



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

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STATE OF WASHINGTON
 DEPARTMENT OF ECOLOGY

7171 Cleanwater Lane, Building 8, LH-14 • Olympia, Washington 98504-6814

January 30, 1992

TO: Dave Wright
 THROUGH: Dick Cunningham *DC*
 FROM: Brad Hopkins *BH*
 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:

<u>Station #</u>	<u>Description</u>
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.

163 rd Carnation station

Snoqualmie R. at Snoqualmie

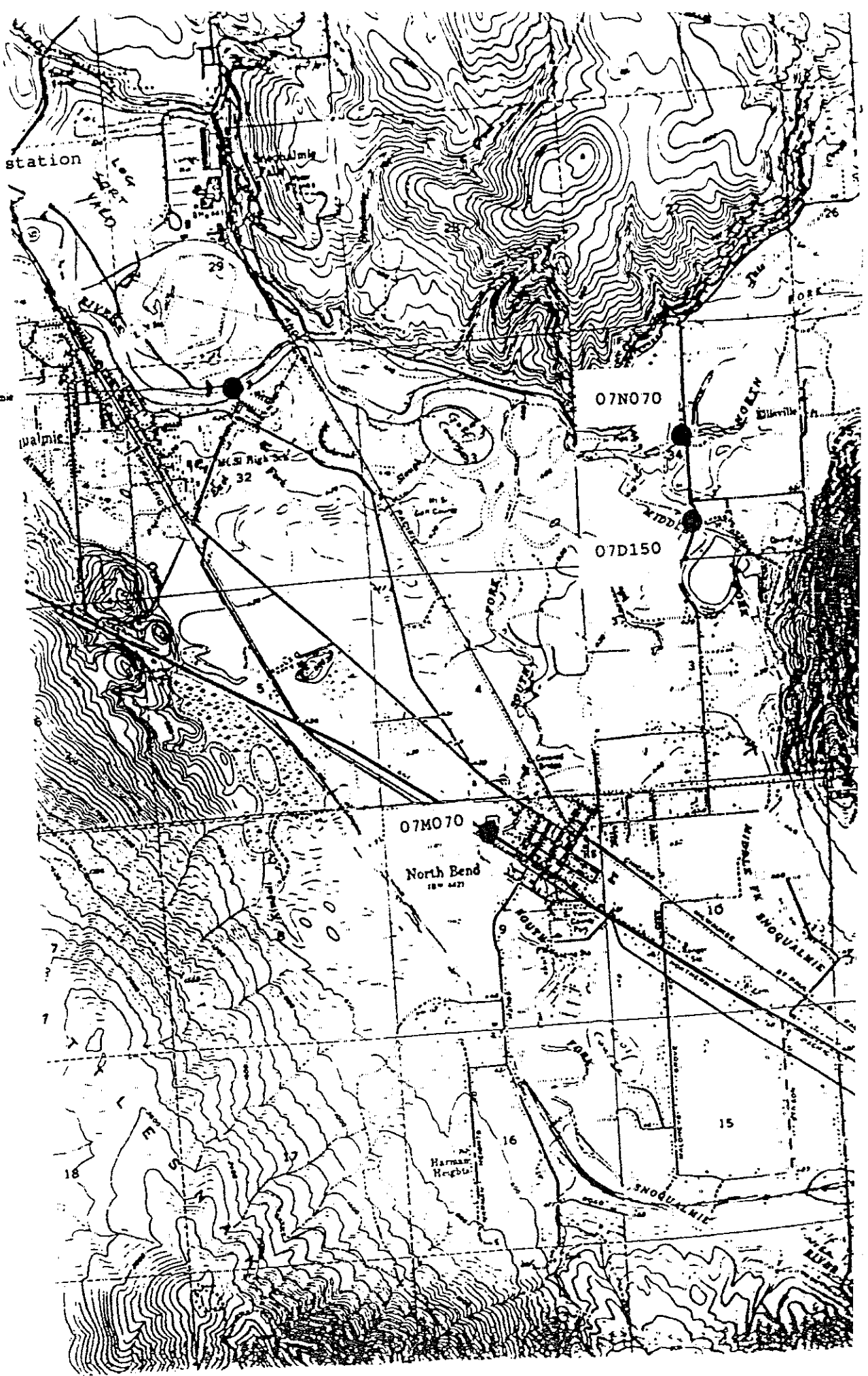


Table 1 General Water Quality on the Snoqualmie River

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 WQB-TOX.WK1 spreadsheet. It is my recommendation

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

	T-Hg	T-Cr	T-Cu	T-Pb	T-Zn	T-Cd	Hard	Calculated Water Quality Criteria Based on Total Hardness											
								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	i 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	i 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	i 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	i 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	i 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	i 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	0.59
9/16/91	0.2 k	1.3	3 k	i 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 Quantitation 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

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	DEPTH TIME METER	LAB IDENT. NUMBER	WATER TEMP CENT	BAROMTRC PRESSURE MM OF HG	STREAM FLOW CFS	CONDUCTVY LAB @ 25C UMHO	DO MG/L	DO SATUR PERCENT	PH SU	RESIDUE TOT-NFLT MG/L	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	DEPTH TIME METER	NO2-N DISS MG/L	NO2+NO3 N-TOTAL MG/L	PHOS-TOT MG/L P	PHOS-DIS ORTHO MG/L P	TOT HARD CACO3 MG/L	ZINC TOT REC UG/L	CADMIUM TOT REC UG/L	LEAD TOT REC UG/L	CHROMIUM TOT REC UG/L	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	DEPTH TIME METER	FEC COLI MFM-FCBR /100ML	MERCURY TOT REC UG/L	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	DEPTH TIME METER	LAB IDENT NUMBER	WATER TEMP CENT	BAROMTRC PRESSURE MM OF HG	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	DEPTH TIME 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	DEPTH TIME 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	DEPTH TIME METER	LAB IDENT. NUMBER	WATER TEMP CENT	BAROMTRC PRESSURE MM OF HG	STREAM FLOW CFS	CONDUCTVY LAB @ 25C UMHO	DO MG/L	DO SATUR PERCENT	PH SU	RESIDUE TOT-NFLT MG/L	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	DEPTH TIME METER	NO2-N DISS MG/L	NO2+NO3 N-TOTAL MG/L	PHOS-TOT MG/L P	PHOS-DIS ORTHO MG/L P	TOT HARD CACO3 MG/L	ZINC TOT REC UG/L	CADMIUM TOT REC UG/L	LEAD TOT REC UG/L	CHROMIUM TOT REC UG/L	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	DEPTH TIME METER	FEC COLI MFM-FCBR /100ML	MERCURY TOT REC UG/L	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	DEPTH TIME METER	LAB IDENT. NUMBER	WATER TEMP CENT	BAROMTRC PRESSURE MM OF HG	STREAM FLOW CFS	TURB JKSN JTU	COLOR PT-CO UNITS	CNDUCTVY LAB @ 25C UMHO	DO MG/L	SATUR PERCENT	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	DEPTH TIME METER	T ALK CACO3 MG/L	HCO3 ION HCO3 MG/L	CO3 ION CO3 MG/L	RESIDUE TOT-NFLT MG/L	NH3+NH4-N TOTAL MG/L	NO2-N DISS MG/L	NO2-N TOTAL MG/L	NO3-N TOTAL MG/L	NO2+NO3 N-TOTAL MG/L	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	DEPTH TIME METER	PHOS-TOT MG/L P	PHOS-DIS ORTHO MG/L P	TOT HARD CACO3 MG/L	NC HARD CACO3 MG/L	CALCIUM CA, DISS MG/L	MGNSIUM MG, DISS MG/L	SODIUM NA, DISS MG/L	SODIUM ADSBTION RATIO	PERCENT SODIUM X	POTASSIUM K, DISS MG/L
90/10/22	1050										
90/11/18	1100										
90/12/10	1100										
91/01/21	1035										
91/02/18	1025										
91/03/18	1030										
91/04/15	1025										
91/05/20	1045										
91/06/17	1150										
91/07/22	1145										
91/08/19	1125										
91/09/16	1225										

MORE DATES NEXT PAGE

DATE FROM TO	DEPTH TIME 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	DEPTH TIME 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
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DATE FROM TO	DEPTH TIME METER	1045 IRON FE,TOT UG/L	1080 STRONTIUM 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 /100ML	31504 MFIM LES /100ML	31505 MPN CONF /100ML	31507 MPN COMP /100ML	31616 FEC COLI /100ML
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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	DEPTH TIME 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		70300	70303	71851	82079
FROM	DEPTH	RESIDUE	DISS SOL	NITRATE	TURBIDTY
TO	TIME METER	DISS-180	TONS PER	DISS-NO3	LAB
		C	ACRE-FT	MG/L	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

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	DEPTH TIME 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 CONDUCTVY 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	DEPTH TIME METER	440 HCO3 ION MG/L	445 CO3 ION 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	DEPTH TIME 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 MGNSTIUM 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	DEPTH TIME 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	DEPTH TIME 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 STRONTIUM 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	DEPTH TIME METER	31616 FEC COLI MFIM-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

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
173-201-070	General classifications
173-201-080	Specific classifications—Freshwater
173-201-085	Specific classifications—Marine water
173-201-090	Achievement considerations
173-201-100	Implementation
173-201-110	Surveillance
173-201-120	Enforcement

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 non-point 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 (CaCO_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 n th 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