CHRISTINE O. GREGOIRE
Director

Water Body No. WA-07-1110
WA-07-1130
WA-07-1140
WA-07-1150
Segment No. 03-07-13
03-07-15
03-07-16

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
7171 Cleanwater Lane, Building 8, LH-14 • Olympia, Washington 98504-6514

92-e34

January 30, 1992

TO: Dave Wright

THROUGH: Dick Cunningham

FROM: Brad Hopkins

SUBJECT: Upper Snoqualmie River Special Study

At the request of the Northwest Regional Office (NWRO), the Ambient Monitoring Section collected water quality information during low flow conditions (June-September 1991) at three additional locations (see Figure 1) on the Snoqualmie River. They were as follows:

Station #	Description
1) 07N070	North Fork of the Snoqualmie River near Ellisville--River Mile 44.9, 0.3; Lat 46 59 43; Long 121 46 07
2) 07D150	Middle Fork of the Snoqualmie River near Ellisville--River Mile 45.3; Lat 47 07 06; Long 121 46 06
3) 07M070	South Fork of the Snoqualmie River at North Bend--River Mile 44.4, 2.01; Lat 47 33 12; Long 121 47 23

Water quality information generated at these locations will be used by the NWRO to evaluate possible outfall locations and to develop a water quality based permit for a planned WWTP expansion. Regional staff specifically expressed interest in background metals concentrations present during low flow conditions.

Attachment 1 and the enclosed floppy disk provide all of the current water quality information on the Snoqualmie River collected by our section from June-September 1991, including the two mainstem stations at the city of Snoqualmie and near Carnation. To compare data between stations, this same information is provided by date rather than by station in Table 1.

19.3 mi Carnation station

Snoqualmie R. at Snoqualmie

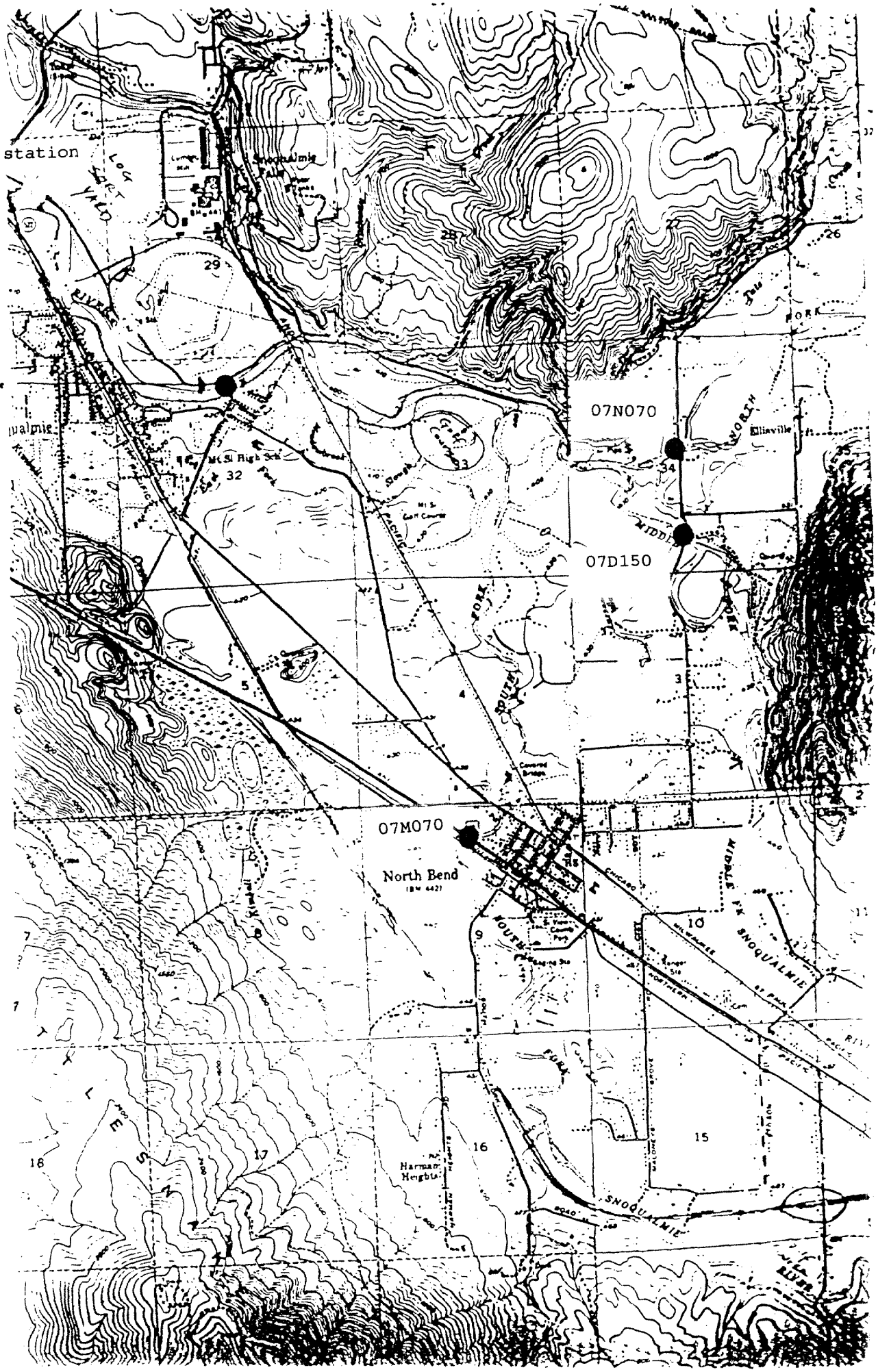

Table 1. General Water Quality on the Snoqualmie River

Date 06/17/91

Station #	07N070	07D150	07M070	07D130	07D070
Classification	AA	AA	AA	A	A
Flow	980	2160	889	4000	5310
Water Temp	8.1	7.5	8.5	8.5	9.4
Conductivity	26	19	35	24	35
DO	11.7	11.9	11.9	11.9	11.3
DO Sat (%)	98.5	98.8	101.4	101.3	97.0
pH	6.9	6.8	7.1	6.9	6.9
Residue	3	25	3.0	12.0	21.0
NH3+NH4 -N	0.01K	0.01K	0.01K	0.01K	0.01K
NO2-N (Diss)	0.01K	0.01K	0.01K	0.01K	0.01K
NO2+NO3 -N	0.113	0.072	0.152	0.107	0.149
Phos-Tot	0.011	0.017	0.01K	0.013	0.015
Phos-Ortho	0.01K	0.01K	0.01K	0.01K	0.01K
Turb	1.2	12.0	1.0	3.5	6.5
F.Coliform	6	12	11	15	35

Date 07/22/91

Station #	07N070	07D150	07M070	07D130	07D070
Classification	AA	AA	AA	A	A
Flow	205	1200	268	1390	1550
Water Temp	14.2	13.9	13.8	14.0	16.0
Conductivity	40	22	60	31	49
DO	10.2	10.4	10.5	10.2	10.0
DO Sat (%)	99.2	100.6	101.5	99.0	99.9
pH	6.9	6.7	7.6	7.0	6.9
Residue	2.0	4.0	2.0	2.0	2.0
NH3+NH4 -N	0.011	0.01K	0.01K	0.01	0.015
NO2-N (Diss)	0.01K	0.01K	0.01K	0.01K	0.01K
NO2+NO3 -N	0.141	0.029	0.215	0.093	0.121
Phos-Tot	0.01K	0.017	0.01K	0.01K	0.01K
Phos-Ortho	0.01K	0.01K	0.01K	0.011	0.01K
Turb	3.3	3.9	2.1	3.0	2.5
F.Coliform	5	6J	12	7	12

Table 1. Continued.

Date 08/19/91

Station #	07N070	07D150	07M070	07D130	07D070
Classification	AA	AA	AA	A	A
Flow	75	400	162	637	904
Water Temp	16.2	17.7	14.7	16.6	20.0
Conductivity	62	33	72	51	59
DO	8.9	9.4	10.2	9.2	9.3
DO Sat (%)	90.6	98.8	100.8	94.6	101.0
pH	7.1	6.6	7.2	6.8	7.0
Residue	3.0	9	3.0	3.0	2.0
NH3+NH4 -N	0.01K	0.01K	0.01K	0.01K	0.01K
NO2-N (Diss)	0.01K	0.01K	0.01K	0.01K	0.01K
NO2+NO3 -N	0.313	0.049	0.229	0.139	0.154
Phos-Tot	0.01K	0.01K	0.01K	0.01K	0.01K
Phos-Ortho	0.01K	0.01K	0.01K	0.01K	0.01K
Turb	1.6	2.8	1.5	2.8	2.0
F.Coliform	5	22	15	27	28

Date 09/16/91

Station #	07N070	07D150	07M070	07D130	07D070
Classification	AA	AA	AA	A	A
Flow	80	195	129	415	686
Water Temp	12.0	12.8	12.4	12.4	14.7
Conductivity	91	46	83	60	70
DO	9.9	10.3	10.4	10.2	10.8
DO Sat (%)	91.9	97.4	97.5	95.7	105.0
pH	6.5	6.4	7.3	7.1	7.3
Residue	1.0	5	1.0	2.0	1.0
NH3+NH4 -N	0.01K	0.01K	0.015	0.01	0.01K
NO2-N (Diss)	0.01K	0.01K	0.01K	0.01K	0.01K
NO2+NO3 -N	0.222	0.065	0.296	0.174	0.167
Phos-Tot	0.011	0.014	0.017	0.016	0.015
Phos-Ortho	0.01K	0.01K	0.01K	0.01K	0.01K
Turb	1.0K	1.6	1.0K	1.1	1.0K
F.Coliform	3	100	8	12	6J

K = Less than
J = Estimated value
☐ = Exceeds Water Quality Criteria

General Water Quality

Upper River

The general water quality at all three locations was, for the most part, very good, with the majority of the parameters within the expected range of waters of high quality. The only exceptions were five violations of Washington State Water Quality Standards as highlighted in Table 1 (see Attachment 2 for specific standards). The August temperature violations of 17.7 and 16.2°C (Class AA Criteria < 16°C) on the Middle and North Forks are most likely the result of combined effects of reduced flow and high ambient temperatures--a natural condition. Dissolved oxygen violations for the same time period of 9.4 and 8.9 mg/L (Class AA Criteria > 9.5 mg/L), show a weakness in the water quality standards, and do not reflect instream conditions. This weakness becomes evident upon review of the percent saturation for dissolved oxygen, which show both stations are above 90% of saturation level with 90.6 and 98.9 percent. The remaining two violations, pH of 6.4 and fecal coliform of 100 colonies per 100 mL of sample, for September are at or near the water quality criteria (6.5-8.5 for pH and <10% of the samples may exceed 100 organisms for fecal coliform).

Mainstem

The water quality for the mainstem Snoqualmie Stations, at Snoqualmie and Carnation, were all within Class A Water Quality Standard (see Attachment 2), with the exception of an August temperature violation at the Carnation stations of 20.0°C (Class A Criteria <18°C).

Metals

Metals concentrations at the three new locations and the corresponding water quality criteria are presented in Table 2. Most of these concentrations are at or near detection limits as denoted by the qualifier codes attached to the data. However, one cadmium value of 0.32 μg/L on the North Fork collected in June does exceed both the calculated acute (0.26 μg/L) and chronic (0.17 μg/L) criteria. This datum may be a laboratory artifact as an inordinately high number of detect were present for the June Northwest ambient monitoring samples. However, a review of the laboratory QA does not indicate a problem. Even if the datum is a valid concentration it should be noted that it is a total recoverable concentration, where as the standards are based on dissolved concentrations. This problem of different methods between water quality values and the standard to which they will be compared, will continue until EPA approves an acid-soluble (dissolved) method. In the interim, EPA recommends applying the criteria using the total recoverable method, even though these criteria may be overly protective.

Detection limits currently available for Hg, Cu, Pb, and Cd are in very close proximity to the chronic criteria, and may lead to overly restrictive permit conditions if the data provided in Table 2 is to be used in the WQBP-TOX.WK1 spreadsheet. It is my recommendation

Table 2. Metals Concentrations (ug/L) and Corresponding Water Quality Criteria on the Upper Snoqualmie River.

								Calculated Water Quality Criteria Based on Total Hardness											
	T-Hg	T-Cr	T-Cu	T-Pb	T-Zn	T-Cd	Hard	Acute Hg	Chronic Hg	Acute Cr	Chronic Cr	Acute Cu	Chronic Cu	Acute Pb	Chronic Pb	Acute Zn	Chronic Zn	Acute Cd	Chronic Cd
North Fork																			
6/17/91	0.04 k	0.4	3 k	1 k	6	0.32	9	2.4	0.012	241.66	28.80	1.83	1.51	3.81	0.15	15.21	13.78	0.26	0.17
7/22/91	NS																		
8/19/91	0.07 p	0.6 v	3 k	2.4 p	4 k	0.1 k	25	2.4	0.012	557.94	66.50	4.80	3.62	13.98	0.54	36.15	32.75	0.82	0.38
9/16/91	0.2 k	0.3 k	3 k	1.9 p	8 v	0.13 p	23	2.4	0.012	521.11	62.11	4.44	3.37	12.57	0.49	33.69	30.51	0.75	0.36
Middle Fork																			
6/17/91	0.04 k	2.3	3 p	1 k	7 v	0.11 p	6	2.4	0.012	173.37	20.67	1.25	1.07	2.27	0.09	10.79	9.77	0.16	0.12
7/22/91	NS																		
8/19/91	0.06 p	0.5 v	3 k	1 k	4 k	0.1 k	12	2.4	0.012	305.86	36.46	2.40	1.93	5.49	0.21	19.41	17.58	0.36	0.21
9/16/91	0.2 k	0.3 k	3 k	1 k	4 k	0.1 k	13	2.4	0.012	326.59	38.93	2.59	2.07	6.08	0.24	20.77	18.82	0.39	0.23
South Fork																			
6/17/91	0.04 k	0.4	3 p	1 k	6	0.1 k	14	2.4	0.012	347.02	41.36	2.78	2.20	6.68	0.26	22.12	20.03	0.43	0.24
7/22/91	NS																		
8/19/91	0.07 p	0.4 v	3 k	1 k	4 k	0.1 k	35	2.4	0.012	734.97	87.60	6.59	4.82	21.46	0.84	48.08	43.55	1.20	0.50
9/16/91	0.2 k	1.3	3 k	1 k	4 k	0.42 p	36	2.4	0.012	752.12	89.65	6.77	4.94	22.24	0.87	49.24	44.60	1.24	0.51

k = Less Than

p = Less Than Quanitation Limit

v = Also Detected in the Blank

NS = No Sample (Laboratory Misplaced Sample)

BOLD # = Exceeds Water Quality Criteria

data for these parameters be used to issue an interim permit subject to future review when analytical methods are adopted that allow true comparison between concentrations and criteria.

Summary

In general, the water quality conditions at the North, Middle, and South Forks of the Snoqualmie River during low flow conditions are very good with only minor water quality criteria violations. The only area of possible concern is temperature on the North and Middle Forks.

If you have any questions concerning the above information, please contact me at SCAN 234-2819.

BH:kd
Attachment

cc: Joe Joy

07D070 3307D070 12149000
SNOQUALMIE RIVER NEAR CARNATION
47 39 58.0 121 55 27.0 2F 0 Elev= 0 ft
53033 Washington King Co. PACIFIC NORTHWEST
PUGET SOUND (Snohomish-07) 131107
21540000 Reach= 0.000 Drg= 0 sqmi
Seg ID= 03-07-13 Class= AA Miles= 0.00 to 0.00
AMBNT/STREAM/RMP

INDEX 1311116 000120
MILES 0020.70 0023.01 . . . . . .

DATE FROM TO	TIME	DEPTH METER	8 LAB IDENT. NUMBER	10 WATER TEMP CENT	25 BAROMTRC PRESSURE MM OF HG	60 STREAM FLOW CFS	80 COLOR PT-CO UNITS	95 CNDUCTVY LAB @ 25C UMHO	300 DO MG/L	301 DO SATUR PERCENT	400 PH SU	410 T ALK CACO3 MG/L
90/10/22	1145		436053	7.9	770	5310		45	11.7	97.0	7.10	
90/11/18	1140		476053	6.9	772	5830		43	12.1	97.7	6.80	
91/02/18	1100		86053	5.2	771	5150		34	12.4	96.1	6.90	
91/03/18	1120		126053	6.7	761	2420		55	11.5	93.7	7.30	
91/04/15	1105		166053	7.7	766	3860		47	11.2	92.9	6.90	
91/05/20	1125		216053	8.8	768	3890		37	11.5	97.6	7.10	
91/06/17	1230		256053	9.4	770	5310		35	11.3	97.0	6.90	
91/07/22	1230		306053	16.0	765	1550		49	10.0	99.9	6.90	
91/08/19	1200		346053	20.0	763	904		59	9.3	101.0	7.00	
91/09/16	1255		386053	14.7	766	686		70	10.8	105.0	7.30	

DATE FROM TO	TIME	DEPTH METER	440 HCO3 ION HCO3 MG/L	445 CO3 ION CO3 MG/L	530 RESIDUE TOT-NFLT MG/L	610 NH3+NH4- N TOTAL MG/L	613 NO2-N DISS MG/L	615 NO2-N TOTAL MG/L	620 NO3-N TOTAL MG/L	625 TOT KJEL N MG/L	630 NO2+NO3 N-TOTAL MG/L	665 PHOS-TOT MG/L P
90/10/22	1145				14.0	0.010K	0.002K				0.293	0.017
90/11/18	1140				20.0	0.020	0.010K				0.300	0.020
91/02/18	1100				9.0	0.010K	0.010K				0.280	0.040
91/03/18	1120				3.0	0.009	0.010K				0.294	0.007
91/04/15	1105				8.0	0.010K	0.010K				0.310	0.010
91/05/20	1125				5.0	0.015	0.010K				0.135	0.011
91/06/17	1230				21.0	0.010K	0.010K				0.149	0.015
91/07/22	1230				2.0	0.015	0.010K				0.121	0.010K
91/08/19	1200				2.0	0.010K	0.010K				0.154	0.010K
91/09/16	1255				1.0	0.010K	0.010K				0.167	0.015

DATE FROM TO	TIME	DEPTH METER	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	902 NC HARD CACO3 MG/L	915 CALCIUM CA,DISS MG/L	925 MGNSIUM MG,DISS MG/L	930 SODIUM NA,DISS MG/L	935 PTSSIUM K,DISS MG/L	940 CHLORIDE CL MG/L	945 SULFATE SO4-TOT MG/L	950 FLUORIDE F,DISS MG/L
90/10/22	1145		0.006									
90/11/18	1140		0.010K									
91/02/18	1100		0.010K									

MORE DATES NEXT PAGE

DATE FROM TO	TIME	DEPTH METER	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	902 NC HARD CACO3 MG/L	915 CALCIUM CA,DISS MG/L	925 MGNSIUM MG,DISS MG/L	930 SODIUM NA,DISS MG/L	935 PTSSIUM K,DISS MG/L	940 CHLORIDE CL MG/L	945 SULFATE SO4-TOT MG/L	950 FLUORIDE F,DISS MG/L
91/03/18	1120		0.011									
91/04/15	1105		0.010K									
91/05/20	1125		0.010K									
91/06/17	1230		0.010K									
91/07/22	1230		0.010K									
91/08/19	1200		0.010K									
91/09/16	1255		0.010K									

DATE FROM TO	TIME	DEPTH METER	955 SILICA DISOLVED MG/L	1020 BORON B,DISS UG/L	1030 CHROMIUM CR,DISS UG/L	1040 COPPER CU,DISS UG/L	1045 IRON FE,TOT UG/L	1049 LEAD PB,DISS UG/L	1080 STRONTUM SR,DISS UG/L	1090 ZINC ZN,DISS UG/L	1130 LITHIUM LI,DISS UG/L	31504 TOT COLI MFIM LES /100ML

DATE FROM TO	TIME	DEPTH METER	31616 FEC COLI MFM-FCBR /100ML	31672 FECSTREP PC M-ENT /100ML	70300 RESIDUE DISS-180 C MG/L	71900 MERCURY HG,TOTAL UG/L	82079 TURBIDTY LAB NTU
90/10/22	1145		17				4.3
90/11/18	1140		59				5.4
91/02/18	1100		23				4.3
91/03/18	1120		8				2.5
91/04/15	1105		22				5.8
91/05/20	1125		30S				3.0
91/06/17	1230		35				6.5
91/07/22	1230		12				2.5
91/08/19	1200		28				2.0
91/09/16	1255		6J				1.0K

07N070 3307N070
NF SNOQUALMIE RIVER NEAR ELLISVILLE
46 59 43.0 121 46 07.0 2F000 Elev= 0 ft
53033 Washington King Co. PACIFIC NORTHWEST
PUGET SOUND (Snohomish-07) 131107
21540000 Reach=17110010000 0.000 Drg= 0 sqmi
AMBNT/STREAM/RMP

INDEX 1311116 000120 00650
MILES 0020.50 0044.90 000.30 . . . . . .

DATE FROM TO	TIME	DEPTH METER	8 LAB IDENT. NUMBER	10 WATER TEMP CENT	25 BAROMTRC PRESSURE MM OF HG	60 STREAM FLOW CFS	95 CNDUCTVY LAB @ 25C UMHO	300 DO MG/L	301 DO SATUR PERCENT	400 PH SU	530 RESIDUE TOT-NFLT MG/L	610 NH3+NH4- N TOTAL MG/L
91/06/17	1020		256077	8.1	762	980	26	11.7	98.5	6.90	3.0	0.010K
91/07/22	1025		306077	14.2	757	205	40	10.2	99.2	6.90	2.0	0.011
91/08/19	1015		346077	16.2	754	75	62	8.9	90.6	7.10	3.0	0.010K
91/09/16	1055		386077	12.0	756	80	91	9.9	91.9	6.50	1.0	0.010K

DATE FROM TO	TIME	DEPTH METER	613 NO2-N DISS MG/L	630 NO2+NO3 N-TOTAL MG/L	665 PHOS-TOT MG/L P	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	1094 ZINC TOT REC UG/L	1113 CADMIUM TOT REC UG/L	1114 LEAD TOT REC UG/L	1118 CHROMIUM TOT REC UG/L	1119 COPPER TOT REC UG/L
91/06/17	1020		0.010K	0.113	0.011	0.010K	9	6.0	0.32	1.0K	0.4	3.0K
91/07/22	1025		0.010K	0.141	0.010K	0.010K	16					
91/08/19	1015		0.010K	0.313	0.010K	0.010K	25	4.0K	0.10K	2.4P	0.6V	3.0K
91/09/16	1055		0.010K	0.222	0.011	0.010K	23	8.0V	0.13P	1.9P	0.3K	3.0K

DATE FROM TO	TIME	DEPTH METER	31616 FEC COLI MFM-FCBR /100ML	71901 MERCURY TOT REC UG/L	82079 TURBIDTY LAB NTU
91/06/17	1020		6	0.04K	1.2
91/07/22	1025		5		3.3
91/08/19	1015		5	0.07P	1.6
91/09/16	1055		3	0.20K	1.0K

07D150 3307D150
MF SNOQUALMIE RIVER NEAR ELLISVILLE
47 07 06.0 121 06 46.0 2F000 Elev= 0 ft
53033 Washington King Co. PACIFIC NORTHWEST
PUGET SOUND (Snohomish-07) 131107
21540000 Reach=17110010000 0.000 Drg= 0 sqmi
AMBNT/STREAM/RMP

INDEX 1311116 000120
MILES 0020.50 0045.30 . . . . . .

DATE FROM TO	TIME	DEPTH METER	8 LAB IDENT. NUMBER	10 WATER TEMP CENT	25 BAROMTRC PRESSURE MM OF HG	60 STREAM FLOW CFS	95 CNDUCTVY LAB @ 25C UMHO	300 DO MG/L	301 DO SATUR PERCENT	400 PH SU	530 RESIDUE TOT-NFLT MG/L	610 NH3+NH4- N TOTAL MG/L
91/06/17	1045		256078	7.5	762	2160	19	11.9	98.8	6.80	25.0	0.010K
91/07/22	1050		306078	13.9	756	1200	22	10.4	100.6	6.70	4.0	0.010K
91/08/19	1035		346078	17.7	754	400	33	9.4	98.8	6.60	9.0	0.010K
91/09/16	1140		386078	12.8	755	195	46	10.3	97.4	6.40	5.0	0.010K

DATE FROM TO	TIME	DEPTH METER	613 NO2-N DISS MG/L	630 NO2+NO3 N-TOTAL MG/L	665 PHOS-TOT MG/L P	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	1094 ZINC TOT REC UG/L	1113 CADMIUM TOT REC UG/L	1114 LEAD TOT REC UG/L	1118 CHROMIUM TOT REC UG/L	1119 COPPER TOT REC UG/L
91/06/17	1045		0.010K	0.072	0.017	0.010K	6	7.0V	0.11	1.0K	2.3	3.0
91/07/22	1050		0.010K	0.029	0.010K	0.010K	8					
91/08/19	1035		0.010K	0.049	0.010K	0.010K	12	4.0K	0.10K	1.0K	0.5V	3.0K
91/09/16	1140		0.010K	0.065	0.014	0.010K	13	4.0K	0.10K	1.0K	0.3K	3.0K

DATE FROM TO	TIME	DEPTH METER	31616 FEC COLI MFM-FCBR /100ML	71901 MERCURY TOT REC UG/L	82079 TURBIDTY LAB NTU
91/06/17	1045		12	0.04K	12.0
91/07/22	1050		6J		3.9
91/08/19	1035		22	0.06P	2.8
91/09/16	1140		100	0.20K	1.6

07M070 3307M070
SF SNOQUALMIE RIVER AT NORTH BEND
47 33 12.0 121 47 23.0 2F000 Elev= 0 ft
53033 Washington King Co. PACIFIC NORTHWEST
PUGET SOUND (Snohomish-07) 131107
21540000 Reach=17110010000 0.000 Drg= 0 sqmi
AMBNT/STREAM/RMP

INDEX 1311116 000120 00620
MILES 0020.50 0044.40 002.01 . . . . . .

DATE FROM TO	TIME	DEPTH METER	8 LAB IDENT. NUMBER	10 WATER TEMP CENT	25 BAROMTRC PRESSURE MM OF HG	60 STREAM FLOW CFS	95 CNDUCTVY LAB @ 25C UMHO	300 DO MG/L	301 DO SATUR PERCENT	400 PH SU	530 RESIDUE TOT-NFLT MG/L	610 NH3+NH4- N TOTAL MG/L
91/06/17	1110		256079	8.5	760	889	35	11.9	101.4	7.10	3.0	0.010K
91/07/22	1125		306079	13.8	755	268	60	10.5	101.5	7.60	2.0	0.010K
91/08/19	1100		346079	14.7	753	162	72	10.2	100.8	7.20	3.0	0.010K
91/09/16	1200		386079	12.4	755	129	83	10.4	97.5	7.30	1.0	0.015

DATE FROM TO	TIME	DEPTH METER	613 NO2-N DISS MG/L	630 NO2+NO3 N-TOTAL MG/L	665 PHOS-TOT MG/L P	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	1094 ZINC TOT REC UG/L	1113 CADMIUM TOT REC UG/L	1114 LEAD TOT REC UG/L	1118 CHROMIUM TOT REC UG/L	1119 COPPER TOT REC UG/L
91/06/17	1110		0.010K	0.152	0.010K	0.010K	14	6.0	0.10K	1.0K	0.4	3.0
91/07/22	1125		0.010K	0.215	0.010K	0.010K	25					
91/08/19	1100		0.010K	0.229	0.010K	0.010K	35	4.0K	0.10K	1.0K	0.4V	3.0K
91/09/16	1200		0.010K	0.296	0.017	0.010K	36	4.0K	0.42P	1.0K	1.3	3.0K

DATE FROM TO	TIME	DEPTH METER	31616 FEC COLI MFM-FCBR /100ML	71901 MERCURY TOT REC UG/L	82079 TURBIDTY LAB NTU
91/06/17	1110		11	0.04K	1.0
91/07/22	1125		12		2.1
91/08/19	1100		15	0.07P	1.5
91/09/16	1200		8	0.20K	1.0K

07D130 3307D130 12144400 541044
SNOQUALMIE RIVER AT SNOQUALMIE
47 31 40.0 121 48 40.0 2F 0 Elev= 0 ft
53033 Washington King Co. PACIFIC NORTHWEST
PUGET SOUND (Snohomish-07) 131107
21540000 Reach= 0.000 Drg= 0 sqmi
Seg ID= 03-07-13 Class= AA Miles= 0.00 to 0.00
AMBNT/STREAM/RMP

INDEX 1311116 000120
MILES 0020.50 0042.30 . . . . . .

DATE FROM TO	TIME	DEPTH METER	8 LAB IDENT. NUMBER	10 WATER TEMP CENT	25 BAROMTRC PRESSURE MM OF HG	60 STREAM FLOW CFS	70 TURB JKSN JTU	80 COLOR PT-CO UNITS	95 CNDUCTVY LAB @ 25C UMHO	300 DO MG/L	301 DO SATUR PERCENT	400 PH SU
90/10/22	1050		436052	7.3	759	4110			40	11.7	97.0	7.70
90/11/18	1100		476052	6.2	760	4010			55	12.2	98.3	7.40
90/12/10	1100		506052	5.6	752	6190			26	13.8	110.6	7.50
91/01/21	1035		46052	2.9	767	2760			38	12.8	93.8	8.00
91/02/18	1025		86052	4.6	760	3680			29	12.4	96.0	6.90
91/03/18	1030		126052	5.5	749	1560			46	11.7	94.1	7.50
91/04/15	1025		166052	6.5	754	2750			56	11.5	94.1	6.90
91/05/20	1045		216052	7.3	757	3290			30	11.6	96.4	7.20
91/06/17	1150		256052	8.5	761	4000			24	11.9	101.3	6.90
91/07/22	1145		306052	14.0	755	1390			31	10.2	99.0	7.00
91/08/19	1125		346052	16.6	753	637			51	9.2	94.6	6.80
91/09/16	1225		386052	12.4	755	415			60	10.2	95.7	7.10

DATE FROM TO	TIME	DEPTH METER	410 T ALK CACO3 MG/L	440 HCO3 ION HCO3 MG/L	445 CO3 ION CO3 MG/L	530 RESIDUE TOT-NFLT MG/L	610 NH3+NH4- N TOTAL MG/L	613 NO2-N DISS MG/L	615 NO2-N TOTAL MG/L	620 NO3-N TOTAL MG/L	630 NO2+NO3 N-TOTAL MG/L	660 ORTHOPO4 PO4 MG/L
90/10/22	1050					18.0	0.010K	0.002K			0.214	
90/11/18	1100					16.0	0.010	0.010K			0.210	
90/12/10	1100					32.0	0.010	0.010K			0.160	
91/01/21	1035					12.0	0.010K	0.010K			0.250	
91/02/18	1025					13.0	0.010K	0.010K			0.200	
91/03/18	1030					4.0	0.010	0.010K			0.203	
91/04/15	1025					9.0	0.010K	0.010K			0.216	
91/05/20	1045					7.0	0.015	0.010K			0.105	
91/06/17	1150					12.0	0.010K	0.010K			0.107	
91/07/22	1145					2.0	0.010	0.010K			0.093	
91/08/19	1125					3.0	0.010K	0.010K			0.139	
91/09/16	1225					2.0	0.010	0.010K			0.174	

DATE FROM TO	TIME	DEPTH METER	665 PHOS-TOT MG/L P	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	902 NC HARD CACO3 MG/L	915 CALCIUM CA,DISS MG/L	925 MGNSIUM MG,DISS MG/L	930 SODIUM NA,DISS MG/L	931 SODIUM ADSBTION RATIO	932 PERCENT SODIUM %	935 PTSSIUM K,DISS MG/L

MORE DATES NEXT PAGE

DATE FROM TO	TIME	DEPTH METER	665 PHOS-TOT MG/L P	671 PHOS-DIS ORTHO MG/L P	900 TOT HARD CACO3 MG/L	902 NC HARD CACO3 MG/L	915 CALCIUM CA,DISS MG/L	925 MGNSIUM MG,DISS MG/L	930 SODIUM NA,DISS MG/L	931 SODIUM ADSBTION RATIO	932 PERCENT SODIUM %	935 PTSSIUM K,DISS MG/L
90/10/22	1050		0.011	0.004								
90/11/18	1100		0.010	0.010K								
90/12/10	1100		0.020	0.010K								
91/01/21	1035		0.030	0.010K								
91/02/18	1025		0.040	0.010K								
91/03/18	1030		0.008	0.010								
91/04/15	1025		0.010K	0.010K								
91/05/20	1045		0.012	0.010K								
91/06/17	1150		0.013	0.010K								
91/07/22	1145		0.010K	0.011								
91/08/19	1125		0.010K	0.010K								
91/09/16	1225		0.016	0.010K								

DATE FROM TO	TIME	DEPTH METER	940 CHLORIDE CL MG/L	945 SULFATE SO4-TOT MG/L	950 FLUORIDE F,DISS MG/L	955 SILICA DISOLVED MG/L	1000 ARSENIC AS,DISS UG/L	1020 BORON B,DISS UG/L	1032 CHROMIUM HEX-VAL UG/L	1034 CHROMIUM CR,TOT UG/L	1040 COPPER CU,DISS UG/L	1042 COPPER CU,TOT UG/L

DATE FROM TO	TIME	DEPTH METER	1045 IRON FE,TOT UG/L	1080 STRONTUM SR,DISS UG/L	1090 ZINC ZN,DISS UG/L	1092 ZINC ZN,TOT UG/L	1130 LITHIUM LI,DISS UG/L	31501 TOT COLI MFIMENDO /100ML	31504 TOT COLI MFIM LES /100ML	31505 TOT COLI MPN CONF /100ML	31507 TOT COLI MPN COMP /100ML	31616 FEC COLI MFM-FCBR /100ML
90/10/22	1050											17
90/11/18	1100											3
90/12/10	1100											9
91/02/18	1025											1K
91/03/18	1030											1
91/04/15	1025											4
91/05/20	1045											9
91/06/17	1150											15
91/07/22	1145											7
91/08/19	1125											27
91/09/16	1225											12

DATE FROM TO	TIME	DEPTH METER	70300 RESIDUE DISS-180 C MG/L	70303 DISS SOL TONS PER ACRE-FT	71851 NITRATE DISS-NO3 MG/L	82079 TURBIDTY LAB NTU
90/10/22	1050					3.1
90/11/18	1100					4.2
90/12/10	1100					13.0
91/01/21	1035					3.2

MORE DATES NEXT PAGE

DATE FROM TO	TIME	DEPTH METER	70300 RESIDUE DISS-180 C MG/L	70303 DISS SOL TONS PER ACRE-FT	71851 NITRATE DISS-NO3 MG/L	82079 TURBIDTY LAB NTU
91/02/18	1025					4.1
91/03/18	1030					1.2
91/04/15	1025					5.5
91/05/20	1045					3.5
91/06/17	1150					3.5
91/07/22	1145					3.0
91/08/19	1125					2.8
91/09/16	1225					1.1

Chapter 173-201 WAC
WATER QUALITY STANDARDS FOR SURFACE WATERS OF THE STATE OF WASHINGTON

WAC

173-201-010	Introduction.
173-201-025	Definitions.
173-201-035	General considerations.
173-201-045	General water use and criteria classes.
173-201-047	Toxic substances.
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173-201-080	Specific classifications—Freshwater.
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173-201-090	Achievement considerations.
173-201-100	Implementation.
173-201-110	Surveillance.
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DISPOSITION OF SECTIONS FORMERLY CODIFIED IN THIS CHAPTER

173-201-020	Water use and quality criteria. [Statutory Authority: RCW 90.48.035. 78-02-043 (Order DE 77-32), § 173-201-020, filed 1/17/78; Order 73-4, § 173-201-020, filed 7/6/73.] Repealed by 82-12-078 (Order DE 82-12), filed 6/2/82. Statutory Authority: RCW 90.48.035.
173-201-030	Water use and quality criteria—General water use and criteria classes. [Order 73-4, § 173-201-030, filed 7/6/73.] Repealed by 78-02-043 (Order DE 77-32), filed 1/17/78. Statutory Authority: RCW 90.48.035.
173-201-040	Water use and quality criteria—General considerations. [Order 73-4, § 173-201-040, filed 7/6/73.] Repealed by 78-02-043 (Order DE 77-32), filed 1/17/78. Statutory Authority: RCW 90.48.035.
173-201-050	Characteristic uses to be protected. [Statutory Authority: RCW 90.48.035. 78-02-043 (Order DE 77-32), § 173-201-050, filed 1/17/78; Order 73-4, § 173-201-050, filed 7/6/73.] Repealed by 82-12-078 (Order DE 82-12), filed 6/2/82. Statutory Authority: RCW 90.48.035.
173-201-060	Water course classification. [Order 73-4, § 173-201-060, filed 7/6/73.] Repealed by 78-02-043 (Order DE 77-32), filed 1/17/78. Statutory Authority: RCW 90.48.035.
173-201-130	Definitions. [Order 73-4, § 173-201-130, filed 7/6/73.] Repealed by 78-02-043 (Order DE 77-32), filed 1/17/78. Statutory Authority: RCW 90.48.035.
173-201-140	Miscellaneous. [Statutory Authority: RCW 90.48.035. 78-02-043 (Order DE 77-32), § 173-201-140, filed 1/17/78; Order 73-4, § 173-201-140, filed 7/6/73.] Repealed by 82-12-078 (Order DE 82-12), filed 6/2/82. Statutory Authority: RCW 90.48.035.

WAC 173-201-010 Introduction. (1) The purpose of this chapter is to establish water quality standards for surface waters of the state of Washington consistent with public health and public enjoyment thereof, and the propagation and protection of fish, shellfish, and wildlife, pursuant to the provisions of chapter 90.48 RCW and the policies and purposes thereof.

(2) This chapter shall be reviewed periodically by the department and appropriate revisions shall be undertaken.

(3) The water use and quality criteria set forth in WAC 173-201-035 through 173-201-085 are established in conformance with present and potential water uses of the surface waters of the state of Washington and in consideration of the natural water quality potential and limitations of the same. These shall be the sole criteria for said waters. [Statutory Authority: RCW 90.48.035 and 90.48.260. 88-02-058 (Order 87-6), § 173-201-010, filed 1/6/88. Statutory Authority: RCW 90.48.035. 82-12-078 (Order DE 82-12), § 173-201-010, filed 6/2/82; 78-02-043 (Order DE 77-32), § 173-201-010, filed 1/17/78; Order 73-4, § 173-201-010, filed 7/6/73.]

WAC 173-201-025 Definitions. (1) Background conditions: The biological, chemical, and physical conditions of a water body, upstream from the point or nonpoint source of any discharge under consideration. Background sampling location in an enforcement action would be upstream from the point of discharge, but not upstream from other inflows. If several discharges to any water body exist, and enforcement action is being taken for possible violations to the standards, background sampling would be undertaken immediately upstream from each discharge.

(2) Department: State of Washington department of ecology.

(3) Director: Director of the state of Washington department of ecology.

(4) Hardness: A measure of the calcium and magnesium salts present in water. For purposes of this chapter, hardness is measured in milligrams per liter as calcium carbonate (C_aCO_3).

(5) Fecal coliform: That portion of the coliform group which is present in the intestinal tracts and feces of warm-blooded animals as detected by the product of acid or gas from lactose in a suitable culture medium within 24 hours at 44.5 plus or minus 0.2 degrees Celsius.

(6) Geometric mean: The nth root of a product of n factors.

(7) Mean detention time: The time obtained by dividing a reservoir's mean annual minimum total storage by the 30-day ten-year low-flow from the reservoir.

(8) Permit: A document issued pursuant to RCW 90.48.160 et seq. or 90.48.260 or both, specifying the waste treatment and control requirements and waste discharge conditions.

(9) pH: The negative logarithm of the hydrogen ion concentration.

(10) Primary contact recreation: Activities where a person would have direct contact with water to the point

WAC 173-201-045 General water use and criteria classes. The following criteria shall apply to the various classes of surface waters in the state of Washington:

(1) **Class AA (extraordinary).**

(a) General characteristic. Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

(b) Characteristic uses. Characteristic uses shall include, but not be limited to, the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Stock watering.

(iii) Fish and shellfish:

Salmonid migration, rearing, spawning, and harvesting.

Other fish migration, rearing, spawning, and harvesting.

Clam, oyster, and mussel rearing, spawning, and harvesting.

Crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing, spawning, and harvesting.

(iv) Wildlife habitat.

(v) Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).

(vi) Commerce and navigation.

(c) Water quality criteria.

(i) Fecal coliform organisms.

(A) Freshwater - fecal coliform organisms shall not exceed a geometric mean value of 50 organisms/100 mL, with not more than 10 percent of samples exceeding 100 organisms/100 mL.

(B) Marine water - fecal coliform organisms shall not exceed a geometric mean value of 14 organisms/100 mL, with not more than 10 percent of samples exceeding 43 organisms/100 mL.

(ii) Dissolved oxygen.

(A) Freshwater - dissolved oxygen shall exceed 9.5 mg/L.

(B) Marine water - dissolved oxygen shall exceed 7.0 mg/L. When natural conditions, such as upwelling, occur, causing the dissolved oxygen to be depressed near or below 7.0 mg/L, natural dissolved oxygen levels can be degraded by up to 0.2 mg/L by man-caused activities.

(iii) Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.

(iv) Temperature shall not exceed 16.0°C (freshwater) or 13.0°C (marine water) due to human activities. Temperature increases shall not, at any time, exceed $t=23/(T+5)$ (freshwater) or $t=8/(T-4)$ (marine water).

When natural conditions exceed 16.0°C (freshwater) and 13.0°C (marine water), no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C.

For purposes hereof, "t" represents the maximum permissible temperature increase measured at a dilution zone boundary; and "T" represents the background temperature as measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge.

Provided that temperature increase resulting from nonpoint source activities shall not exceed 2.8°C, and the maximum water temperature shall not exceed 16.3°C (freshwater).

(v) pH shall be within the range of 6.5 to 8.5 (freshwater) or 7.0 to 8.5 (marine water) with a man-caused variation within a range of less than 0.2 units.

(vi) Turbidity shall not exceed 5 NTU over background turbidity when the background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

(vii) Toxic, radioactive, or deleterious material concentrations shall be below those which may adversely affect characteristic water uses, cause acute or chronic conditions to the aquatic biota, or adversely affect public health (see WAC 173-201-047).

(viii) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

(2) **Class A (excellent).**

(a) General characteristic. Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

(b) Characteristic uses. Characteristic uses shall include, but not be limited to, the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Stock watering.

(iii) Fish and shellfish:

Salmonid migration, rearing, spawning, and harvesting.

Other fish migration, rearing, spawning, and harvesting.

Clam, oyster, and mussel rearing, spawning, and harvesting.

Crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing, spawning, and harvesting.

(iv) Wildlife habitat.

(v) Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).

(vi) Commerce and navigation.

(c) Water quality criteria.

(i) Fecal coliform organisms.

(A) Freshwater - fecal coliform organisms shall not exceed a geometric mean value of 100 organisms/100 mL, with not more than 10 percent of samples exceeding 200 organisms/100 mL.

(B) Marine water - fecal coliform organisms shall not exceed a geometric mean value of 14 organisms/100 mL, with not more than 10 percent of samples exceeding 43 organisms/100 mL.

(ii) Dissolved oxygen.

(A) Freshwater - dissolved oxygen shall exceed 8.0 mg/L.

(B) Marine water - dissolved oxygen shall exceed 6.0 mg/L. When natural conditions, such as upwelling, occur, causing the dissolved oxygen to be depressed near or below 6.0 mg/L, natural dissolved oxygen levels can be degraded by up to 0.2 mg/L by man-caused activities.

(iii) Total dissolved gas shall not exceed 110 percent of saturation at any point of sample collection.

(95) Skykomish River from mouth to May Creek (above Gold Bar at river mile 41.2). Class A

(96) Skykomish River from May Creek (above Gold Bar at river mile 41.2) to headwaters. Class AA

(97) Snake River from mouth to Washington–Idaho–Oregon border (river mile 176.1). Special condition.

(a) Below Clearwater River (river mile 139.3). Temperature shall not exceed 20.0°C due to human activities. When natural conditions exceed 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed t=34/(T+9).

(b) Above Clearwater River (river mile 139.3). Temperature shall not exceed 20.0°C due to human activities. When natural conditions exceed 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed 0.3°C due to any single source or 1.1°C due to all such activities combined. Class A

(98) Snohomish River from mouth and east of longitude 122°13'40"W upstream to latitude 47°56'30"N (southern tip of Ebey Island river mile 8.1). Special condition – fecal coliform organisms shall not exceed a geometric mean value of 200, organisms/100 mL. with not more than 10 percent of samples exceeding 400 organisms/100 mL. Class A

(99) Snohomish River upstream from latitude 47°56'30"N (southern tip of Ebey Island river mile 8.1) to confluence with Skykomish and Snoqualmie River (river mile 20.5). Class A

(100) Snoqualmie River and tributaries from mouth to west boundary of Twin Falls State Park on south fork (river mile 9.1). Class A

(101) Snoqualmie River, middle fork. Class AA

(102) Snoqualmie River, north fork. Class AA

(103) Snoqualmie River, south fork, from west boundary of Twin Falls State Park (river mile 9.1) to headwaters. Class AA

(104) Soleduck River and tributaries. Class AA

(105) Spokane River from mouth to Long Lake Dam (river mile 33.9). Special condition – temperature shall not exceed 20.0°C due to human activities. When natural conditions exceed 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time, exceed t=34/(T+9). Class A

(106) Spokane River from Long Lake Dam (river mile 33.9) to Nine Mile Bridge (river mile 58.0). Special conditions:

(a) The average euphotic zone concentration of total phosphorus (as P) shall not exceed 25μg/L during the period of June 1 to October 31.

(b) Temperature shall not exceed 20.0°C, due to human activities. When natural conditions exceed 20.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time exceed t=34/(T+9). Lake Class

(107) Spokane River from Nine Mile Bridge (river mile 58.0) to the Idaho border (river mile 96.5). Temperature shall not exceed 20.0°C due to human activities. When natural conditions exceed 20.0°C no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C; nor shall such temperature increases, at any time exceed t=34/(T+9). Class A

(108) Stehekin River. Class AA

(109) Stillaguamish River from mouth to north and south forks (river mile 17.8). Class A

(110) Stillaguamish River, north fork, from mouth to Squire Creek (river mile 31.2). Class A

(111) Stillaguamish River, north fork, from Squire Creek (river mile 31.2) to headwaters. Class AA

(112) Stillaguamish River, south fork, from mouth to Canyon Creek (river mile 33.7). Class A

(113) Stillaguamish River, south fork, from Canyon Creek (river mile 33.7) to the headwaters. Class AA

(114) Sulphur Creek. Class B

(115) Sultan River from mouth to Chaplain Creek (river mile 5.9). Class A

(116) Sultan River and tributaries from Chaplain Creek (river mile 5.9) to headwaters. Special condition – no waste discharge will be permitted above city of Everett Diversion Dam (river mile 9.4). Class AA

(117) Sumas River from Canadian border (river mile 12) to headwaters (river mile 23). Class A

(118) Tieton River. Class AA

(119) Tolt River, south fork and tributaries from mouth to west boundary of Sec. 31–T26N–R9E (river mile 6.9). Class AA

(120) Tolt River, south fork from west boundary of Sec. 31–T26N–R9E (river mile 6.9) to headwaters. Special condition – no waste discharge will be permitted. Class AA

(121) Touchet River, north fork from Dayton water intake structure (river mile 3.0) to headwaters. Class AA