

DEPARTMENT OF ECOLOGY

November 15, 1994

TO: John Glynn and Ed Abassi
Water Quality Program, NWRO

THROUGH: Will Kendra *WK*
EILS Program, Watershed Assessments Section

FROM: Norm Glenn *Norm*
Watershed Assessments Section

SUBJECT: City of Monroe Basin Class II Inspection Summary

An announced Basin Class II inspection was conducted at the above facility during the week of August 23, 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):

- The calculated flow rate was determined by measuring depth of flow over the two effluent weirs. This flow rate was significantly different from the instantaneous flow rate read in the control room. All flow measuring equipment and instrumentation should be calibrated by an independent specialist.
- Of the general chemistry parameters, ammonia and total residual chlorine exceeded water quality standards at "end-of-pipe."
- Metals in effluent are a cause for concern. The criteria for silver is an instantaneous concentration which was exceeded by 10-fold. Exceedances of acute and chronic criteria for cadmium, copper, lead and zinc were less pronounced.
- A mixing zone study, which includes receiving water characterization as well as ammonia, chlorine, and metals sampling, would establish whether exceedances occur at acute and chronic boundaries.

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- A comparison of inspection results to National Pollutant Discharge Elimination System (NPDES) limits revealed several problems. The plant was not achieving 85 percent removal of five-day biochemical oxygen demand (BOD₅), and the monthly average for BOD₅ was exceeded somewhat. Both the monthly and weekly averages for fecal coliform were not met during the three days of this inspection, suggesting a potential problem with the disinfection process. Although these weren't enforceable violations, they point to emerging patterns which may have resulted in violations of the permit limits for weekly and monthly averages.
- Comparison of results from sample "splits" produced some significant differences attributable to lab procedures. However, they analyzed all standards accurately, and no further light can be shed on the disparity.

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

NLG/WK: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.

Cusimano, R., in prep. Snohomish River Basin Dry Season TMDL Study. Washington State Department of Ecology, Environmental Investigations and Laboratory Services Program, Olympia, WA.

Ecology, 1992. Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington. Washington State Department of Ecology, Water Quality Program, Olympia, WA.

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

-----, 1986. Quality Criteria for Water. EPA 440/5-86-001.

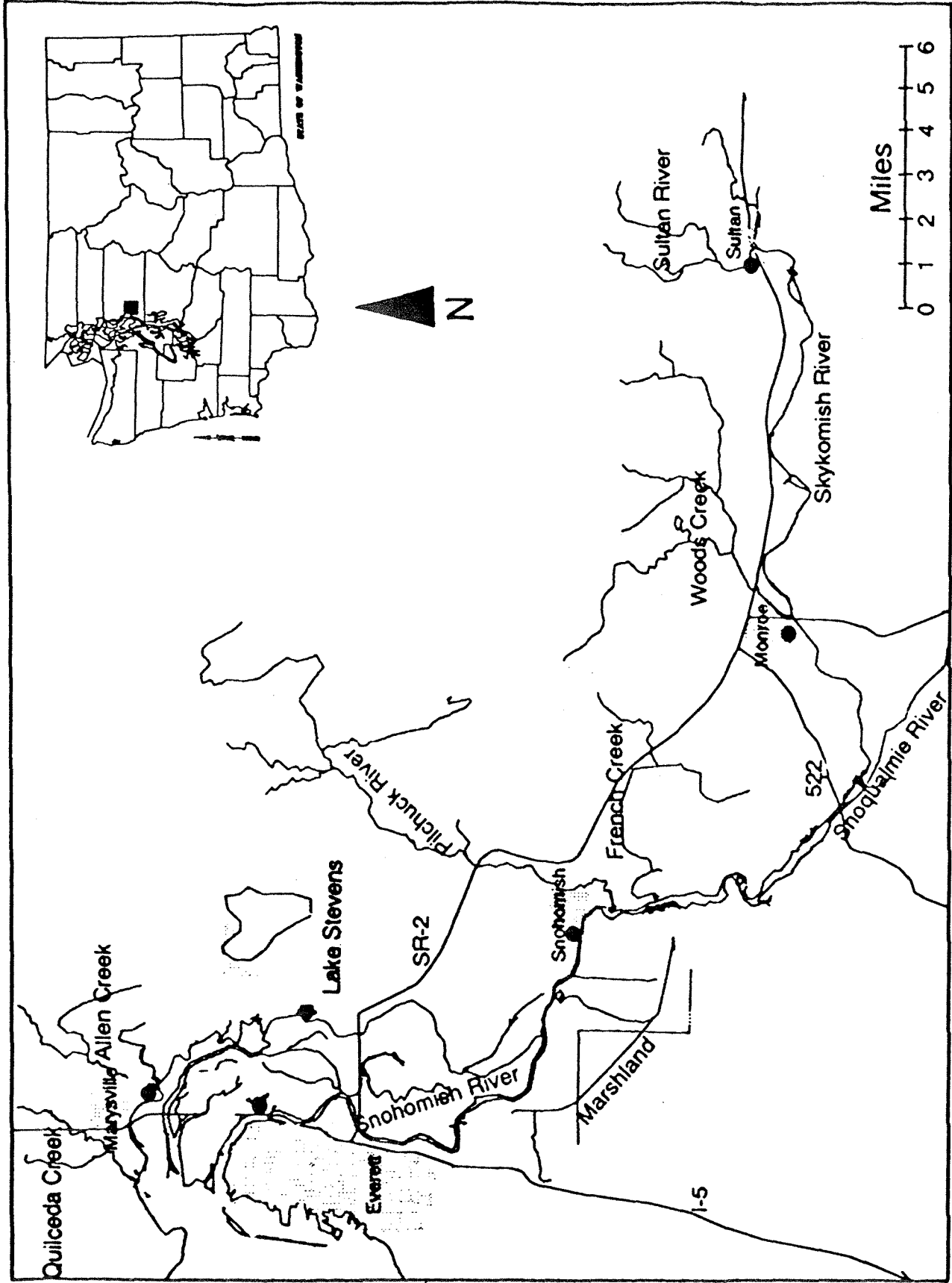


Figure 1. Location Map for WWTPs in Lower Snohomish TMDL Study Area, 8/93.

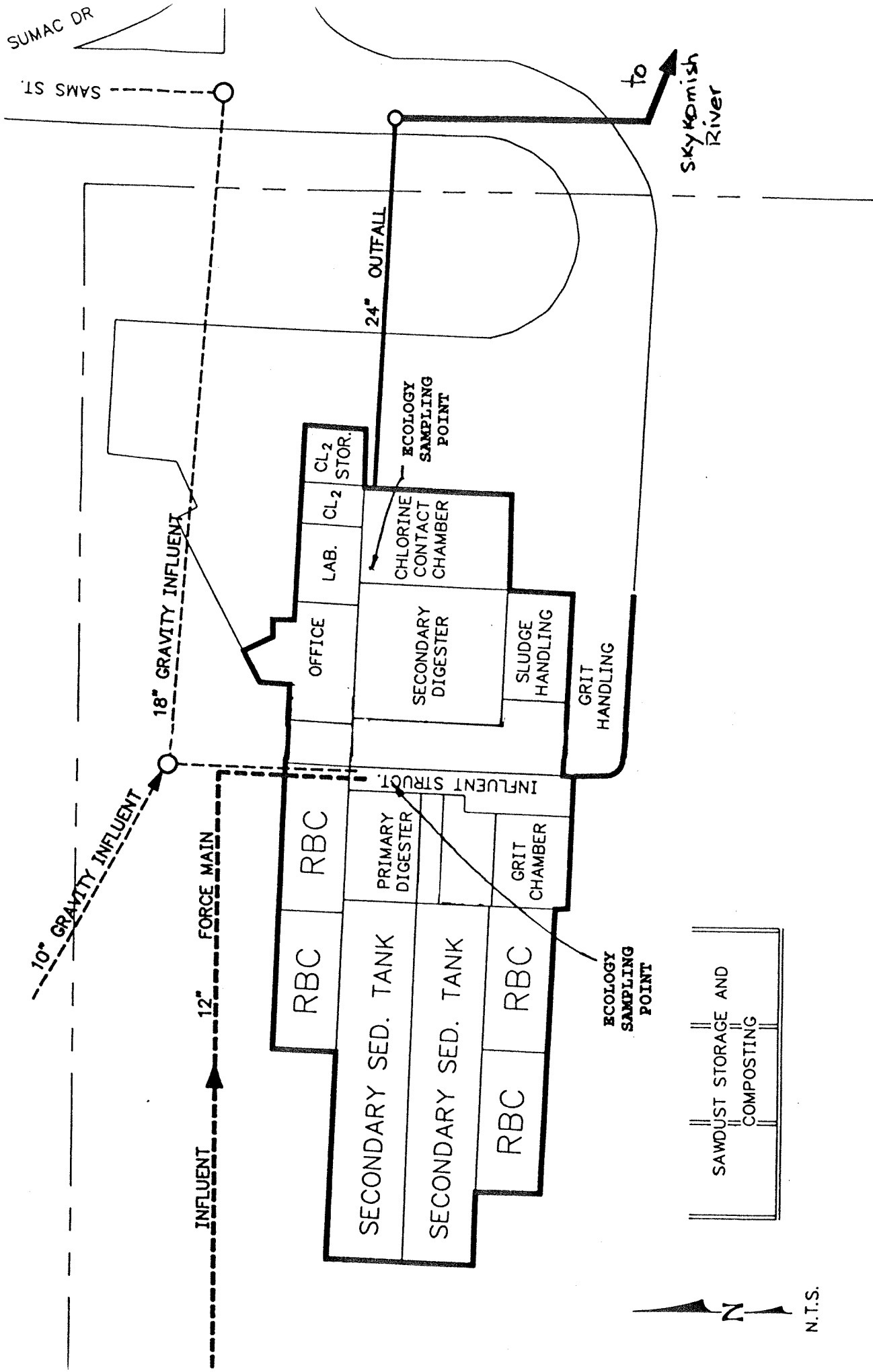


Figure 2. Plant Schematic - City of Monroe WWTP, 8/93.

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Table 1. Chemical Analytical Methods and Laboratories - City of Monroe - 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
Ortho phosphate	EPA, 1983: 365.3	Ecology; Manchester WA
Total phosphorus	EPA, 1983: 365.3	Sound Analytical Svcs.; Tacoma WA
Fecal Coliform, by membrane filter technique	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 Monroe - L. Snohomish River Basin Class II Inspections, 8/93

Parameter	Location:		Influent		Effluent		Eflimo-2
	Blank-E	Equip	Comp	Equip	Comp	Equip	
Alkalinity (mg/L)			154		155	162	150
Chloride (mg/l)			54		65	80	65
SOLIDS 4 (mg/l)							
TS			601	743	392	403	382
TNVS			287	337	244	272	245
TSS			275	411	26	25	23
TNVSS			65	67	9	6	7
BOD5 (mg/l)			220	220	37	37	36
NH3-N (mg/L)			14		14	13	13
NO2+NO3-N (mg/L)			0.78		0.18	0.11	0.46
Total Kjeldahl N (mg/L)			33		22	18	20
Phosphate - Ortho (mg/L)					4.66	5.07	4.74
Phosphate - Total (mg/L)			6.3		4.8	1.7	4.3
F-Colliform MF (#/100mL)						LAC	660
METALS (µg/L)							
Cadmium			0.10U		*		0.36P
Copper			2.2P		*		16.2
Lead			1.0U		*		2.1P
Mercury			0.05U		*		0.05U
Silver			0.50U		*		2.5P
Zinc			.4U		*		66.1
FIELD OBSERVATIONS							
Flow (MGD)							
Temperature (°C.)			5.5**		4.2**	19.9	20.0
pH (s.u.)			7.4**		7.3**	7.1	7.1
Conductivity (µmho/cm)			585		625	650	700
Chlorine free (mg/L)						0.6	0.1
total (mg/L)						0.9	0.7

Inflimo - Influent; Eflimo - Effluent; -E - Ecology sampler; -MO - Monroe sampler.
 -1 - Grab sample taken on 8/25; -2 - Grab sample taken on 8/26.
 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.
 LAC means Laboratory Accident.
 * - Samples not collected.
 ** - Iced composite sample.

Table 3. Comparison of Effluent Pollutants to Water Quality Criteria, City of Monroe - L. Snohomish River Basin Class II Inspections, 8/93.

Parameter	Lab Log # 3582:	Station:		EffMO-E		EffMO-1		EffMO-2		Water Quality Criteria*	
		Blank-E	Equip	comp	grab	grab	grab	grab	Acute	Chronic	
		-40		-43	-45	-46					
<u>General Chemistry (mg/L)</u>											
Total Ammonia (as N)		---		14	13	13			8.6	1.7	
Total Residual Chlorine		---		---	0.9	0.7			0.019	0.011	
<u>Total Recoverable Metals (µg/L)</u>											
Cadmium		0.10U		---	---	0.36P			0.60	0.31	
Copper		2.2P		---	---	16.2			3.71	2.86	
Lead		1.0U		---	---	2.1P			9.85	0.38	
Silver		0.50U		---	---	2.5P			0.23**	---	
Zinc		4U		---	---	66.1			28.65	25.95	

EffMO - Effluent; -E - Ecology sampler; -1 - Grab sample on 8/25; -2 - Grab sample on 8/26.

* - Refer to EPA's Gold Book (EPA, 1986) or WA State Water Quality Standards (Ecology, 1992).

Based on receiving water temperature of 15°C., pH of 7.75, and hardness of 19 (Cusimano, in prep).

** - An instantaneous concentration not to be exceeded at any time.

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

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

Table 4. Comparison of Inspection Results to NPDES Permit Limits, City of Monroe – L. Snohomish River Basin Class II Inspections, 8/93.

Parameter	NPDES Permit Limits		Inspection Data		Loading and Performance			
	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)			220		---	1,376	---	85
Influent BOD5 (lbs/d)								
Effluent BOD5 (mg/L)	30	45	37			200		
Effluent BOD5 (lbs/d)	250	350				83		
Effluent BOD5 (% removal)	85							
Influent TSS (mg/L)			275		---	1,720	---	85
Influent TSS (lbs/d)								
Effluent TSS (mg/L)	30	45	26					
Effluent TSS (lbs/d)	250	350				120		
Effluent TSS (% removal)	85					90		
Fecal Coliform (#/100 mL)	200	400		660				
pH (s.u.)	6.5 ≤ pH ≤ 8.5			7.1; 7.1				
Flow (MGD)	1.4				---	0.75	---	85

Table 5. Comparison of Laboratory Results of Sample Splits, City of Monroe – L. Snohomish River Basin Class II Inspections, 8/93.

Location: Lab Log #: Date: Sampler:	InfMO-E 358241 8/25-26 Ecology	InfMO-MO 358242 8/25-26 Monroe	EffMO-E 358243 8/25-26 Ecology	EffMO-MO 358244 8/25-26 Monroe
Laboratory:	Ecology	Ecology	Ecology	Ecology
BOD5 (mg/L)	220	220	37	37
TSS (mg/L)	275	411	26	25
	442	301	49	41
	270	290	26	32

