94-e16

WA-07-1010

DEPARTMENT OF ECOLOGY

November 15, 1994

TO: John Glynn and Dave Wright
Water Quality Program, NWRO

THROUGH: Will Kendra
EILS Program, Watershed Assessments Section

FROM: Norm Glenn
Watershed Assessments Section

SUBJECT: City of Everett Basin Class II Inspection Summary

An announced Basin Class II inspection was conducted at the above facility during the week of August 16, 1993. My original intent was to provide the usual inspection report. However, due to the recent reprogramming of Class II activities in EILS, it became necessary to abbreviate the reporting effort on my remaining projects. This transmittal memo summarizes the significant findings from my review of the inspection data (attached):

- No conclusions could be reached regarding the accuracy of the plant's three flow measuring devices because they weren't accessible; instantaneous flows could not be checked. Plant personnel acknowledged that for flows below 7 MGD, the propeller meter (outfall 015) precision is suspect. Periodic verification of all three by an independent contractor must be done on a regular basis.

- Reduction of ammonia concentrations throughout the WWTP was minimal, resulting in relatively high concentrations in effluent.

- Copper and silver are pollutants of concern in effluent from the TF/SC system. Metals limits contained in the NPDES permit have been temporarily stayed by the Pollution Control Hearings Board; nevertheless copper concentrations are well above limits. Silver matched the "instantaneous concentration not to be exceeded at any time" contained in the water quality standards.

- BOD_5 of effluent from the lagoon system exceeded permit limits at times, but the pattern appeared to be highly variable. Fecal coliform counts in effluent to outfall 015a were well above the allowable limit. Total residual chlorine concentrations were high, but installation of dechlorination equipment is imminent.

- The plant manager chose to replicate each of our sampling efforts, with the single exception of the grab samples on August 18. The split sample data appear to indicate that plant composite samples are not thoroughly mixed before dispensing to lab split samples (part of the sampling procedure) and before dispensing to aliquots within the lab (part of the analytical procedure). Since this is likely a common problem that has a direct bearing on whether the "85 percent removal" permit limit is met, it is recommended that Ecology's Quality Assurance Section assess the plant's sample handling and preparation procedures.

If you have any questions concerning this memo, please contact me at 407-6683.

NLG:blt
Attachments

References:

APHA-AWWA-WEF, 1992. Standard Methods for the Examination of Water and Wastewater, 18 edition. American Public Health Association, American Water Works Association, Water Environment Federation, Washington D.C.

Ecology, 1992. Administrative Order No. DE 92WQ-N305, Department of Ecology, Northwest Regional Office, Bellevue WA.

EPA, 1983. Methods for Chemical Analyses of Water and Waste. EPA-600/4-79-020 (Rev. March, 1983). Washington D.C.

PCHB, 1993. City of Everett, Department of Public Works vs. Department of Ecology. Pollution Control Hearings Board, Lacey WA. PCHB No. 92-214.

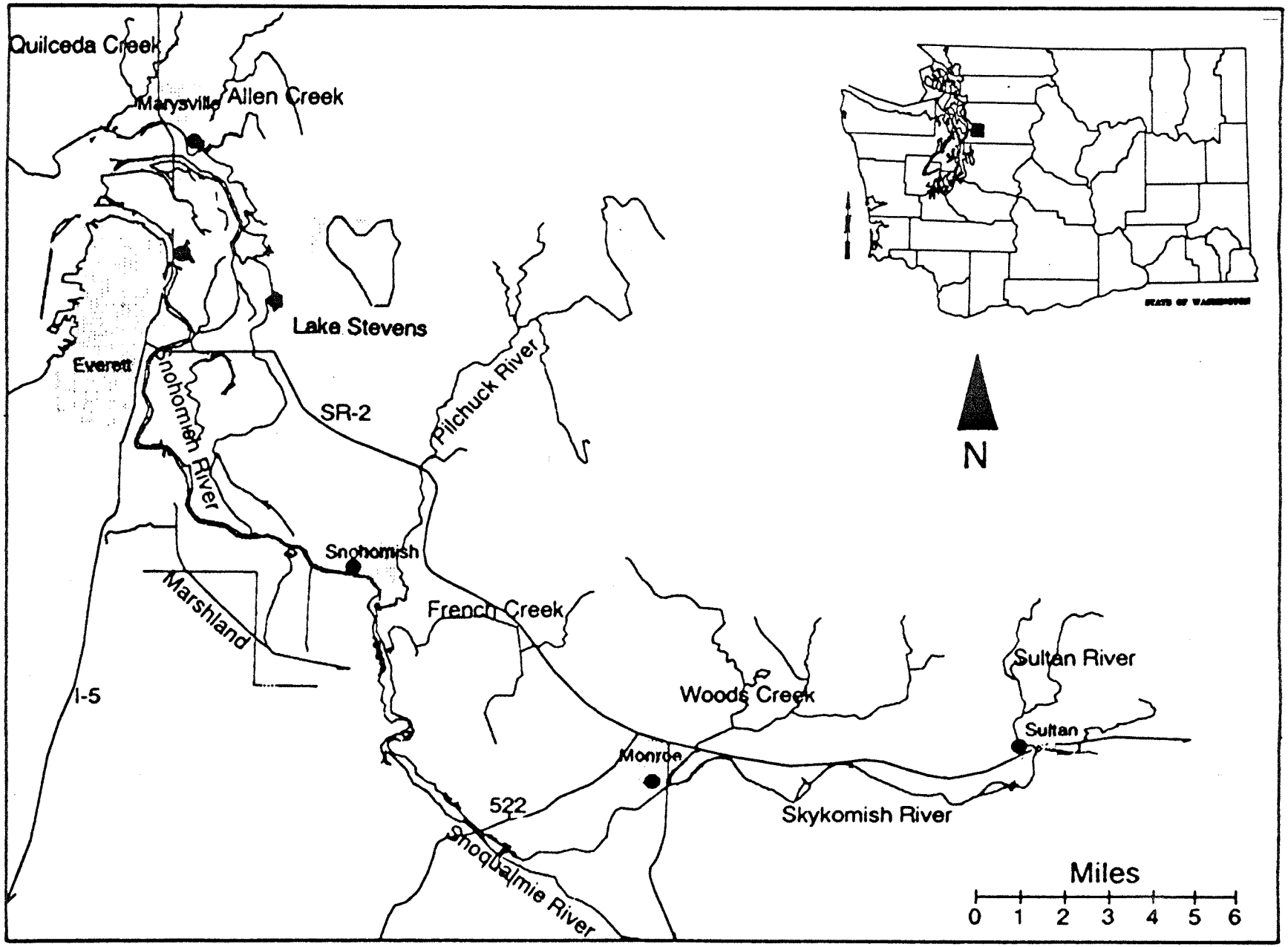

Figure 1. Location Map for WWTPs in Lower Snohomish TMDL Study Area, 8/93.

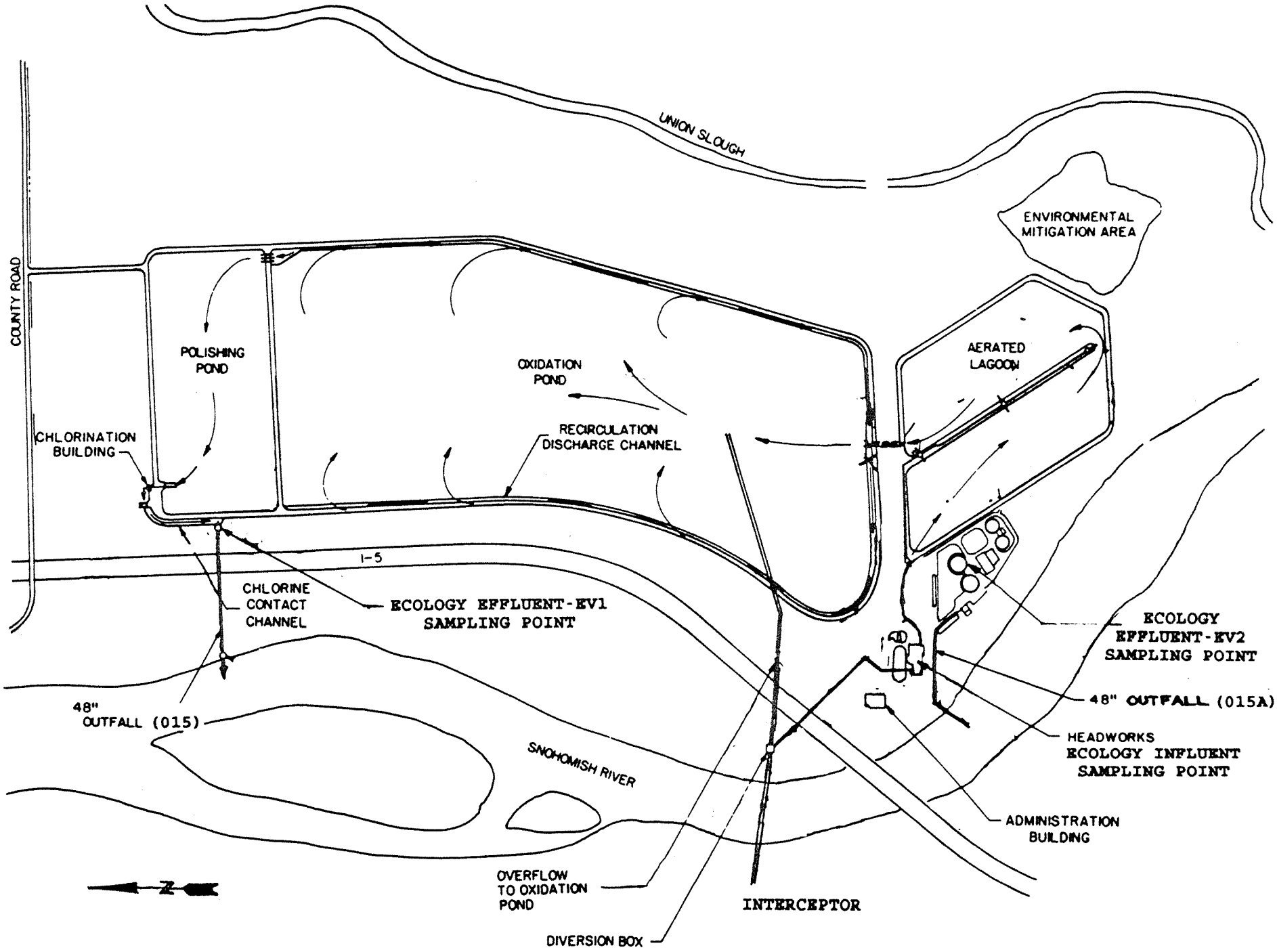

Figure 2. Plant Schematic - City of Everett WWTPs, 8/93.

Table 1. Chemical Analytical Methods and Laboratories – City of Everett – L. Snohomish River Basin Class II Inspections, 8/93.

Parameter	Method	Lab used
Alkalinity	EPA, 1983: 310.1	Ecology; Manchester WA
Chloride	EPA, 1983: 330.0	Ecology; Manchester WA
SOLIDS		
Total solids (TS)	EPA, 1983: 160.3	Ecology; Manchester WA
Total non-volatile solids (TNVS)	EPA, 1983: 160.4	Ecology; Manchester WA
Total suspended solids (TSS)	EPA, 1983: 160.2	Ecology; Manchester WA
Total non-volatile suspended solids (TNVSS)	EPA, 1983: 160.4	Ecology; Manchester WA
Five-day biochemical oxygen demand (BOD5)	APHA, 1992; 5210	Sound Analytical Svcs.; Tacoma WA
NUTRIENTS		
Total ammonia, as nitrogen (NH3-N)	EPA, 1983: 350.1	Sound Analytical Svcs.; Tacoma WA
Nitrate-nitrite, as nitrogen (NO2+NO3-N)	EPA, 1983: 353.2	Sound Analytical Svcs.; Tacoma WA
Total Kjeldahl nitrogen	EPA, 1983: 351.2	Sound Analytical Svcs.; Tacoma WA
O-phosphate	EPA, 1983: 365.3	Ecology; Manchester WA
T-phosphorus	EPA, 1983: 365.3	Sound Analytical Svcs.; Tacoma WA
Fecal Coliform MF	APHA, 1992:9222D	Ecology; Manchester WA
METALS		
Cadmium	EPA, 1983;213.2	Ecology; Manchester WA
Copper	EPA, 1983;220.2	Ecology; Manchester WA
Lead	EPA, 1983;239.2	Ecology; Manchester WA
Mercury	EPA, 1983;245.1	Ecology; Manchester WA
Silver	EPA, 1983;272.2	Ecology; Manchester WA
Zinc	EPA, 1983;200.7	Ecology; Manchester WA

Table 2. General Chemistry and Metals Results, City of Everett – L. Snohomish River Basin Class II Inspections, 8/93

Location:	Blank1-E	Blank2-E	InfEV-E	InfEV-EV	EffEV1-E	EffEV1-EV
Type:	Equip	Equip	Comp	Comp	Comp	Comp
Date:	8/17	8/17	8/18-19	8/18-19	8/18-19	8/18-19
Time:	1245	1210	24 hour	24 hour	24 hour	24 hour
Parameter Lab Log #: 3482	-40	-49	-41	-42	-43	-44
GENERAL CHEMISTRY						
Alkalinity (mg/L)			162		151	
Chloride (mg/L)			37		41	
SOLIDS 4 (mg/L)						
TS			543	591	311	320
TNVS			217	212	182	191
TSS			178	235	50	31
TNVSS			48	55	5	8
BOD5 (mg/L)			160	220	71	92
NH3-N (mg/L)			18		16	
NO2+NO3-N (mg/L)			0.09J		0.95	
Total Kjeldahl N (mg/L)			52		41	
Phosphate - Ortho (mg/L)					3.99	
Phosphate - Total (mg/L)			5.5		4.3	
F-Coliform MF (#/100mL)						
METALS (µg/L)*						
Cadmium	0.12P	0.21P			0.20P	
Copper	1.3P	1.0U			6.5P	
Lead	1.0U	1.0U			2.8P	
Mercury	0.05U	0.05U			0.05U	
Silver	0.50U	0.50U			0.50U	
Zinc	4UB	4UB			14PB	
FIELD OBSERVATIONS						
Flow (MGD)						
Temperature (°C.)			9.6**		14.3**	
pH (s.u.)			7.8**		8.1**	
Conductivity (µmho/cm)			534		534	
Chlorine, free (mg/L)					0.03	
total (mg/L)					0.03	

InfEV - Influent; EffEV1 - Effluent to outfall 015; EffEV2 - Effluent to outfall 015a; -E - Ecology sampler; -EV - Everett sampler.
P means the analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
U means the analyte was not detected at or above the reported result.
J means the analyte was positively identified. The associated numerical result is an estimate.
B means the analyte was also found in the analytical method blank indicating the sample may have been contaminated.
* - All metals data are total recoverable metals. ** - Iced composite sample.

Table 2. General Chemistry and Metals Results, City of Everett – L. Snohomish River Basin Class II Inspection, 8/93 (P. 2)

Location:	EffEV1-1	EffEV1-2	EffEV2-E	EffEV2-EV	EffEV2-1	EffEV2-2
Type:	Grab	Grab	Comp	Comp	Grab	Grab
Date:	8/18	8/19	8/18-19	8/18-19	8/18	8/19
Time:	1230	1200	24 hour	24 hour	1200	1050
Parameter Lab Log #: 3482	-45	-46	-50	-51	-52	-53
GENERAL CHEMISTRY						
Alkalinity (mg/L)	149	146	186		187	188
Chloride (mg/L)	39	41	53		56	48
SOLIDS 4 (mg/l)						
TS	321	336	358	329	348	332
TNVS	163	173	210	222	159	182
TSS	40	29	11	10	8	4
TNVSS	3	1U	2	1U	3	1U
BOD5 (mg/L)	86	36	15	27	29	24U
NH3-N (mg/L)	15	15	24		21	24
NO2+NO3-N (mg/L)	0.97	1.26	0.08J		0.14	0.12
Total Kjeldahl N (mg/L)	21	48	28		29	28
Phosphate - Ortho (mg/L)	3.87	3.88	3.49		3.37	3.56
Phosphate - Total (mg/L)	4.3	4.4	3.9		3.8	3.8
F-Coliform MF (#/100 mL)	160	170			1600	1600
METALS (µg/L)*						
Cadmium		0.11P	0.31P			0.26P
Copper		6.5P	13.3			12.4
Lead		1.8P	4.4P			4.5P
Mercury		0.05U	0.06P			0.05P
Silver		0.50U	1.1P			1.2P
Zinc		11PB	30PB			29PB
FIELD OBSERVATIONS						
Flow (MGD)			6.5			
Temperature (°C.)	22.1	22.5	12.4**		20.5	20.1
pH (s.u.)	8.4	8.5	7.5**		7.5	6.9
Conductivity (µmho/cm)	494	484	634		604	634
Chlorine free (mg/L)	0.15	0.03	0.04		0.07	0.03
total (mg/L)	0.10	0.03	0.04		0.08	0.03

EffEV1 - Effluent to outfall 015; EffEV2 - Effluent to outfall 015a; -E - Ecology sampler;
-EV - Everett sampler; -1 - grab sample on 8/18; -2 - grab sample on 8/19.
P means the analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
U means the analyte was not detected at or above the reported result.
J means the analyte was positively identified. The associated numerical result is an estimate.
B means the analyte was also found in the analytical method blank indicating the sample may have been contaminated.
* - All metals data are total recoverable metals. ** - Iced composite sample.

Table 3a. Comparison of Inspection Results to NPDES Permit Limits for Outfall 015, City of Everett – L. Snohomish River Basin Class II Inspections, 8/93.

	NPDES Permit Limits (Outfall 015)*		Inspection Data		Loading and Performance			
Parameter	Monthly Average	Weekly Average	Ecology Composite	Grab Samples	Design Criteria (DC)	Derived Results	Plant Loading (% of DC)	Planning to begin (% of DC)
Influent BOD5 (mg/L)			160					
(lbs/d)					29,400	17,600**	60	85
Effluent BOD5 (mg/L)	33	50	71					
(lbs/d)	2890	4380				2,250		
(% removal)	78.5					56		
Influent TSS (mg/L)			178					
(lbs/d)					45,530	19,600**	43	85
Effluent TSS (mg/L)	63	95	50					
(lbs/d)	5520	8320				1,580		
(% removal)	72					72		
Fecal Coliform (#/100mL)	200	400		160;170				
pH (s.u.)	6.0 ≤ pH ≤ 9.0			8.4;8.5				
Flow (MGD)	10.5					3.8		
		Daily Maximum						
Chlorine, total (µg/L)	(23)200^	(59)500^		100;30				
(lbs/d)	2.01					2.06		
Heavy Metals^^								
Cadmium (µg/L)	1.1	2.2	0.20P	0.11P				
(lbs/d)	0.1					0.006		
Copper (µg/L)	4.7	9.5	6.5P	6.5P				
(lbs/d)	0.41					0.206		
Lead (µg/L)	12	24	2.8P	1.8P				
(lbs/d)	1.05					0.089		
Mercury (µg/L)	0.46	0.93	0.05U	0.05U				
(lbs/d)	0.04					0.000		
Silver (µg/L)	1.5	3.0	0.50U	0.50U				
(lbs/d)	0.13					0.000		
Zinc (µg/L)	51	103	14PB	11PB				
(lbs/d)	4.46					- - -		

U means the analyte was not detected at or above the reported result.
P means the analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
B means the analyte was also found in the analytical method blank indicating the sample may have been contaminated.
* - Seasonal limits for August and September.
** - Based on an influent flow of 13.2 MGD on 8/18.
^ - Concentrations have been modified by Order (Ecology, 1992); number in ( ) is original limit.
^^ - Metals limits have been stayed (PCHB, 1993); metals limits and data are total recoverable metals.

Table 3b. Comparison of Inspection Results to NPDES Permit Limits for Outfall 015a, City of Everett – L. Snohomish River Basin Class II Inspections, 8/93.

	NPDES Permit Limits (Outfall 015a)*		Inspection Data		Loading and Performance			
Parameter	Monthly Average	Weekly Average	Ecology Composite	Grab Samples	Design Criteria (DC)	Derived Results	Plant Loading (% of DC)	Planning to begin (% of DC)
Influent BOD5 (mg/L)			160					
(lbs/d)					29,400	17,600**	60	85
Effluent BOD5 (mg/L)	30	45	15					
(lbs/d)	1615	3000				810		
(% removal)	85					91		
Influent TSS (mg/L)			178					
(lbs/d)					45,530	19,600**	43	85
Effluent TSS (mg/L)	30	45	11					
(lbs/d)	2000	3000				600		
(% removal)	85					94		
Fecal Coliform (#/100mL)	200	400		1600;1600				
pH (s.u.)	6.0 ≤ pH ≤ 9.0			7.5;6.9				
Flow (MGD)	8.0					6.5		
		Daily Maximum						
Chlorine (µg/L)	(28)200^	(72)500^		80;30				
(lbs/d)	1.87					2.98		
Heavy Metals^^								
Cadmium (µg/L)	1.4	2.7	0.31P	0.26P				
(lbs/d)	0.09					0.017		
Copper (µg/L)	4.7	9.5	13.3	12.4				
(lbs/d)	0.31					0.721		
Lead (µg/L)	12	24	4.4P	4.5P				
(lbs/d)	0.80					0.239		
Mercury (µg/L)	0.6	1.2	0.06P	0.05P				
(lbs/d)	0.04					0.003		
Silver (µg/L)	1.5	3.0	1.1P	1.2P				
(lbs/d)	0.10					0.060		
Zinc (µg/L)	62	125	30PB	29PB				
(lbs/d)	4.13					- - -		

P means the analyte was detected above the instrument detection limit but below the established minimum quantitation limit.

B means the analyte was also found in the analytical method blank indicating the sample may have been contaminated.

* - Seasonal limits for August and September.

** - Based on an influent flow of 13.2 MGD on 8/18.

^ - Concentrations have been modified by Order (Ecology, 1992); number in ( ) is original limit.

^^ - Metals limits have been stayed (PCHB, 1993); metals limits and data are total recoverable.

Table 4. Comparison of Sampling and Laboratory Procedures, City of Everett - L. Snohomish River Basin Class II Inspections, 8/93

Location:	Blank1-E		Blank2-E		InfEV-E		InfEV-EV		EffEV1-E	
Lab Log #~:	348240		348249		348241		348242		348243	
Date:	8/17		8/17		8/18-19		8/18-19		8/18-19	
Sampler:	Ecology		Ecology		Ecology		Everett		Ecology	
Laboratory:	Ecology	Everett*	Ecology	Everett*	Ecology	Everett**	Ecology	Everett***	Ecology	Everett****
GENERAL CHEMISTRY										
Alkalinity (mg/L)					162	157		157	151	144
Chloride (mg/L)					37				41	
SOLIDS 4 (mg/L)										
TS					543	434	591	300	311	295
TNVS					217	195	212	108	182	173
TSS					178	263	235	300	50	47
TNVSS					48	16	55	0	5	1
BOD5 (mg/L)					160	200	220	220	71	>67
NH3-N (mg/L)					18	21.2		20.7	16	15.9
NO2+NO3-N (mg/L)					0.09J	0.00		0.003	0.95	1.11
Total Kjeldahl N (mg/L)					52	33.2		33.7	41	22.6
Phosphate - Ortho (mg/L)									3.99	3.95
Phosphate - Total (mg/L)					5.5	5.80		6.17	4.3	4.63
F-Coliform MF (#/100mL)										
METALS (µg/L)										
Cadmium	0.12P	0.2U	0.21P	0.2U					0.20P	0.2U
Copper	1.3P	14	1.0U	14					6.5P	10
Lead	1.0U	3P	1.0U	3P					2.8P	2J
Mercury	0.05U	0.2U	0.05U	0.2U					0.05U	0.2U
Silver	0.50U	1	0.50U	1					0.50U	0.5P
Zinc	4UB	19	4UB	20					14PB	7P
FIELD OBSERVATIONS										
Temperature (°C.)										
pH (s.u.)									8.1	
Conductivity (µmho/cm)					534	447		446	534	428
Chlorine, free (mg/L)									0.03	
total (mg/L)									0.03	

Blank1-E means equipment blank run through Ecology compositor used for sampling effluent to outfall 015.

Blank2-E means equipment blank run through Ecology compositor used for sampling effluent to outfall 015a.

InfEV - Influent; EffEV1 - Effluent to outfall 015; -E - Ecology composite sampler; -EV - Everett composite sampler.

~ - Lab Log # is assigned at Manchester Environmental Lab (MEL) and therefore, applicable only to those samples submitted to MEL for analysis.

* - City of Everett Environmental Lab ID is Project #2593, QC File #: QC-M2592, Sample ID: 2593B.

** - City of Everett Environmental Lab ID is Project #2593, Plant Influent (PI)19C.

*** - City of Everett Environmental Lab ID is Project #2592, Plant Influent (PI)19C.

**** - City of Everett Environmental Lab ID is Project #2593, Final Effluent North (FEN)19C.

P means the analyte was detected above the instrument detection limit but below the established minimum quantitation limit. J means analyte was positively identified. Result is an estimate.

U means the analyte was not detected at or above the reported result. B means analyte was also found in the analytical method blank indicating the sample may have been contaminated.

Table 4. Comparison of Sampling and Laboratory Procedures, City of Everett - L. Snohomish River Basin Class II Inspections, 8/93 (P. 2)

Location:	EffEV1-EV		EffEV2-E		EffEV2-EV		EffEV1-2	FEN19G	EffEV2-2	FES19G
Lab Log #~:	348244		348250		348251		348246		348253	
Date:	8/18-19		8/18-19		8/18-19		8/19		8/19	
Sampler:	Everett		Ecology		Everett		Ecology	Everett	Ecology	Everett
Laboratory:	Ecology	Everett^	Ecology	Everett^^	Ecology	Everett^^^	Ecology	Everett	Ecology	Everett
GENERAL CHEMISTRY										
Alkalinity (mg/L)		144	186	176		178	146	140	188	185
Chloride (mg/L)			53				41'		48	
SOLIDS 4 (mg/L)										
TS	320	288	358	288	329	288	336	297	332	278
TNVS	191	172	210	200	222	200	173	179	182	182
TSS	31	52	11	14	10	18	29	52	4	12
TNVSS	8	3	2	0	1U	0	1U	0	1U	0
BOD5 (mg/L)	92	>67	15	24	27	29	36	56	24U	23
NH3-N (mg/L)		16.6	24	26.7		25.0	15	15.9	24	26.8
NO2+NO3-N (mg/L)		1.38	0.08J	0.098		0.12	1.26	1.55	0.12	0.167
Total Kjeldahl N (mg/L)		21.9	28	29.7		29.3	48	21.5	28	29.8
Phosphate - Ortho (mg/L)		3.86	3.49	3.50		3.39	3.88	3.88	3.56	3.47
Phosphate - Total (mg/L)		4.65	3.9	4.02		3.97	4.40	4.63	3.8	4.11
F-Coliform MF (#/100mL)							170	42	1,600	72
METALS (µg/L)										
Cadmium			0.31P	0.2U			0.11P	0.2U	0.26P	0.2U
Copper			13.3	14			6.5P	6	12.4	14
Lead			4.4P	3P			1.8P	2J	4.5P	3P
Mercury			0.06P	0.2U			0.05U	0.2U	0.05P	0.2U
Silver			1.1P	1.3			0.50U	0.4P	1.2P	1.3
Zinc			30PB	19			11PB	4J	29PB	18
FIELD OBSERVATIONS										
Temperature (°C.)							22.5	23.1	20.1	21.0
pH (s.u.)							8.5	8.5	6.9	7.4
Conductivity (µmho/cm)		431	634	538		536	484	412	634	527
Chlorine, free (mg/L)			0.04				0.03	0.08	0.03	0.1
total (mg/L)			0.04				0.03	0.10	0.03	0.1

EffEV1 - Effluent to outfall 015; EffEV2 - Effluent to outfall 015a; -E - Ecology composite sampler; -EV - Everett composite sampler; -2 - Grab sample on 8/19.

FEN19G - Grab sample taken by Everett at same time and place as Ecology's EffEV1-2. City of Everett Environmental Lab ID is Project # 2592.

FES19G - Grab sample taken by Everett at same time and place as Ecology's EffEV2-2. City of Everett Environmental Lab ID is Project # 2592.

~ - Lab Log # is assigned at Manchester Environmental Lab (MEL) and therefore, applicable only to those samples submitted to MEL for analysis.

^ - City of Everett Environmental Lab ID is Project #2592, Final Effluent North (FEN)19C.

^^ - City of Everett Environmental Lab ID is Project #2593, Final Effluent South (FES)19C.

^^^ - City of Everett Environmental Lab ID is Project #2592, Final Effluent South (FES)19C.

P means the analyte was detected above the instrument detection limit but below the established minimum quantitation limit.

U means the analyte was not detected at or above the reported result.

B means the analyte was also found in the analytical method blank indicating the sample may have been contaminated.