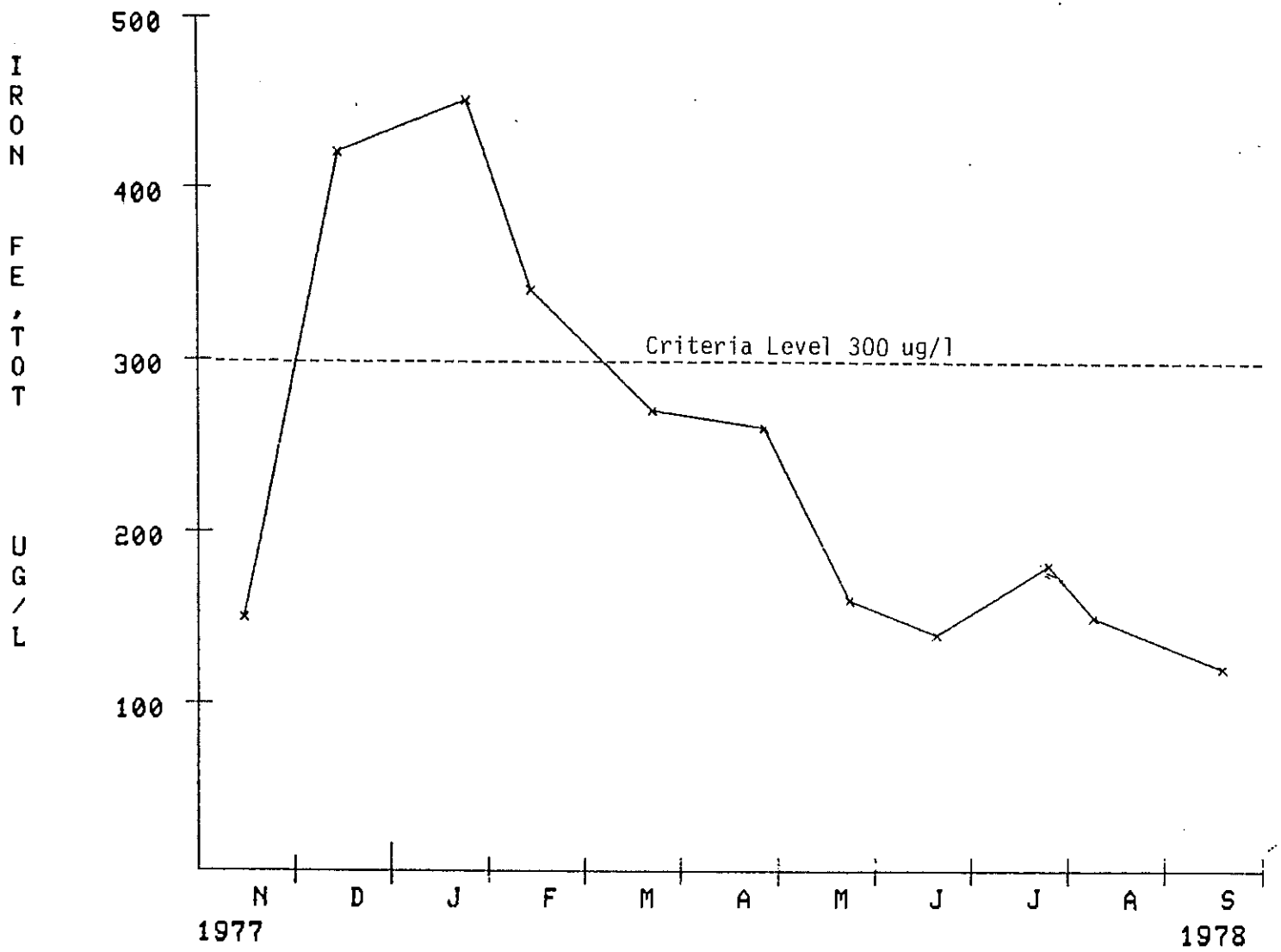
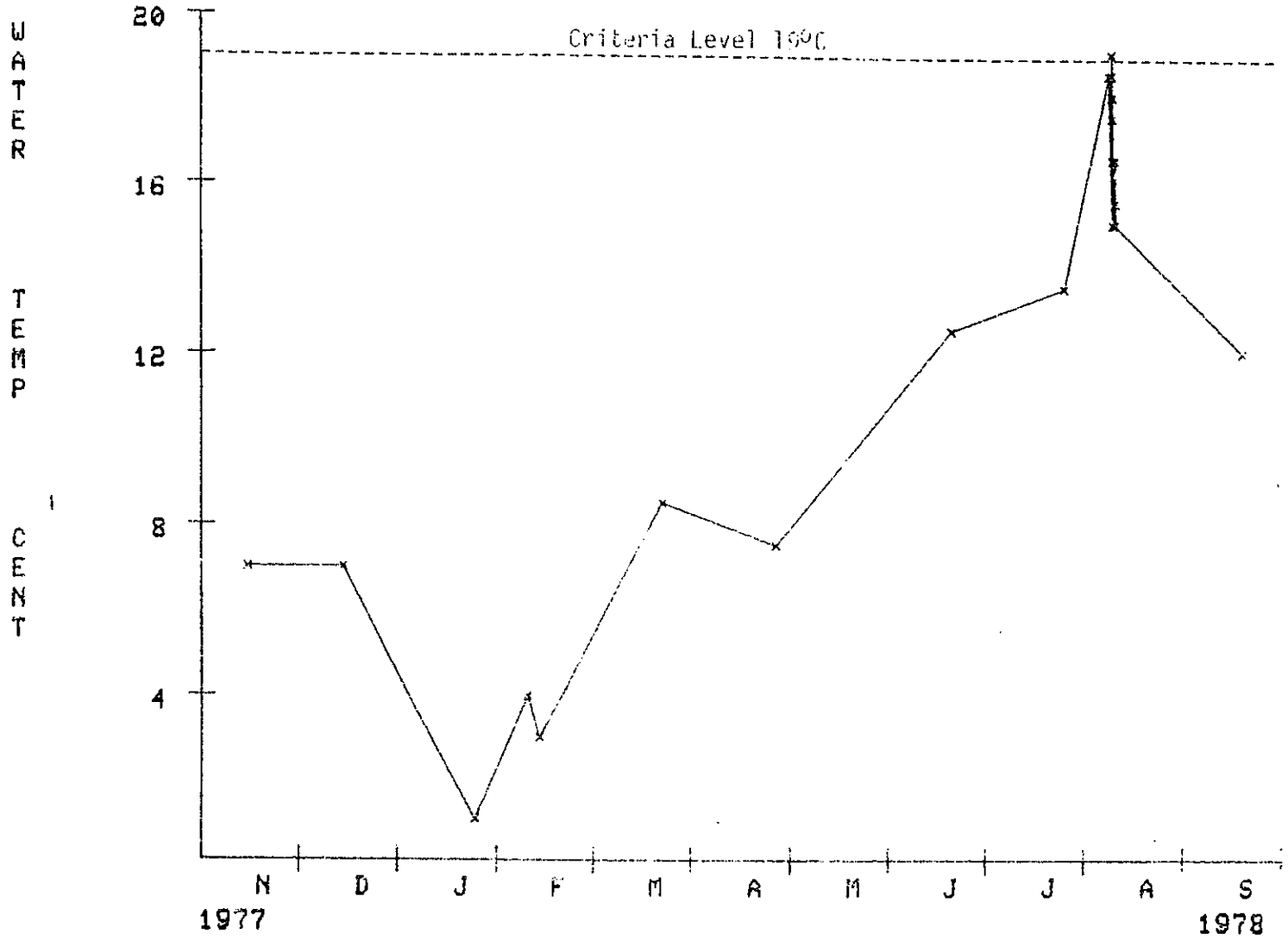


STORET STATION 2040119
BOISE RIVER AT CAPITOL ST BRIDGE



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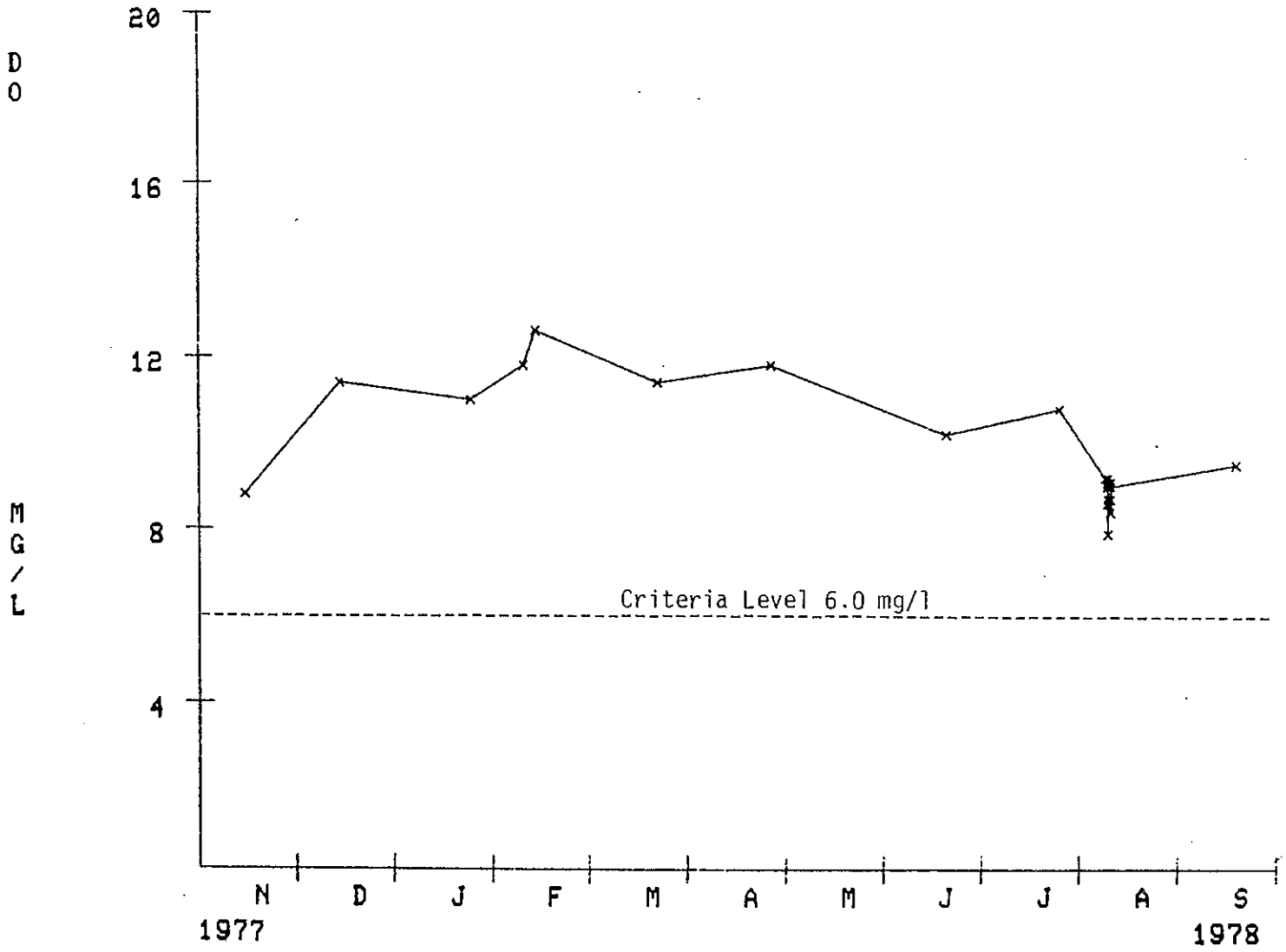
BOISE RIVER AT CAPITOL ST BRIDGE



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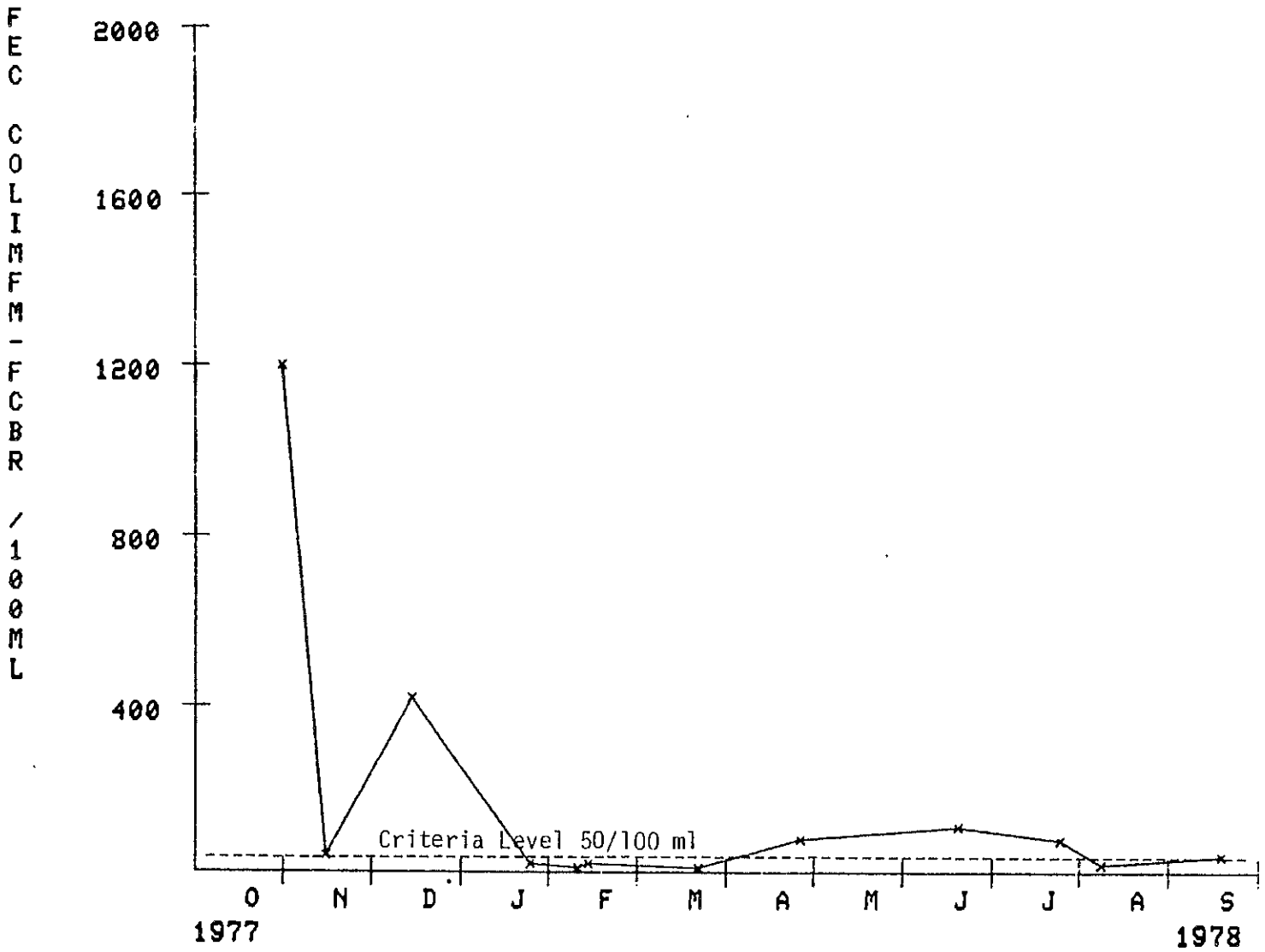

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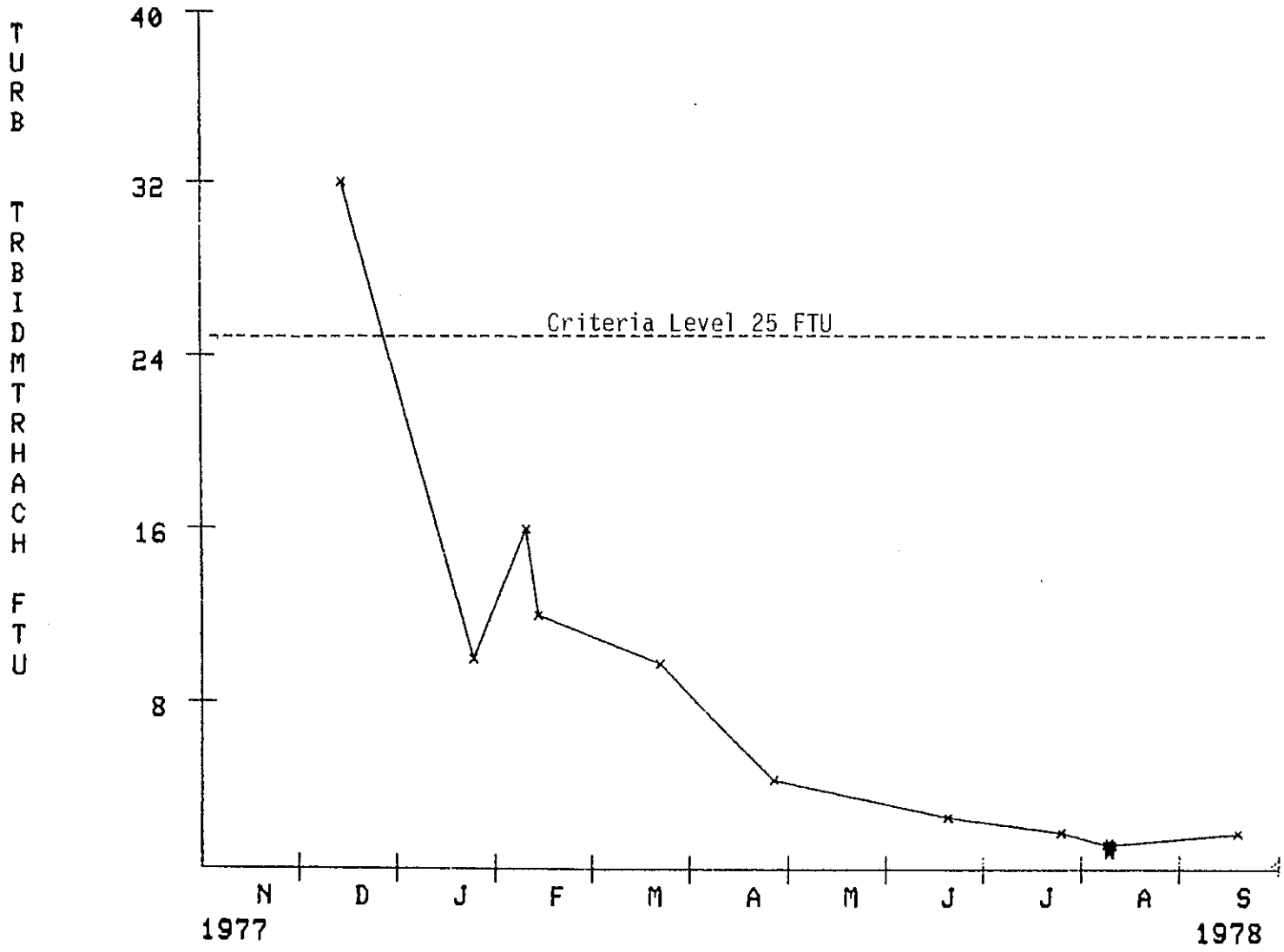
BOISE RIVER AT CAPITOL ST BRIDGE



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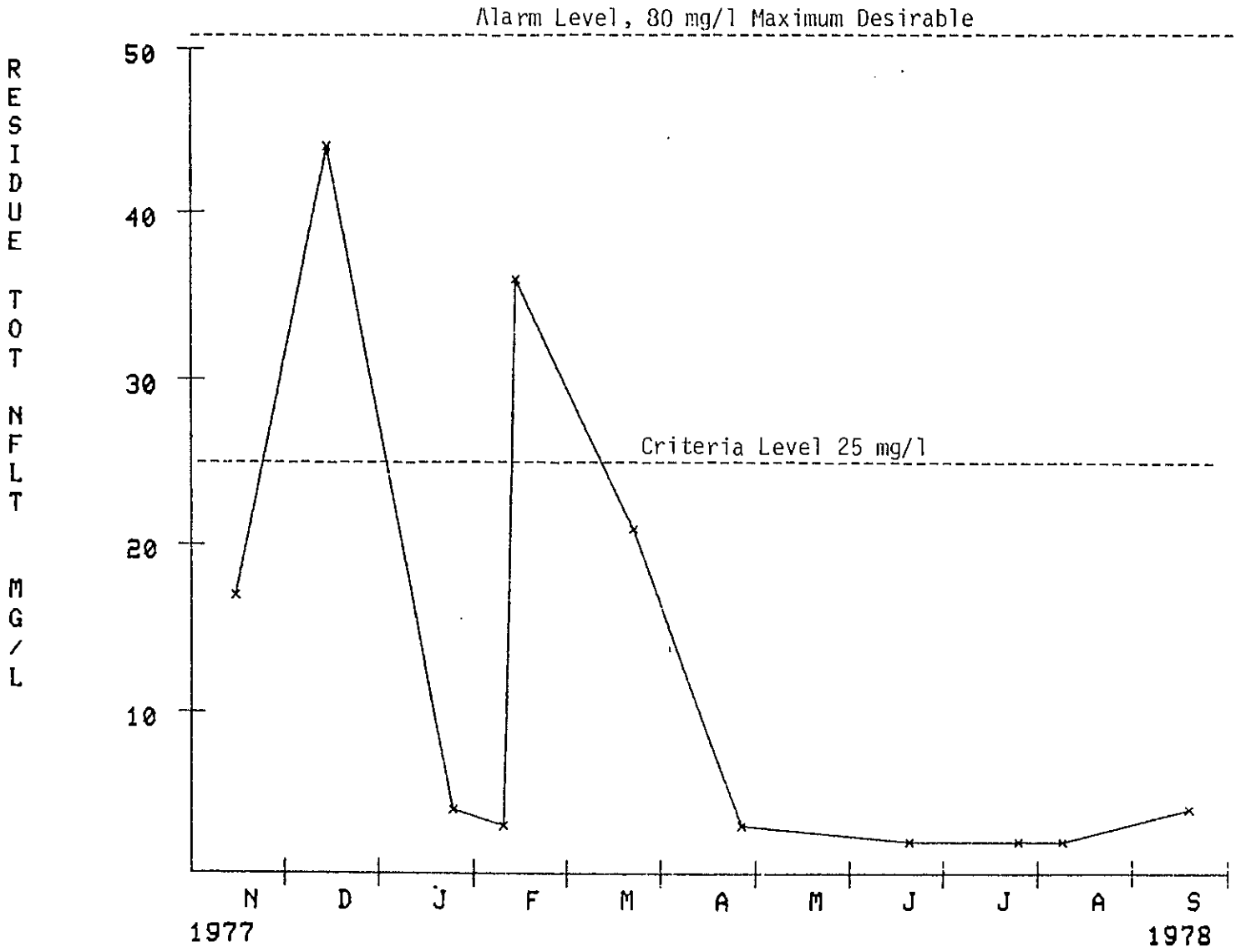
BOISE RIVER AT CAPITOL ST BRIDGE



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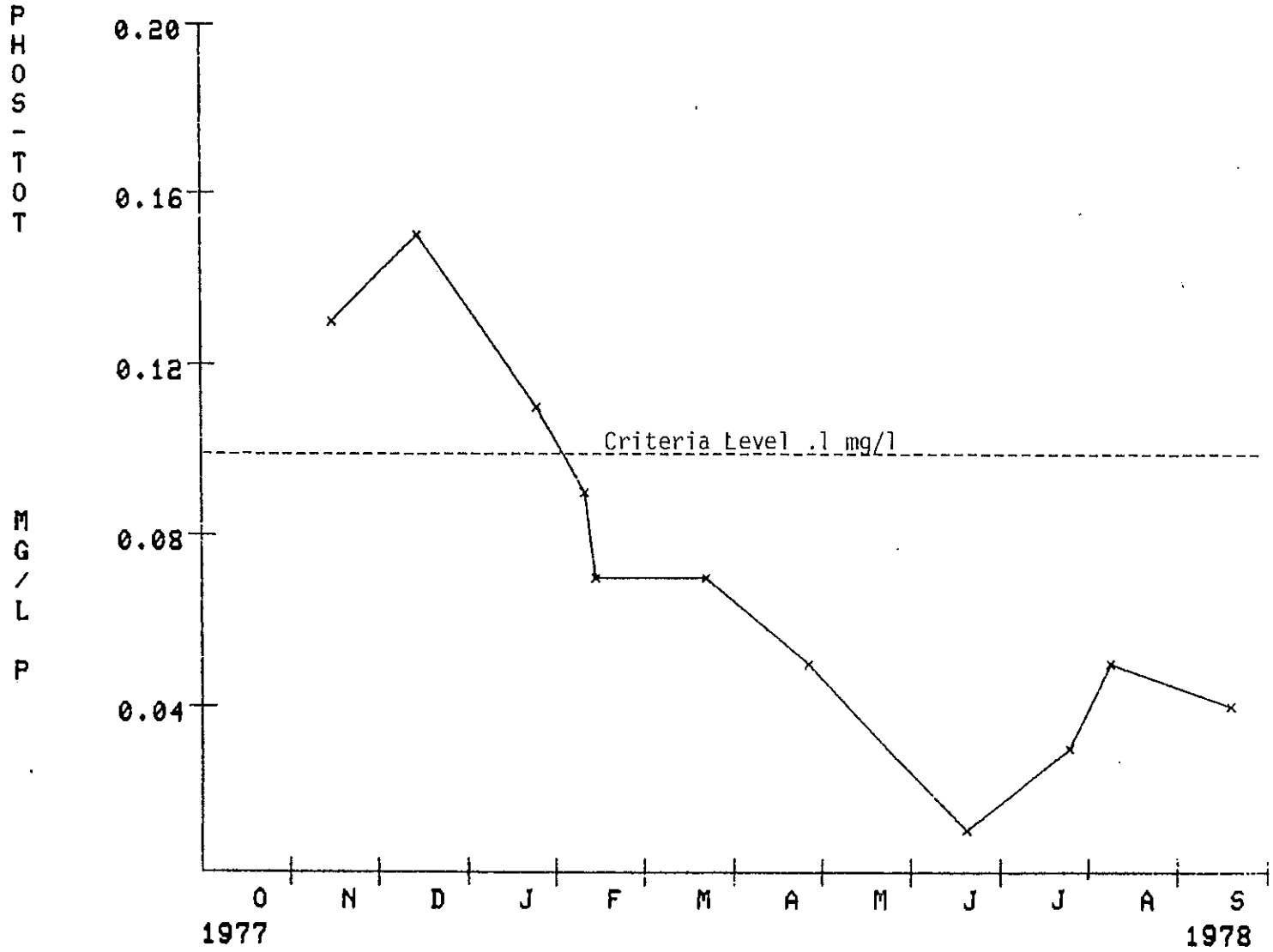
BOISE RIVER AT CAPITOL ST BRIDGE



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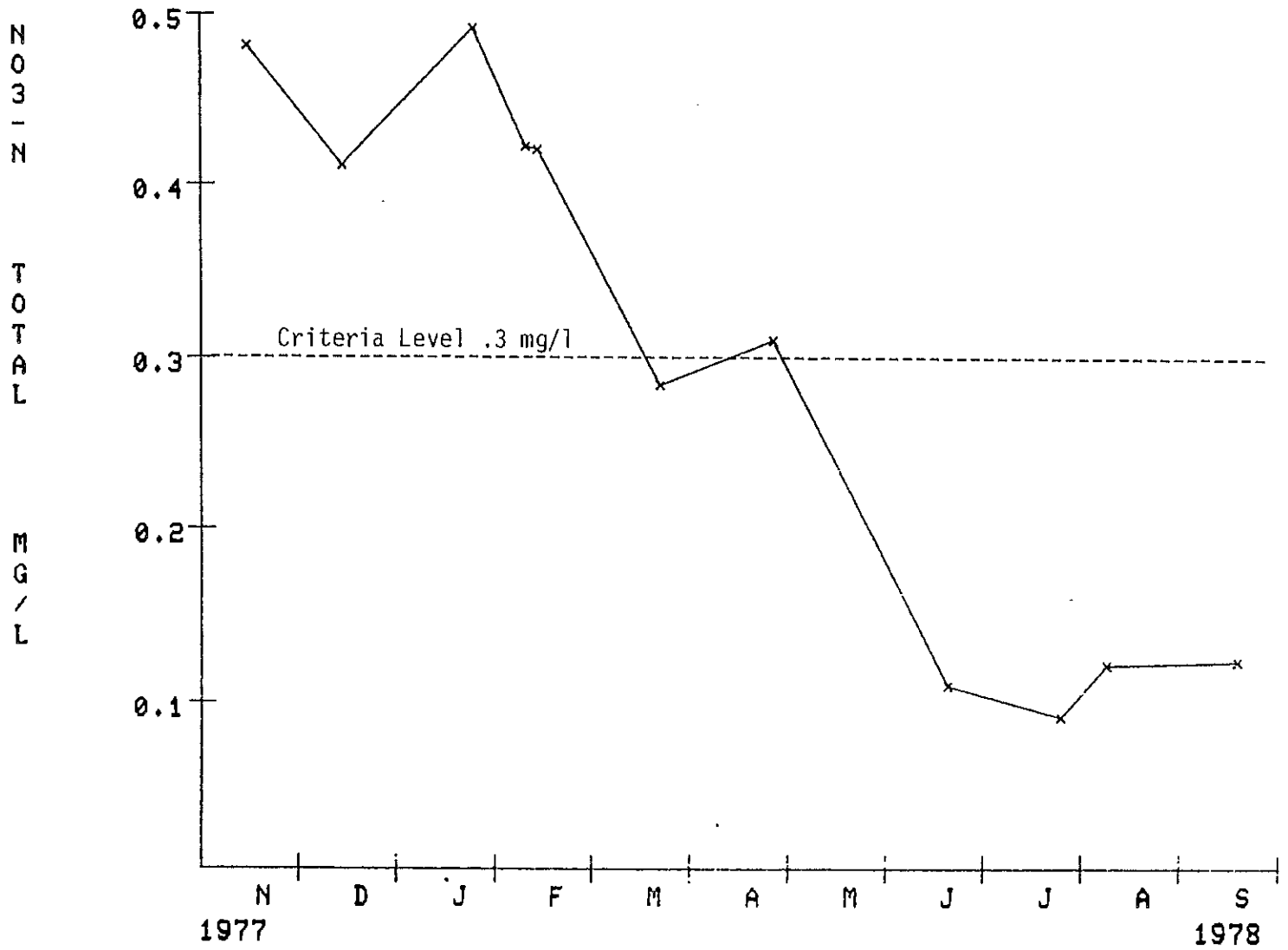
BOISE RIVER AT CAPITOL ST BRIDGE



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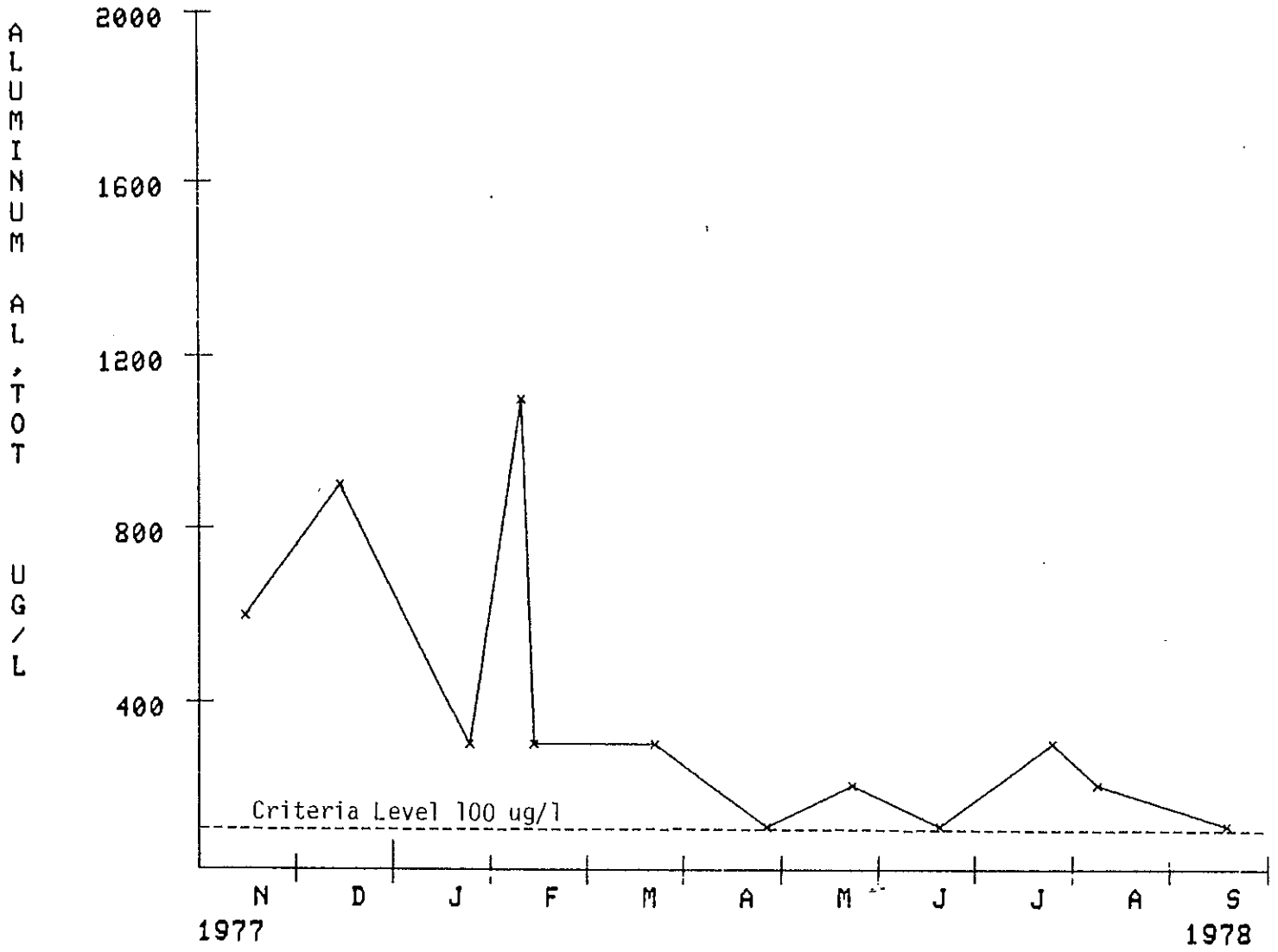

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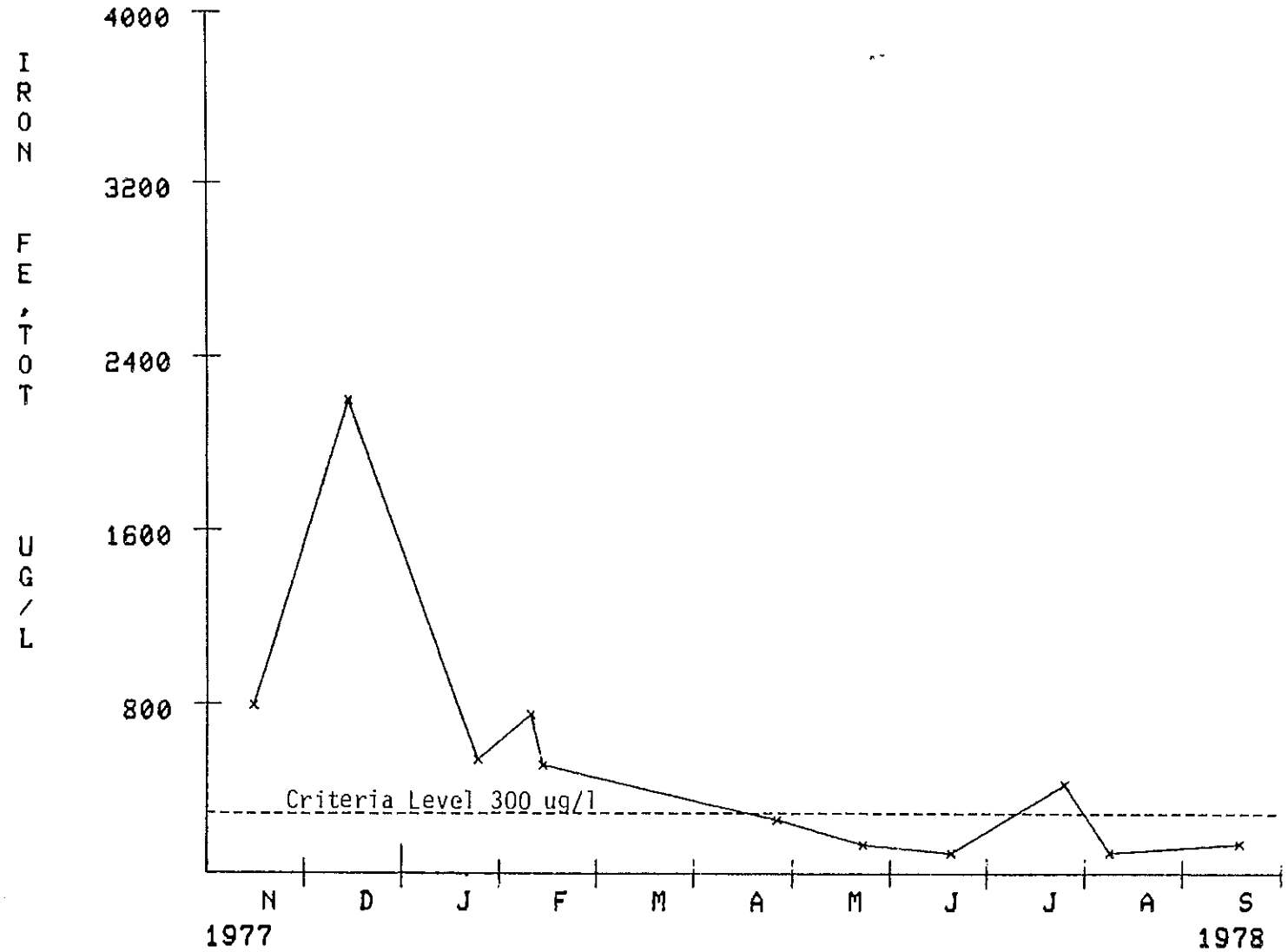
BOISE RIVER AT CAPITOL ST BRIDGE



BOISE RIVER
INTENSIVE SURVEY DATA FOR 6 DAYS OF MONITORING
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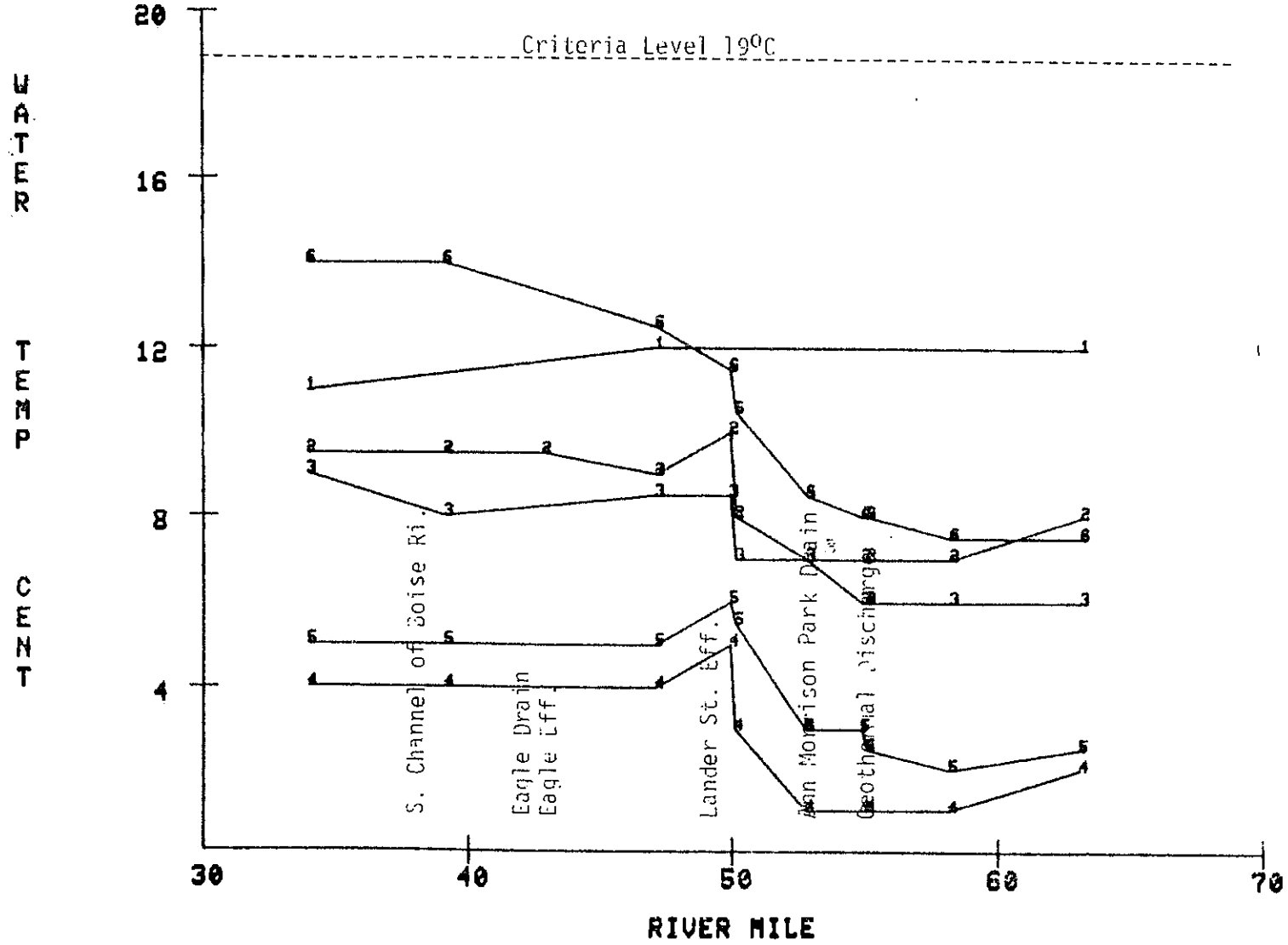
4 : 01-25-78 5 : 02-14-78 6 : 03-22-78



BOISE RIVER
INTENSIVE SURVEY DATA FOR 6 DAYS OF MONITORING
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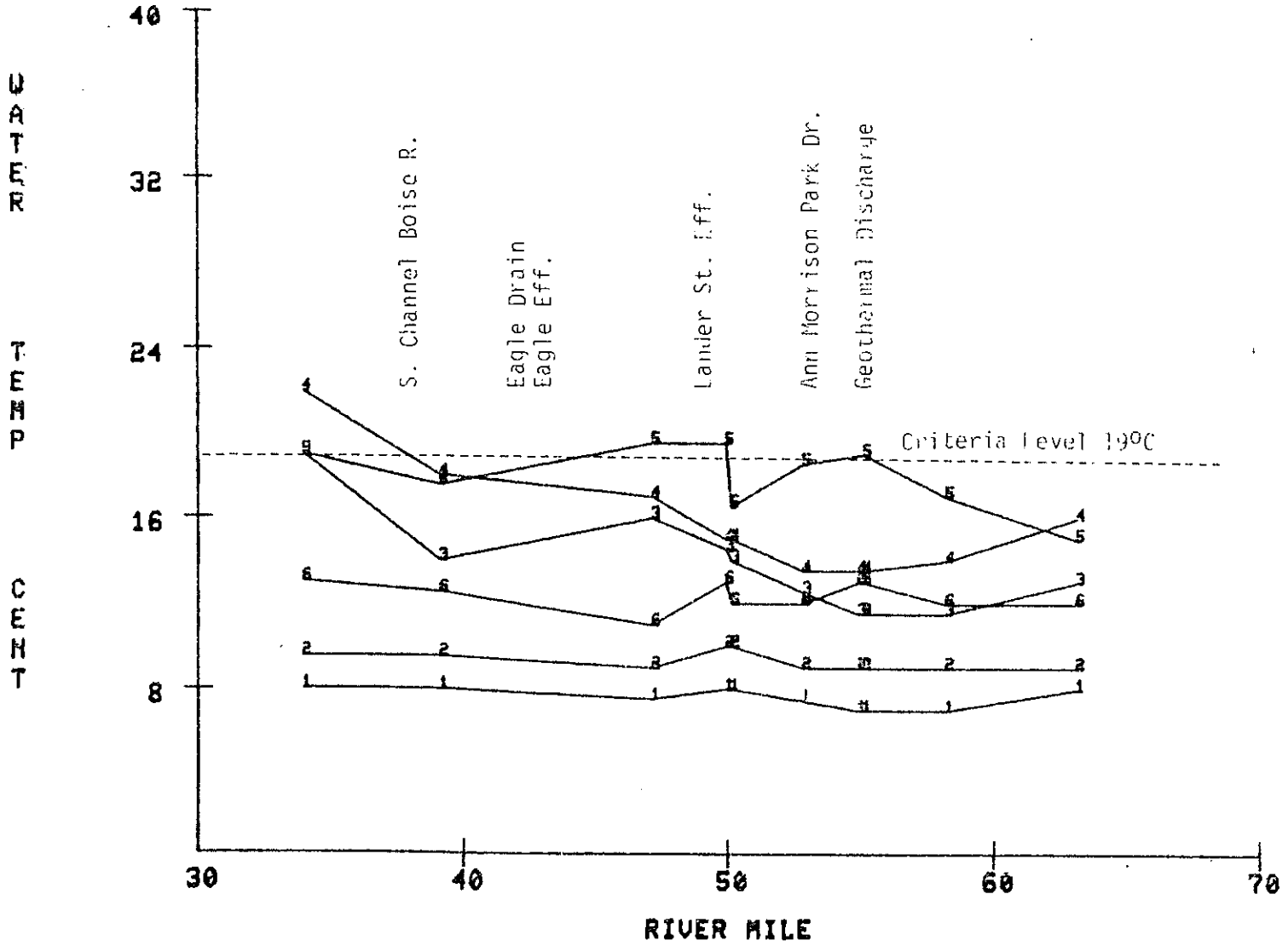

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INTENSIVE SURVEY DATA FOR 6 DAYS OF MONITORING
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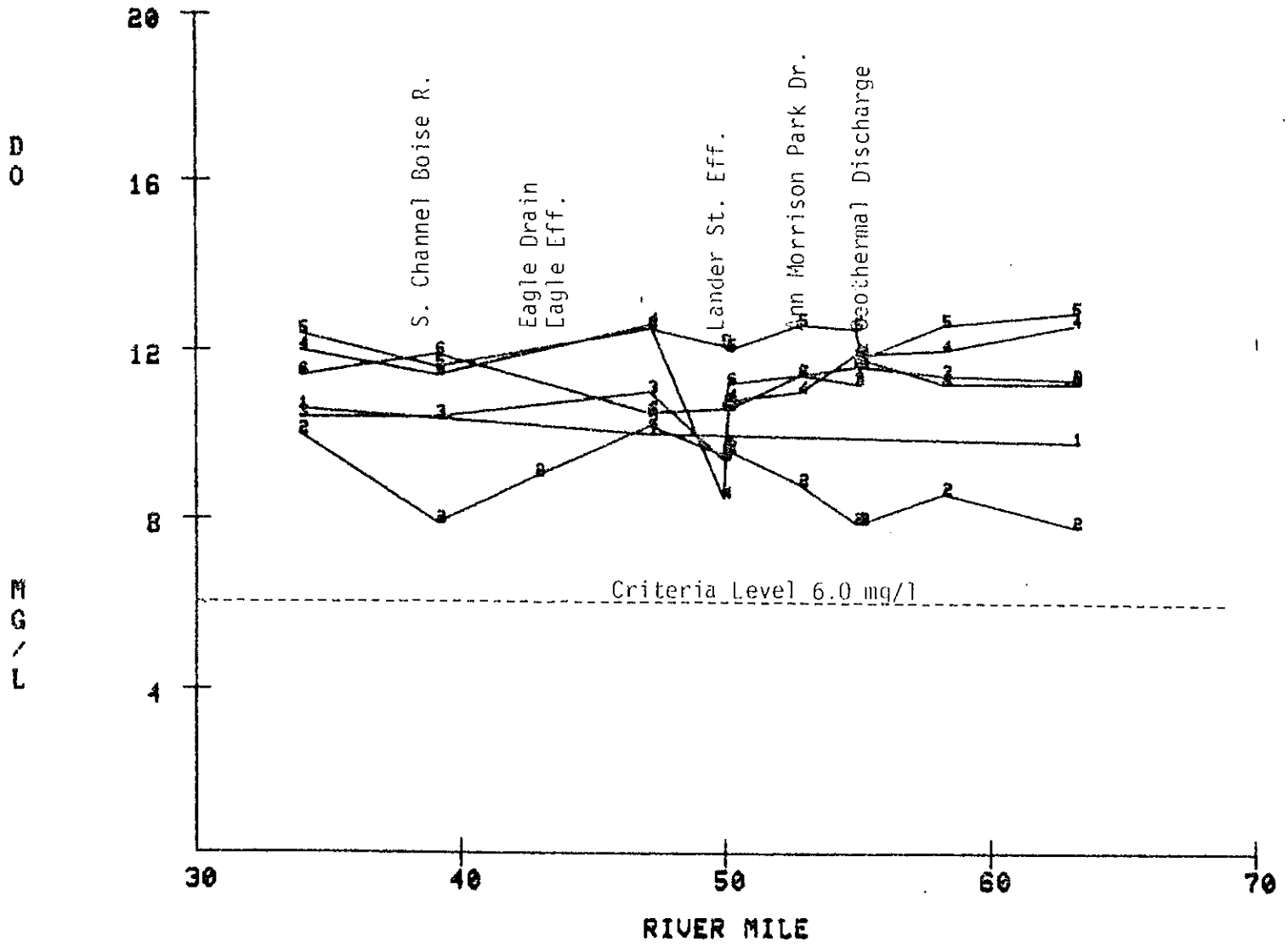
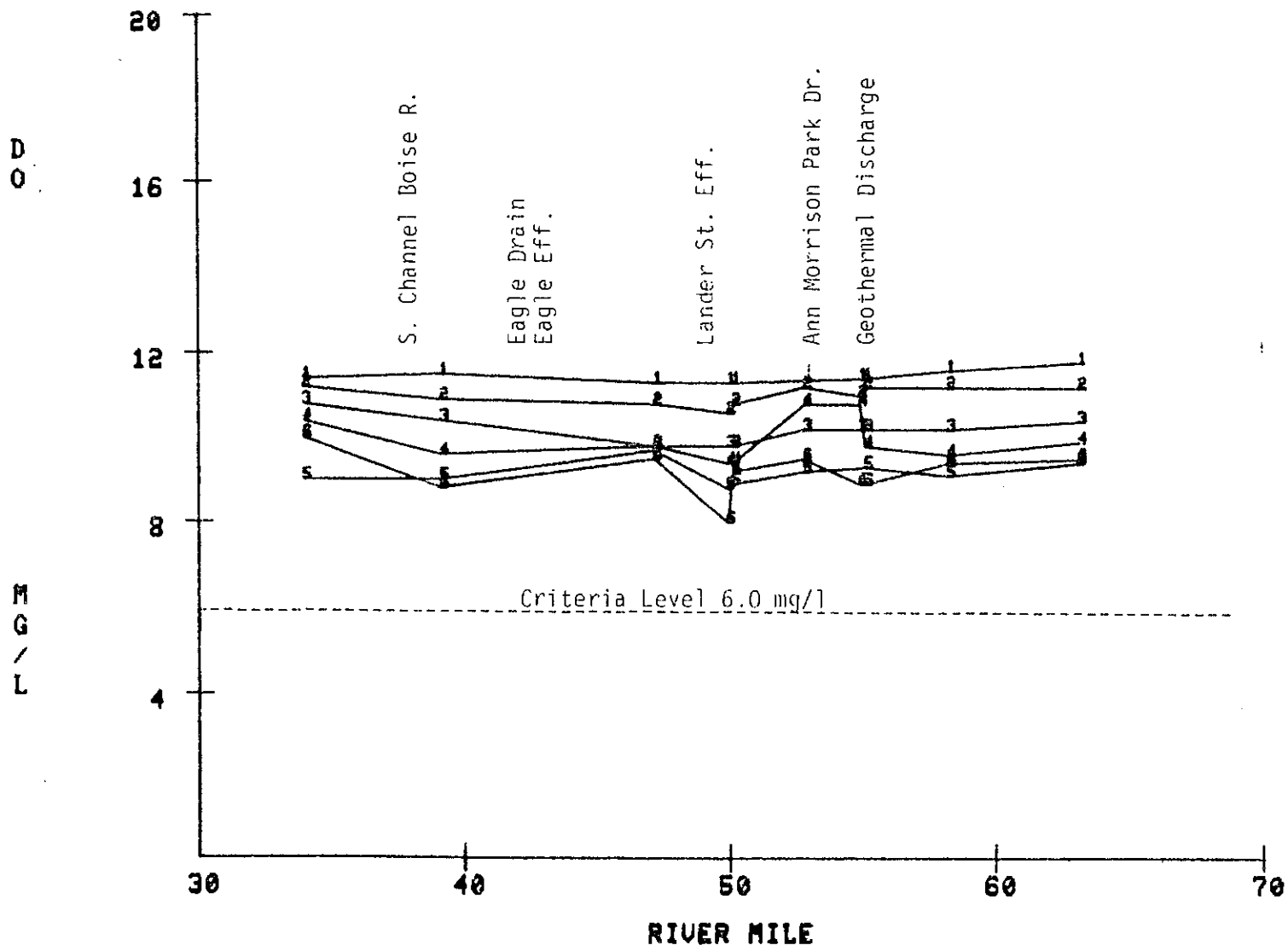


BOISE RIVER
INTENSIVE SURVEY DATA FOR 6 DAYS OF MONITORING

1 : 04-27-78 2 : 05-23-78 3 : 06-20-78
4 : 07-25-78 5 : 08-08-78 6 : 09-19-78



BOISE RIVER
INTENSIVE SURVEY DATA FOR 5 DAYS OF MONITORING
1 : 12-06-76 2 : 01-17-77 3 : 02-07-77
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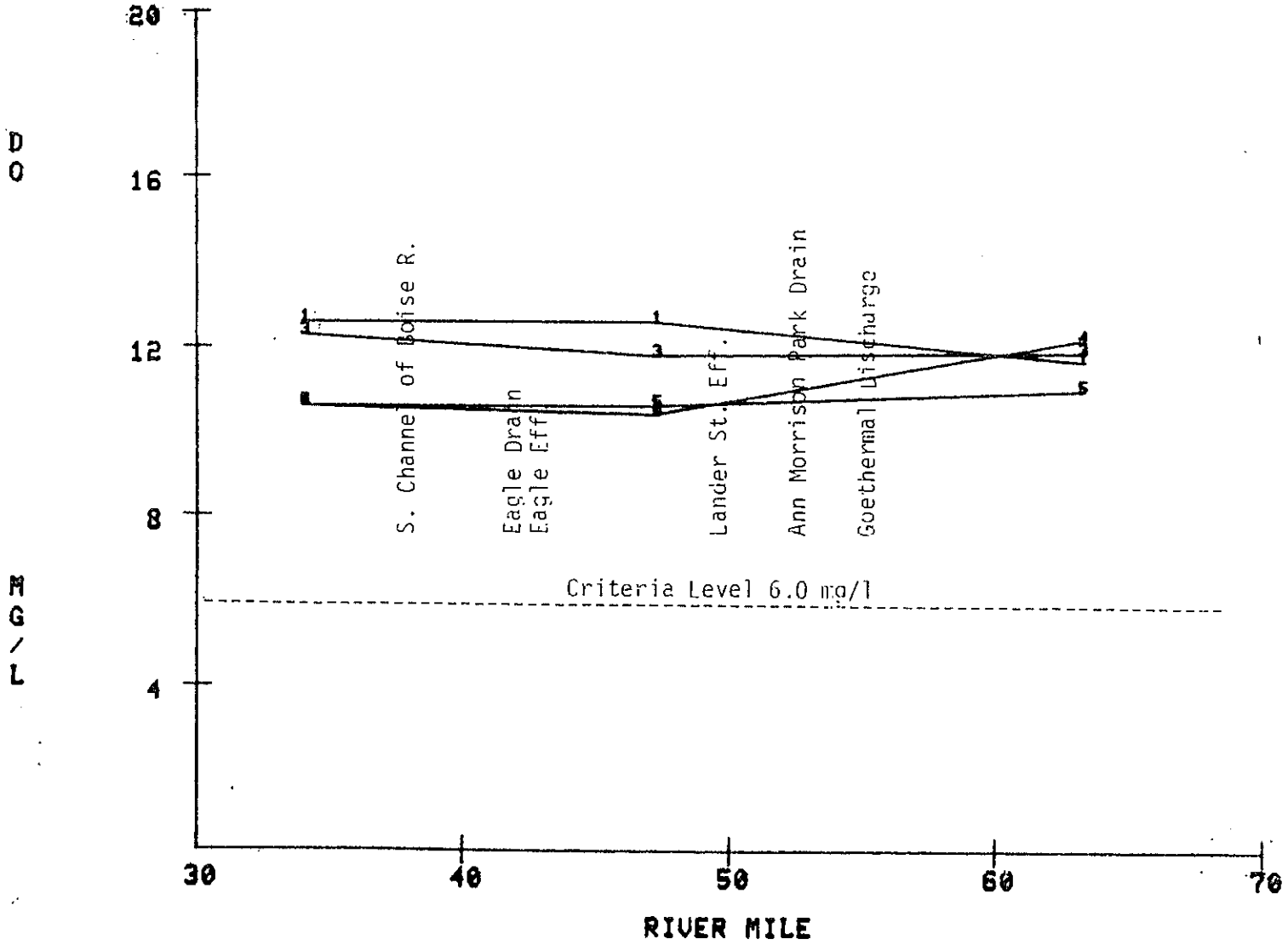

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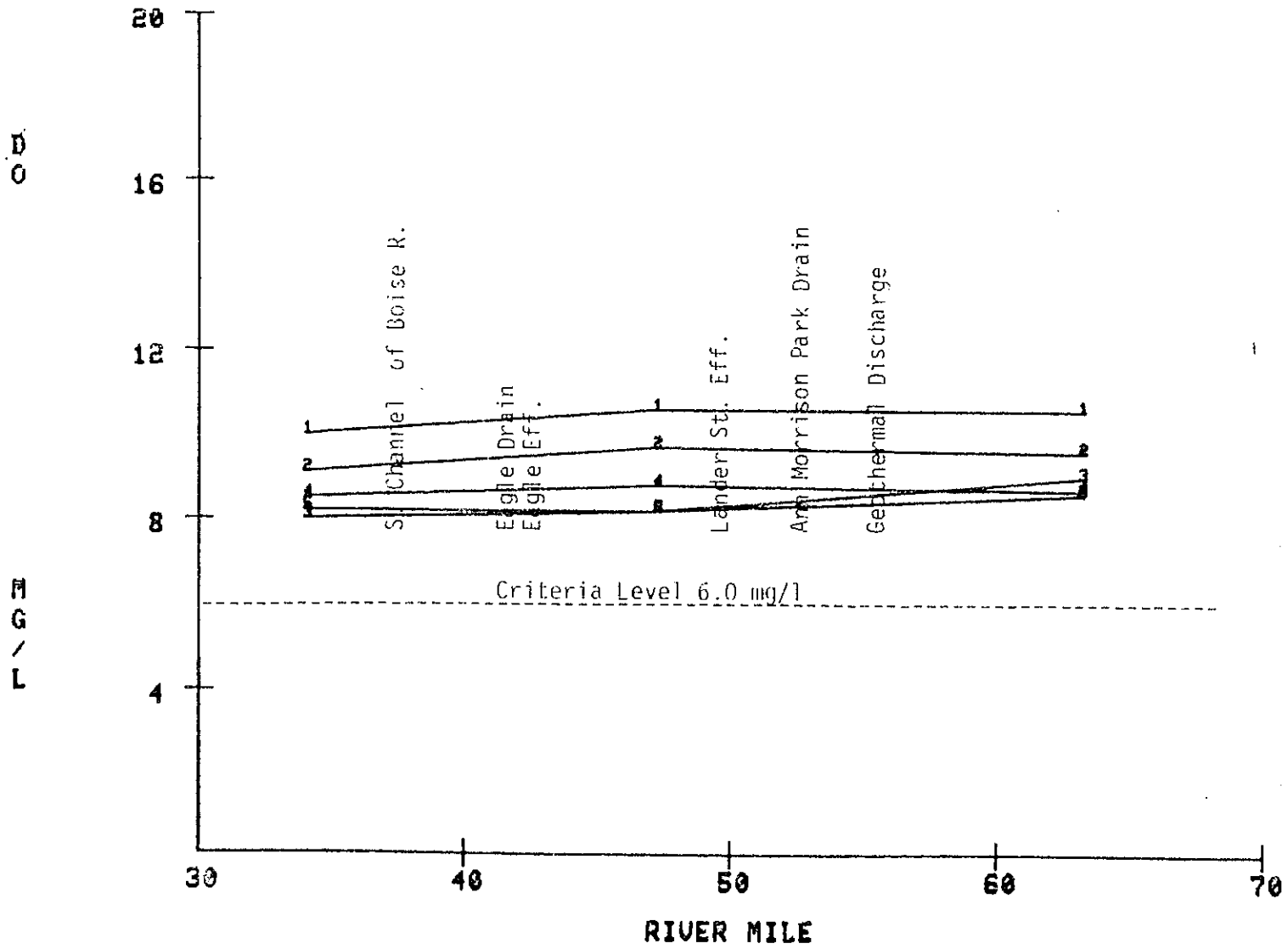

BOISE RIVER
INTENSIVE SURVEY DATA FOR 6 DAYS OF MONITORING

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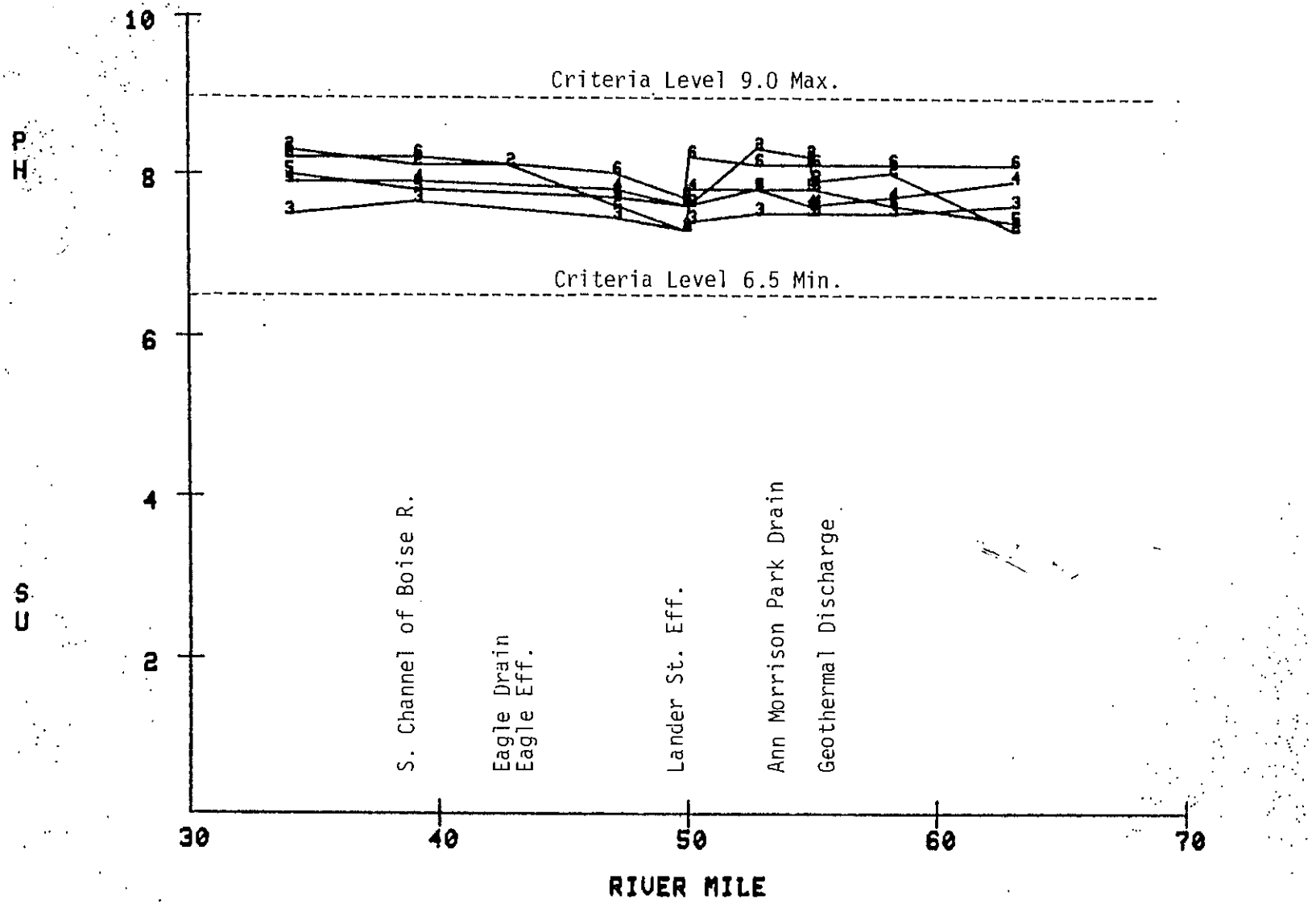

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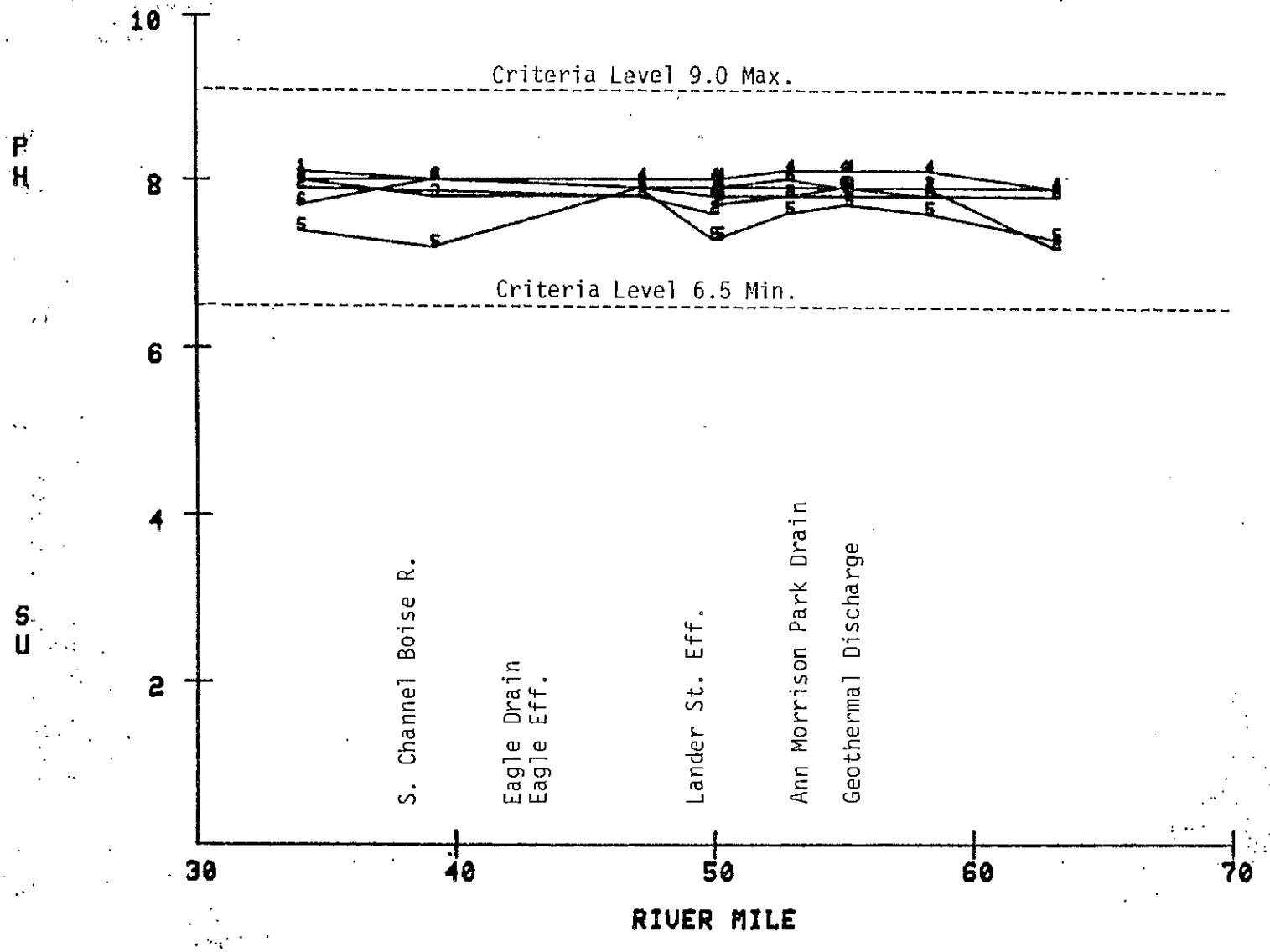

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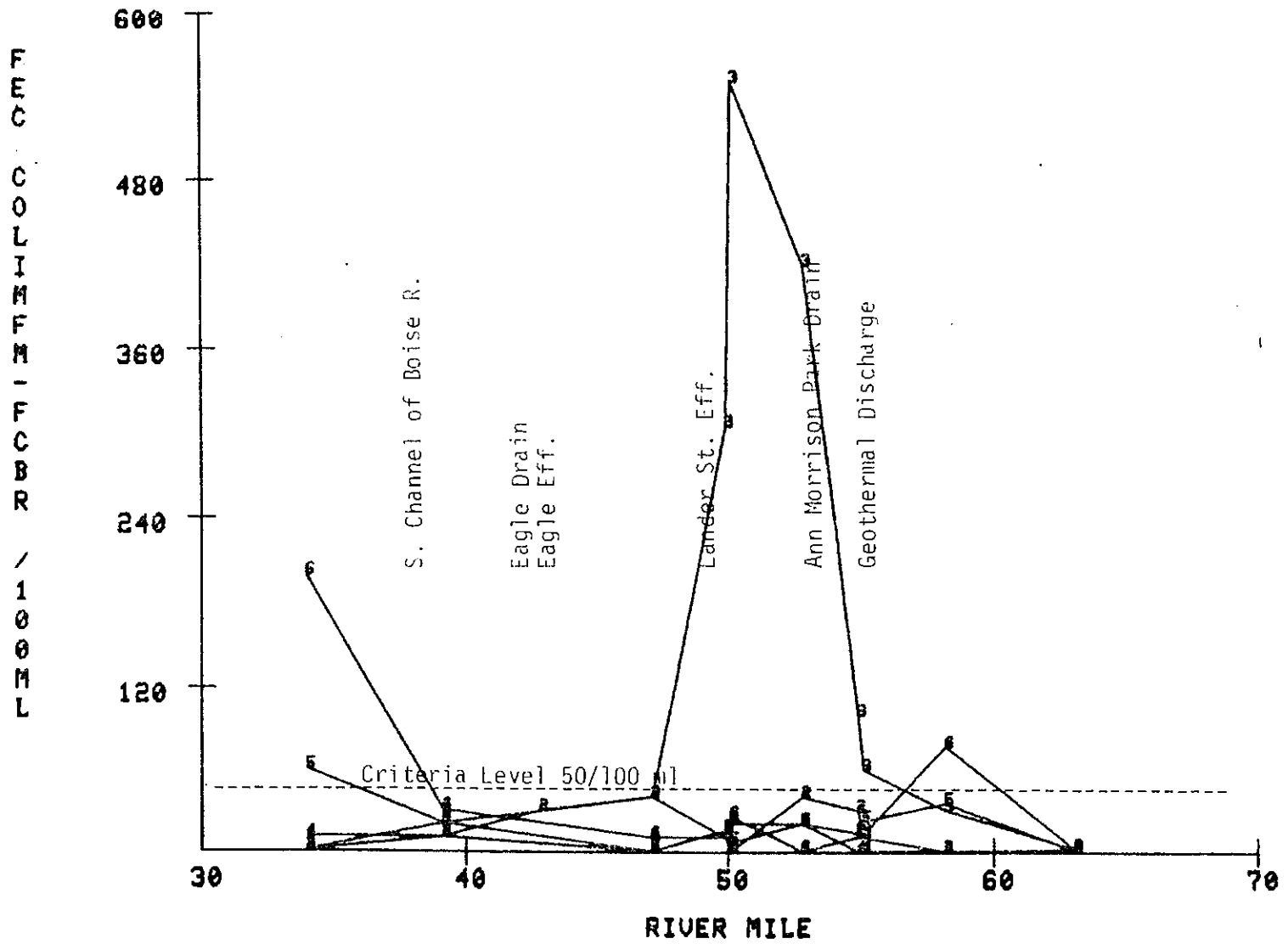

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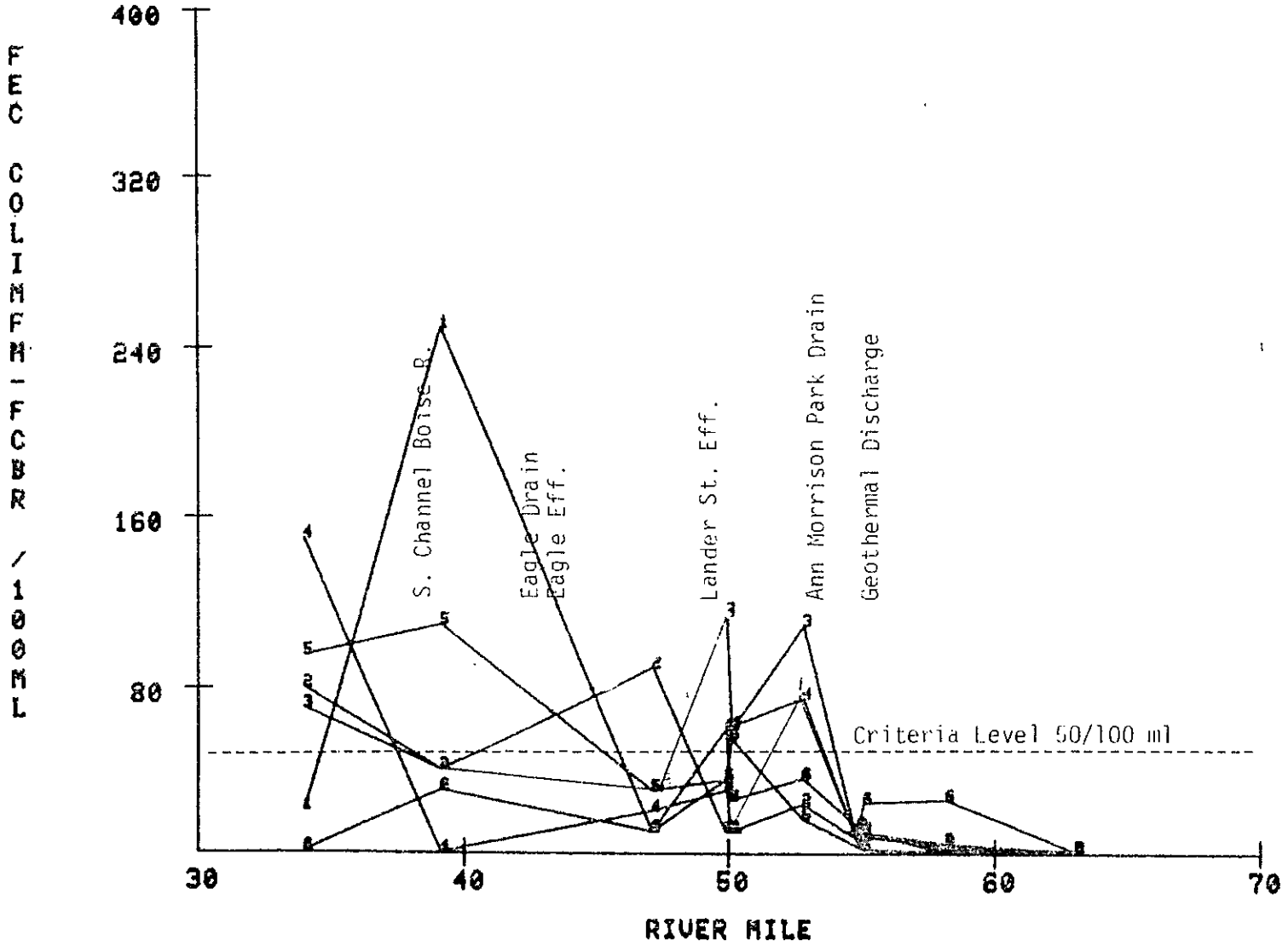

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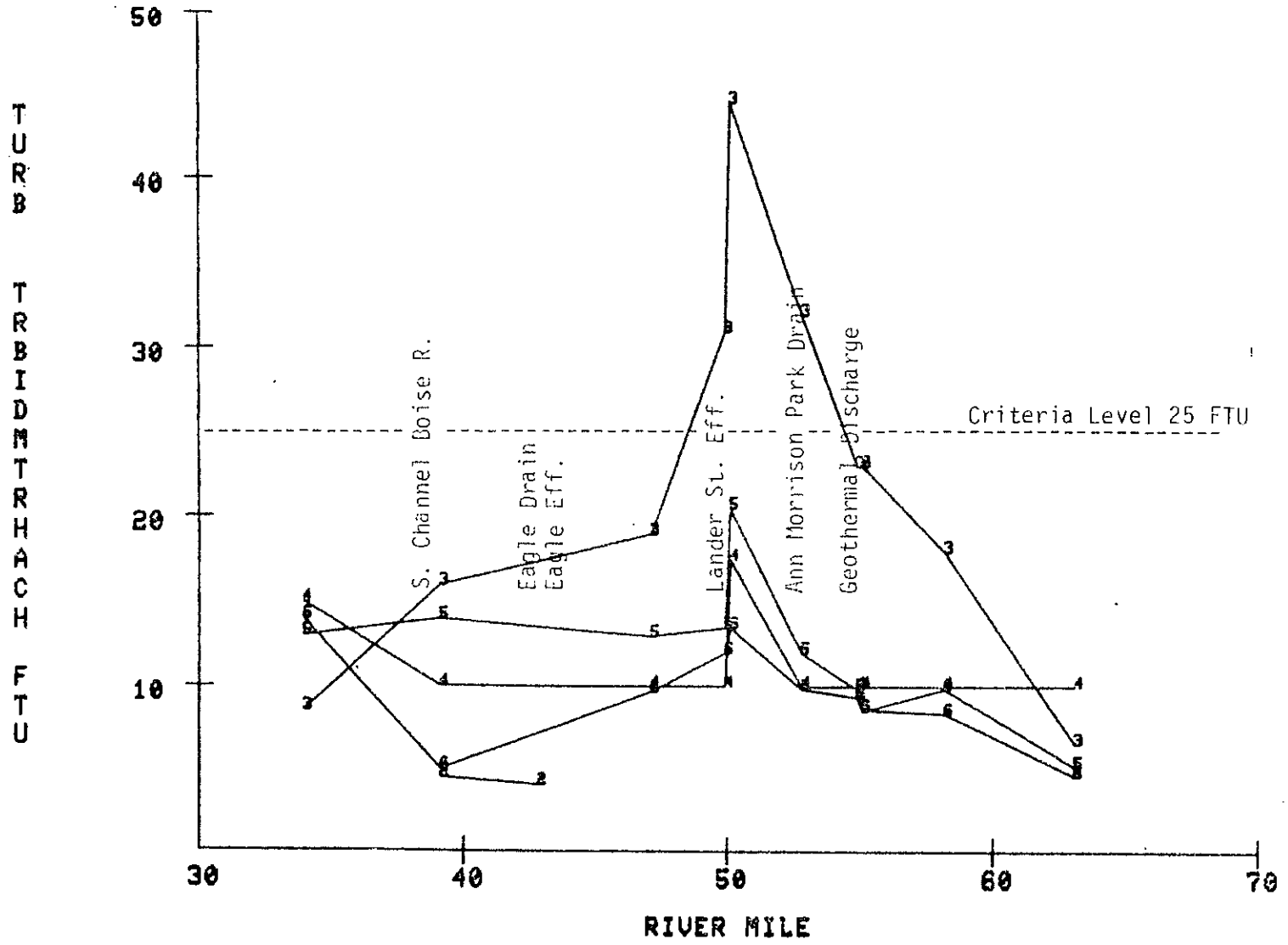

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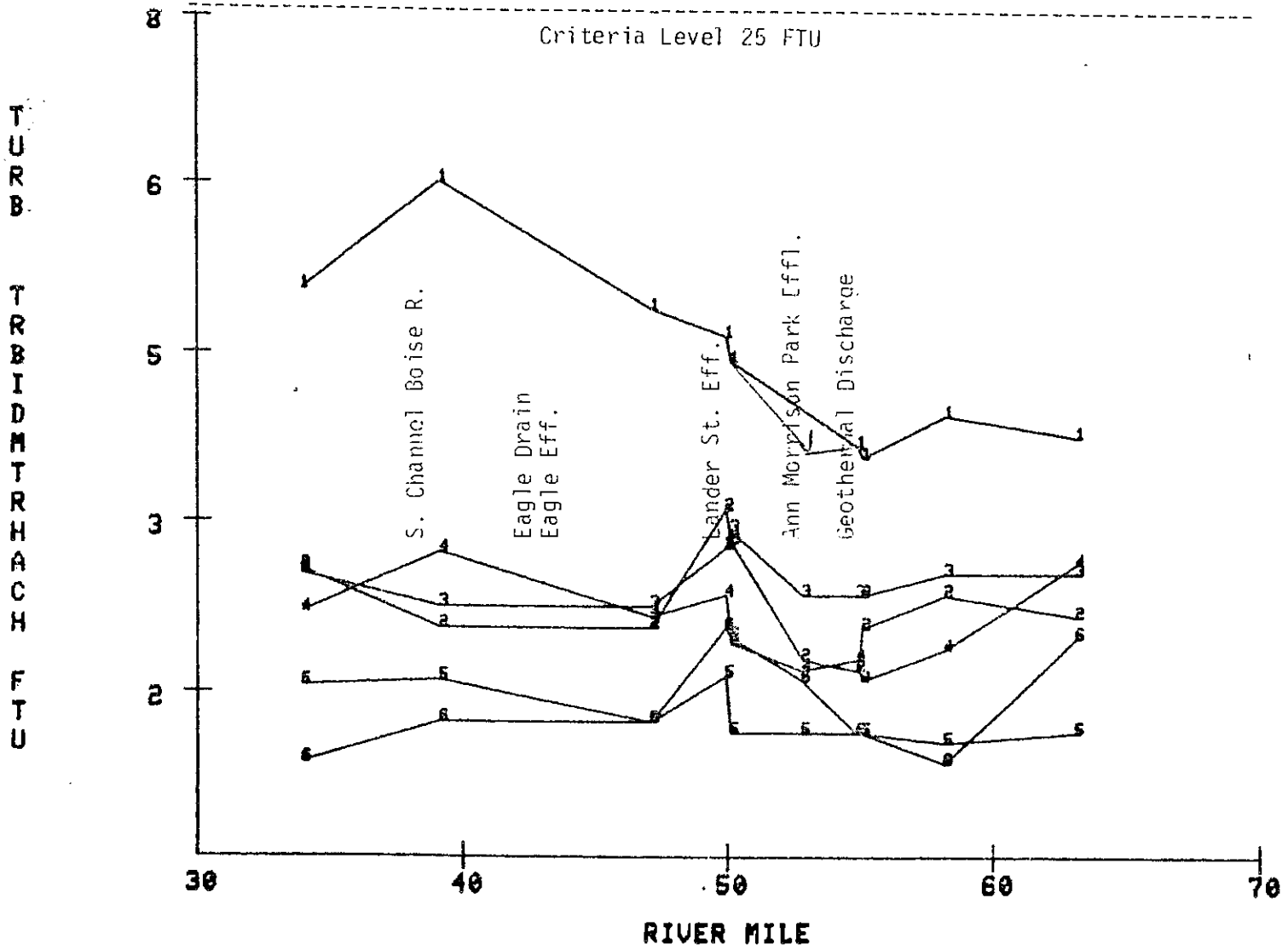

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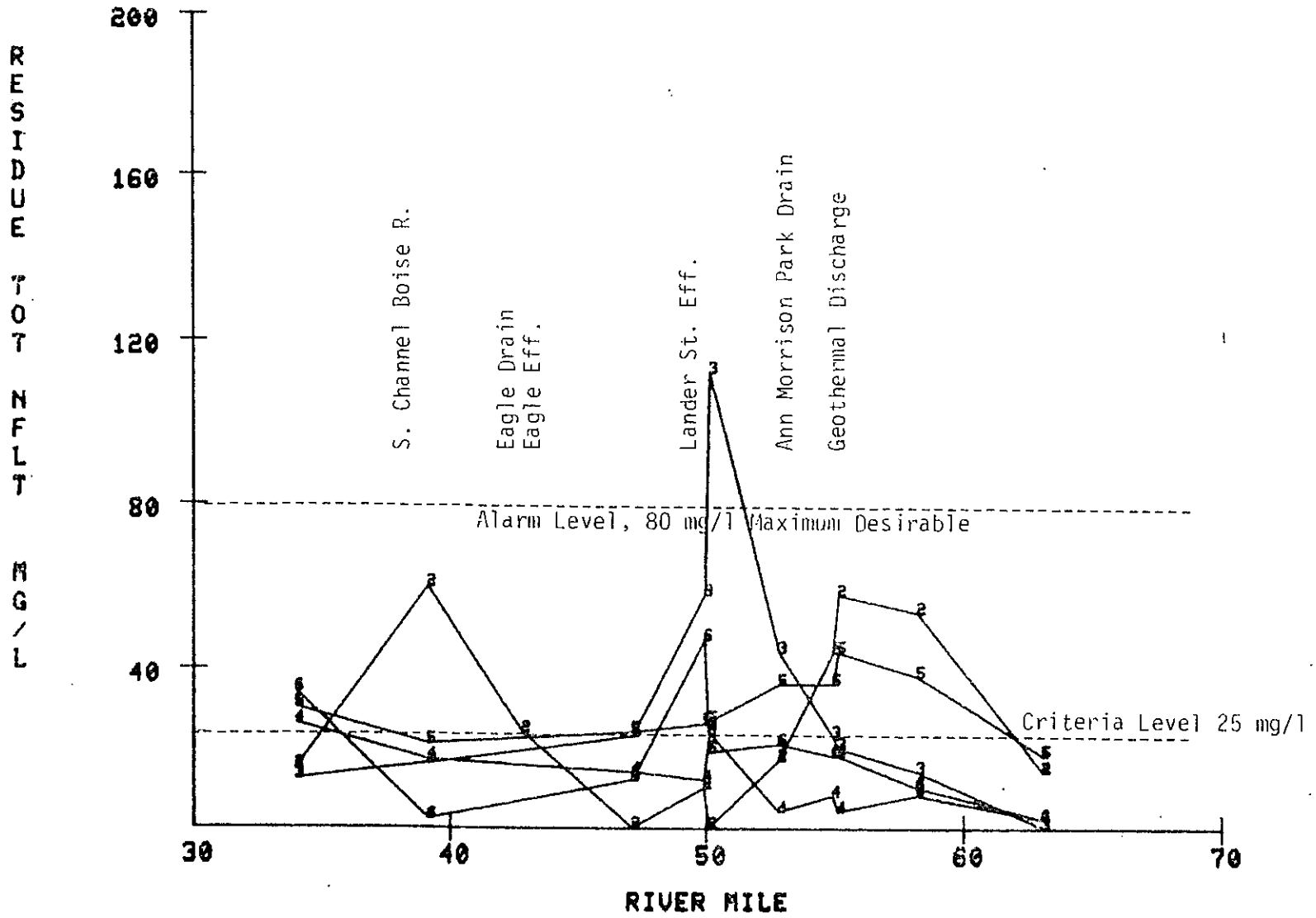

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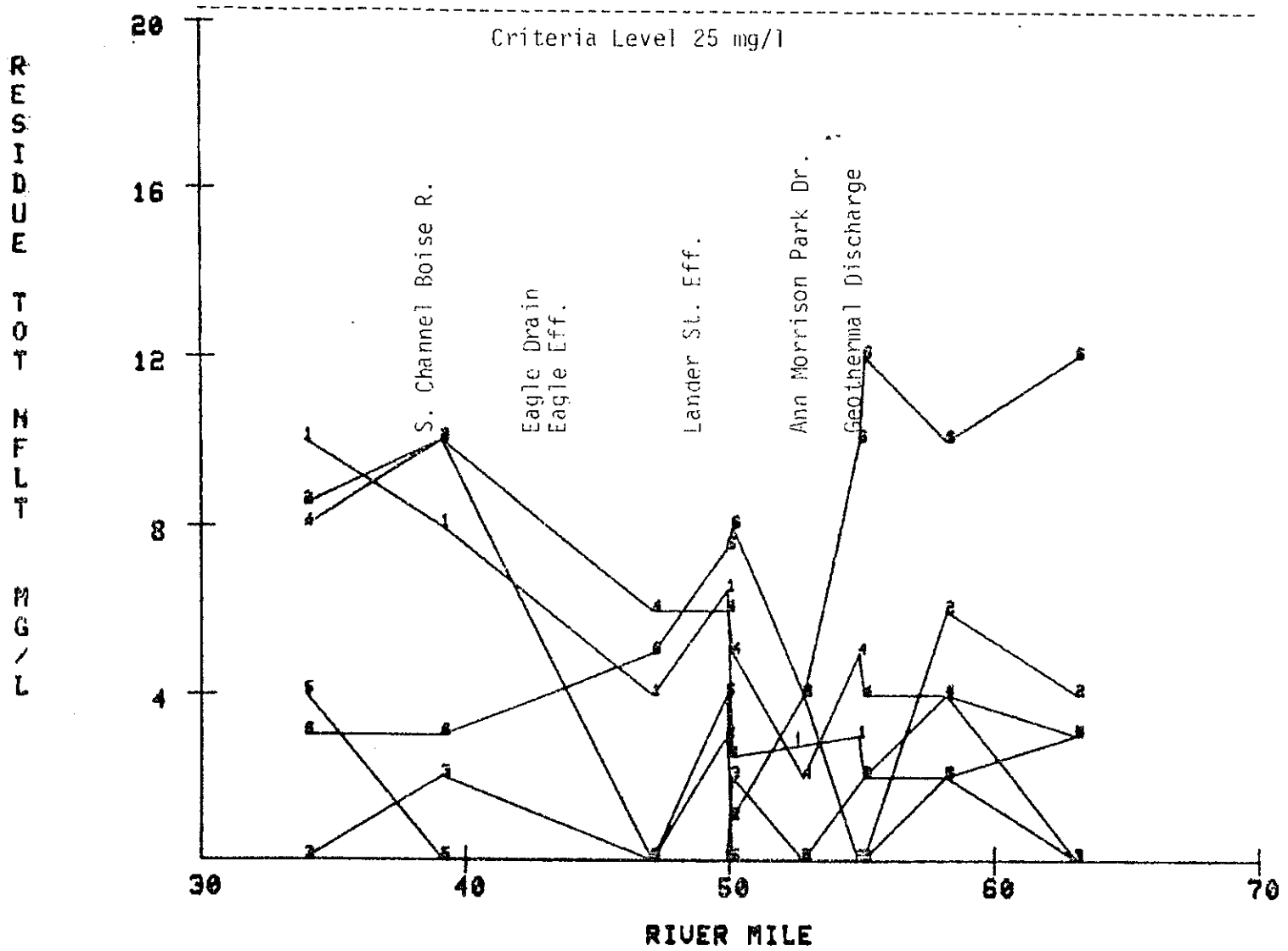

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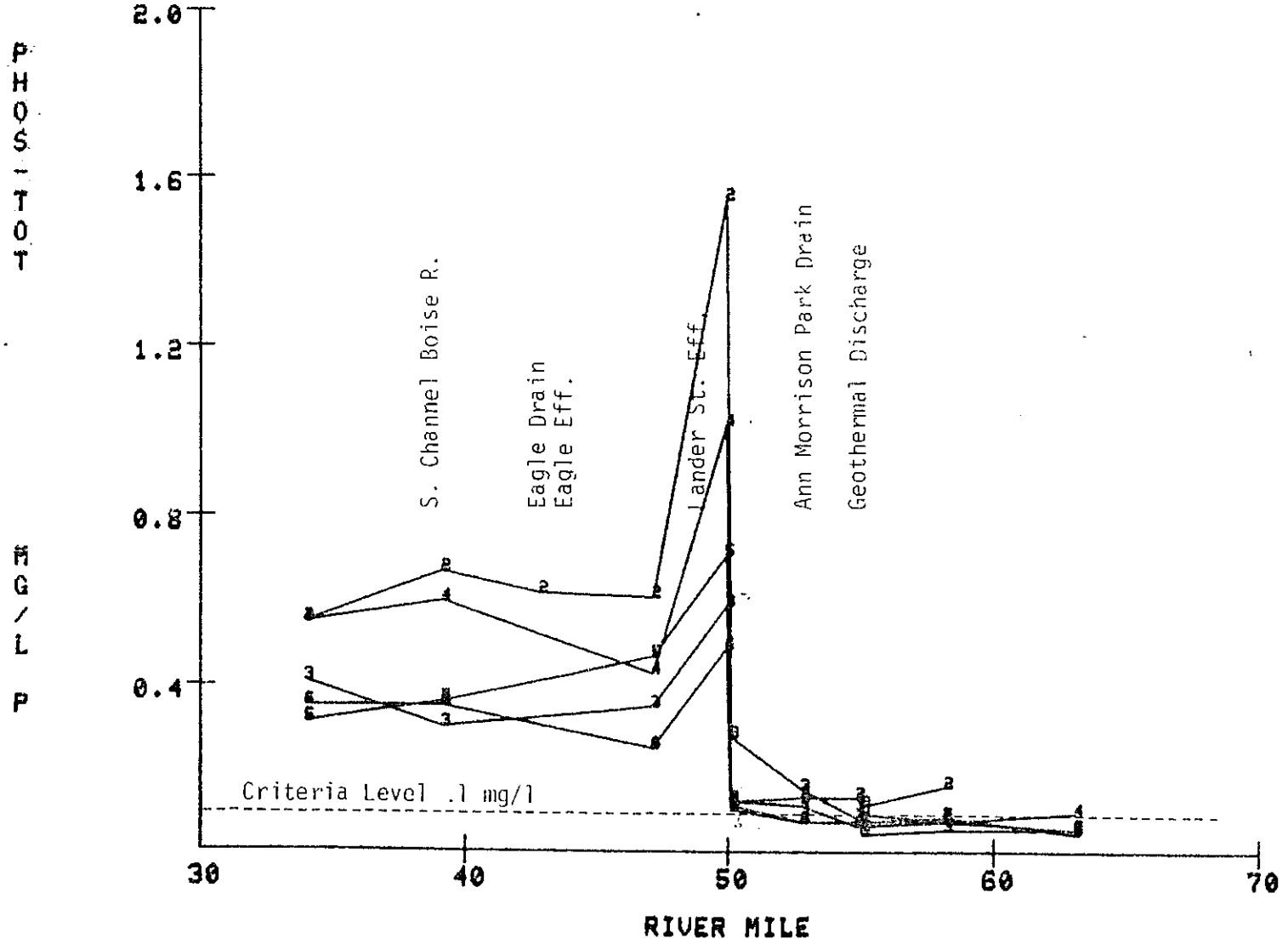

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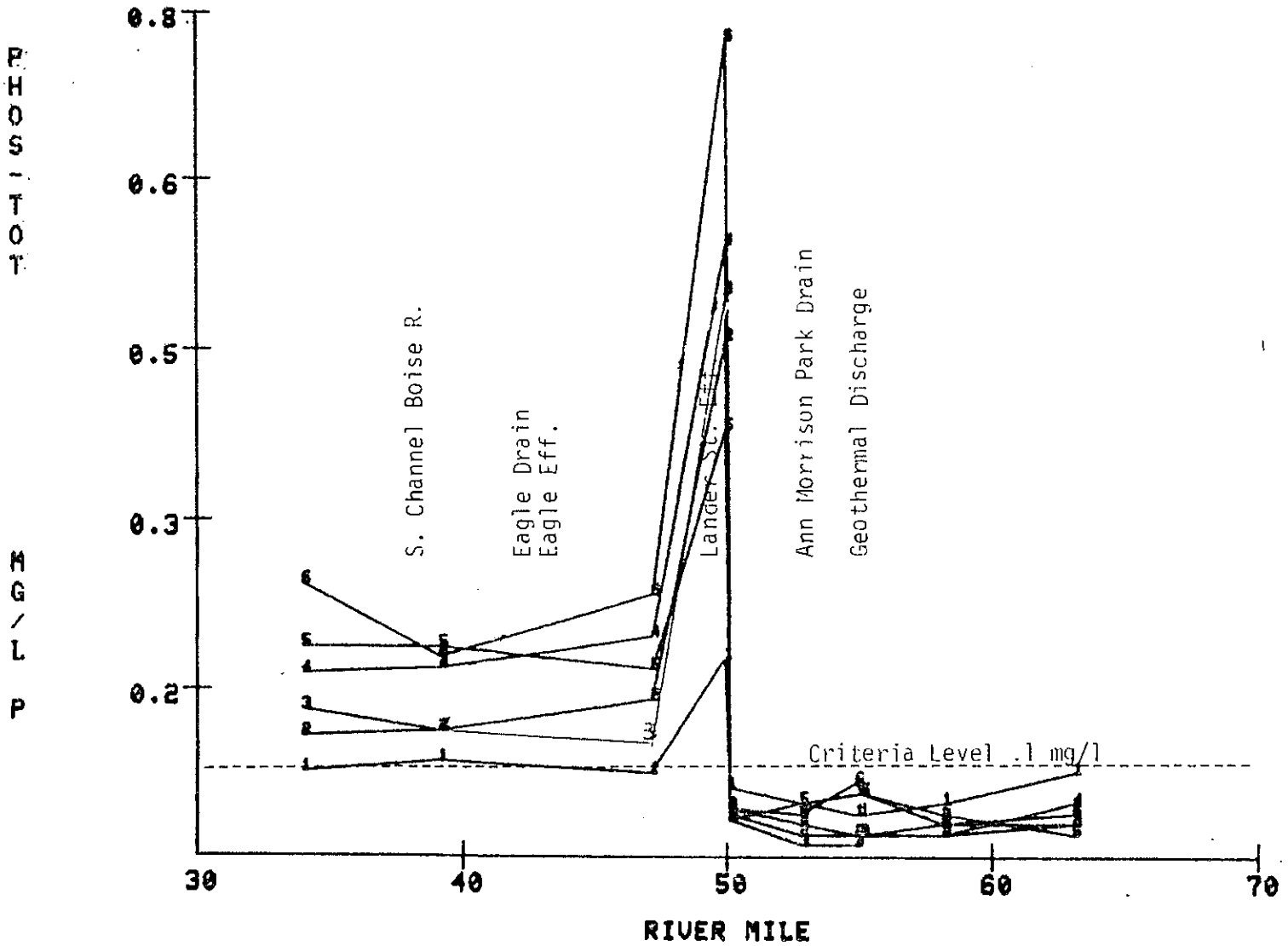

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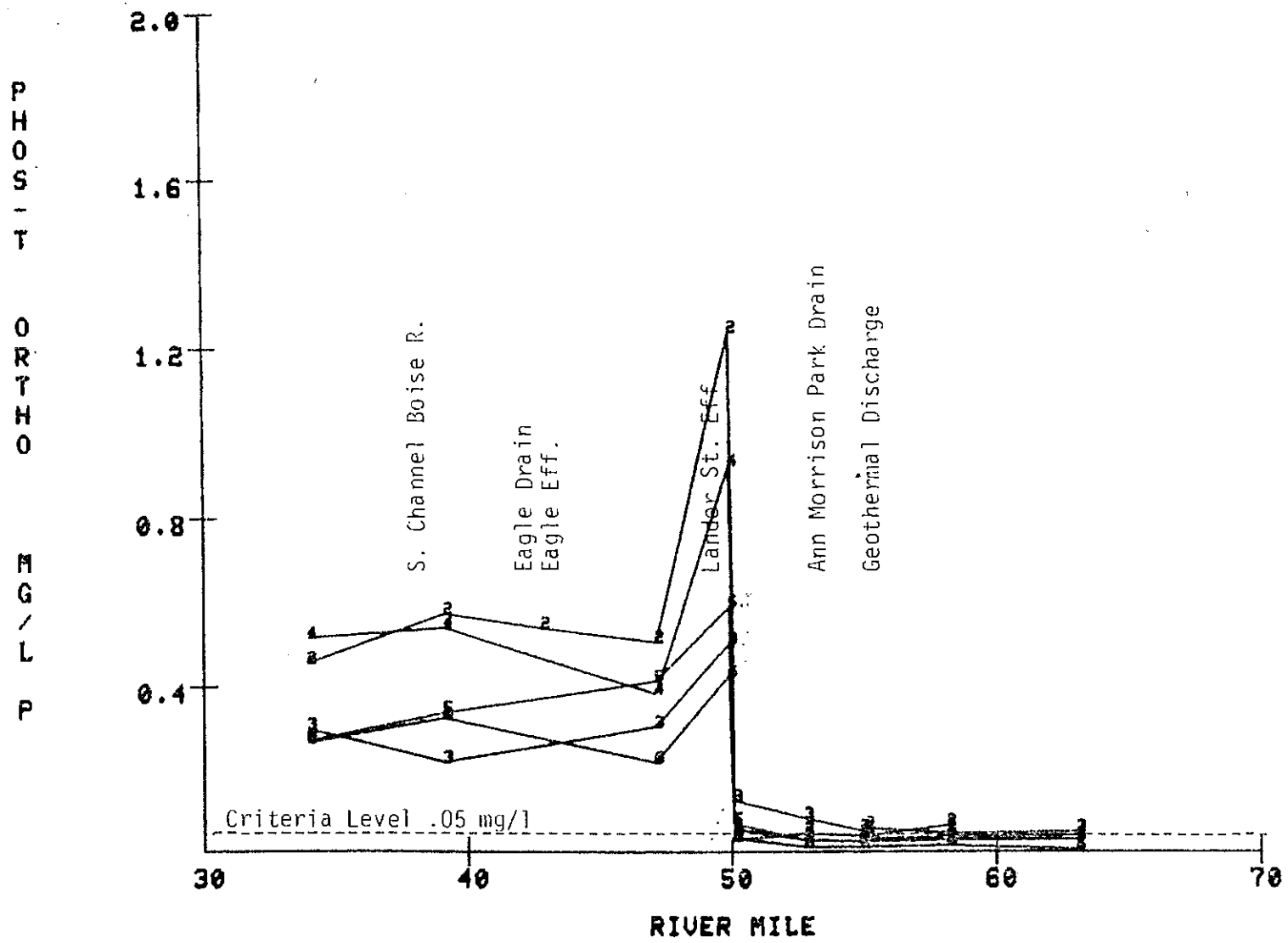

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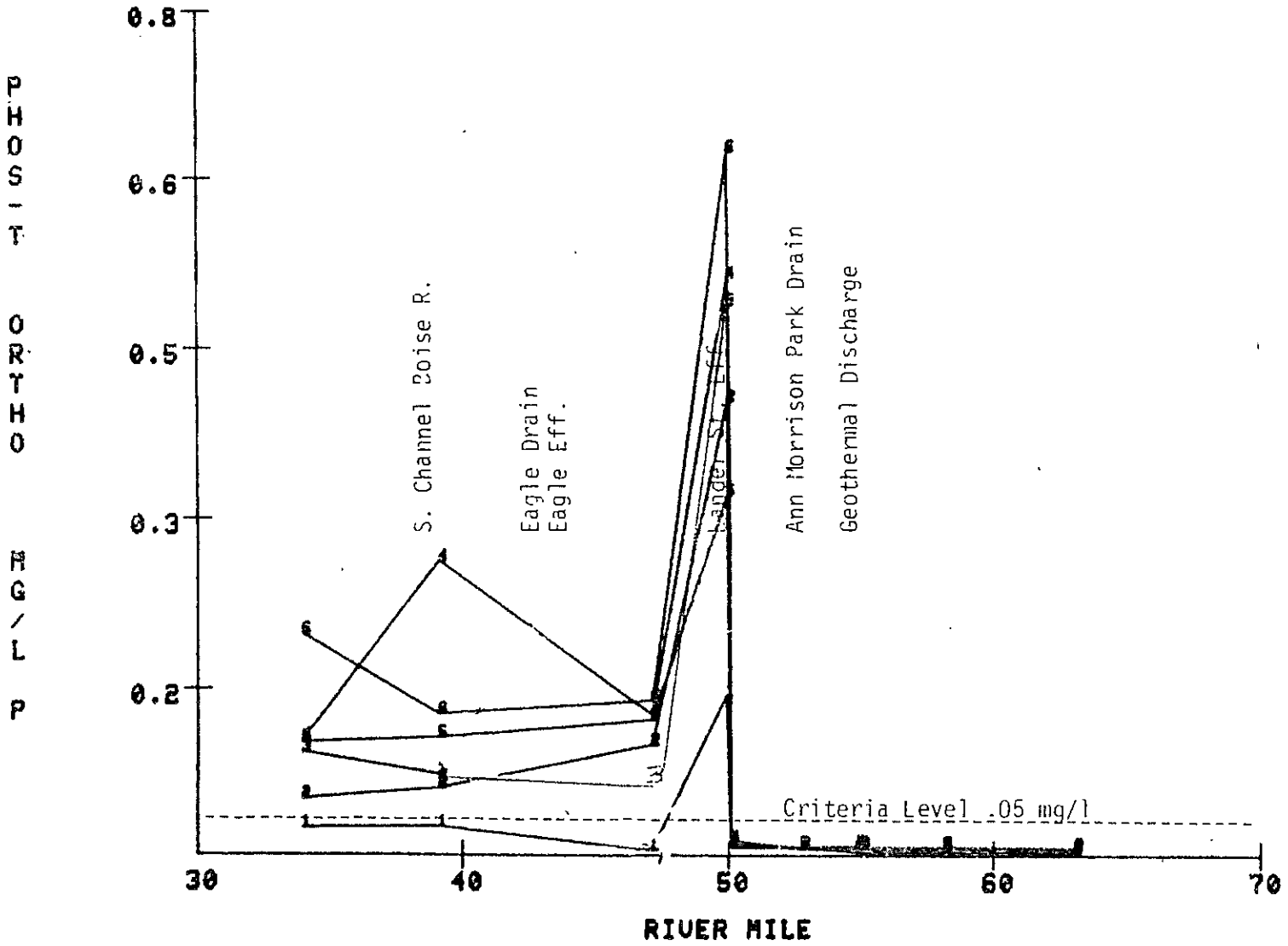

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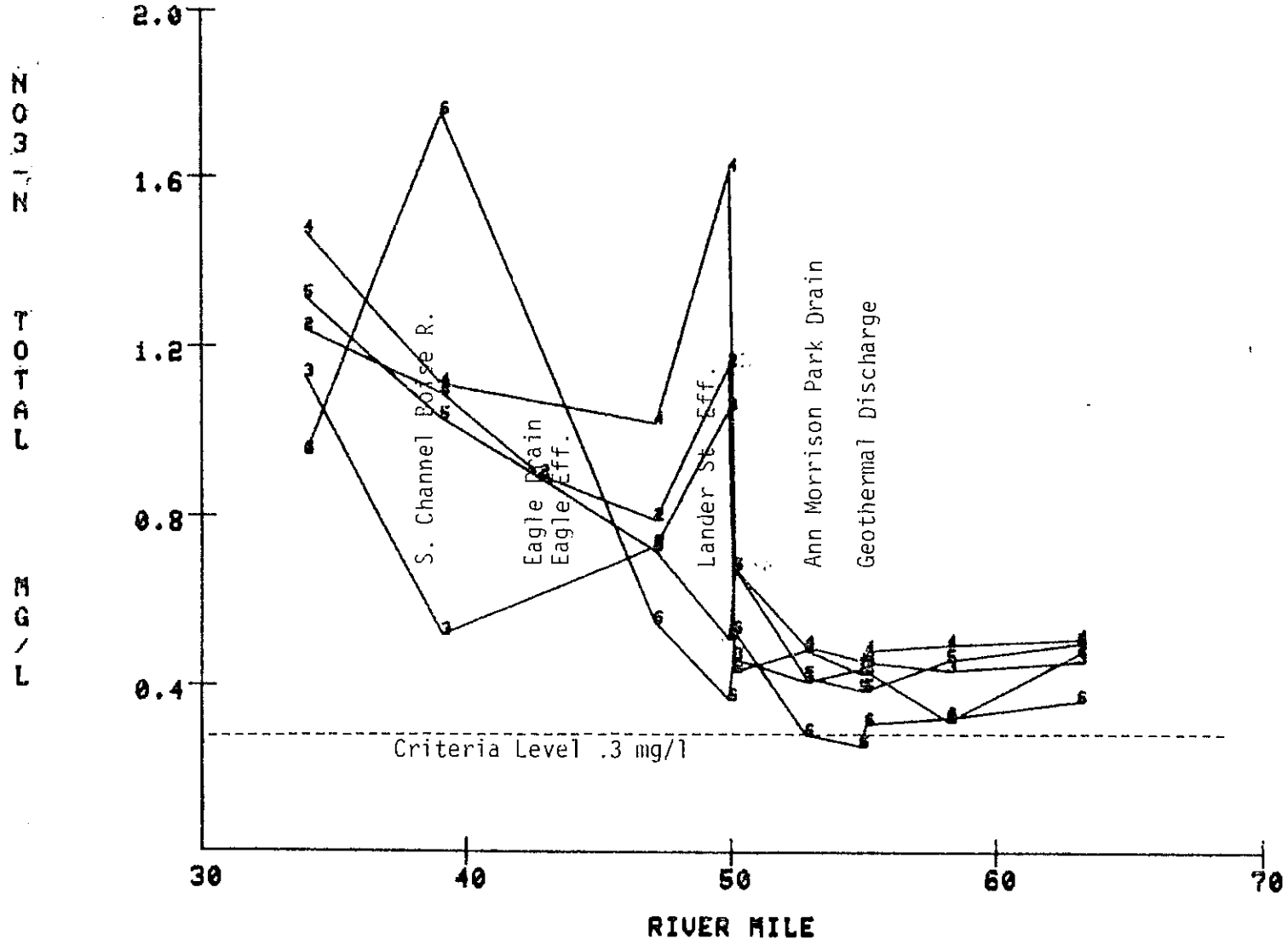

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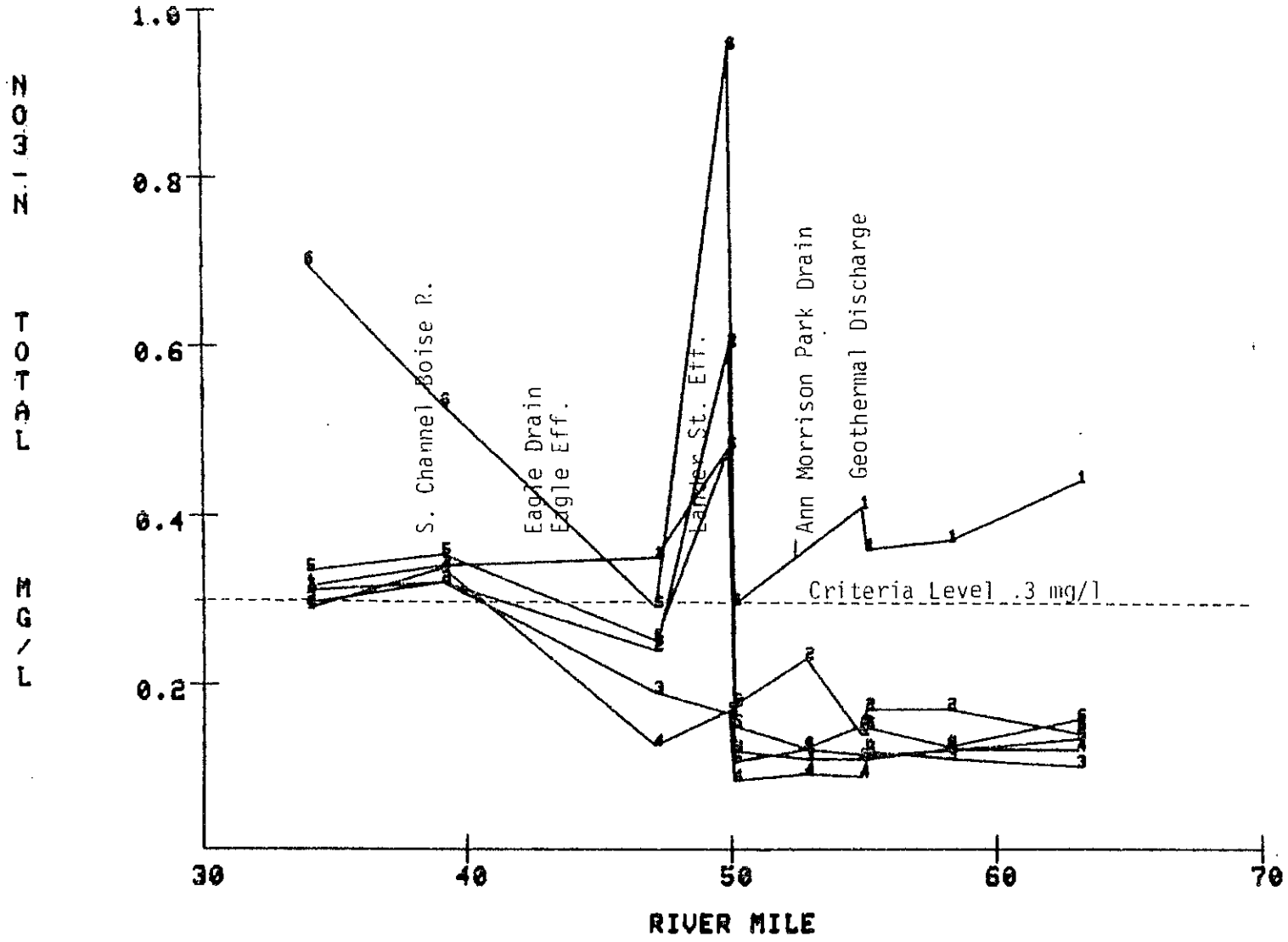

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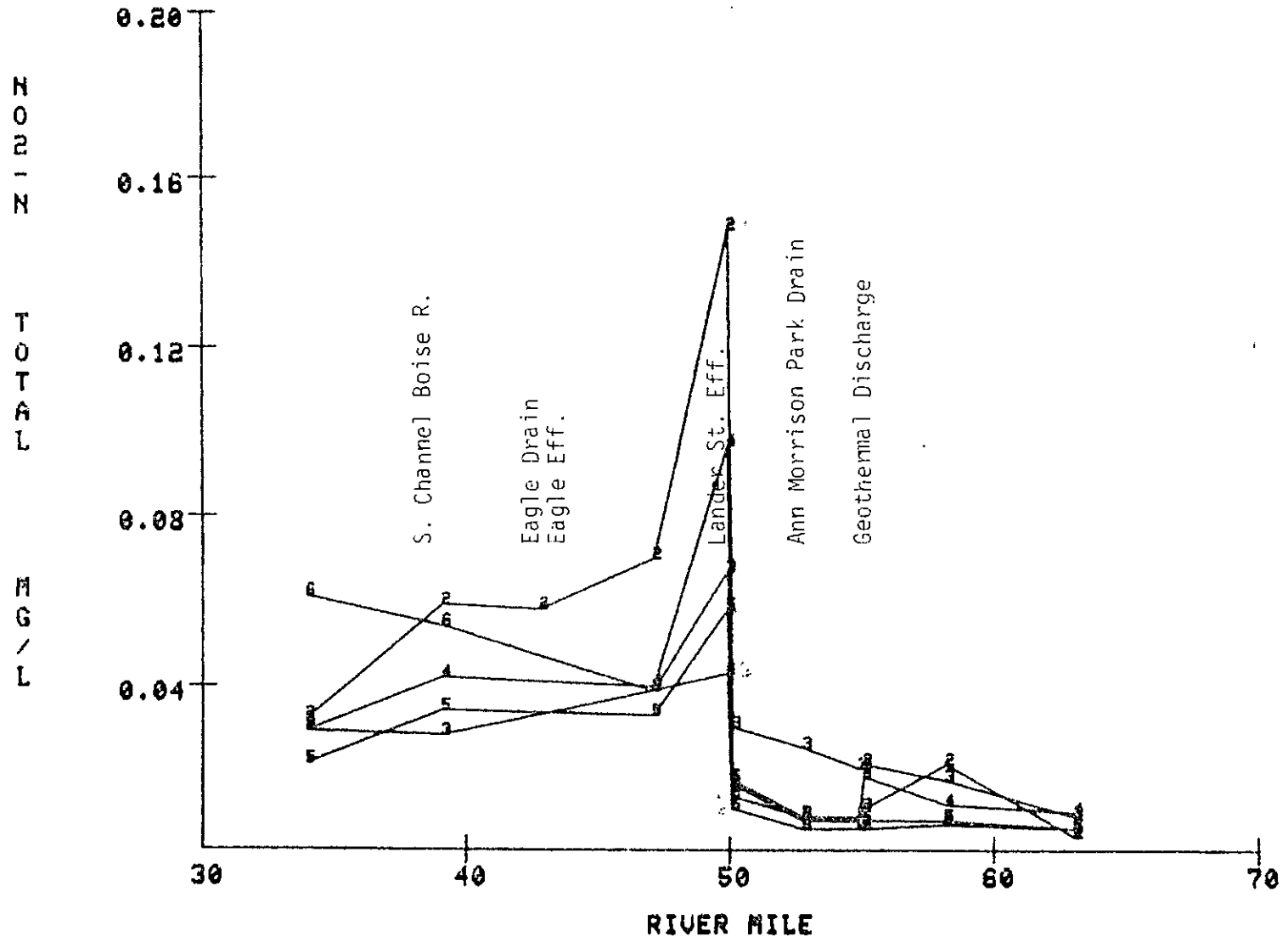

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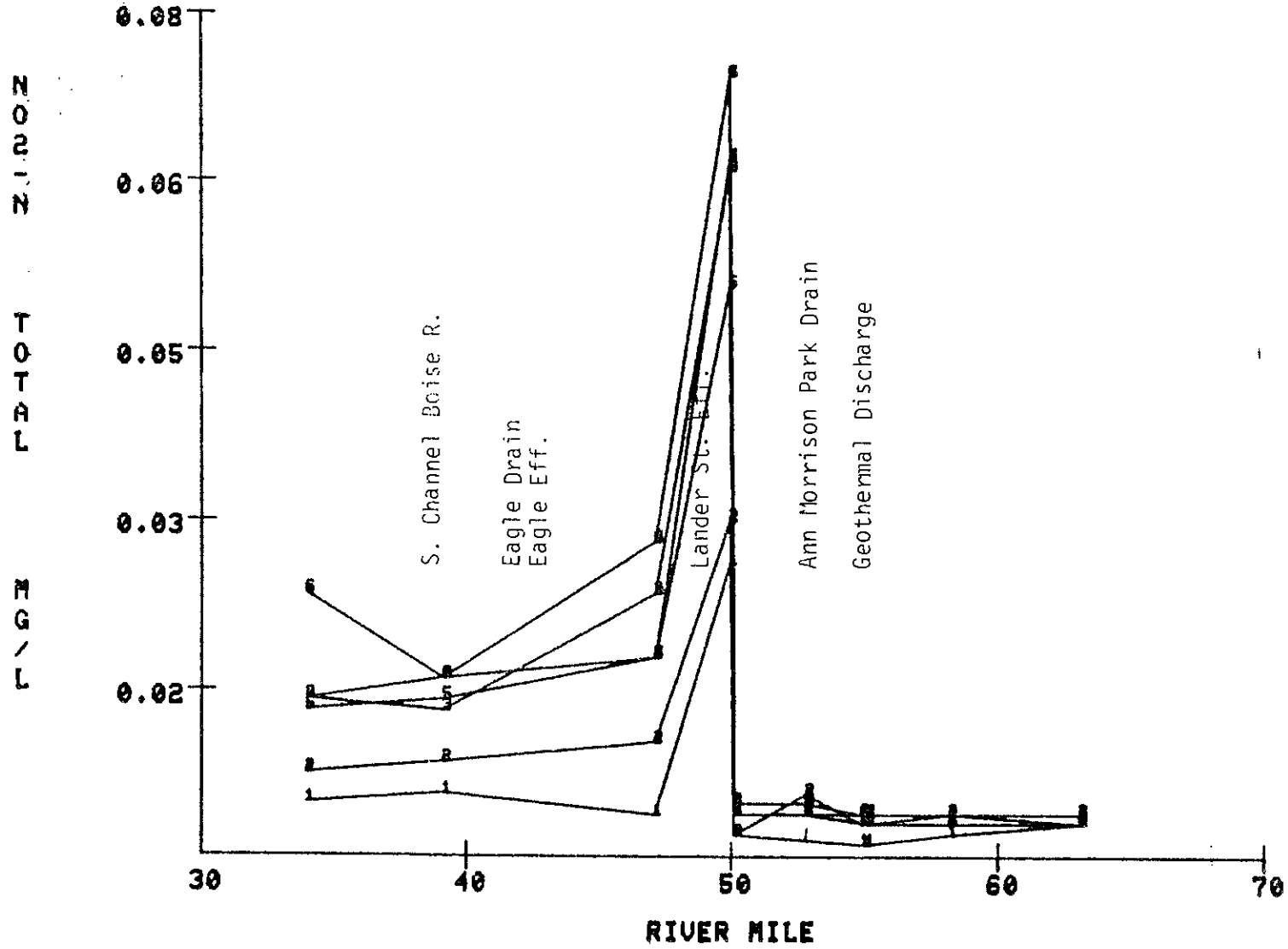

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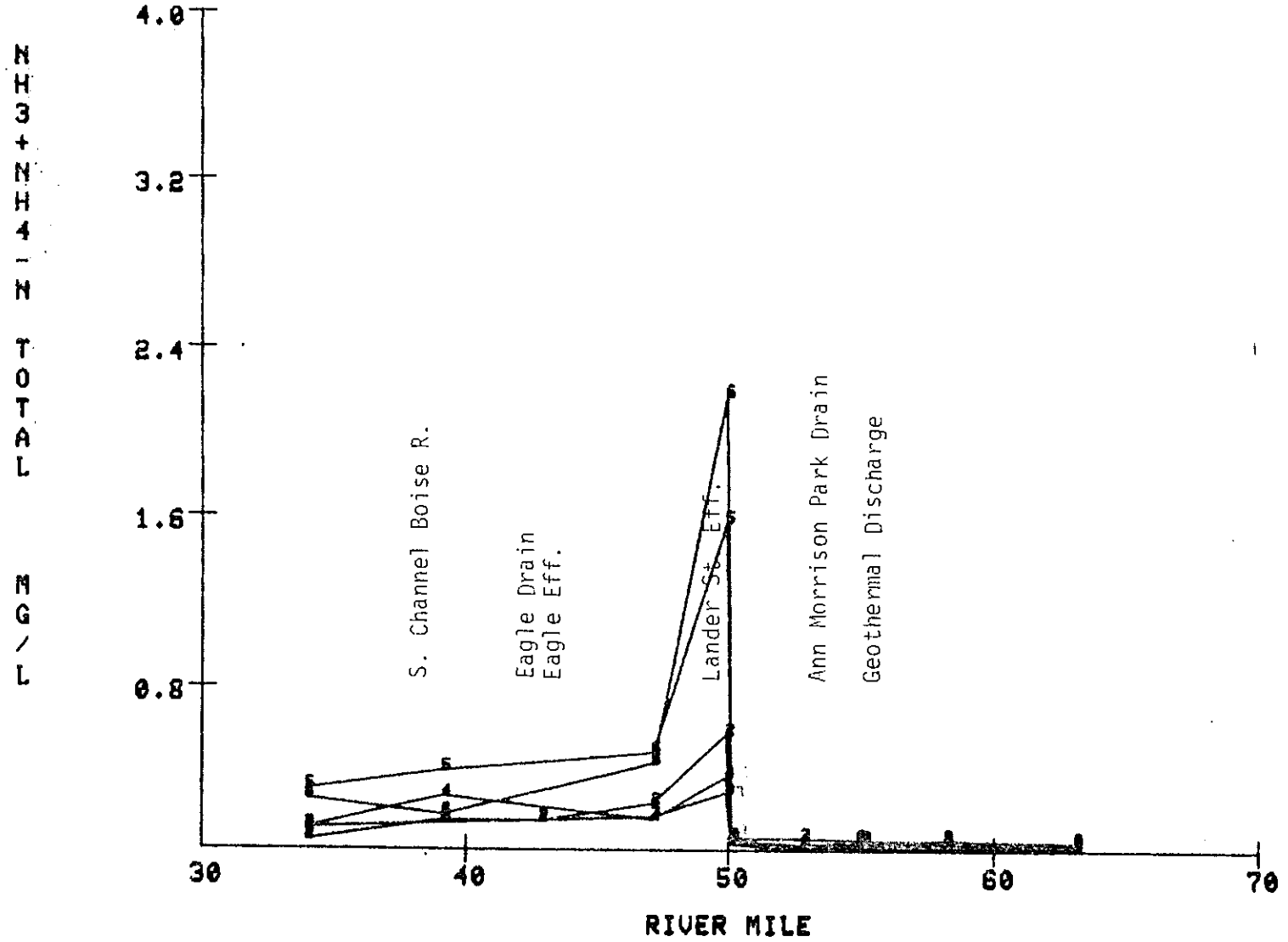

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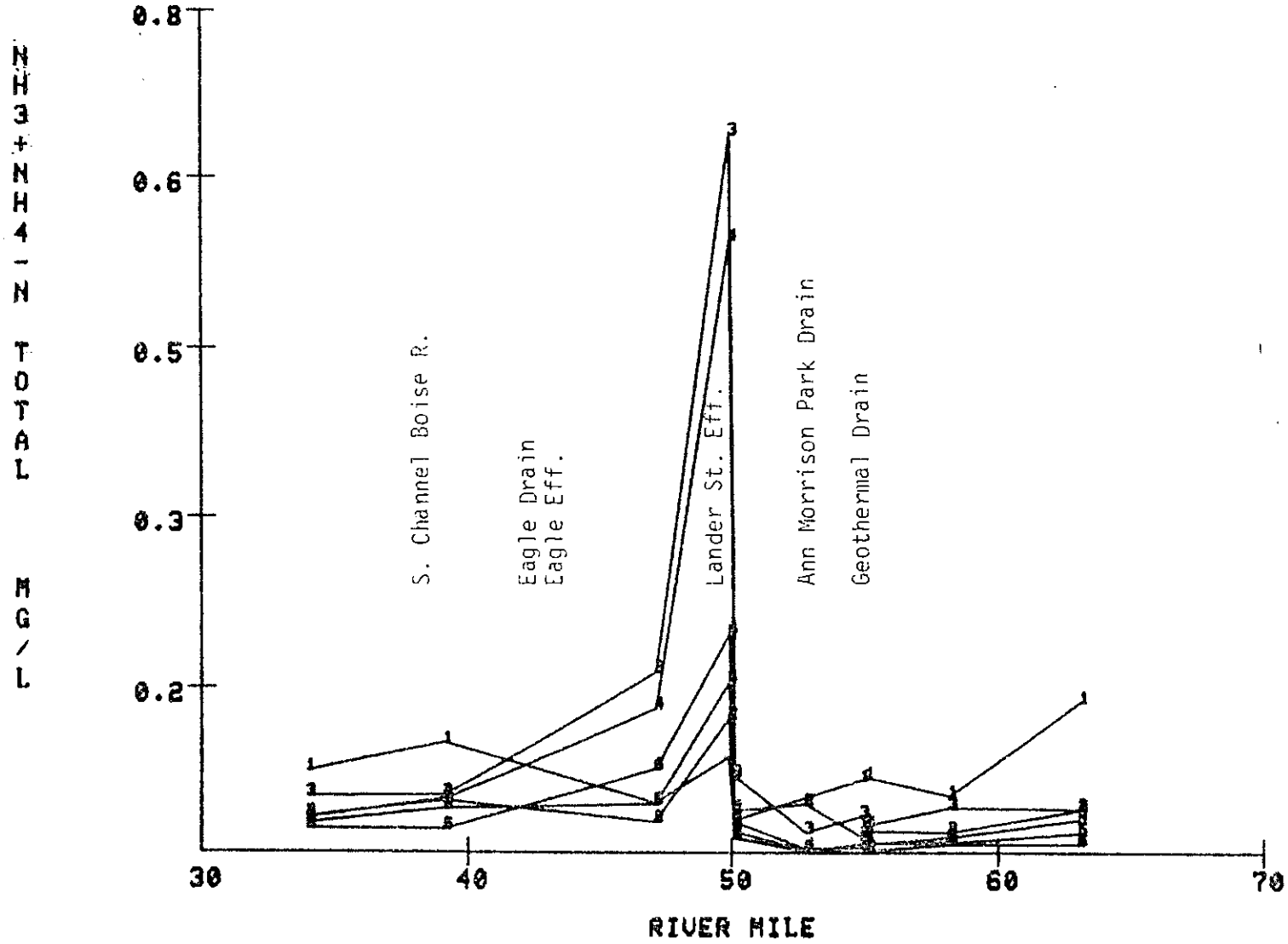

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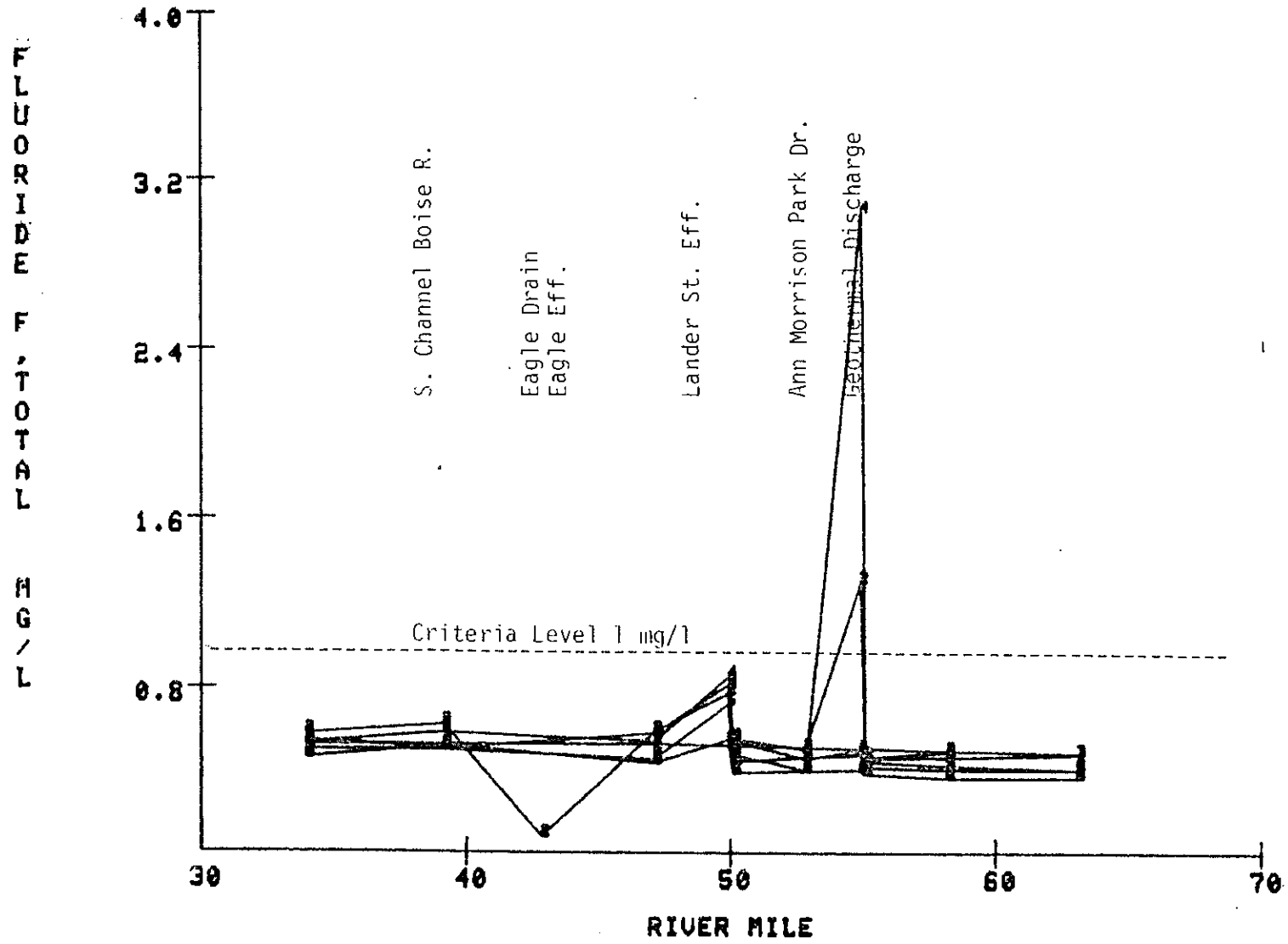

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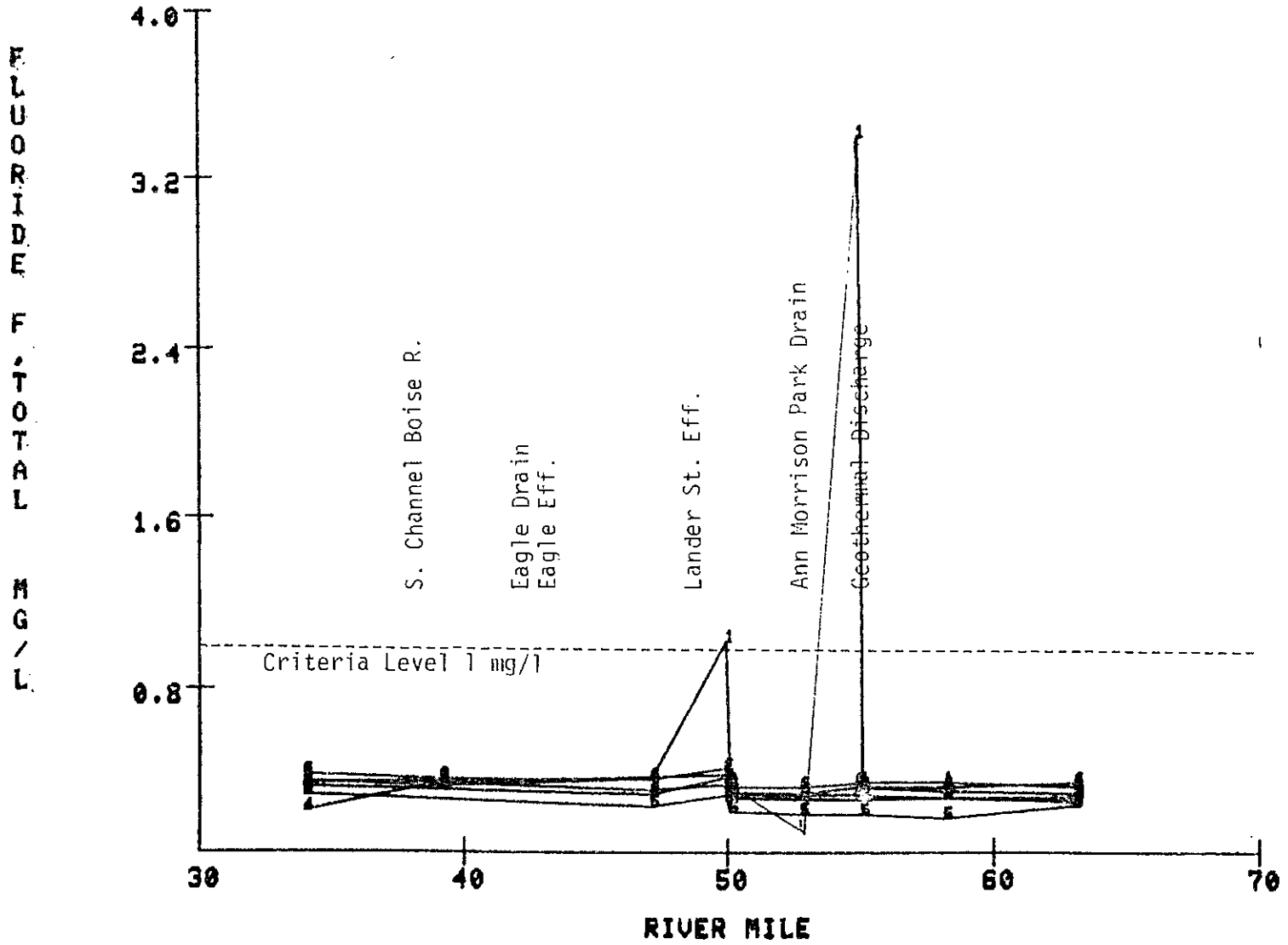

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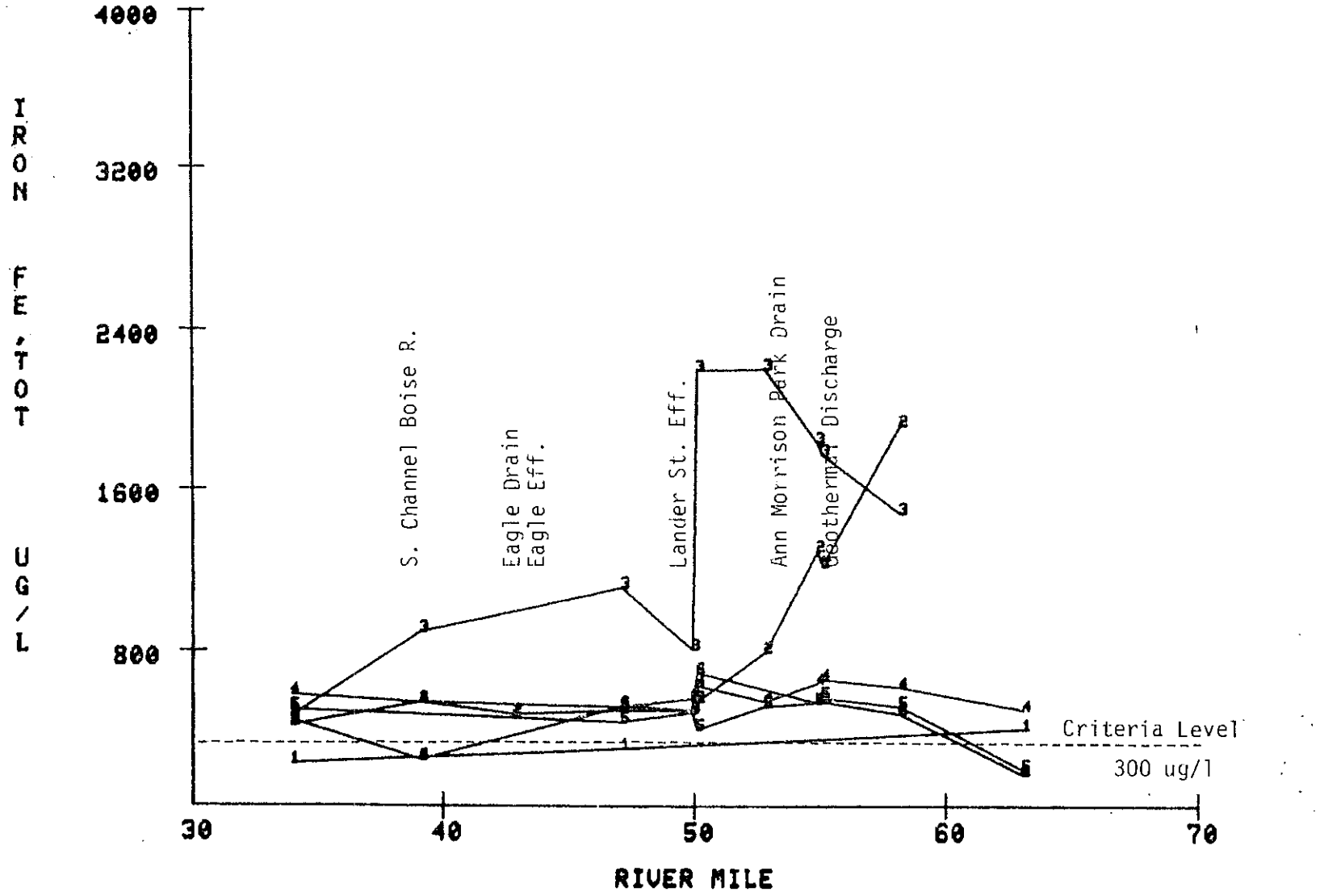

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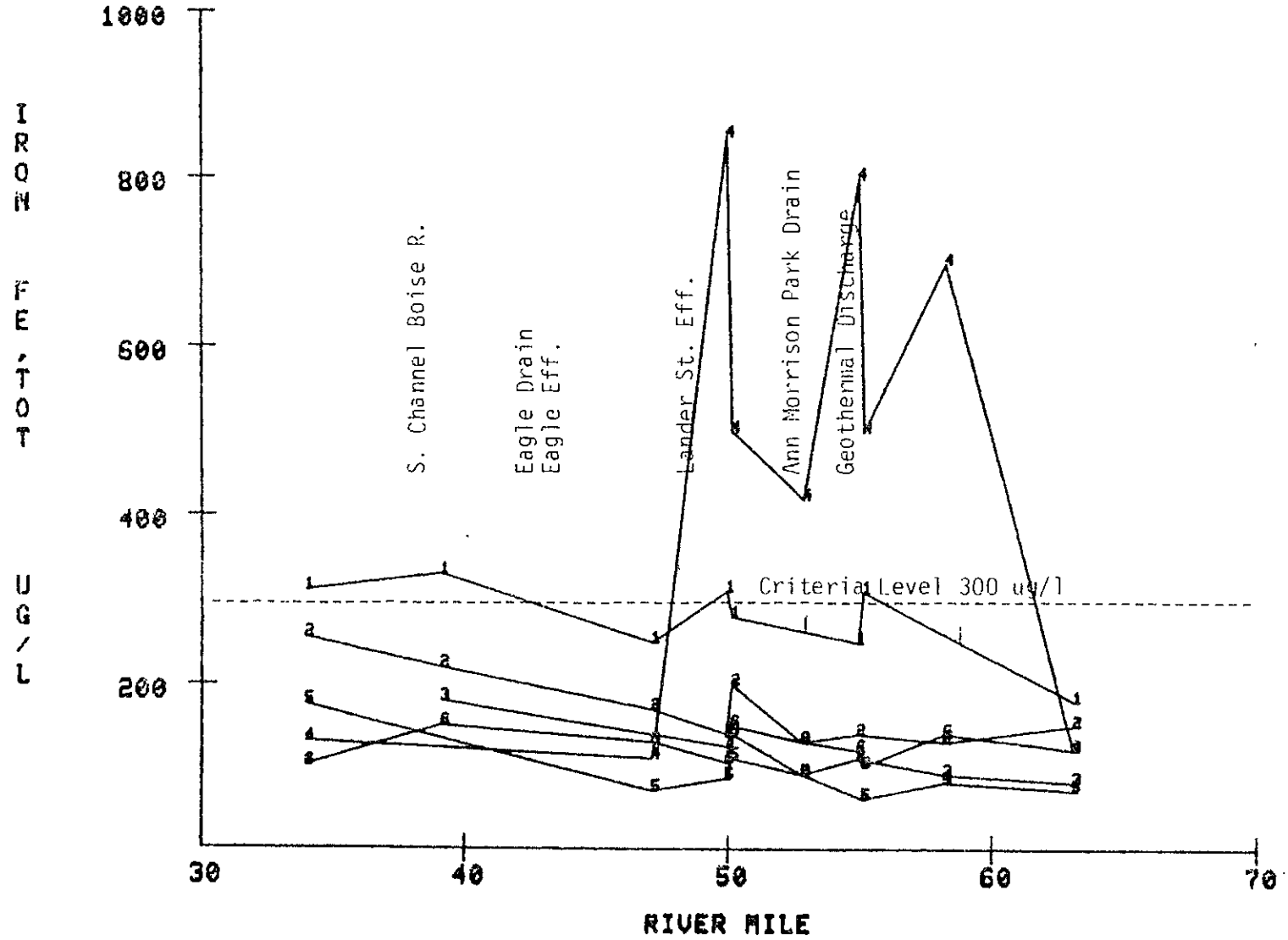

BOISE RIVER
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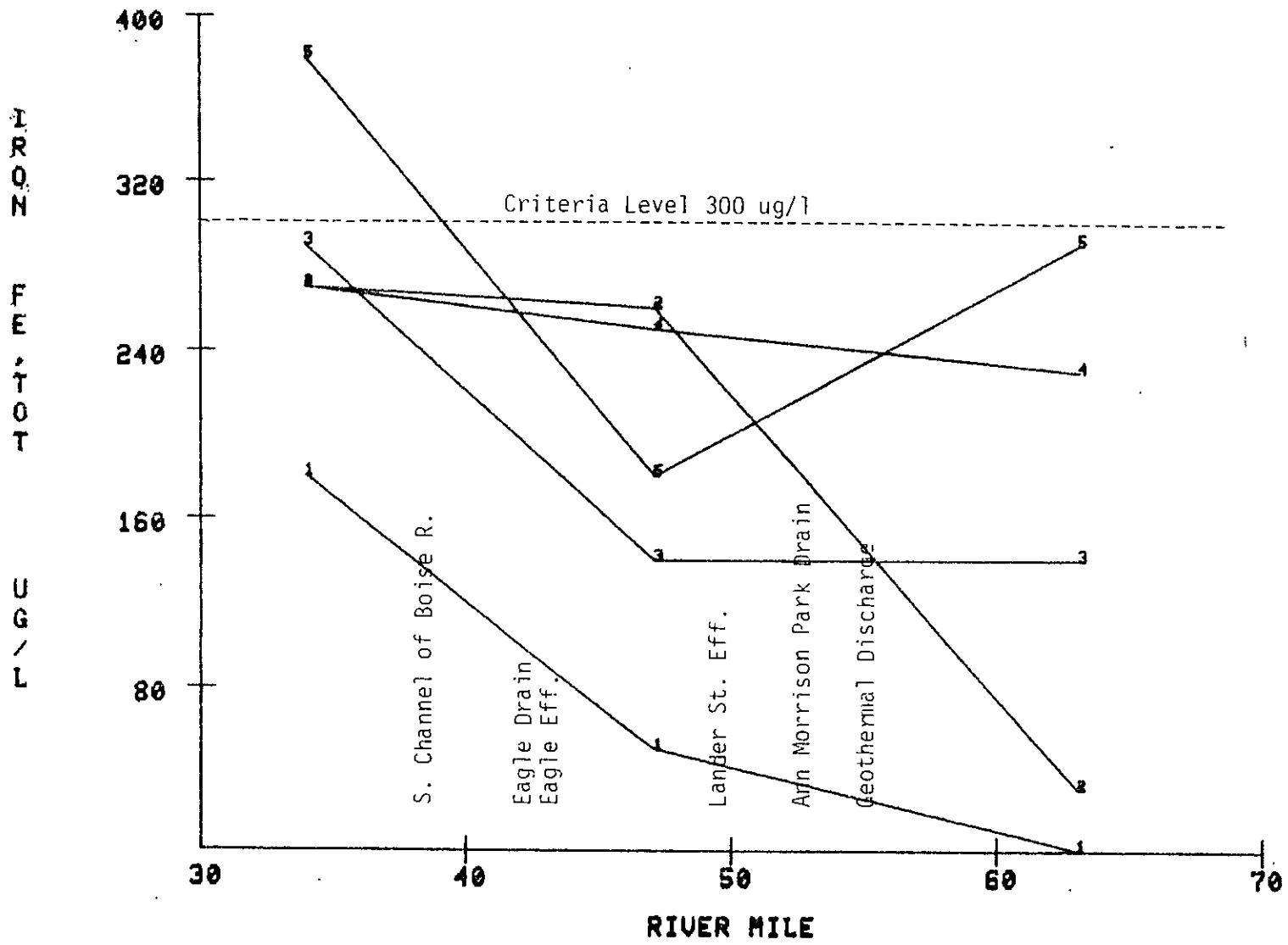
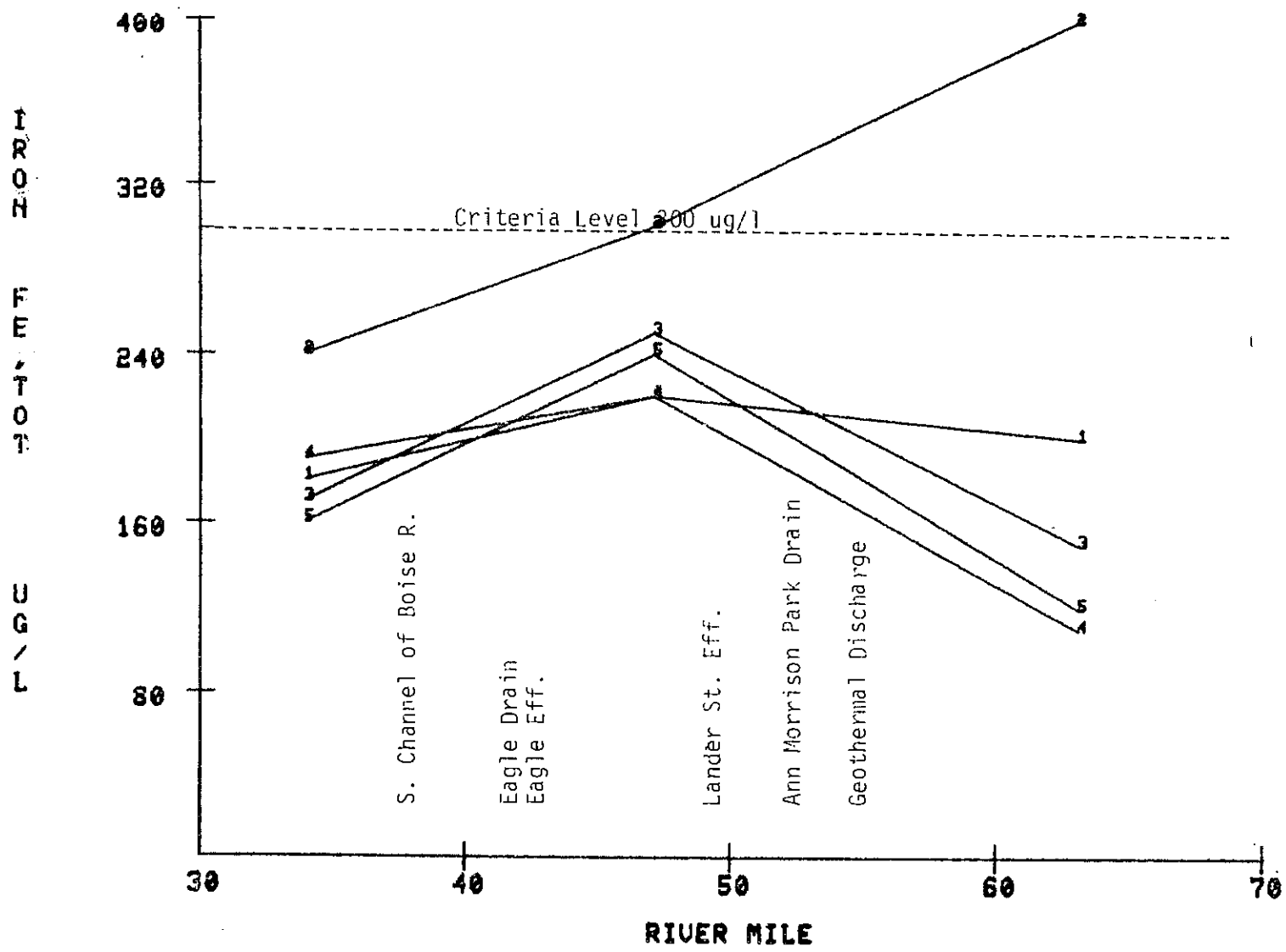


BOISE RIVER
INTENSIVE SURVEY DATA FOR 5 DAYS OF MONITORING
1 : 05-02-77 2 : 06-06-77 3 : 07-12-77
4 : 08-09-77 5 : 09-02-77



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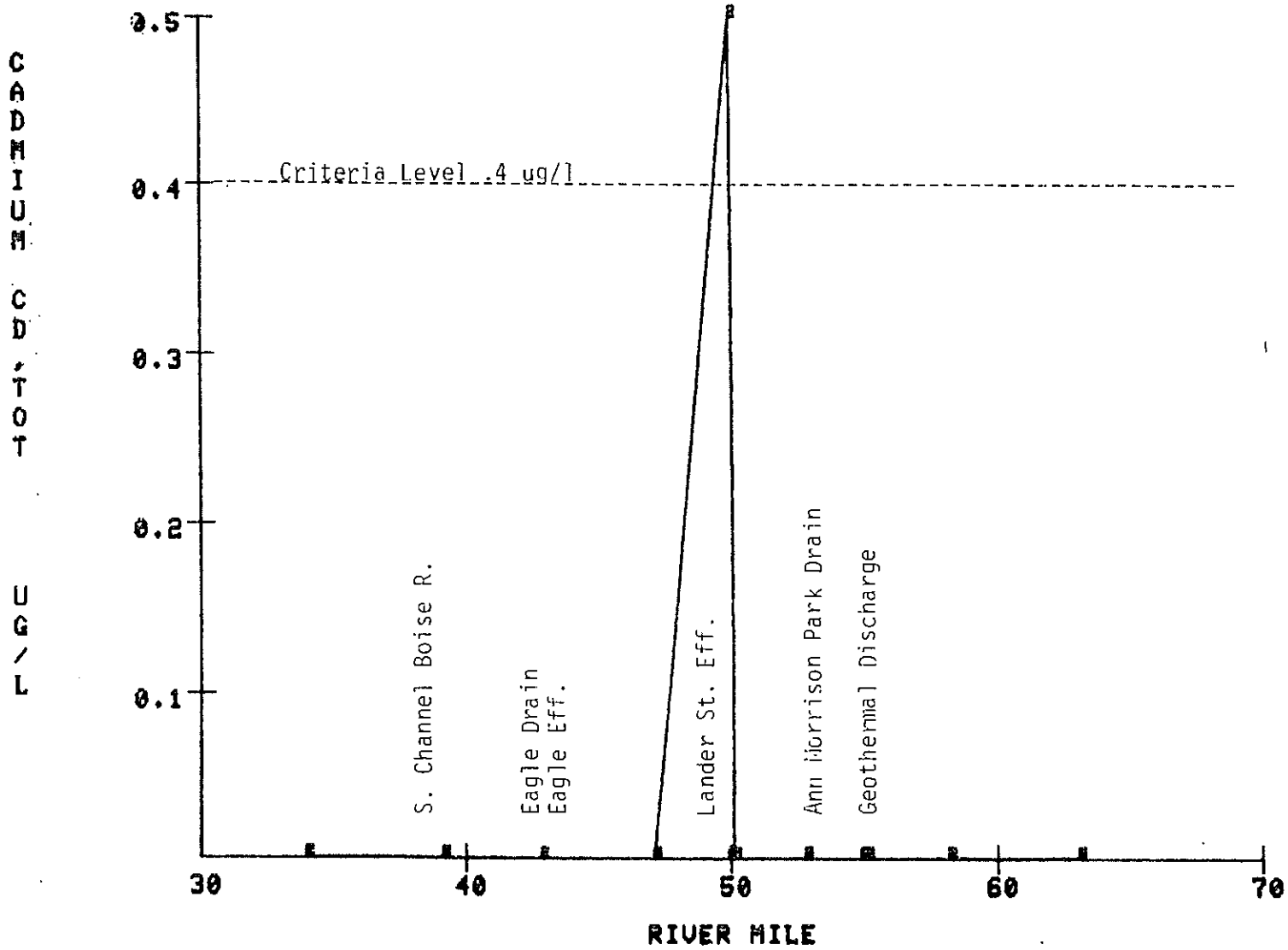

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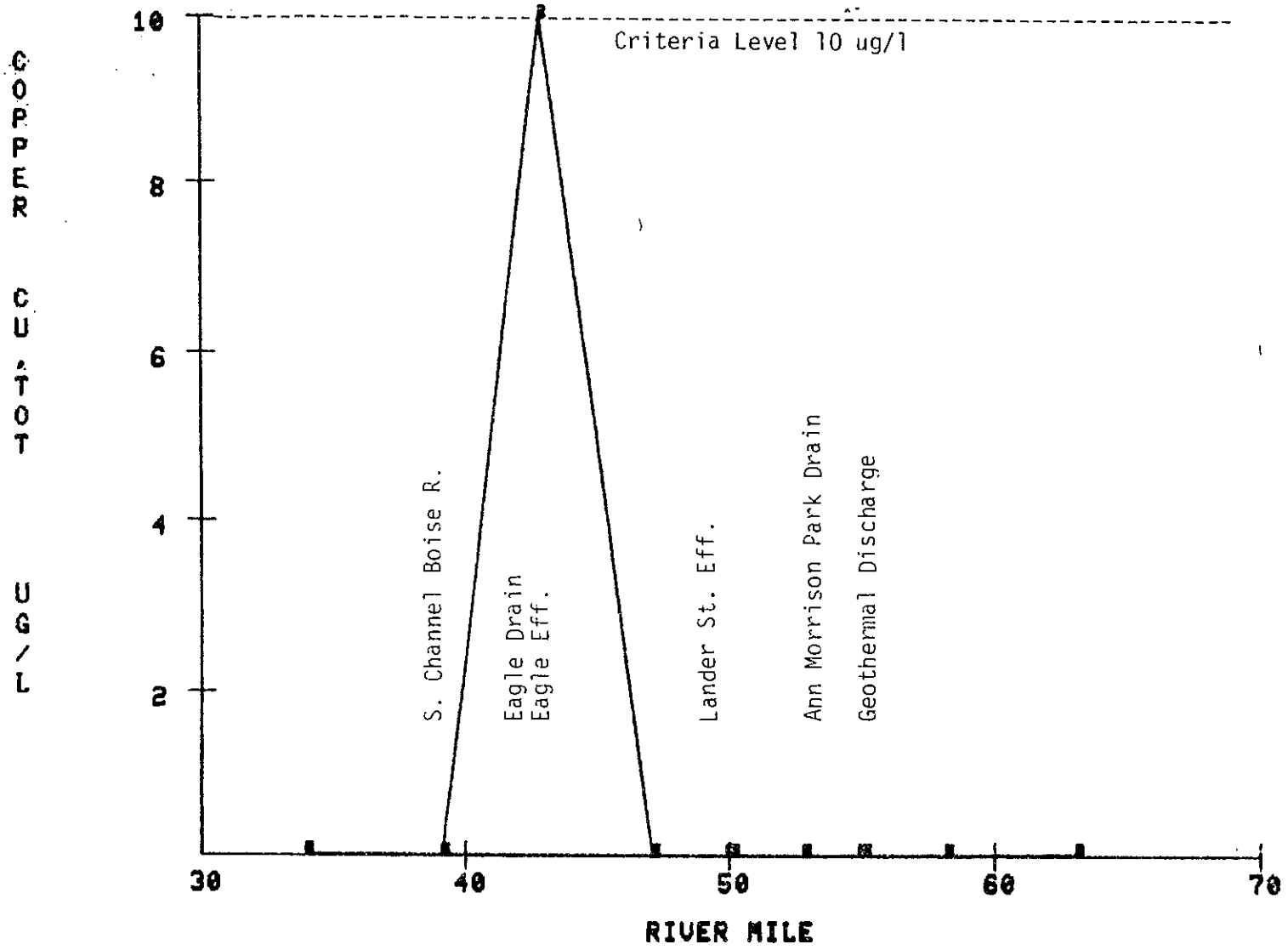

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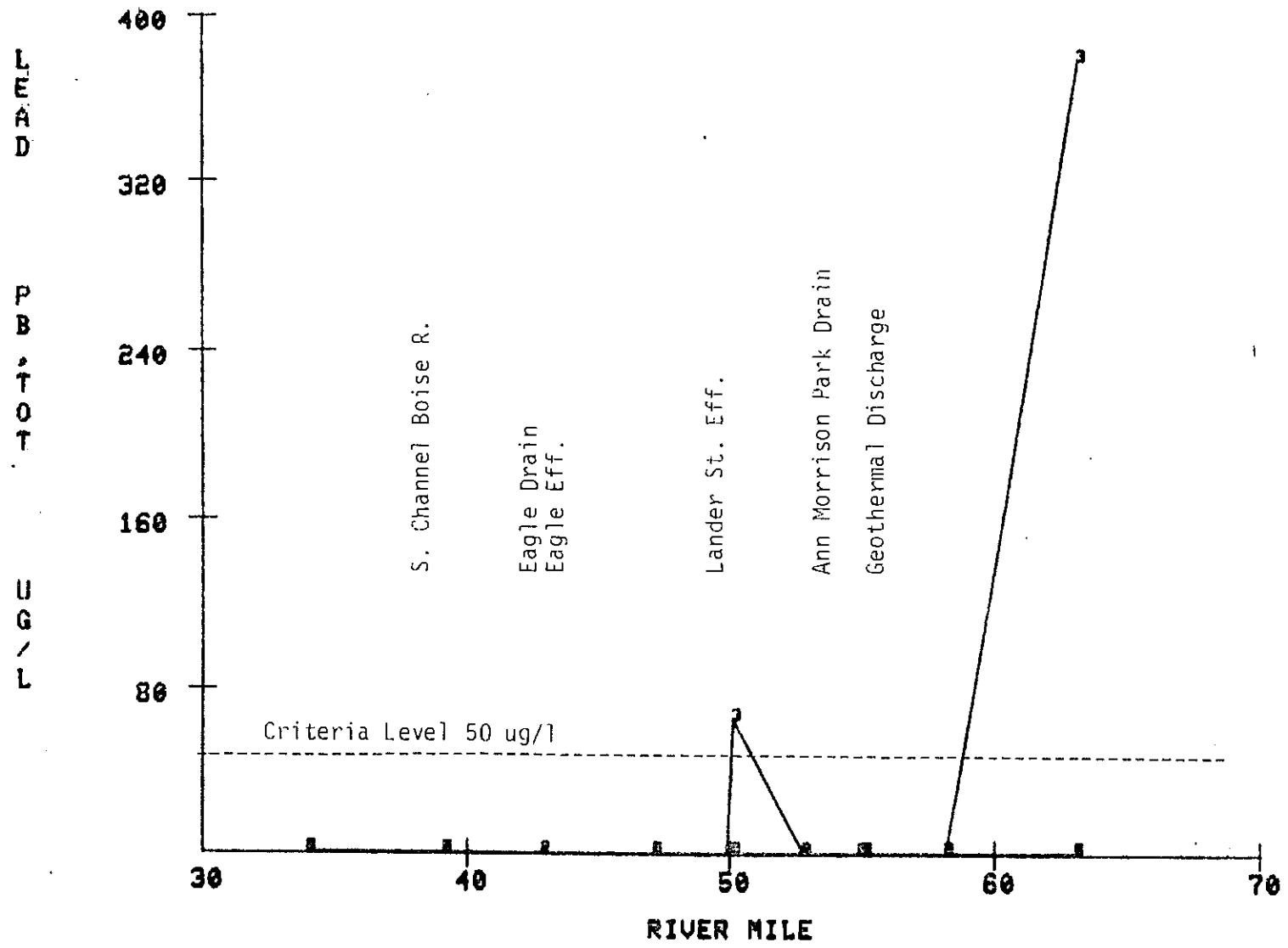

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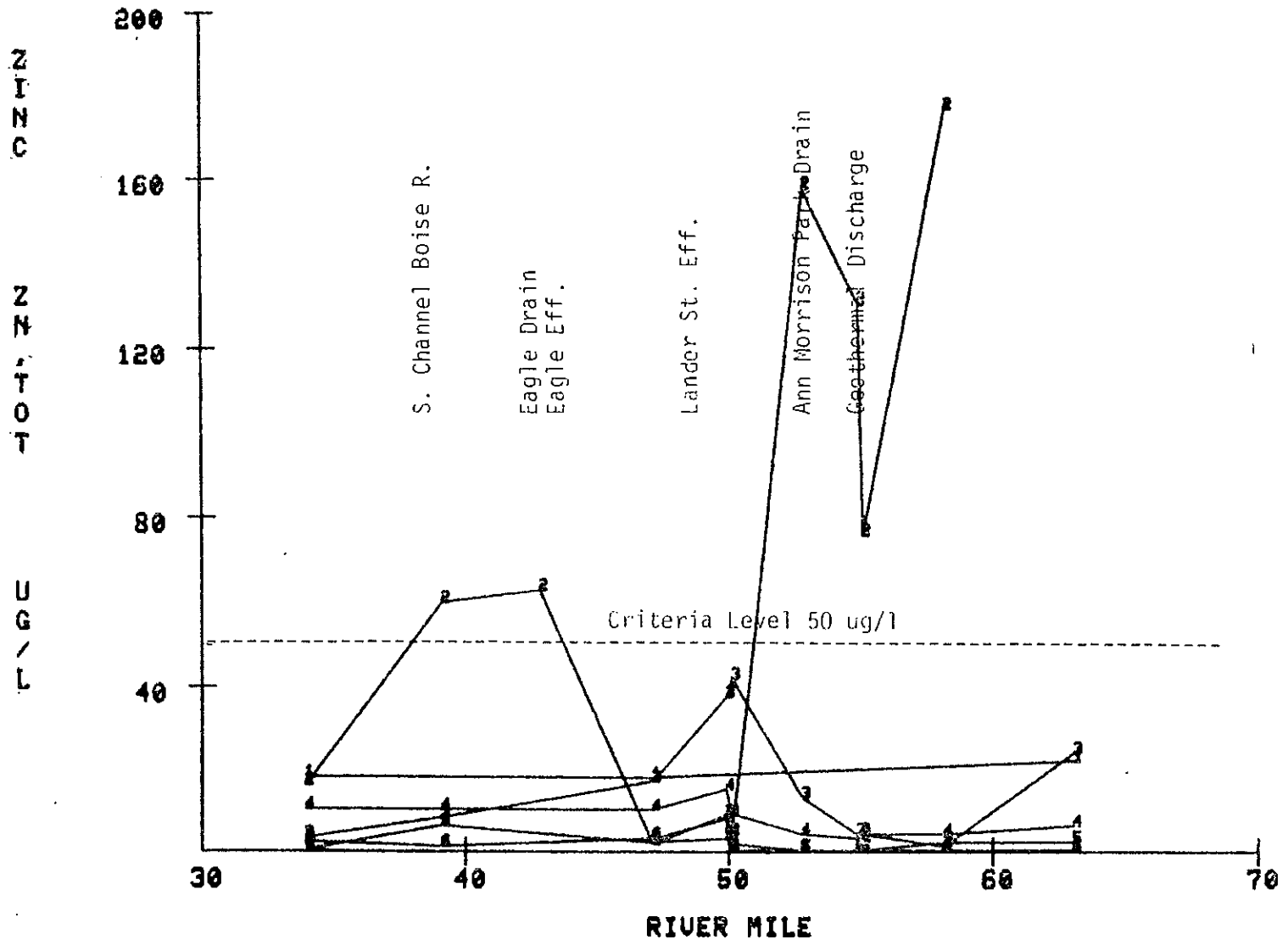

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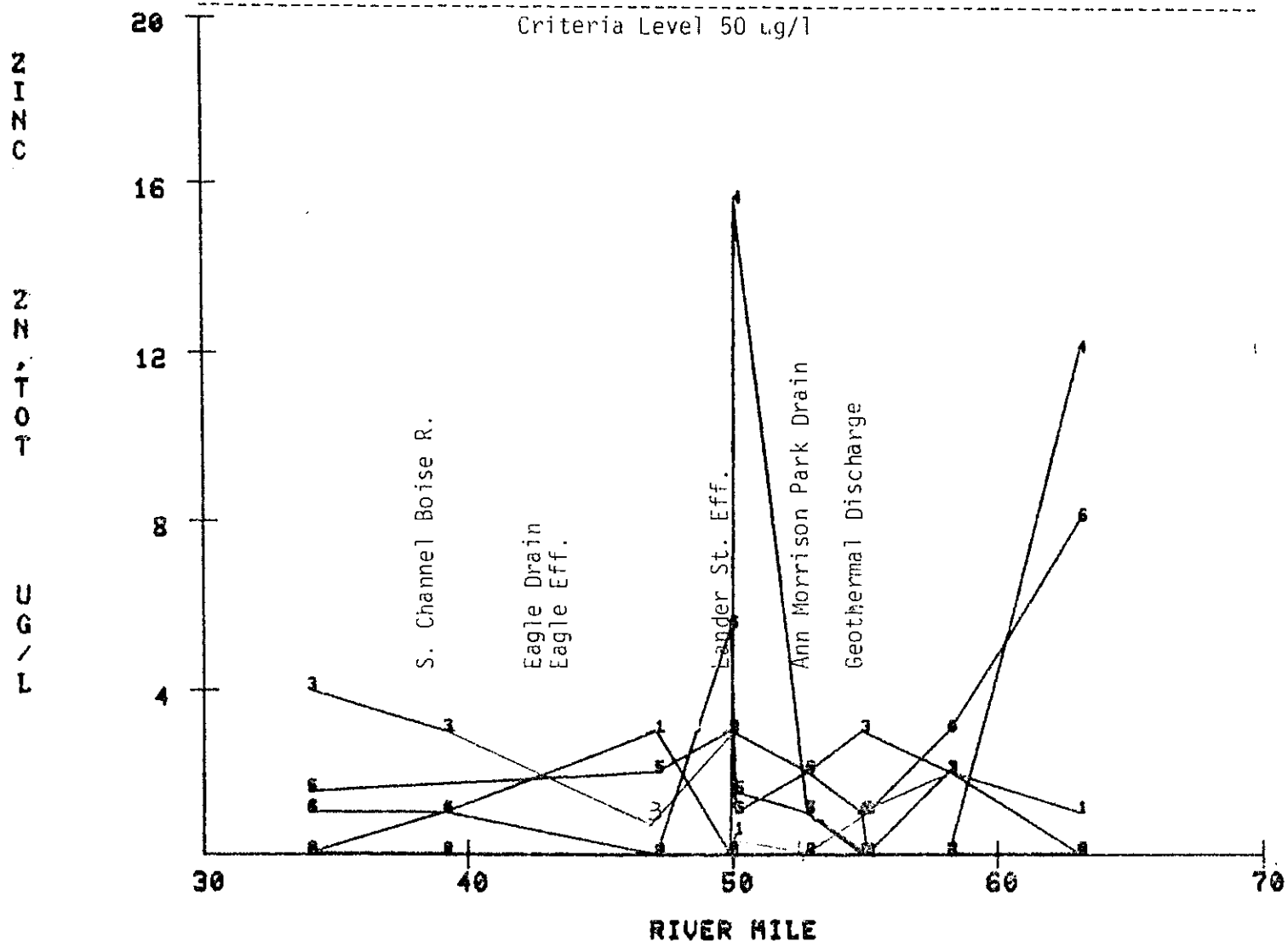

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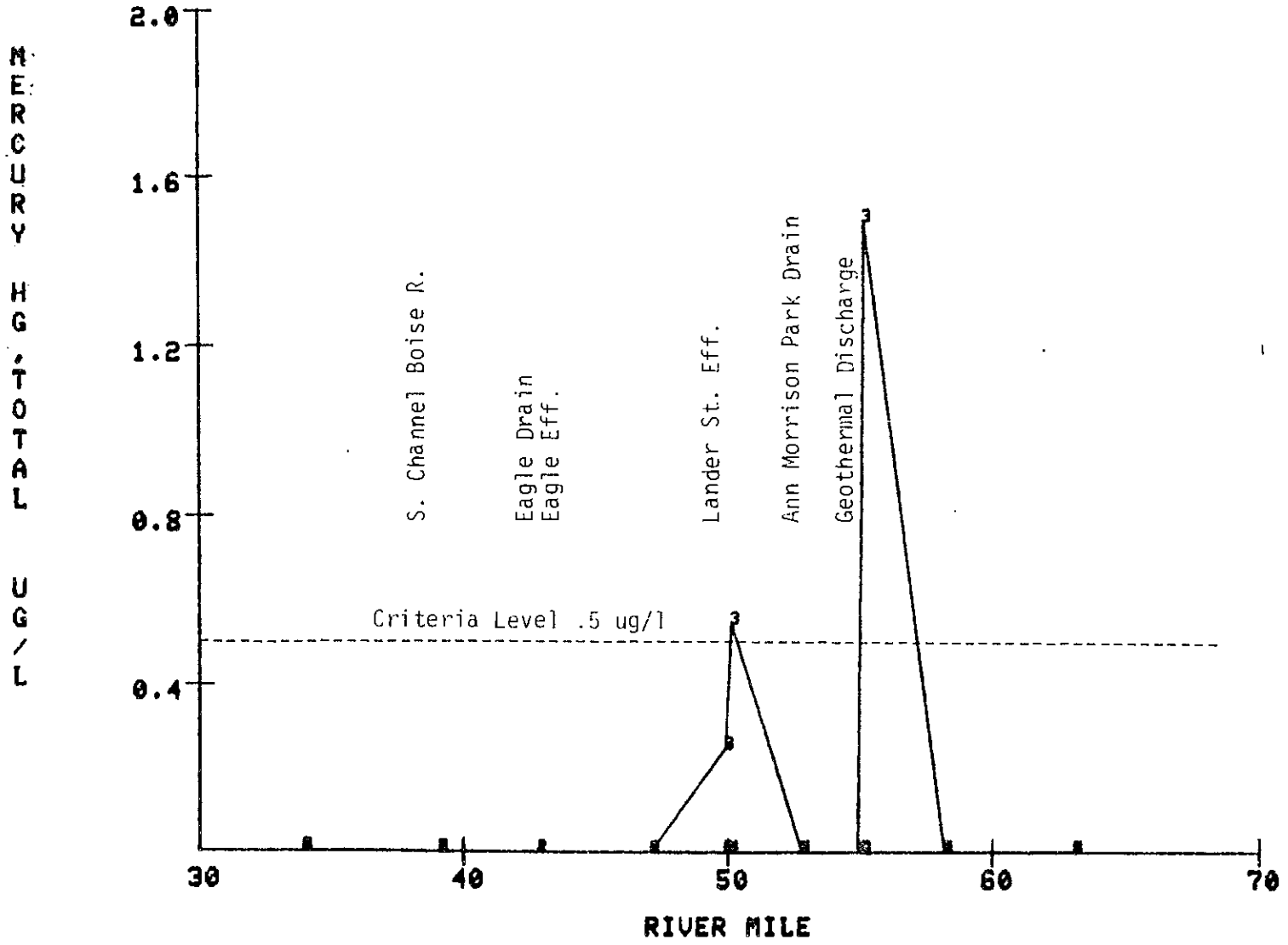

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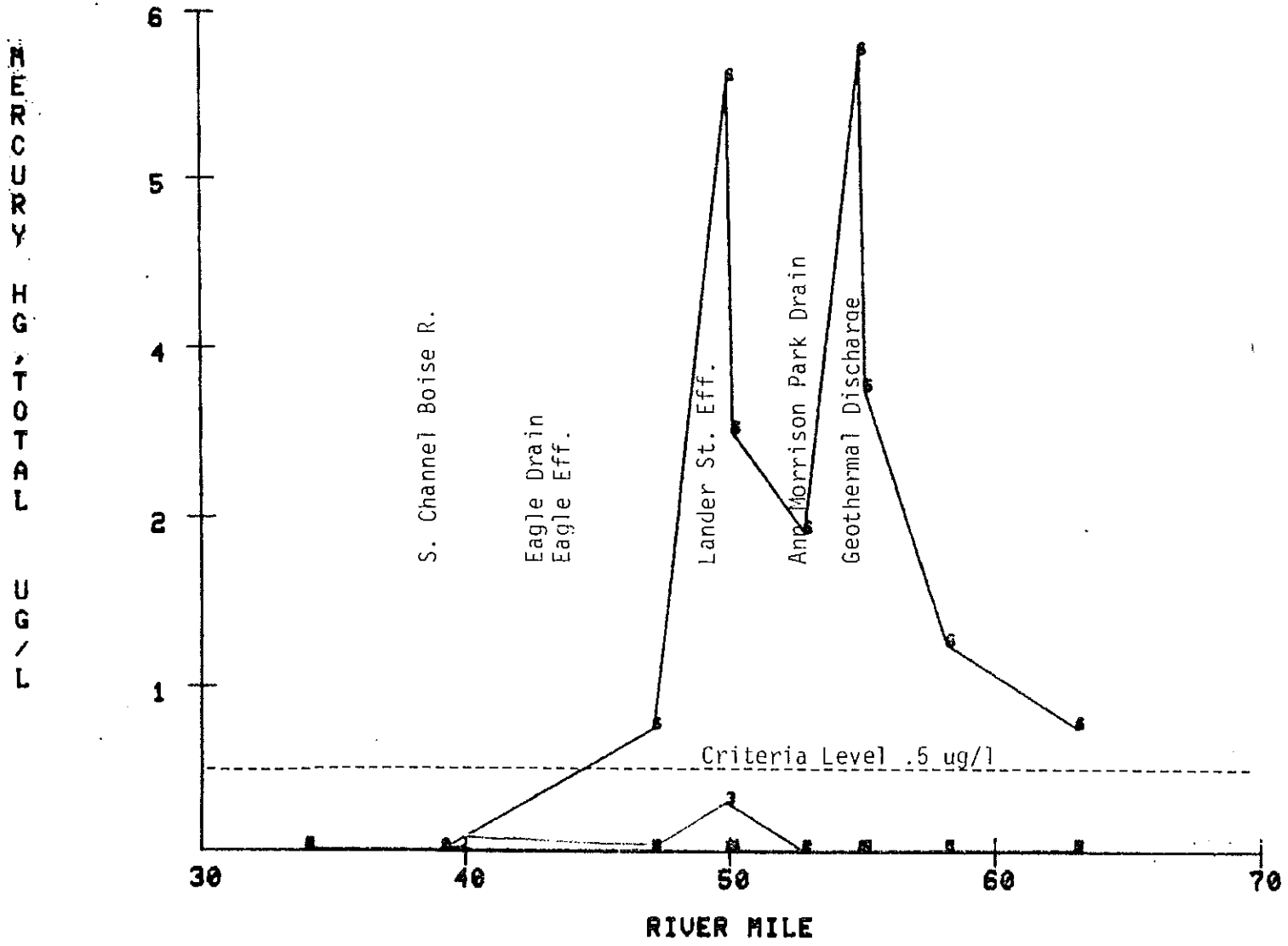

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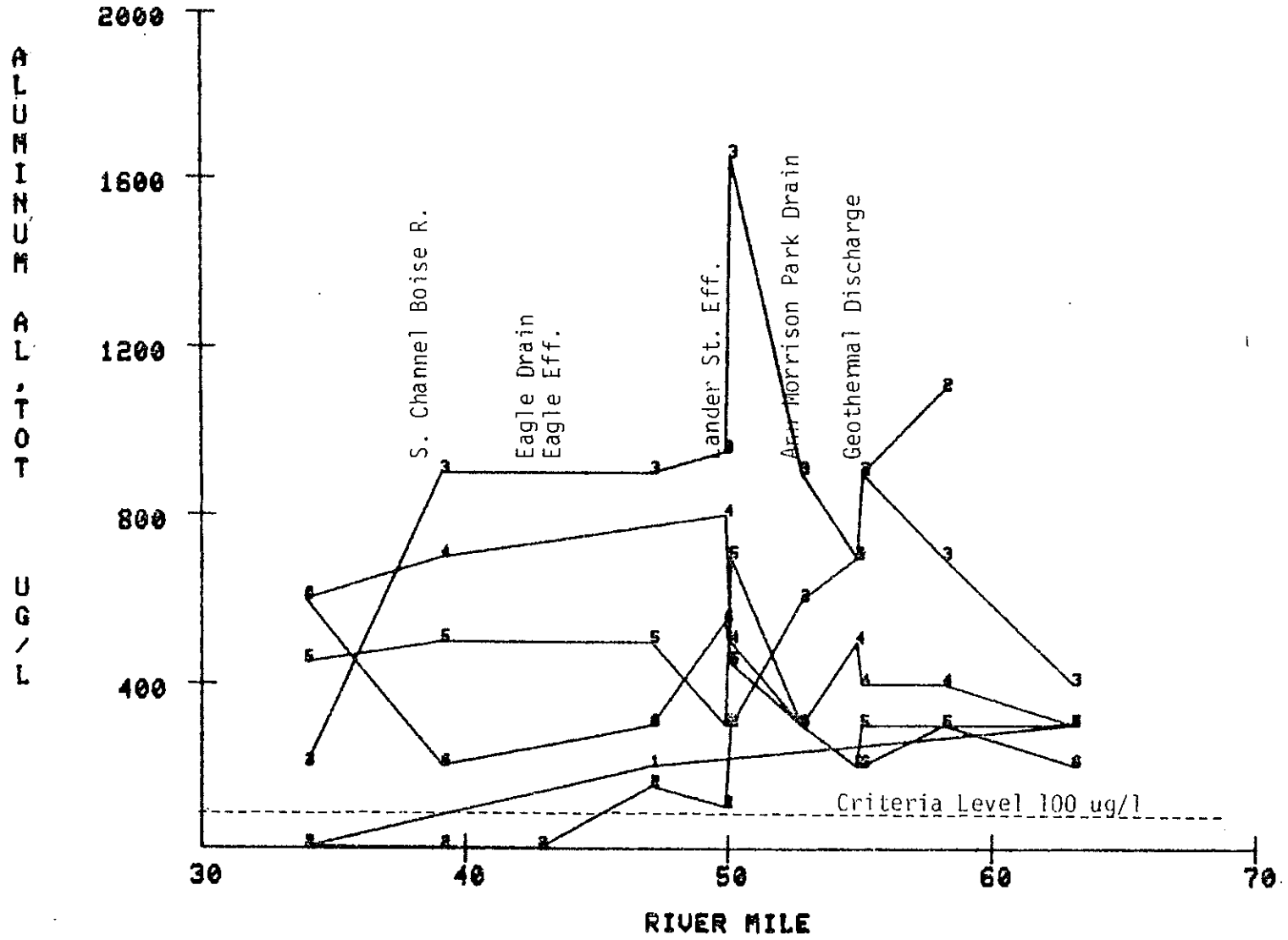

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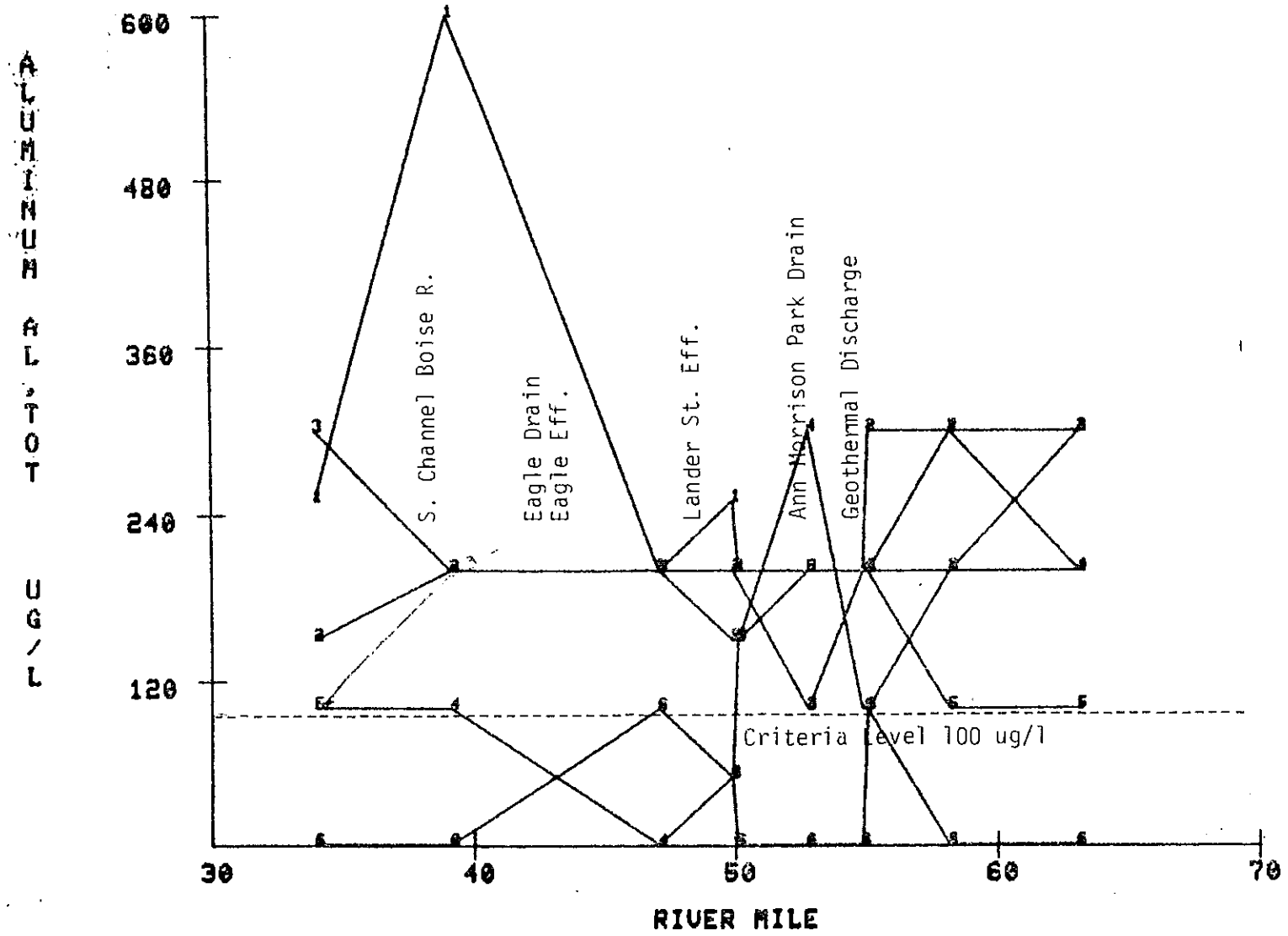

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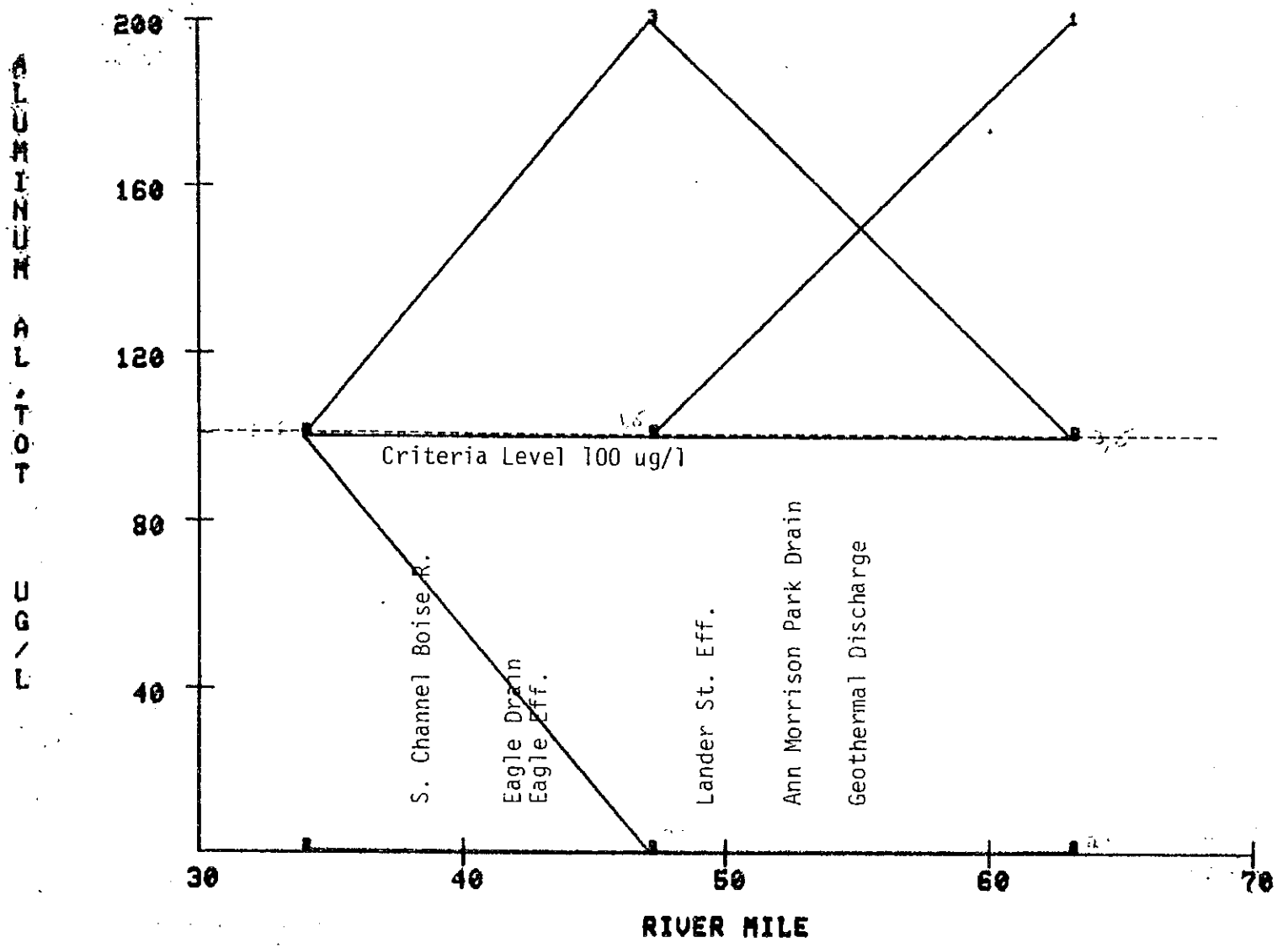

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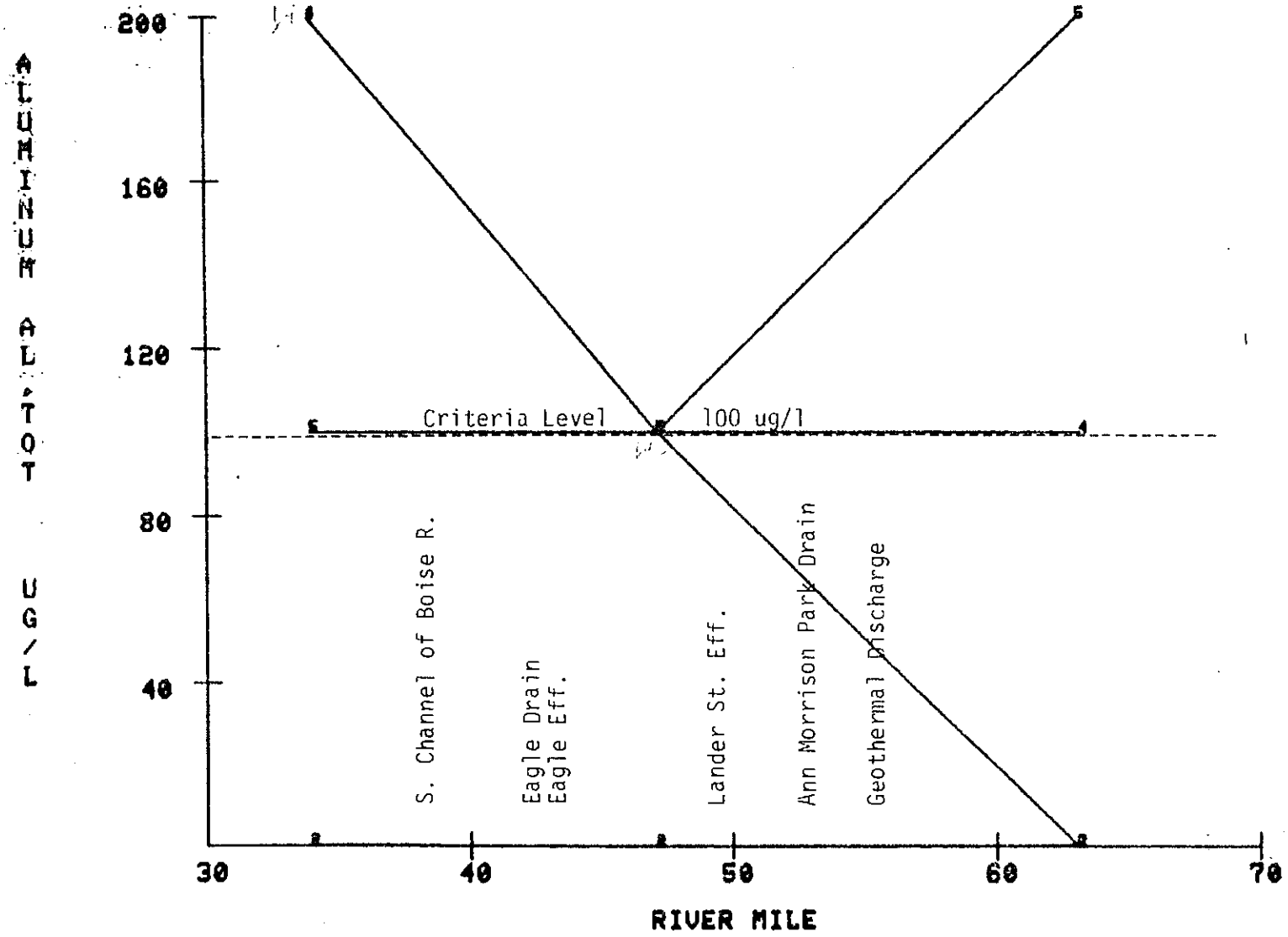

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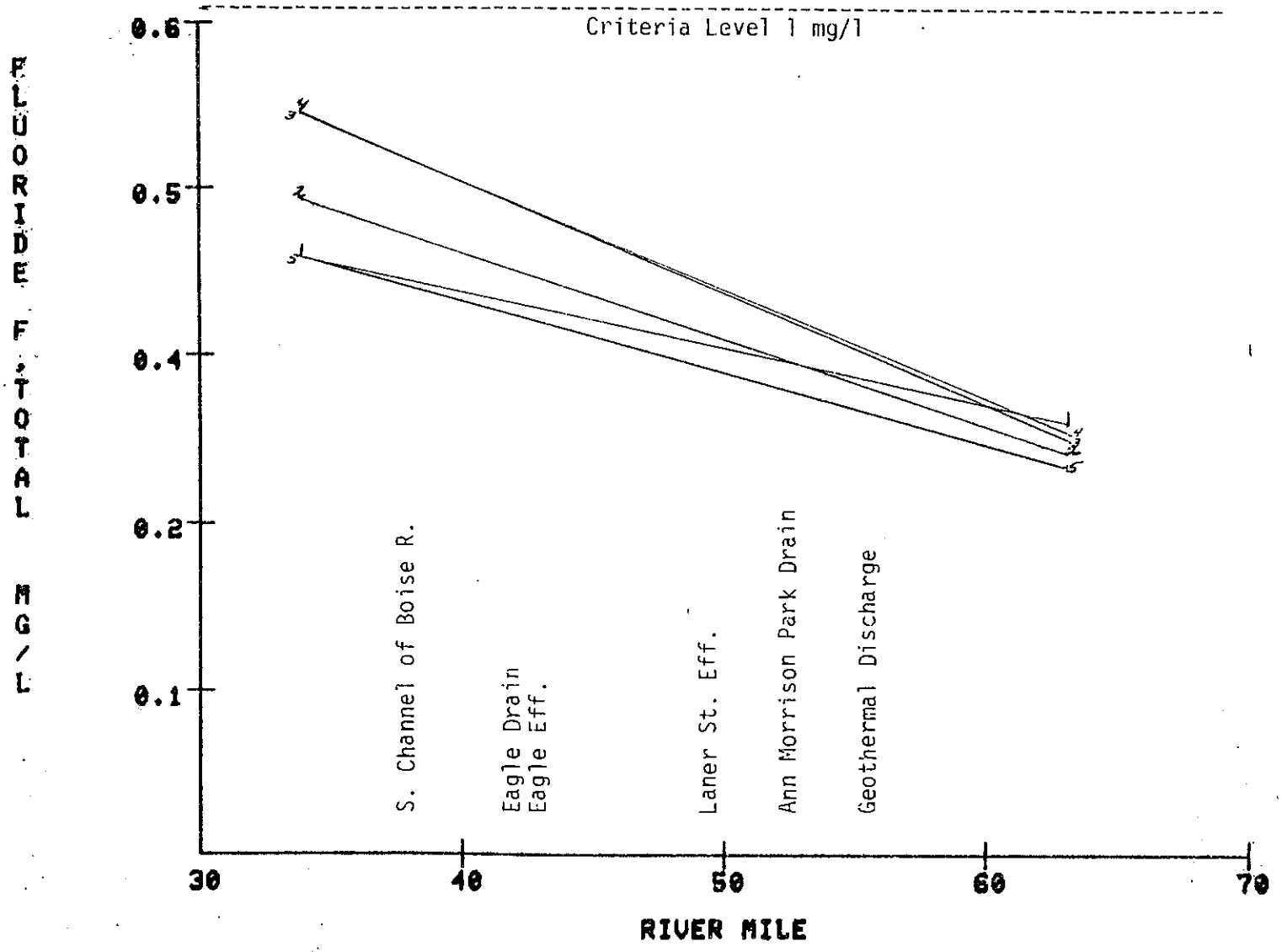

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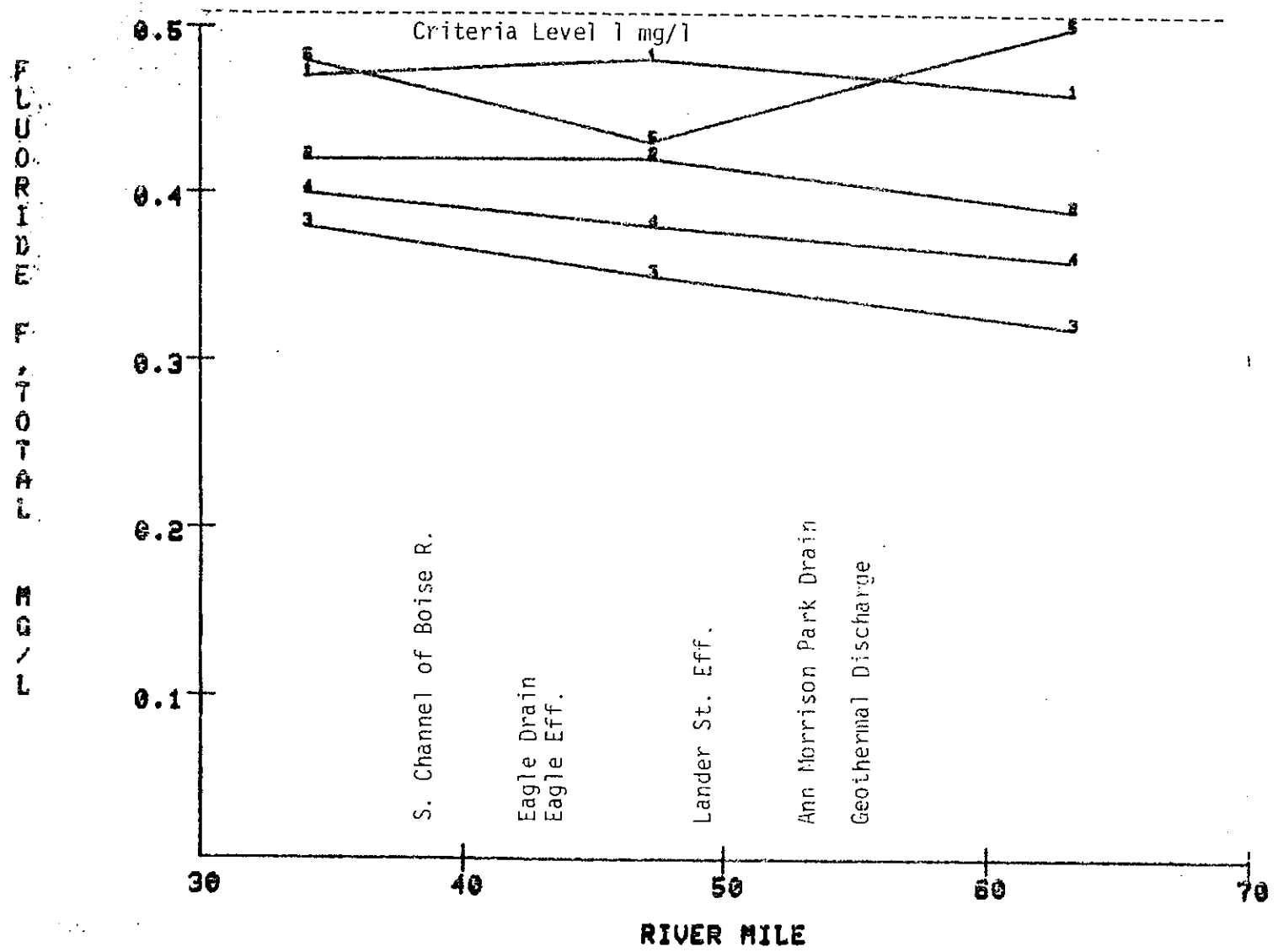

S CHANNEL
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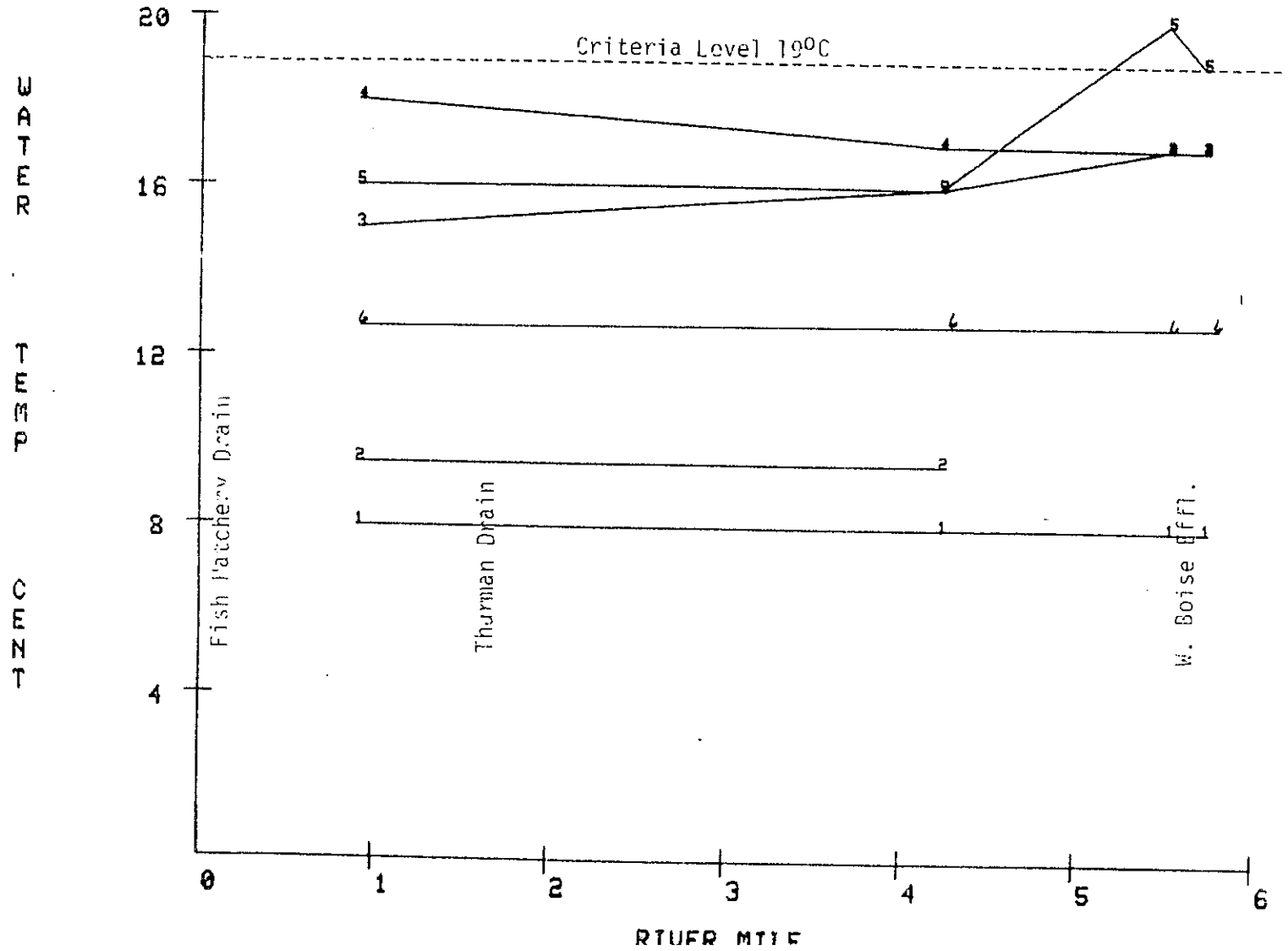

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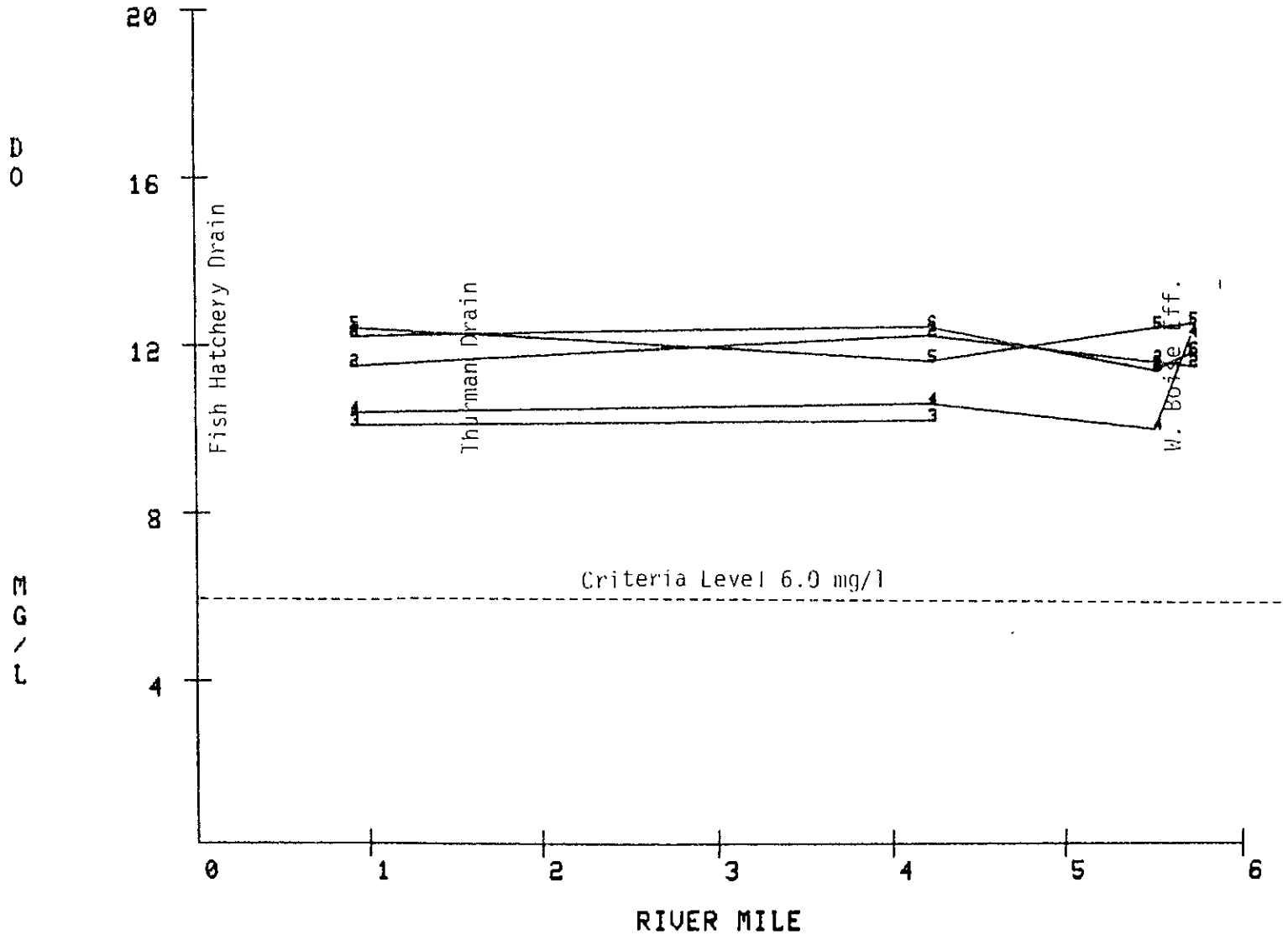

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BOISE RIVER
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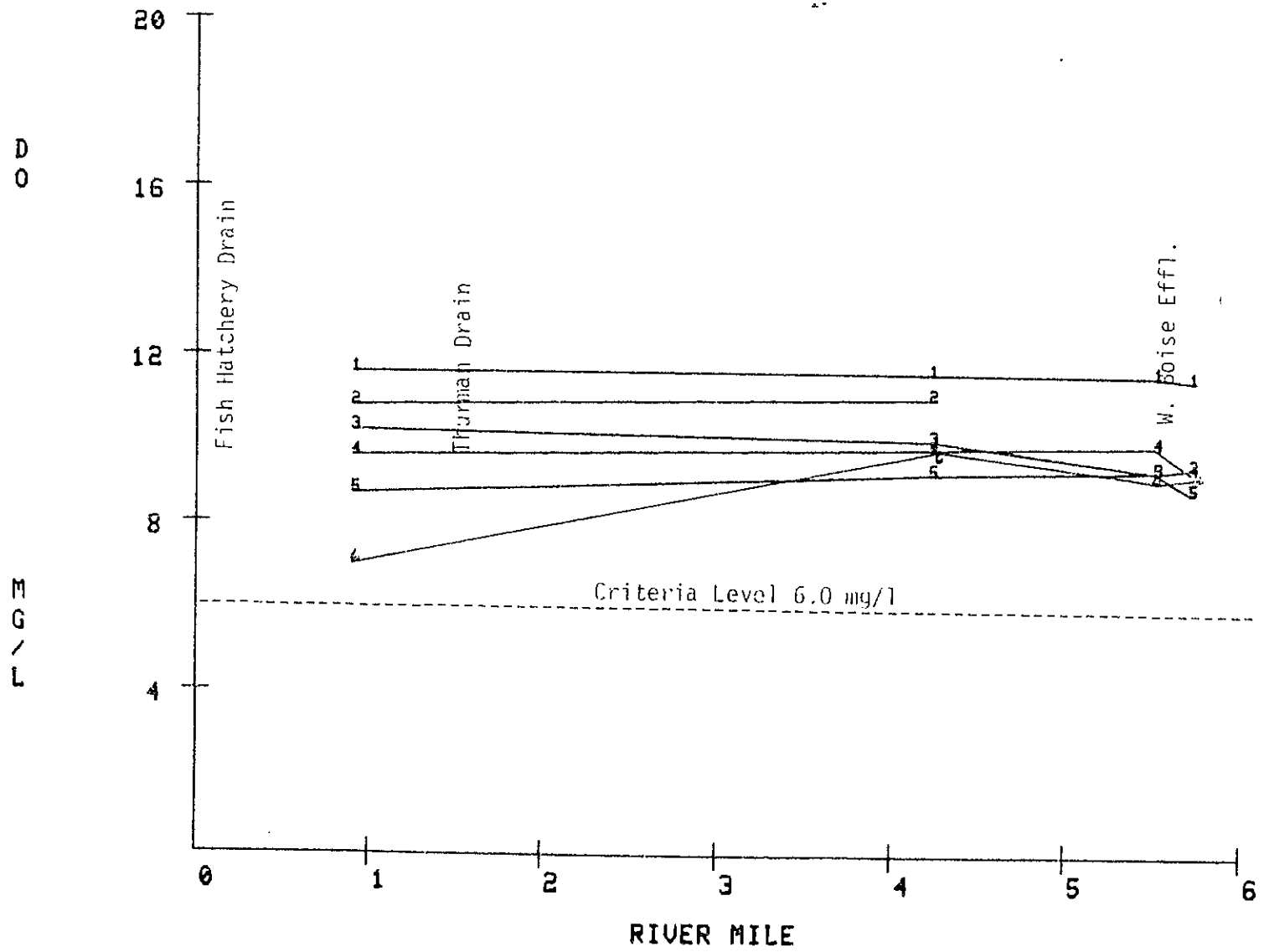

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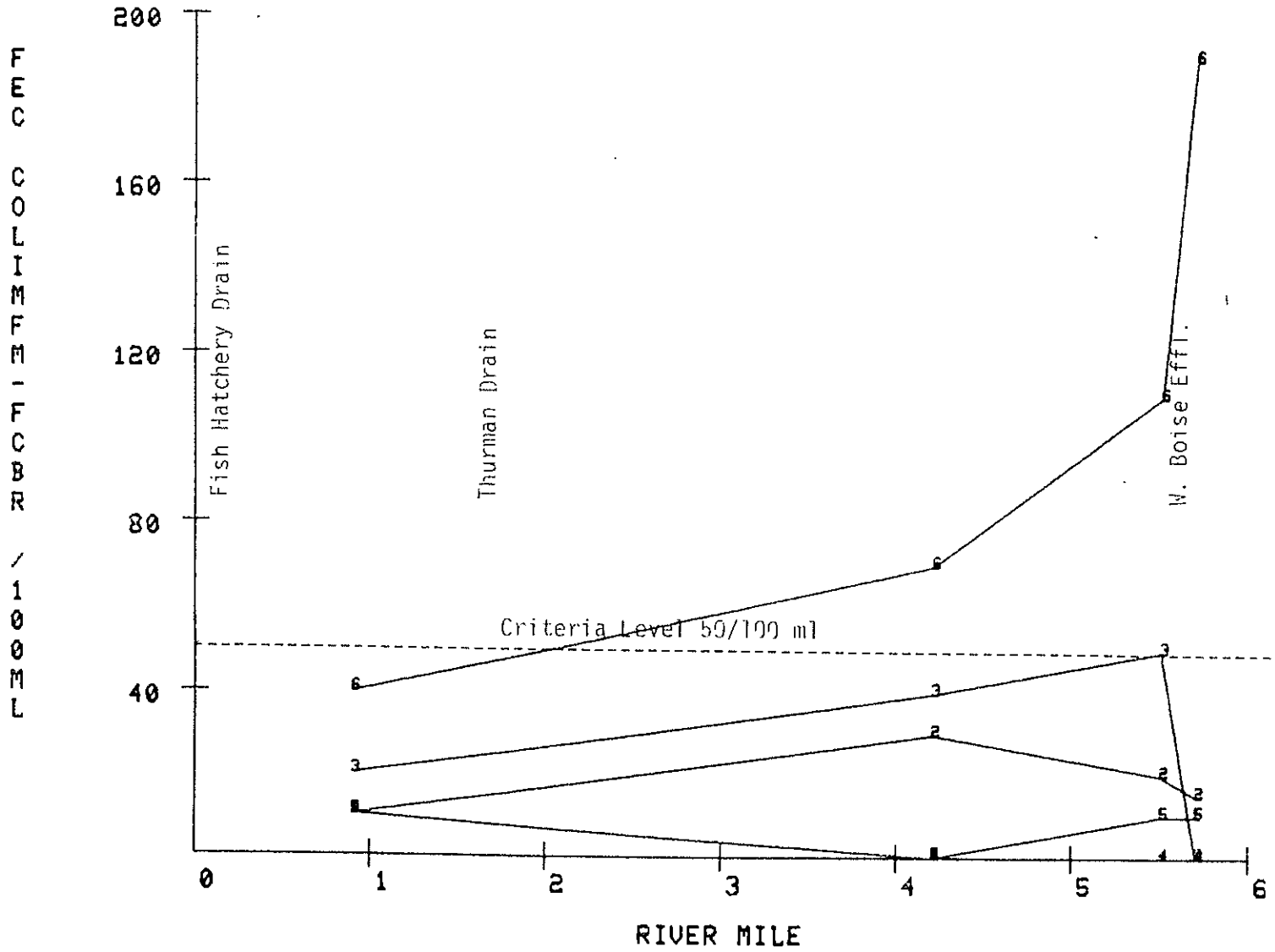

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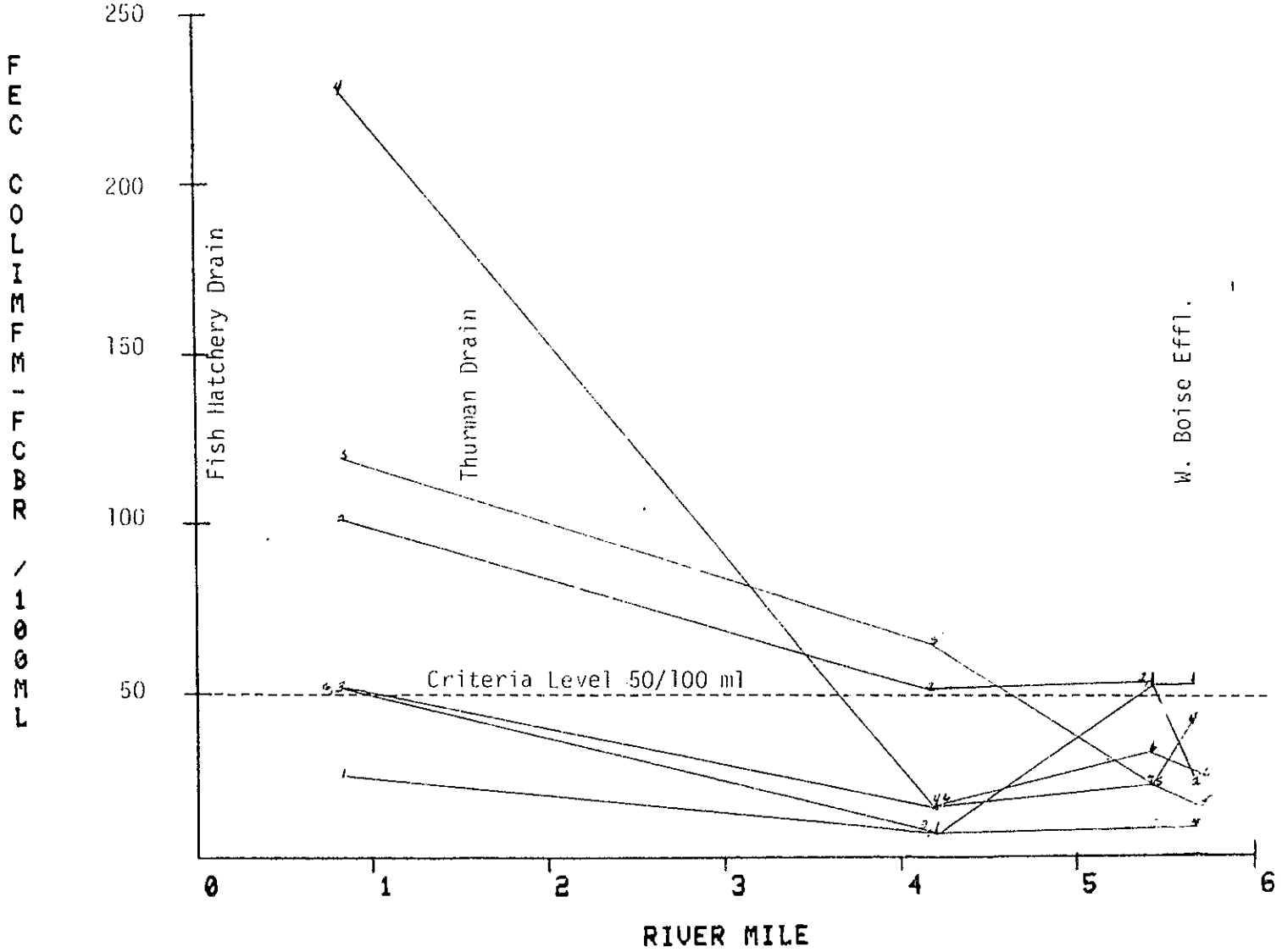

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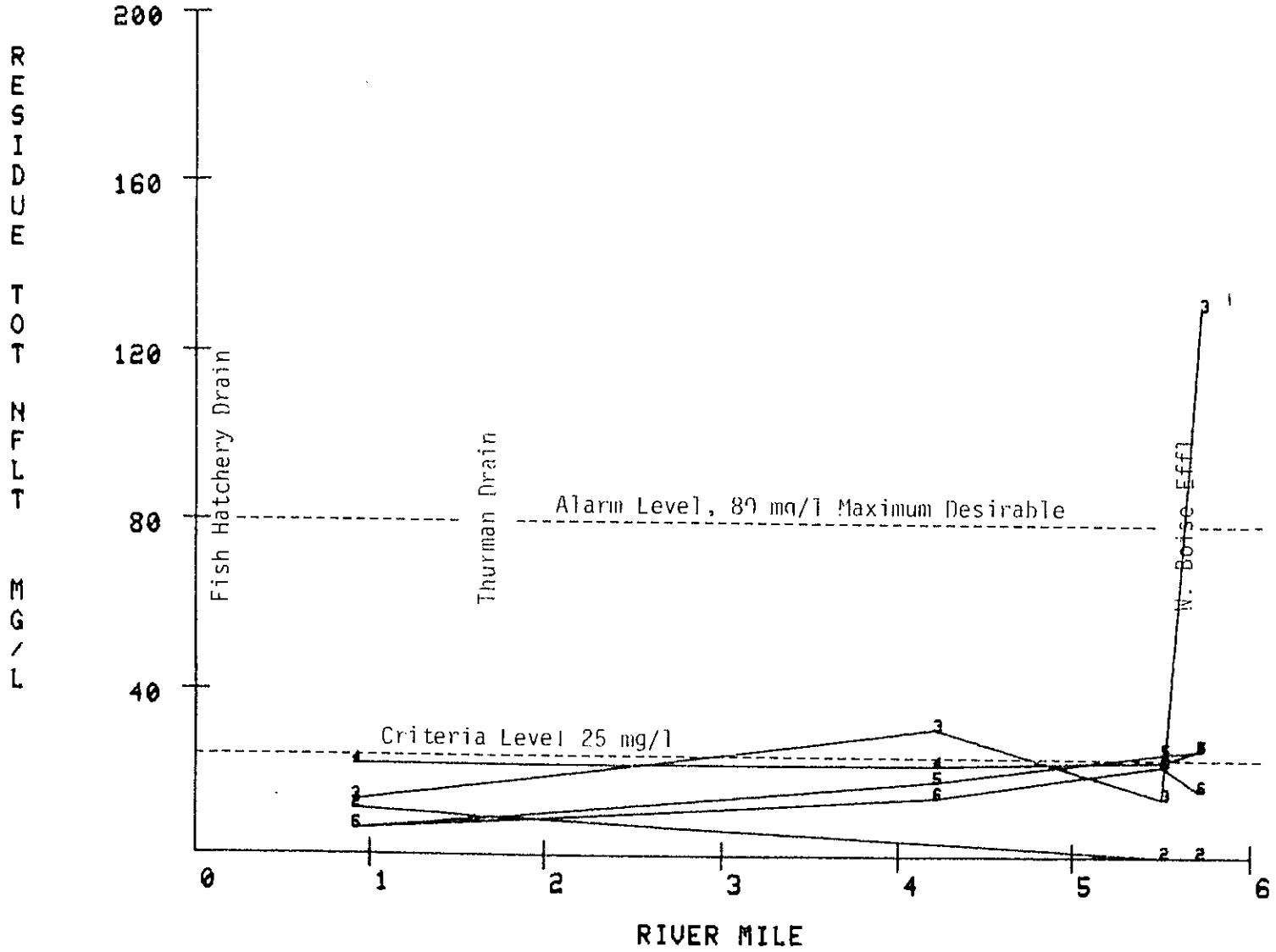

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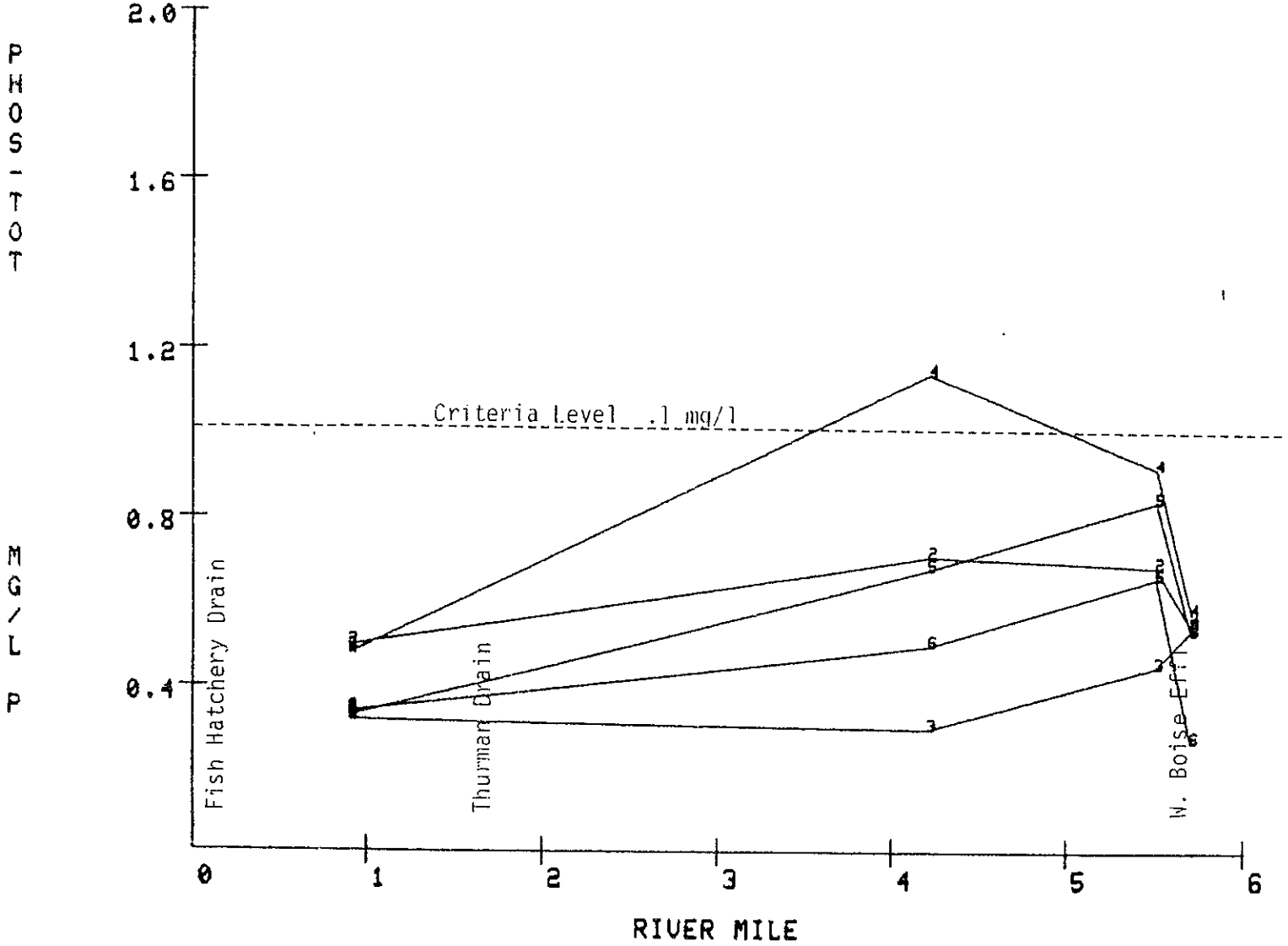

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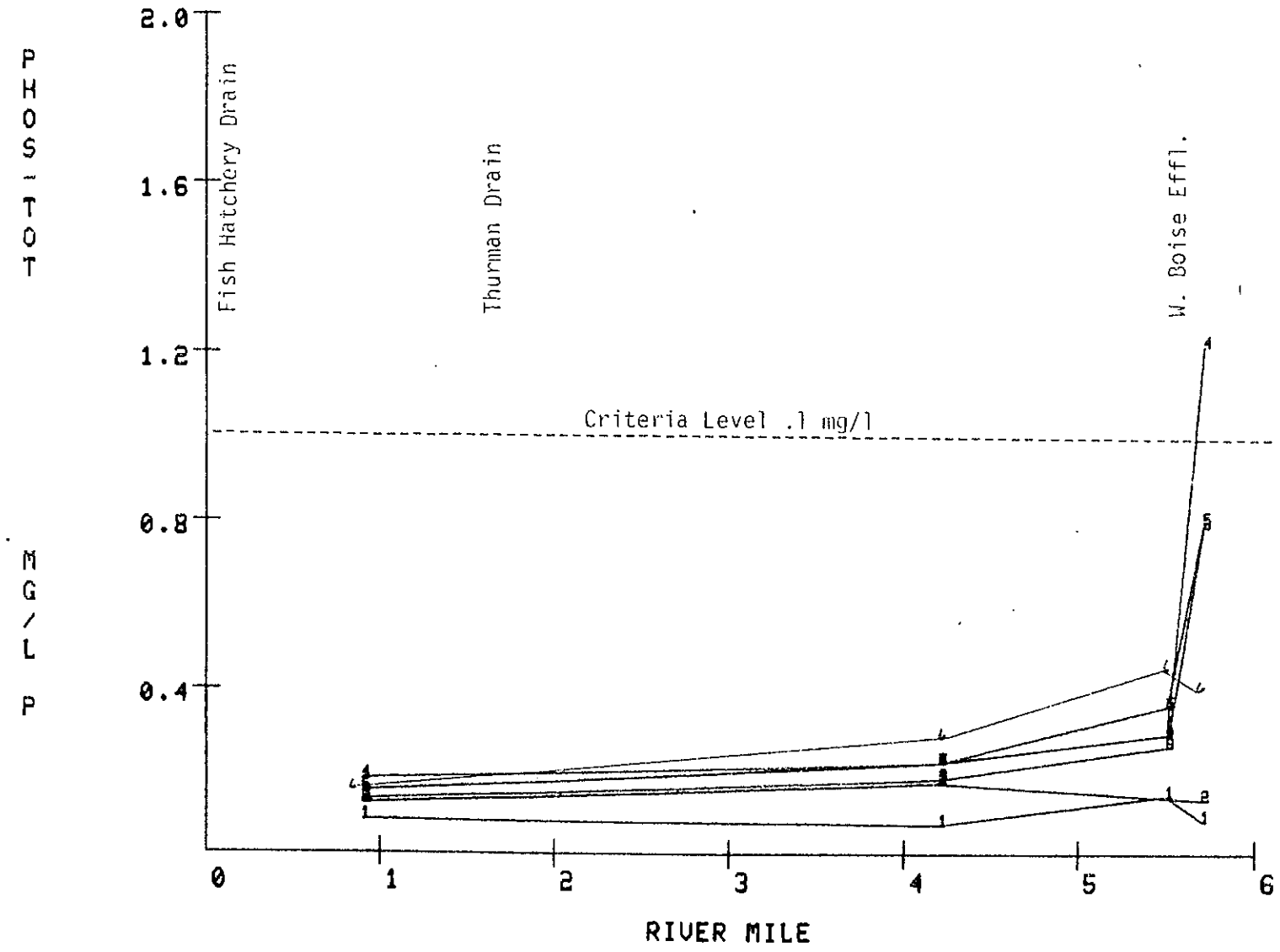

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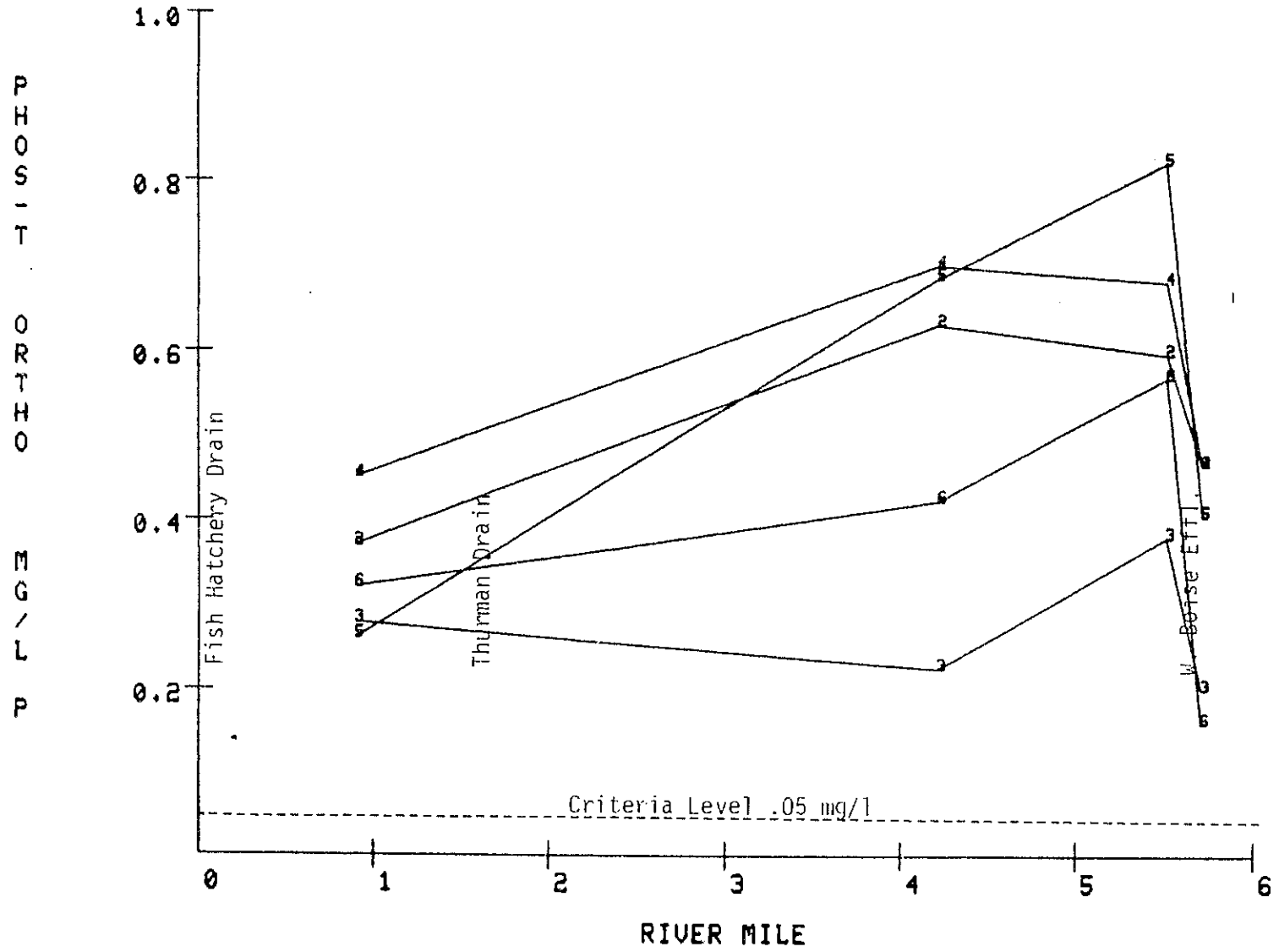

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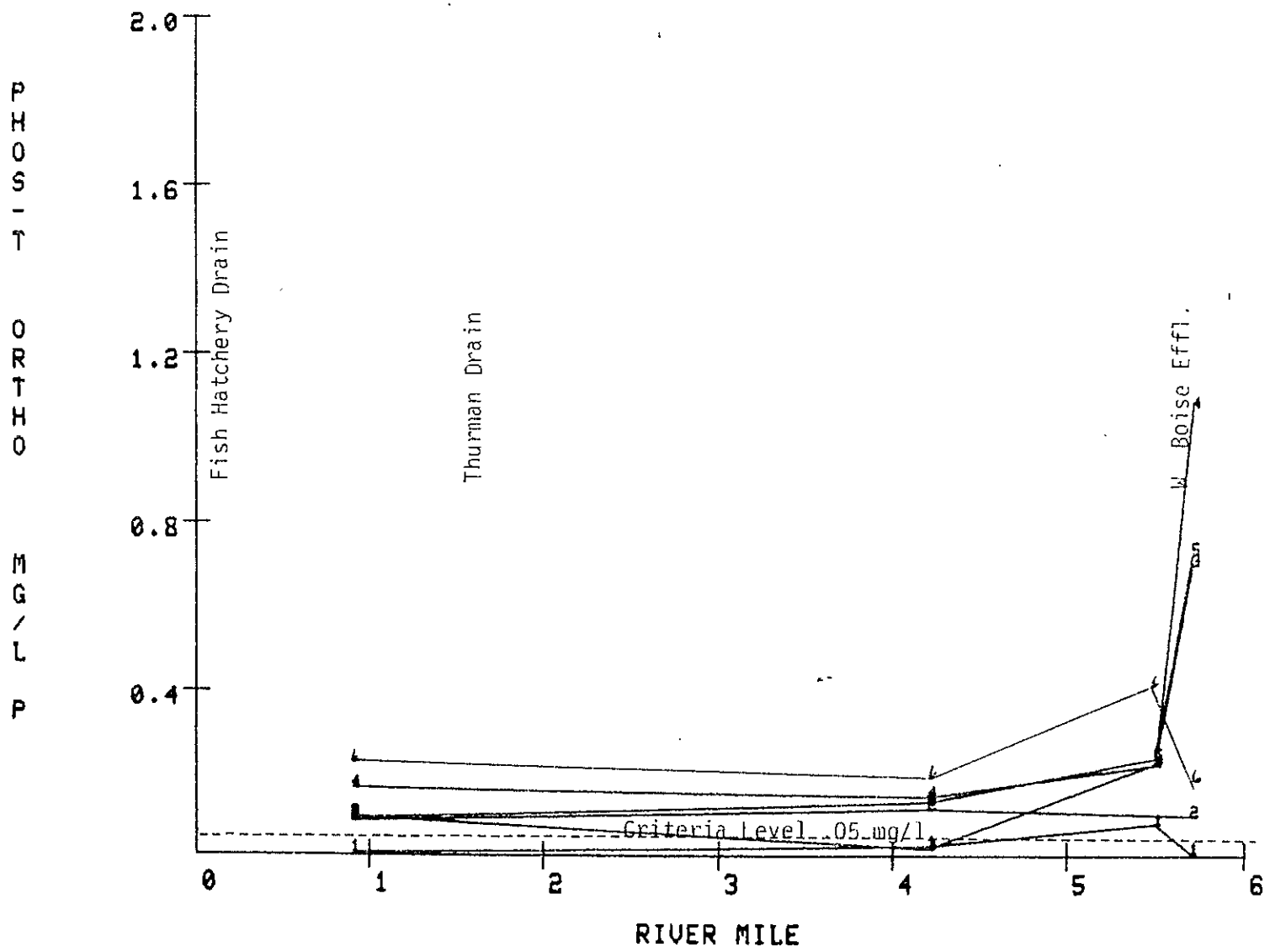

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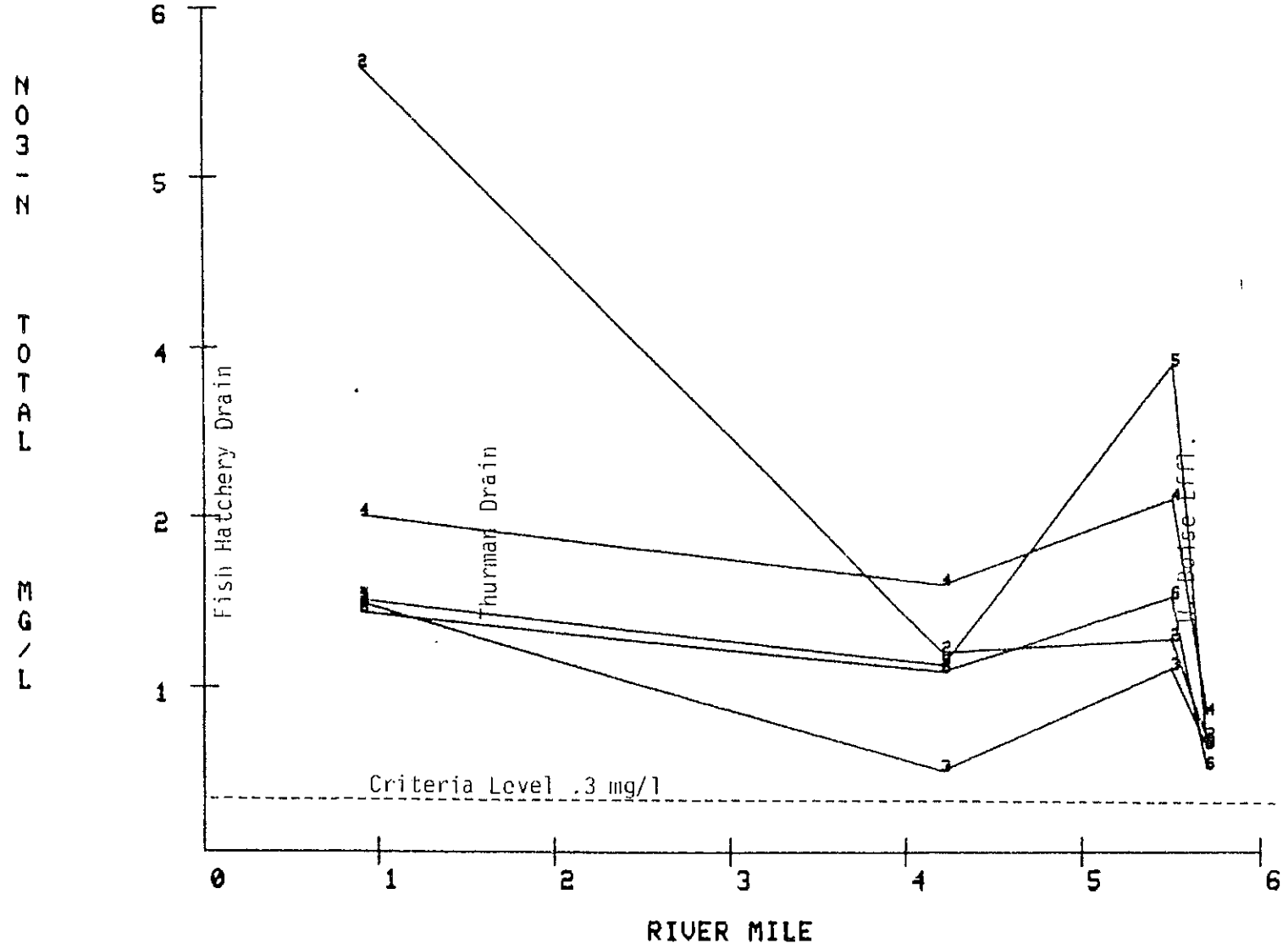

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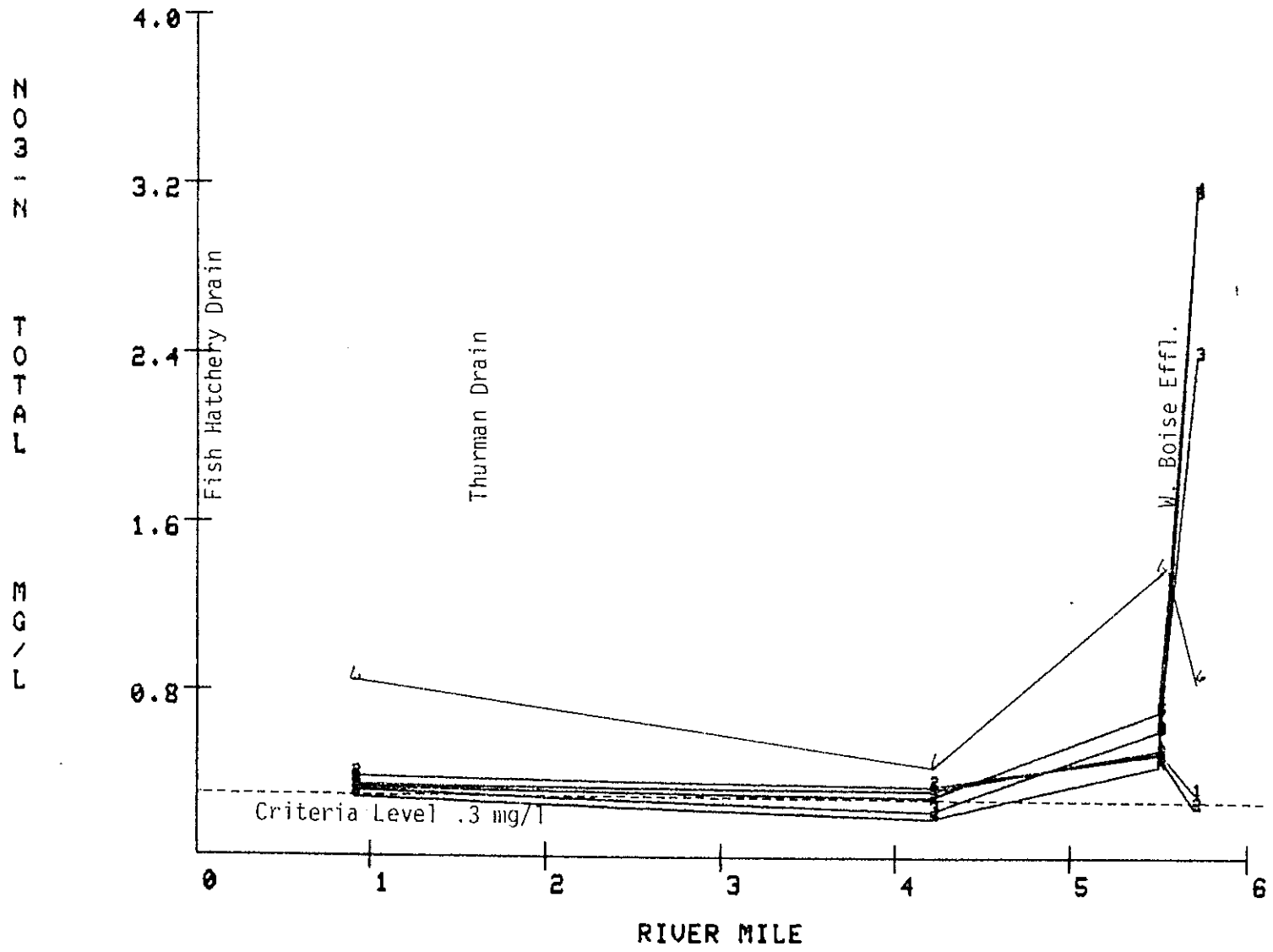

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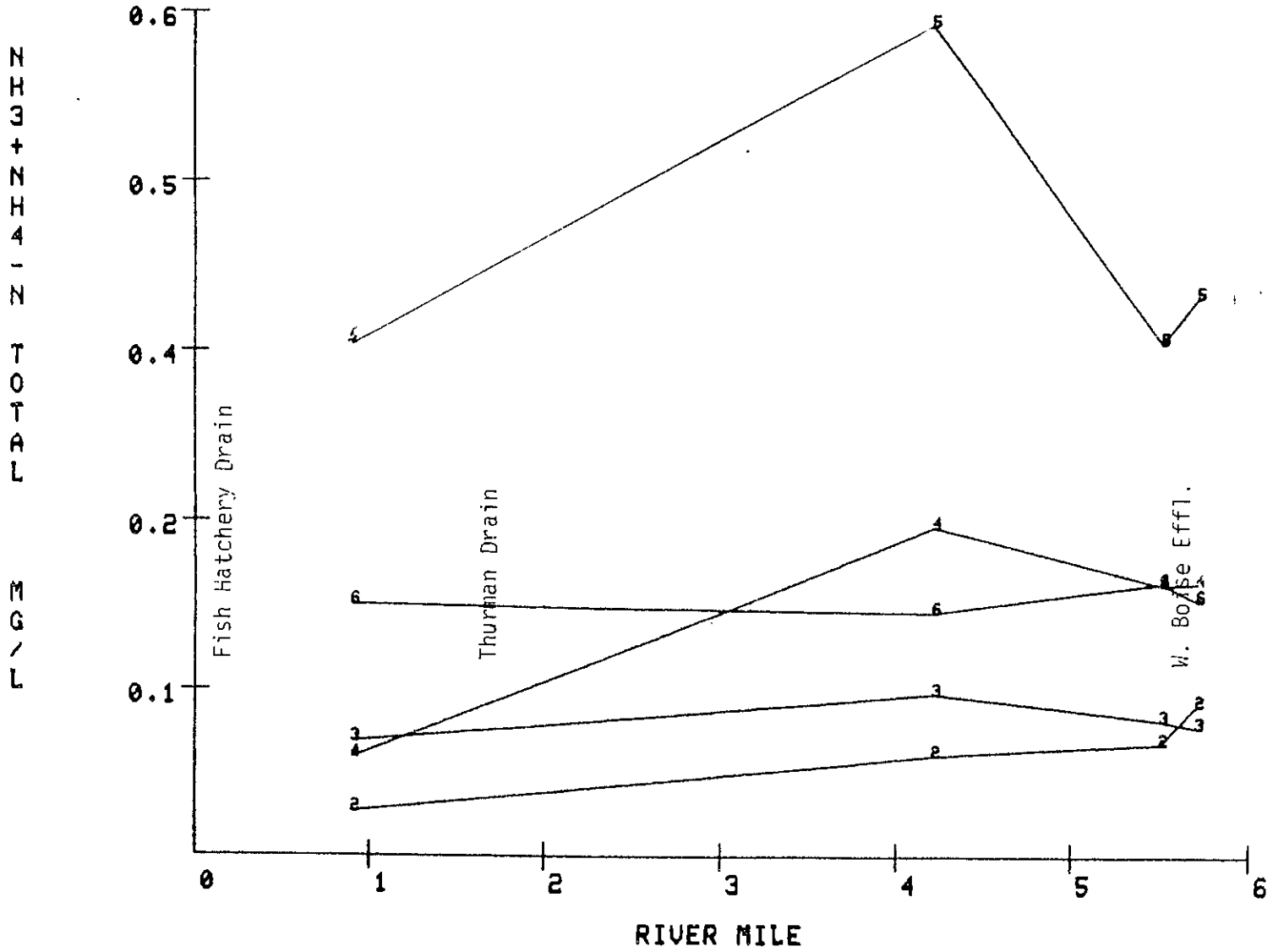

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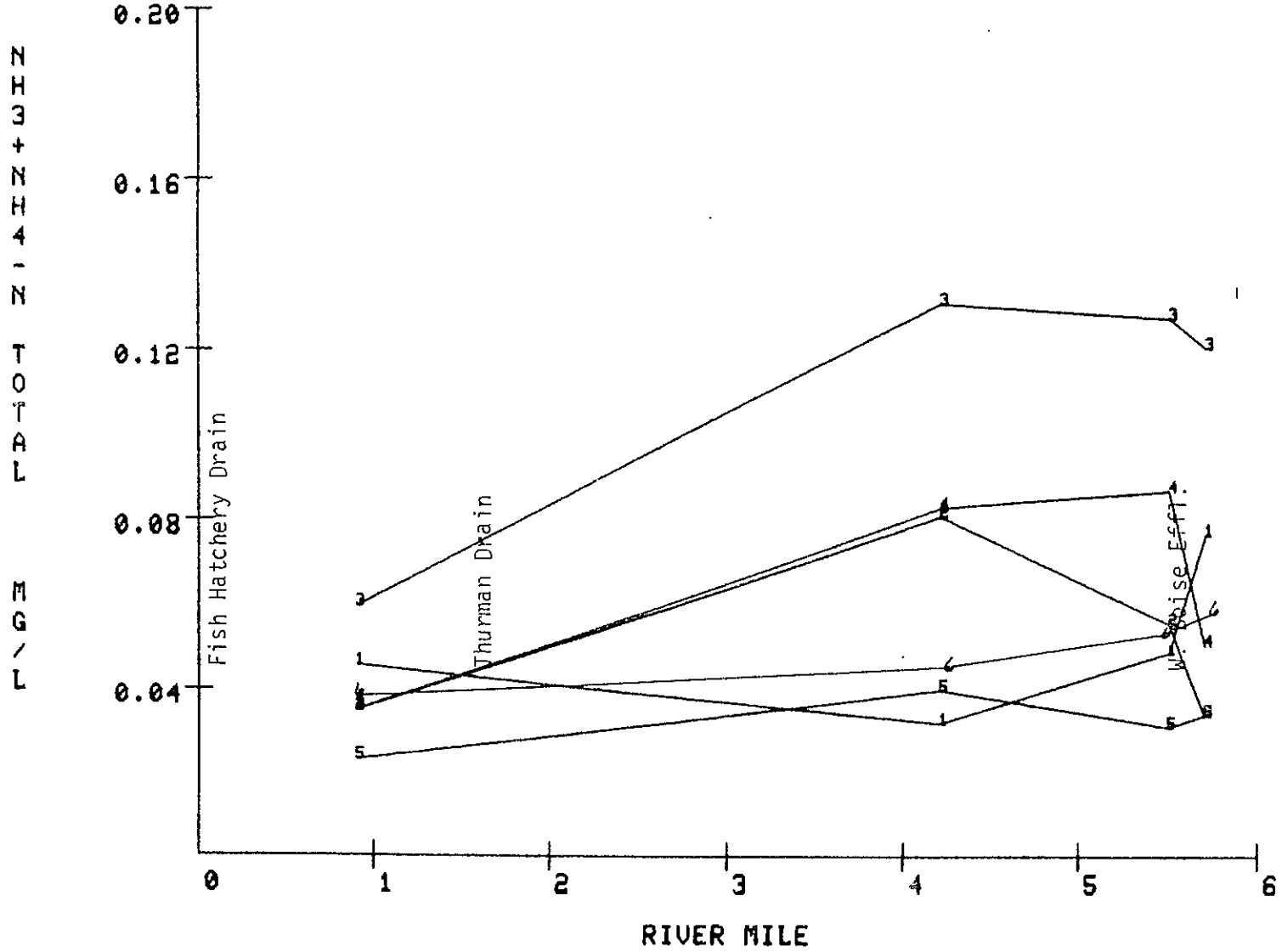

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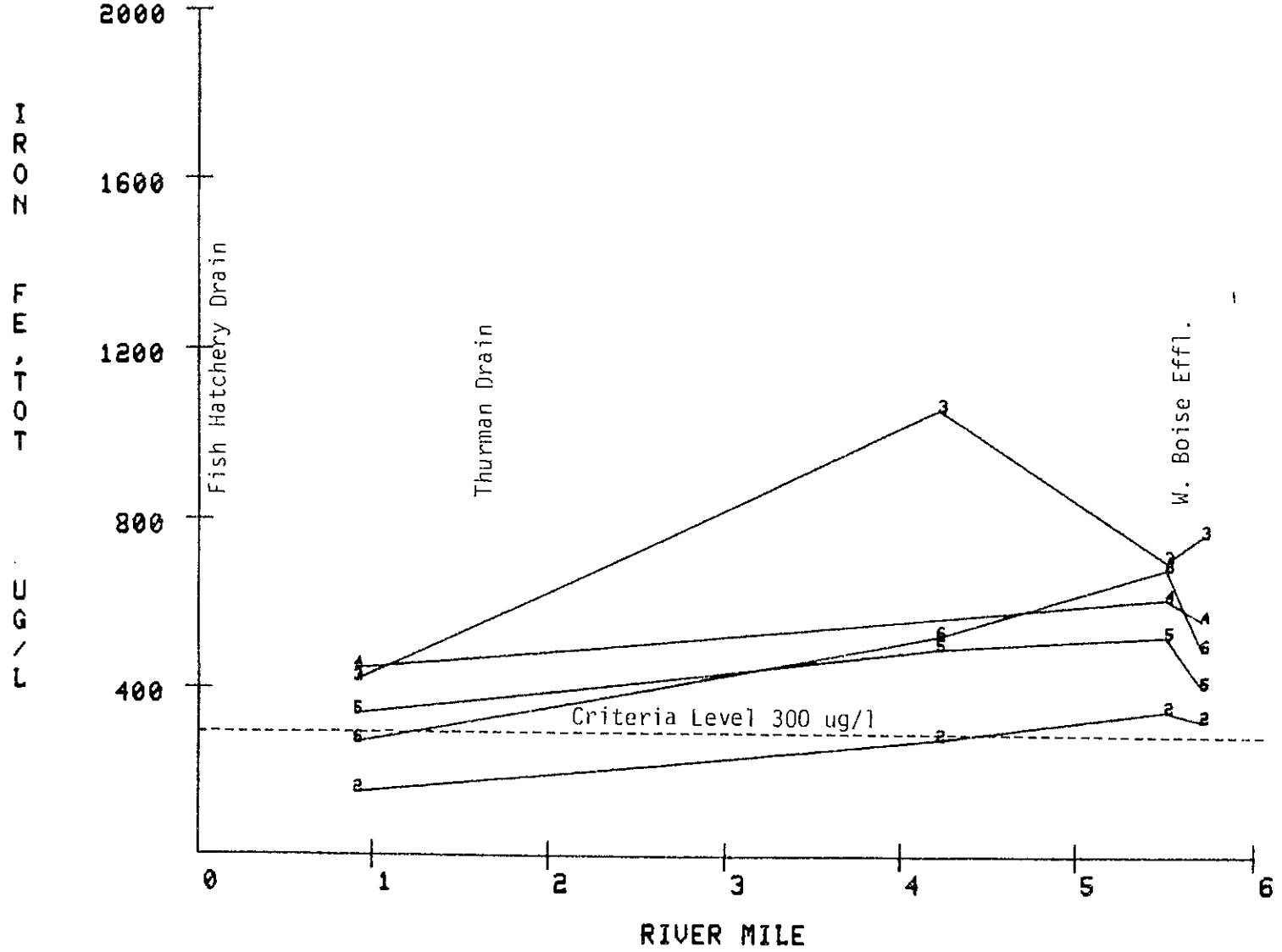

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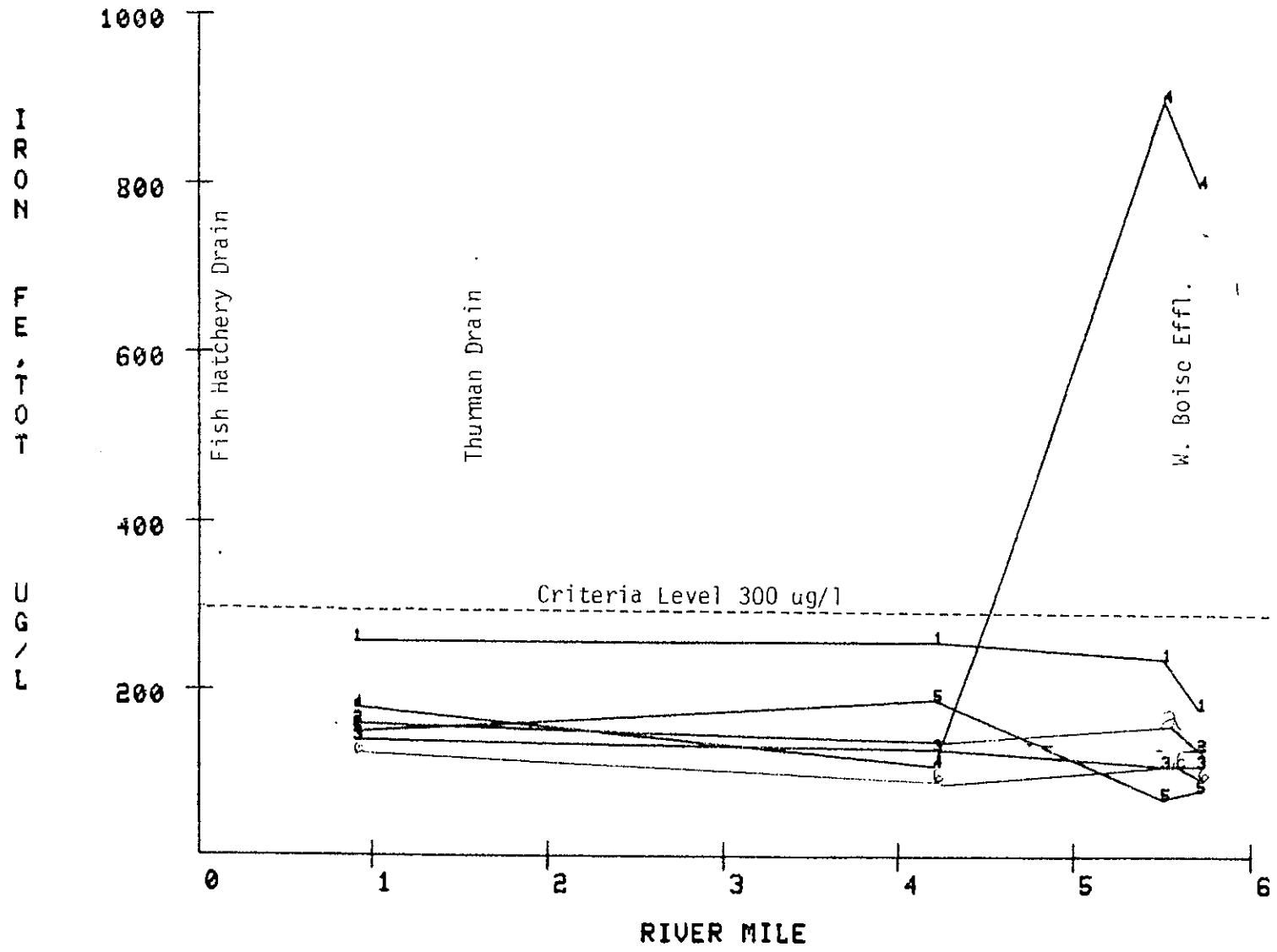

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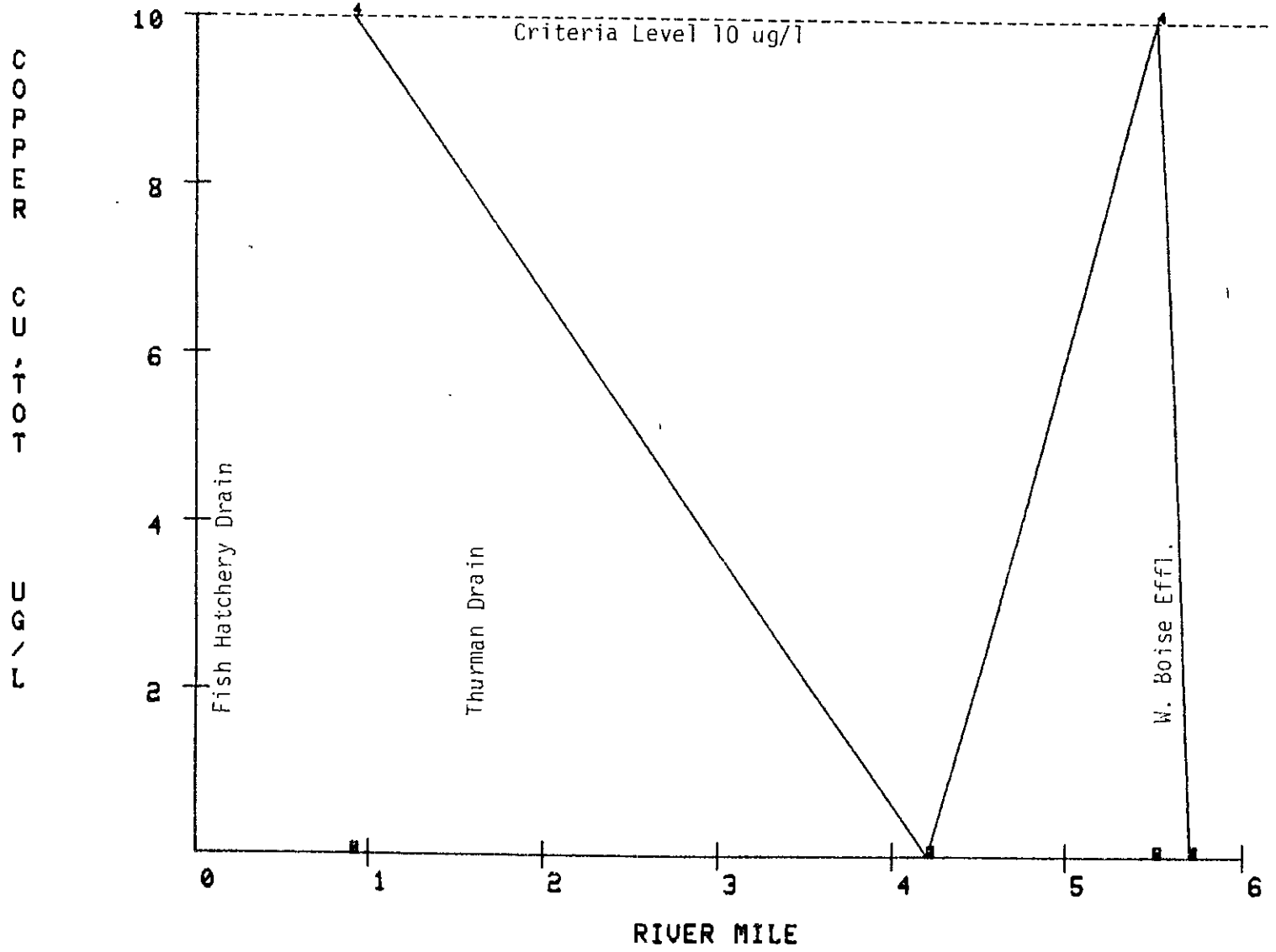

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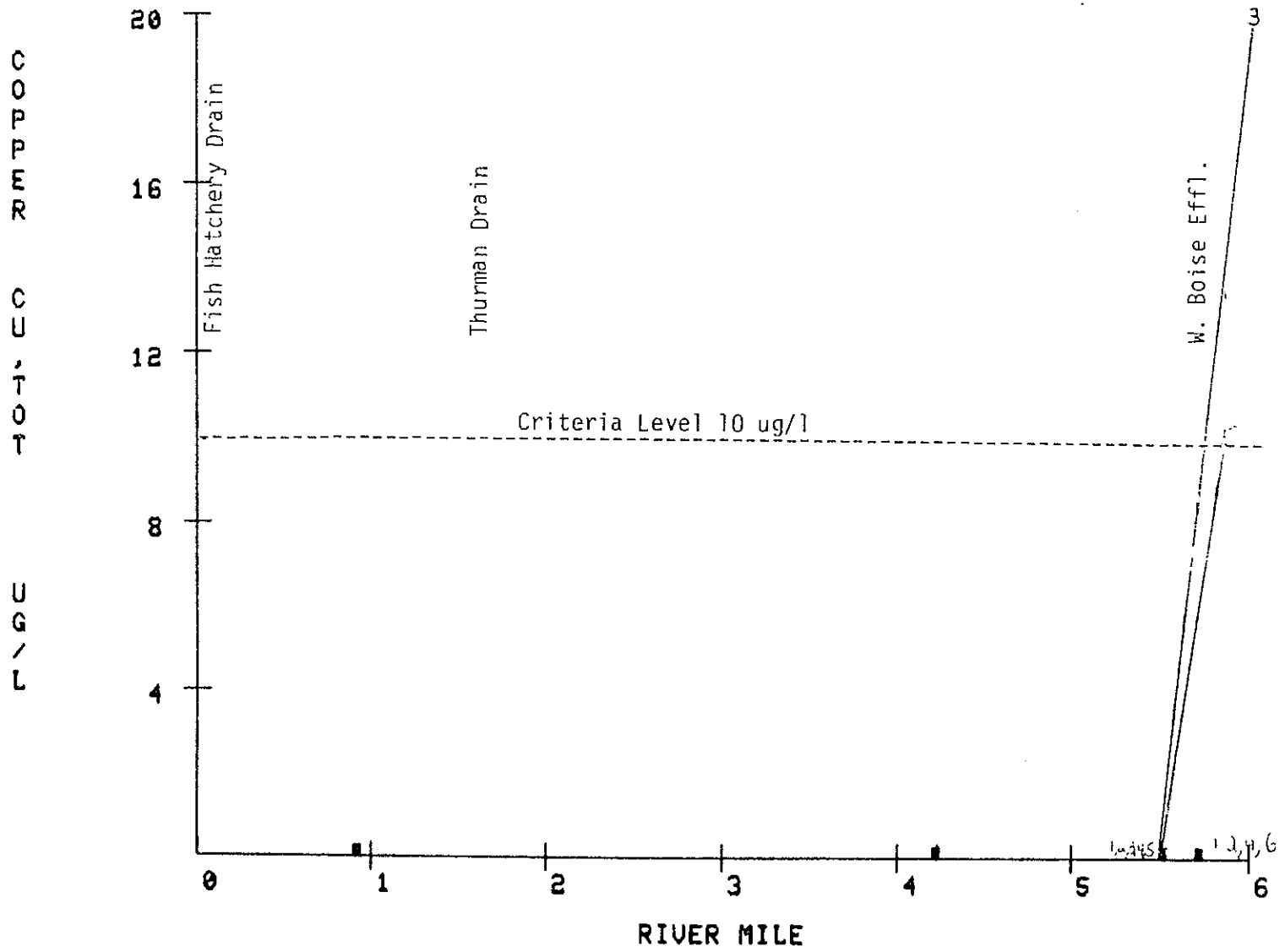

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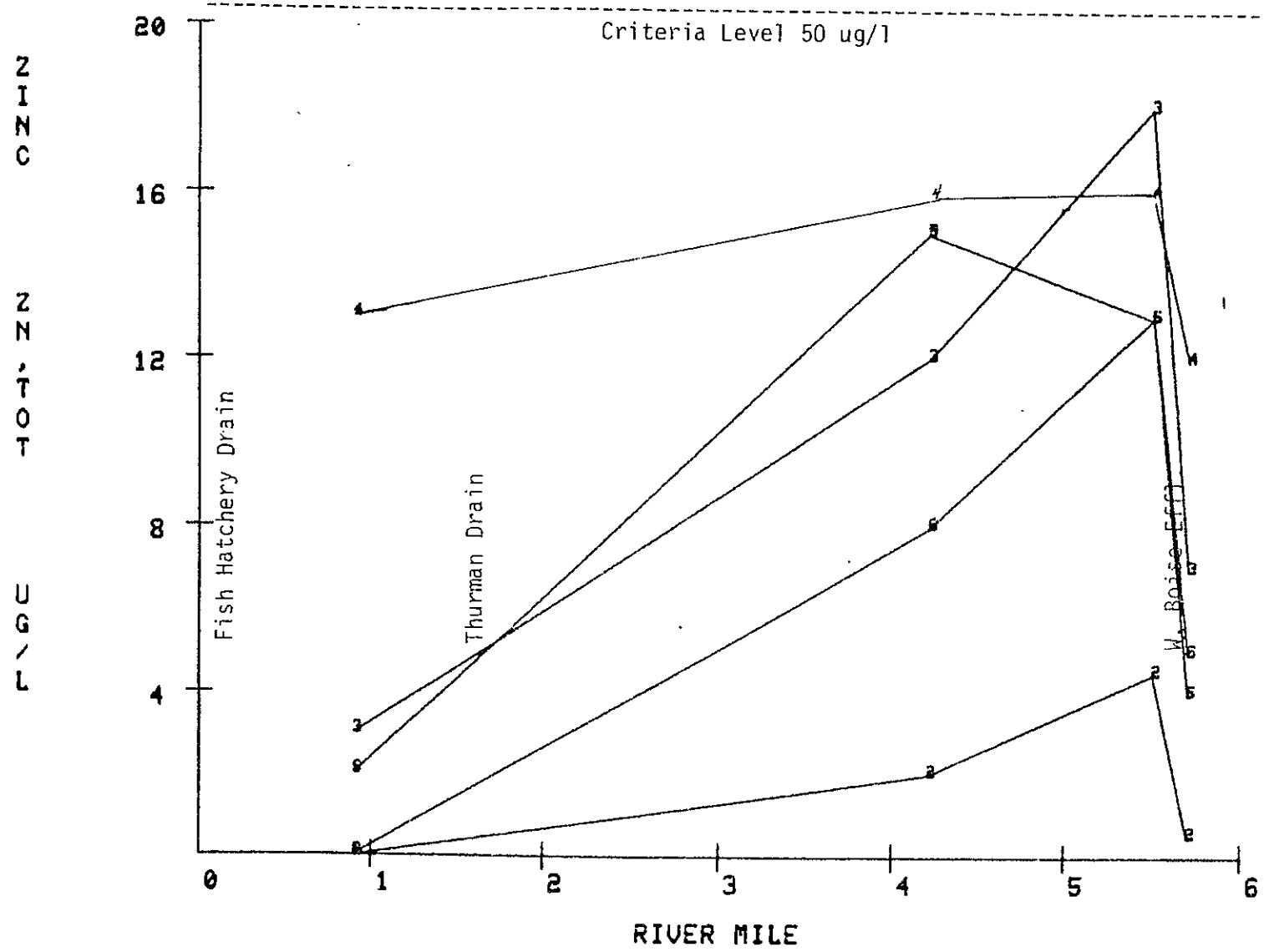

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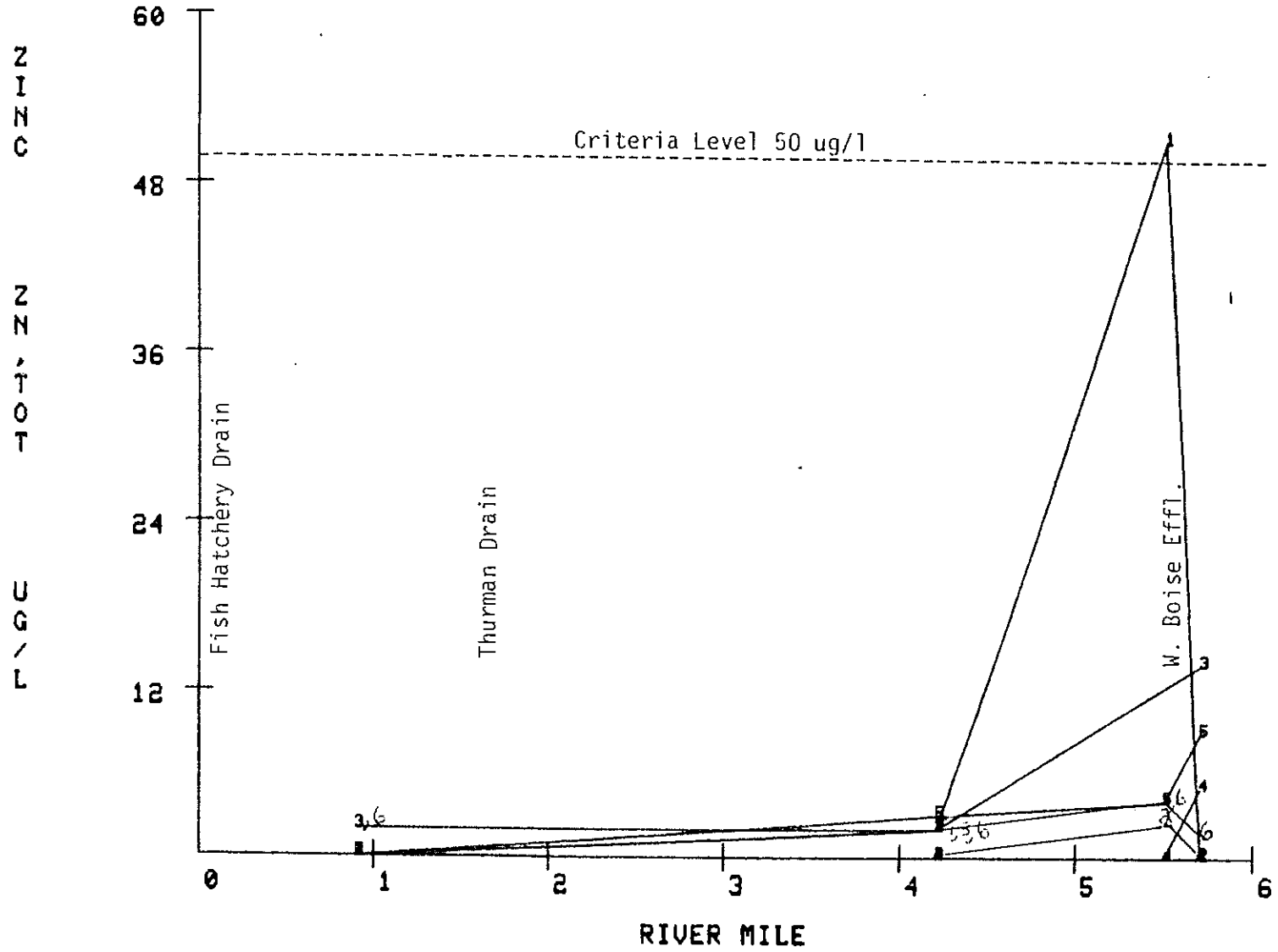

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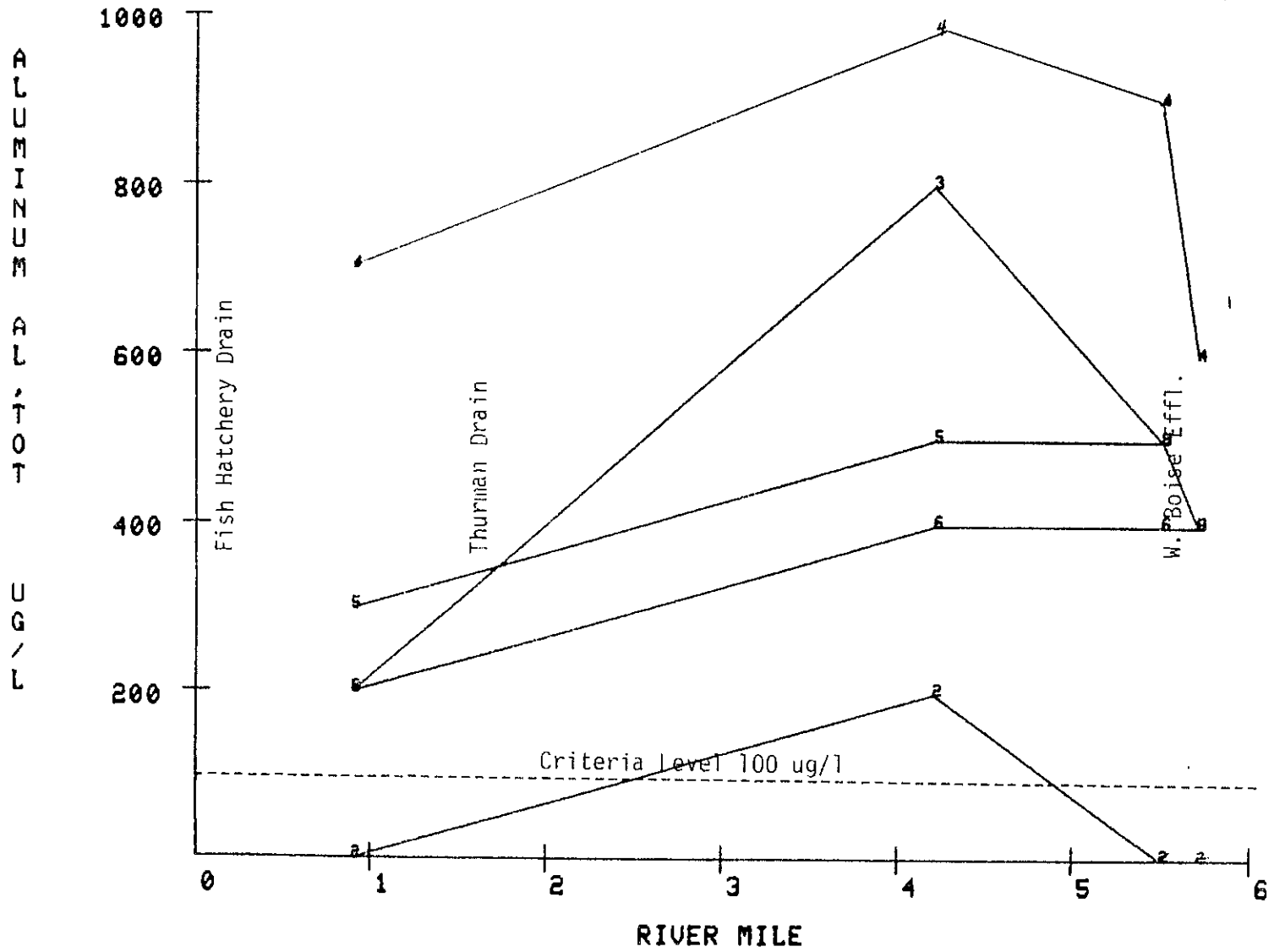

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