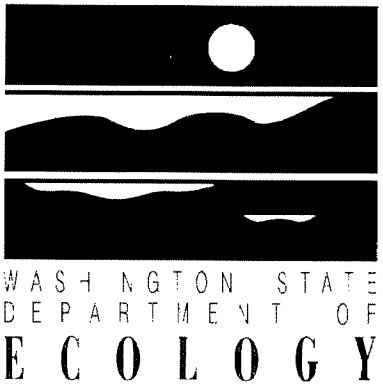

Boise Cascade Pulp and Paper Mill
Wallula, Washington

Class II Inspection

January 1997

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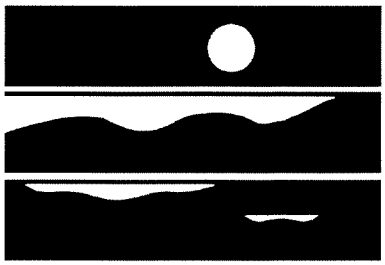

Boise Cascade Pulp and Paper Mill
Wallula, Washington

Class II Inspection

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by
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January 1997

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Table of Contents

List of Figures and Tables

Abstract

An unannounced Class II inspection was conducted at the Boise Cascade (Wallula) pulp and paper mill October 21-23, 1996. Tier 2 permit limits based on mill production were in effect at the time of the inspection. Results showed Boise Cascade's ASB effluent and final effluent were within discharge limits for BOD_5, TSS, and pH. Fecal coliform counts in the final effluent were low.

Split sample results showed that Ecology analyses for BOD_5 were in agreement with Boise Cascade analyses. There were no consistent trends in the differences between TSS results. Variations in results between Ecology and Boise Cascade analyses for ASB effluent and final effluent TSS can be attributed largely to the nonhomogenous nature of paper mill effluent. Boise Cascade sample results compared closely with results from Ecology samples for primary influent, primary effluent, aerated stabilization basin (ASB) influent, and ASB effluent. The Boise Cascade final effluent sample yielded BOD_5 and TSS results considerably higher than the Ecology sample results, and it is recommended that Boise Cascade sampling procedures for final effluent be evaluated.

Removal efficiencies across the primary clarifier were 10% for BOD_5 and 83% for TSS. Removal efficiency for BOD_5 across the ASB was 90%. TSS concentrations increased across the ASB. This increase can be attributed to the production of microorganisms in the ASB and their incomplete settling.

Of the seven priority pollutant metals found in the final effluent sample, none were found in a concentration exceeding chronic or acute state fresh water criteria at the dilution zone boundaries. The ASB influent sample was analyzed for both total metals and total recoverable metals so that a comparison could be made. Variability in results between metals analyses for the same sample obscured any consistent differences between total metals and total recoverable metals analysis methodologies. Of the pesticide/PCB analyses for primary and ASB influent and effluent, PCB-1260 (Aroclor-1260) was found at an estimated concentration of 0.090 µg/L in the primary influent. No other pesticide/PCBs were found.

Summary

Mill Operating Conditions

Both of the pulp mills, as well as the three paper machines, at the site were in operation during the inspection. Total production for July 16, 1996 was approximately 1372 air dry tons. Average production for July was 1410 air dry tons/day.

Flow Measurements

The primary clarifier influent passes through a Parshall flume, but the flume is usually submerged and is not used for flow measurements. Magnetic flow meters are used to measure flow for both the alkaline and acid waste streams entering the aerated stabilization basin (ASB), as well as for the ASB (secondary) effluent and the final effluent.

Final effluent flow determined from totalizer readings by Ecology from 0832 on July 16, 1996 to 0833 on July 17, 1996 was 32.40 MGD as prorated to 24 hours. This is in agreement with Boise Cascade's flow determination of 32.43 MGD for the 24-hour sampling period. Boise Cascade determined a concurrent ASB effluent flow of 20.75 MGD.

NPDES Permit Limits Comparison/General Chemistry

Effluent limitations were based on Tier 2 production as defined in the NPDES permit at the time of the inspection. Results showed Boise Cascade's ASB effluent and final effluent were within discharge limits for BOD_5, TSS, and pH. Loadings were calculated using the ASB effluent flow reported by the mill. Fecal coliform counts in the final effluent were low.

Split Sample Results

Ecology analyses for BOD_5 were in agreement with Boise Cascade analyses. There were no consistent trends in the differences between TSS results. Variations in results between Ecology and Boise Cascade analyses for ASB effluent and final effluent TSS can be attributed largely to the nonhomogenous nature of paper mill effluent. Boise Cascade sample results compared closely with results from Ecology samples for primary influent, primary effluent, and ASB effluent. Relatively low BOD_5 results for the ASBin-B sample may be a consequence of the Boise Cascade sample being unrefrigerated. The Boise Cascade final effluent sample yielded BOD_5 and TSS results considerably higher than the Ecology sample results.

Treatment Removal Efficiencies

Primary influent and primary effluent BOD_5 and TSS concentrations were similar in 1996 and 1992. Removal efficiencies across the primary clarifier were also similar, with 10% BOD_5 removal in 1996 and 6% in 1992, as well as 83% TSS removal in 1996 and 72% in 1992. BOD_5 removal across the ASB was 90% both in 1996 and in 1992, demonstrating effective biochemical removal. ASB influent and ASB effluent BOD_5 concentrations were similar during both inspections. ASB influent TSS concentration in 1996 (49 mg/L) was considerably lower than the concentration in 1992 (267 mg/L). Boise Cascade reports that the use of lime caused TSS concentrations in the ASB influent to be elevated at the time of the 1992 inspection. The increase in TSS across the ASB during the 1996 inspection can be attributed to the production of microorganisms as part of secondary treatment and their incomplete settling.

Priority Pollutant Metals

Ten priority pollutant metals were detected in the composite primary influent sample. Arsenic, cadmium, chromium, copper, lead, mercury, and zinc were detected in the final effluent sample. Copper and mercury concentrations in the final effluent sample exceeded the state chronic fresh water criteria, with mercury exceeding the criterion by a factor of 22. It should be noted that state water quality criteria apply to the edge of dilution zones rather than to undiluted effluent. With a chronic dilution ratio of 306:1, both copper and mercury concentrations from the effluent fall within state criteria at the edge of the chronic mixing zone.

A comparison of the composite ASB influent sample analyzed for both total metals and for total recoverable metals showed that variability in results between metals analyses for the same sample obscured any consistent differences between total metals and total recoverable metals analysis methodologies.

Pesticide/PCBs

No pesticides were found in the primary influent, primary effluent, ASB influent, or ASB effluent samples. PCB-1260 (Aroclor-1260) was found at an estimated concentration of 0.090 µg/L in the primary influent. PCB-1260 was not detected in the primary effluent or final effluent. Chronic fresh water quality criterion for PCB-1260 is 0.014 µg/L, approximately one half of the 0.033 µg/L detect limit. With a chronic dilution ratio of 306:1, effluent PCB-1260 would be well below the chronic water quality criterion in the receiving water for the worst case of effluent PCB-1260 concentration at the detect limit.

Recommendation

- Boise Cascade should evaluate its final effluent sampling procedures to assure that they provide for representative samples.

Introduction

An unannounced Class II inspection was conducted at the Boise Cascade (Wallula) pulp and paper mill October 21-23, 1996. Conducting the inspection were Steven Golding of the Ecology Toxics Investigations Section and Dale Clark of the Ecology Ambient Monitoring Section. Roger Yerkes, Environmental Engineer, and Rich Nelson of Boise Cascade assisted during the inspection. Barbara Vincent of Boise Cascade provided and installed insulation for the compositors.

Boise Cascade operates a pulp and paper mill at Wallula, Washington. The mill is located on the east shore of the Columbia River (Lake Wallula) about 15 miles southeast of Pasco (Figure 1). The mill wastewater receives primary clarification followed by secondary treatment in a two-stage aerated stabilization basin (ASB; Figure 2). The ASB receives effluent from the primary clarifier as well as the wastewater from the bleach plant and alkaline and acid sewers. The mill discharges an average of 25-30 million gallons per day (MGD) consisting of 20 MGD secondary treated effluent and 10 MGD non-contact cooling water. Effluent flow is measured by Boise Cascade with an in-line flow meter. The alkaline and acid sewers also have in-line flow meters. Primary influent and ASB effluent flow are also measured. The mill outfall extends 9,000 feet from shore into Lake Wallula near mile 316. The 512 foot long diffuser is submerged to a depth of about 58 feet. A dilution zone study performed in 1992 determined a chronic dilution ratio of 306:1 and an acute dilution ratio of 43:1.

Objectives of the inspection included:

- Evaluate NPDES permit compliance
- Compare effluent concentrations with state and federal water quality criteria
- Evaluate sampling and laboratory procedures with split sample comparisons
- Evaluate efficiency of wastewater treatment
- Evaluate metals concentrations in wastewater and effluent

Procedures

Composite and grab samples were collected by Ecology at influent (Inf-1,2; Inf-E) and final effluent (Eff-1,2,3,4; Eff-E) locations as well as primary clarifier effluent (Prm-1,2: Prm-E), ASB (secondary) influent (ASBin-1,2; ASBin-E) and ASB (secondary) effluent (ASBef-1,2; ASBef-E) locations. Boise Cascade collected composite samples at influent (Inf-B), primary clarifier effluent (Prm-B), ASB influent (ASBinf-B), and ASB effluent (ASBef-B) and final effluent (Eff-B) locations (See Figure 2). Ecology conducted field measurements on all composite and grab samples.

A more detailed description of sampling procedures appears in Appendix A. Sampling station descriptions appear in Table 1. The sampling schedule, parameters analyzed, and sample splits are included in Appendix B. Ecology analytical methods and laboratories performing the analyses are summarized in Appendix C. Ecology field and laboratory QA/QC are summarized in Appendix D. Quality assurance cleaning procedures are included in Appendix E. A glossary of terms appears in Appendix F.

Results and Discussion

Mill Operating Conditions

Both of the pulp mills, as well as three paper machines, at the site were in operation during the inspection. Total production for July 16, 1996 was approximately 1372 air dry tons (Yerkes, 1996). Average production for July was 1410 air dry tons/day.

Flow Measurements

The primary clarifier influent passes through a Parshall flume, but the flume is usually submerged and is not used for flow measurements (Yerkes, 1996). Magnetic flow meters are used to measure flow for both the alkaline and acid waste streams entering the ASB, as well as for the ASB (secondary) effluent and the final effluent. The magnetic flow meters are subject to annual calibration in conformance with manufacturers recommendations as required by the permit. Boise Cascade calculates flow through the primary clarifier by subtracting acid and alkaline flows from the ASB effluent flow. Because all flow-measuring devices were of the in-line type, they were not accessible to Ecology and flow measurements were not verified.

Final effluent flow determined from totalizer readings by Ecology from 0832 on July 16, 1996 to 0833 on July 17, 1996 was 32.40 MGD as prorated to 24 hours. This is in agreement with Boise Cascade's flow determination of 32.43 MGD for the 24-hour sampling period. Boise Cascade determined a concurrent ASB effluent flow of 20.75 MGD. Boise Cascade flow determinations are used in this report.

NPDES Permit Limits Comparison/General Chemistry

General chemistry results are shown in Table 2. Effluent limitations were based on Tier 2 production as defined in the NPDES permit at the time of the inspection. Tier 2 production is defined as a maximum of 1376 tons/day production for three consecutive months. Production for the three consecutive months ending July, 1996 was as follows:

May	1022 tons/day
June	1377 tons/day
July	1410 tons/day

Since 1376 tons/day production was exceeded for only two of the three months, Tier 2 permit limits remained in effect at the time of the inspection. The permit limits in Table 3 include Tier 2 permit limits which apply to BOD_5 and TSS for the ASB effluent. All other limits in Table 3 apply to final effluent.

Results showed Boise Cascade's ASB effluent was within discharge limits for BOD_5 and TSS. The final effluent was within the pH limit. Loadings were calculated using the flow reported by the mill.

Fecal coliform counts by the most probable number (MPN) method (31/100 ml; 33/100 ml) and by the membrane filter (MF) method (46/100ml est.; 11/100ml est.) in the final effluent were below the Class A water quality standard of 100/100 ml for fecal coliform, even without considering dilution at mixing zone boundaries.

Split Sample Results

Samples were split to determine the comparability of Ecology and permittee sampling methods and laboratory results (Table 4). Ecology analyses for BOD_5 were in agreement with Boise Cascade analyses. There were no consistent trends in the differences between TSS results. Variations in results between Ecology and Boise Cascade analyses for ASB effluent and final effluent TSS can be attributed largely to the nonhomogenous nature of paper mill effluent.

Boise Cascade sample results compared closely with results from Ecology samples for primary influent, primary effluent, ASB influent, and ASB effluent. Degradation of the Boise Cascade unrefrigerated BOD_5 sample may account for the relatively low ASBin-B BOD_5 result. Another exception was found in the comparison of results from the Boise Cascade and Ecology samples of final effluent. The Boise Cascade final effluent sample yielded BOD_5 and TSS results considerably higher than the Ecology sample results. A high over-reporting of results could lead to unnecessary enforcement action from Ecology. Therefore, Boise Cascade should evaluate its final effluent sampling procedures to assure that representative samples are provided for.

Treatment Removal Efficiencies

Treatment removal efficiencies across the primary clarifier and ASB are shown in Table 5. Removal efficiencies were calculated from the results of composite samples of primary clarifier and ASB influents and effluents taken during the inspection. Removal efficiencies found during the April 1992 Class II inspection are also shown on Table 5 (Johnson and Heffner, 1993).

Because mill operating conditions were similar during the 1996 and 1992 inspections (Yerkes, 1996), a comparison can be made of treatment facility operation during both inspections. Effluent flow on the sampling date was 32.43 MGD in 1996 and 28.84 MGD in 1992. Production for the sampling date in 1996 (July 16) was estimated to be 1372 air dry tons/day (Yerkes, 1996). Average production for the month of July 1996 was 1410 air dry tons/day. Production for the three sampling dates in 1992 (April 6,7, and 8) ranged from 992 to 1441 air dry tons/day. The April 7 low production was associated with the bleach plant being down (Johnson and Heffner, 1993).

Primary influent and primary effluent BOD_5 and TSS concentrations were similar in 1996 and 1992. Removal efficiencies across the primary clarifier were also similar, with 10% BOD_5 removal in 1996 and 6% in 1992, as well as 83% TSS removal in 1996 and 72% in 1992. BOD_5 removal across the ASB was 90% both in 1996 and in 1992, demonstrating effective biochemical removal. ASB influent and ASB effluent BOD_5 concentrations were similar during both inspections. ASB influent TSS concentration in 1996 (49 mg/L) was considerably lower than the concentration in 1992 (267 mg/L). Boise Cascade reports that the use of lime caused TSS concentrations in the ASB influent to be elevated at the time of the 1992 inspection (Yerkes, 1996). Lime addition is reported to be better controlled since the 1992 inspection. The settling of lime is likely responsible for the reduction in TSS across the ASB in 1992. The increase in TSS across the ASB during the 1996 inspection can be attributed to the growth of microorganisms as part of secondary treatment and their incomplete settling.

It should be noted that even with the increase in TSS across the ASB during the 1996 inspection, the TSS concentration of the ASB effluent in 1996 (67 mg/L) was lower than the TSS concentration in 1992 (108 mg/L). The BOD_5 concentration of the ASB effluent was also lower in 1996. It should also be noted that the 1996 ASB effluent inspection results met permit limits for BOD_5 and TSS.

Priority Pollutant Metals

Ten priority pollutant metals were detected in the composite primary influent sample. Arsenic, cadmium, chromium, copper, lead, mercury, and zinc were detected in the final effluent sample (Table 6). Copper concentration in the final effluent sample exceeded the state chronic fresh water criterion by 36%. Mercury concentration exceeded the state chronic fresh water criterion by a factor of 22. It should be noted that state water quality criteria apply to the edge of dilution zones rather than to undiluted effluent. With a chronic dilution ratio of 306:1 (Ecology, 1995), both copper and mercury concentrations from the effluent fall within state criteria at the edge of the chronic mixing zone.

The composite ASB influent sample was analyzed for total metals and for total recoverable metals so that the results of the two methods could be compared for potential permit management purposes. Because the process used to digest samples for total metals analyses is more complete than that used for total recoverable metals analyses, total metals results would be expected to be the same or higher in concentration than the total recoverable result for the same sample (Knox, 1996). Of the six pairs of total metals and total recoverable metals results in which there was at least one detection, two of the total metals concentrations were higher and two of the total recoverable metals concentrations were higher (Table 6). The results of the other two pairs were equal. Total recoverable estimated results were at most 31% higher than the total metals result for the same sample (arsenic). Total metals results were at most 27% higher than the total recoverable metals result for the same sample (copper). In summary, variability between metals analyses for

the same sample obscured any consistent differences between total and total recoverable analysis methodologies.

Pesticide/PCBs

No pesticides were found in the primary influent, primary effluent, ASB influent, or ASB effluent samples (Table 7). PCB-1260 (Aroclor-1260) was found at an estimated concentration of 0.090 µg/L in the primary influent. PCB-1260 was not detected at or above estimated detect concentrations of 0.033 µg/L and 0.034 µg/L in the primary effluent and the final effluent. Chronic fresh water quality criterion for PCB-1260 is 0.014 µg/L, approximately one half of the 0.033 µg/L detect limit. With a chronic dilution ratio of 306:1 (Ecology, 1995), effluent PCB-1260 would be well below the chronic water quality criterion in the receiving water for the worst case of effluent PCB-1260 concentration at the detect limit.

It should be noted that all surrogate recoveries for the samples were very low, so that the analyses may have under represented PCBs in the samples (see Appendix D).

No PCBs were found in the April 1992 Class II inspection (Johnson and Heffner, 1992). The detect limit for the final effluent sample was 0.7 µg/L. No sampling for PCBs in the primary influent was conducted during the 1992 inspection.

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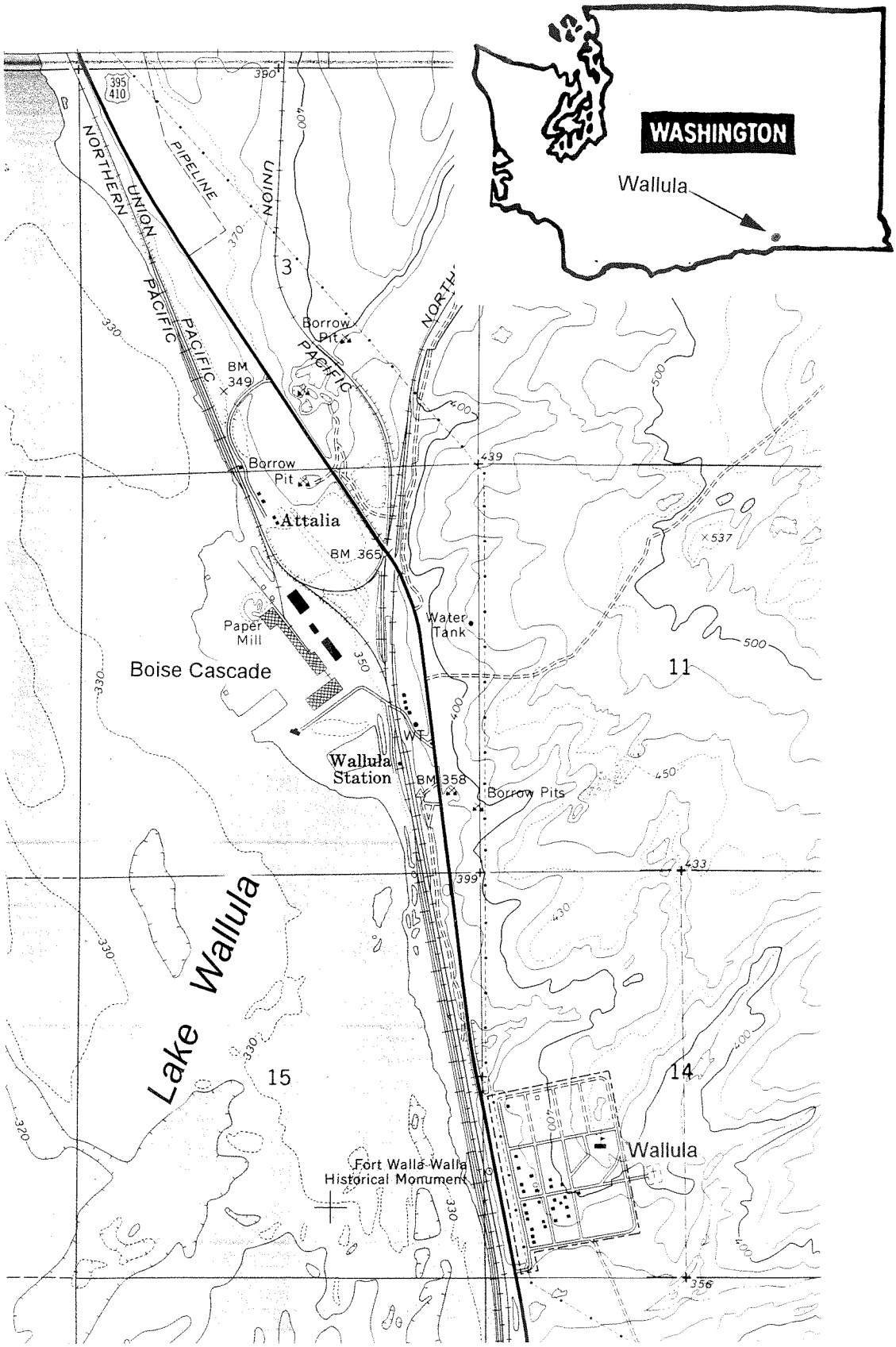

Figure 1 - Location Map - Boise Cascade (Wallula), July 1996.

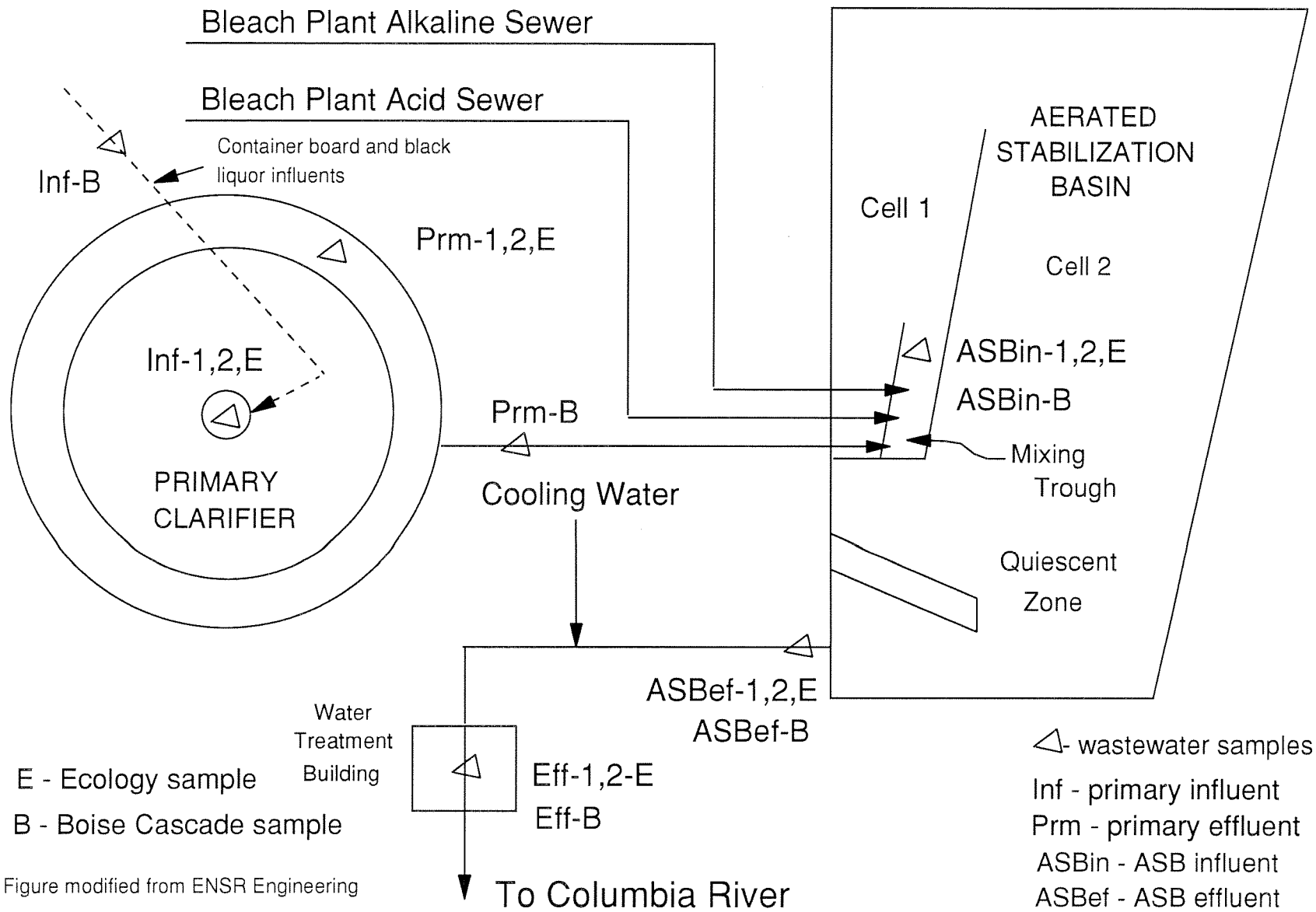

Figure modified from ENSR Engineering

Figure 2 - Flow Schematic and Sampling Locations - Boise Cascade (Wallula), July 1996.

Table 1 - Sampling Station Descriptions - Boise Cascade (Wallula), July 1996.

Ecology influent grab and composite samples (Inf-1,2; Inf-E)

The Ecology compositor intake was placed in the center well of the primary, one foot below the surface in a well-mixed region. Grab samples were obtained from the same location.

Boise Cascade influent composite sample (Inf-B)

The Boise Cascade compositor intake was placed in the pulp mill influent sump, upstream of the primary clarifier. The influent stream does not include container board and black liquor influents that are included in the Ecology influent at the center well of the primary clarifier.

Ecology primary clarifier effluent grab and composite samples (Prm-1,2; Prm-E)

The Ecology compositor intake was placed in the outer channel of the primary clarifier, in the center of the channel, one foot below the surface. Grab samples were obtained from the same location.

Boise Cascade primary clarifier effluent composite sample (Prm-B)

The Boise Cascade compositor sampled flow from the pipeline exiting the primary clarifier through a circulating line. The pipeline conveys primary effluent for secondary treatment.

Ecology ASB influent grab and composite samples (ASBin-1,2; ASBin-E)

The Ecology compositor intake was placed at the end of the mixing trough, two feet below the surface in a well-agitated region. The grab samples were collected from the same location.

Boise Cascade ASB influent composite sample (ASBin-B)

The Boise Cascade compositor intake was placed at the end of the mixing trough in a well-agitated region.

Ecology ASB effluent grab and composite samples (ASBef-1,2; ASBef-E)

The Ecology composite intake was placed in a sampling pot. The intake was suspended in the pot so as not to touch the edges. ASB effluent is continually discharged to the pot, which is on the pressure side of the discharge pumps. The pot is cleaned by Boise Cascade personnel daily.

Grab samples were obtained from a tap on a line with continuous flow.

Boise Cascade ASB effluent composite sample (ASBef-B)

The Boise Cascade composite intake was placed in a sampling pot in the same manner as the Ecology ASB effluent sample.

Ecology final effluent grab and composite samples (Eff-1,2,3,4; Eff-E)

The Ecology composite intake was placed in a sampling pot that is installed permanently for Boise Cascade sampling. The intake was suspended in the pot so as not to touch the edges. Final effluent is continually discharged to the pot. The pot is cleaned by Boise Cascade personnel daily. Grab samples were obtained from a tap on a line with continuous flow.

Boise Cascade final effluent composite sample (Eff-B)

The Boise Cascade composite intake was placed in a sampling pot, as described above: "Ecology final effluent."

Table 2 - General Chemistry Results - Boise Cascade (Wallula), July 1996.

Location	Inf-1	Inf-2	Inf-E	Prm-1	Prm-2	Prm-E	ASBin-1	ASBin-2	ASBin-E
Type:	grab	grab	comp	grab	grab	comp	grab	grab	comp
Date:	7/16	7/16	7/16-17	7/16	7/16	7/16-17	7/16	7/16	7/16-17
Time:	0925	1420	0730-0730	0930	1425	0730-0730	0945	1455	0730-0730
Lab Log #:	298180	298181	298182	298183	298184	298185	298186	298187	0730-0730
GENERAL CHEMISTRY									
Conductivity (umhos/cm)	976	924	1010	1070	912	991	2120	2020	2230
Alkalkinity (mg/L Ca CO3)			255			191			19.5
Hardness (mg/L Ca CO3)			187			91.8			210
Color (color unit)									1500J
Phenolics (ug/L)									
TS (mg/L)			1353			995			2078
TNVS (mg/L)			755			641			1317
TSS (mg/L)	378	64	455	103	753	76	75	56	49
TNVSS (mg/L)			180			51			24
BOD5 (mg/L)			264			237			344
BOD5(INH - mg/L)			271			243			343
TOC (water - mg/L)	101	112	184	196	173	189	349	394	406
NH3-N (mg/L)									7.15
NO2 + NO3-N (mg/L)									0.158
Total-P (mg/L)									2.12
Oil and Grease (water - mg/L)									
F-Coliform MPN (#/100mL)									
F-Coliform MF (#/100mL)									
% Klebsiella (KES)									
Cyanide (wk & dis - mg/L)									
FIELD OBSERVATIONS									
Temperature (C)	34.2	33.5		32.4	35.6		39.6	37.6	
Temp-Cooled (C)			7.7			6.3			6.0
pH	9.7	10.0	10.9	10.1	10.0	10.6	5.3	4.9	4.7
Conductivity (umhos/cm)	1051	983	1071	1143	963	1061	2250	2140	2380

NOTE: ASBin metals run as total and recoverable. Spike and spike dupe with ASBin. Trnsblnk from ASBef compositor.

J - estimated value
X - estimated value
Inf - influent to primary clarifier
Prm - primary clarifier effluent
ASBin - Aerated Stabilization Basin influent
ASBef - Aerated Stabilization Basin effluent
Trnsblnk - transfer blank
grab - grab sample
comp - composite sample
E - Ecology sample
B - Boise Cascade sample

Table 2 - (cont'd) - Boise Cascade Wallula, July 1996.

Location:	ASBef-1	ASBef-2	ASBef-E	Eff-1	Eff-2	Eff-E	Trnsblnk	Eff-B	Eff-3	Eff-4
Type:	grab	grab	comp	grab	grab	comp	grab	comp	grab	grab
Date:	7/16	7/16	7/16-17	7/16	7/16	7/16-17	7/15	7/16-17	7/17	7/17
Time:	0955	1455	1035	0850	1345	0840	1810	0825	0805	1020
Lab Log #:	298189	298190	0730-0730	298192	298193	0730-0730	298195	298196	298197	298198
GENERAL CHEMISTRY										
Conductivity (umhos/cm)	2480	2480	2470	1590	1750	1690		1690		
Alkalkinity (mg/L Ca CO3)			229			172				
Hardness (mg/L Ca CO3)			153			123		126		
Color (color unit)			2000J			1500J				
Phenolics (ug/L)						20.8				
TS (mg/L)			2059			1369				
TNVS (mg/L)			1497			993				
TSS (mg/L)	63	54	67	38	41	45		69	45	43
TNVSS (mg/L)			22			17				
BOD5 (mg/L)			33			17		40		
BOD5(INH - mg/L)			29			15		17		
TOC (water - mg/L)	198	146	165	107	121	125		120		
NH3-N (mg/L)			3.16			2.13				
NO2 + NO3-N (mg/L)			0.011			0.042				
Total-P (mg/L)			4.65			4.13				
Oil and Grease (water - mg	13	4		2	3					
F-Coliform MPN (#/100mL)									31	33
F-Coliform MF (#/100mL)									46X	11X
% Klebsiella (KES)									56	50
Cyanide (wk & dis - mg/L)	<0.010	<0.010		<0.010	<0.010					
FIELD OBSERVATIONS										
Temperature (C)	30.9	31.7		34.9	35.5				35.9	35.2
Temp-Cooled (C)			6.4			6.3		9.1		
pH	7.3	7.2	7.7	7.4	7.3	7.8		8.0	7.2	7.2
Conductivity (umhos/cm)	2600	2600	2640	1660	1831	1789		1775	1833	1823

Table 3 - NPDES Permit Limits and Inspection Results - Boise Cascade (Wallula), July 1996.

	NPDES Limits		Inspection Results	
Parameter	Monthly Average	Daily Maximum	Composite Samples	Grab Samples
ASB (Secondary) effluent				
*BOD5 (lbs/day)	13,000	24,900	5,711	
*TSS (lbs/day)	28,500	55,400	11,595	
Outfall 001				
pH	5.1 - 9.0 (continuous)			7.4; 7.3
Flow (MGD)	--	--	32.43 MGD	
Temperature (F)	--	--		34.9; 35.5
Production, (ADT/D)	--	--	1410 air dry tons/day July average	

* Effluent limits based on Tier 2 production of 1376 tons/day maximum for three consecutive months. Loading during inspection based on effluent flow of 20.75 MGD reported by Boise Cascade representing the period 0730 on July 16, 1996 to 0730 on July 17, 1996.

Table 4 - Split Sample Results Comparison - Boise Cascade (Wallula), July 1996.

	Location:	Inf-E	Inf-B	Prm-E	Prm-B	ASBin-E
	Type:	comp	comp	comp	comp	comp
	Date:	7/16-17	7/16-17	7/16-17	7/16-17	7/16-17
	Time:	0730-0730	0730-0730	0730-0730	0730-0730	0730-0730
	Lab Log #:	298182		298185		298188
	Sampled by:	Ecology	B.C.	Ecology	B.C.	Ecology
Parameter	Analysis by:					
BOD5 (mg/L)						
	Ecology	264	--	237	--	344
	B. Cascade	283	--	273	--	338
TSS (mg/L)						
	Ecology	455	--	76	--	49
	B. Cascade	730	596	56	76	27

	Location:	ASBin-B	ASBef-E	ASBef-B	Eff-E	Eff-B
	Type:	comp	comp	comp	comp	comp
	Date:	7/16-17	7/16-17	7/16-17	7/16-17	7/16-17
	Time:	0730-0730	0730-0730	0730-0730	0730-0730	0730-0730
	Lab Log #:		298191		298194	298196
	Sampled by:	B.C.	Ecology	B.C.	Ecology	B.C.
Parameter	Analysis by:					
BOD5 (mg/L)						
	Ecology	--	33	--	17	40
	B. Cascade	226*	33	26	18	--
TSS (mg/L)						
	Ecology	--	67	--	45	69
	B. Cascade	56*	54	57	34	--

Inf-E - Primary influent
Inf-B - Pulp mill influent sump (does not include container board and black liquor influents).
Prm - Primary effluent
ASBin - ASB influent
ASBef - ASB effluent
Eff - Final effluent
E - Ecology
B - Boise Cascade
B.C. - Boise Cascade
* - unrefrigerated sample

Table 5 - Treatment Removal Efficiency - Boise Cascade (Wallula), July 1996.

July 1996 Class II Inspection - 32.43 MGD final effluent flow

	Primary Clarifier			ASB		
Parameter	Influent	Effluent	% Removal	Influent	Effluent	% Removal
BOD_6 (mg/L)	264	237	10%	344	33	90%
TSS (mg/L)	455	76	83%	49	67	-37%

April 1992 Class II Inspection - 28.84 MGD final effluent flow

	Primary Clarifier			ASB		
Parameter	Influent	Effluent	% Removal	Influent	Effluent	% Removal
BOD_6 (mg/L)	366	344	6%	443	44	90%
TSS (mg/L)	357	100	72%	267	108	60%

Table 6 - Metals Results and Comparison with Water Quality Criteria - Boise Cascade (Wallula), July 1996.

	Locati	Inf-E	ASBin-E	ASBin-E	Eff-E	Trnsblk	EPA/Ecology Water Quality Criteria	
	Type:	comp	comp	comp	comp	grab		
	Date:	7/16-17	7/16-17	7/16-17	7/16-17	7/15		
	Time:	0730-0730	0730-0730	0730-0730	0730-0730	1730	Acute	Chronic
	Lab Lo	298182	298188	298188	298194	298195	Fresh	Fresh
		(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)		
Metals :		Total Recov.	Total Recov.	Total	Total Recov.	Total Recov.	(ug/L)	(ug/L)
Antimony		30 U	30 U	30 UJ	30 U	30 U	9,000 *	1,600 *
Arsenic		6.8 J	3.8 J	2.9	3.4 J	1.5 U		
Beryllium		1 U	1 U	1 U	1 U	1 U	130 *	5.3 *
Cadmium		2.17 J	0.75 J	0.75	0.34 J	0.10 J	2.1 +	0.7 +
Chromium		14	5 U	5.3	8.2	5 U		
	Hexavalent						16	11
	Trivalent						1204.9 +	143.6 +
Copper		57.5	11	14	9.5	4 U	10.03 +	6.96 +
Lead		9.9	2.9	2.9	1.1	1 U	31.78 +	1.238 +
Mercury (Total)		0.077		0.23	0.26	0.05 U	2.4	0.012
Nickel		10	10 U	10 U	10 U	10 U	924 +	103 +
Selenium		1.6 J	1.5 UJ	1.5 UJ	1.5 UJ	1.5 UJ	20	5.0
Silver		0.73	0.5 U	0.5 U	0.5 U	0.5 U	1.000 +	0.12
Thallium		1.5 UJ	1.5 UJ	1.5 UJ	1.5 UJ	1.5 UJ	1400 *	40 *
Zinc		202	72.4	71.3	37	4 U	71.4 +	64.7 +

Inf - Influent to the primary clarifier
ASBin - Influent to the ASB
Eff - Effluent sample
Trnsblk - Transfer blank sample
E - Ecology sample

U The analyte was not detected at or above the reported result.
J The analyte was positively identified. The associated numerical result is an estimate.
UJ The analyte was not detected at or above the reported estimated result.

Bold - analyte detected
[ ] - effluent concentration exceeds acute or chronic water quality criteria (dilution from mixing zone not considered).

* Insufficient data to develop criteria. Value presented is the LOEL - Lowest Observed Effect Level.

\+ Hardness dependent criteria (64 mg/L used - average of 1990-95 hardness data for Columbia River at Umatilla for flow of 200,000 cfs - 300,000 cfs. Flow during the inspection was 255,000 cfs July 17, 1996. Flow data at McNary dam from USGS, Pasco Washington office).

Table 7 - Pesticide/PCB Results and Comparison with Water Quality Criteria - Boise Cascade Wallula, July 1996.

	Location:	Inf-E	Prm-E	ASBin-E	Eff-E	EPA/Ecology Water Quality Criteria Summary	
	Type:	comp	comp	comp	comp		
	Date:	7/16-17	7/16-17	7/16-17	7/16-17	Acute	Chronic
	Time:	0730-0730	0730-0730	0730-0730	0730-0730	Fresh	Fresh
	Lab Log#:	298182	298185	298188	298194		
		(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
	Pesticide/PCB Compounds						
(Group)[1]							
q	alpha-BHC	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	100 *(q)	
q	beta-BHC	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	100 *(q)	
q	delta-BHC	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	100 *(q)	
q	gamma-BHC (Lindane)	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0	0.08
r	Heptachlor	0.003 UJ	0.003 UJ	0.004 UJ	0.003 UJ	0.52 (r)	0.0038 (r)
	Aldrin	0.003 UJ	0.003 UJ	0.004 UJ	0.003 UJ	2.5	0.0019
r	Heptachlor Epoxide	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	0.52 (r)	0.0038 (r)
s	Endosulfan I	0.003 UJ	0.003 UJ	0.036 UJ	0.034 UJ	0.22 (s)	0.056 (s)
	Dieldrin	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	2.5	0.0019
u	4,4'-DDE	0.003 UJ	0.003 UJ	0.004 UJ	0.003 U	1,050 *	0.001 (u)
t	Endrin	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	0.18 (t)	0.0023 (t)
s	Endosulfan II	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	0.22 (s)	0.056 (s)
u	4,4'-DDD	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	0.6 *	0.001 (u)
s	Endosulfan Sulfate	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	0.22 (s)	0.056 (s)
u	4,4'-DDT	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	1.1 (u)	0.001 (u)
	Methoxychlor	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ		0.03
t	Endrin Ketone	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	0.18 (t)	0.0023 (t)
	Toxaphene	0.97 UJ	0.99 UJ	1.1 UJ	1.0 UJ	0.73	0.0002
w	Aroclor-1016	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
w	Aroclor-1221	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
w	Aroclor-1232	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
w	Aroclor-1242	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
w	Aroclor-1248	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
w	Aroclor-1254	0.032 UJ	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
w	Aroclor-1260	**0.090 J**	0.033 UJ	0.036 UJ	0.034 UJ	2.0 (w)	0.014 (w)
t	Endrin Aldehyde	0.032 UJ	0.033 UJ	0.18 UJ	0.034 UJ	0.18 (t)	0.0023 (t)
v	Chlordane	0.32 UJ	0.33 UJ	0.36 UJ	0.34 UJ	2.4 (v)	0.0043 (v)

Inf - Influent
Prm - Primary clarifier effluent
SBin - ASB influent
Eff - Final effluent

E - Ecology sample
Bold - detected analyte

UJ - The analyte was not detected at or above the reported estimated result.
J - The analyte was positively identified. The associated numerical result is an estimate.

q Total BHCs
r Heptachlor
s Endosulfan
t Endrin
u DDT plus metabolites
v Total Chlordane
w Total Aroclors (PCBs)

Appendices

Appendix A - Sampling Procedures - Boise Cascade (Wallula), July 1996.

Ecology Isco composite samplers were set up to collect time-proportional samples with equal volumes of sample collected every 30 minutes for 24 hours. The samples were then divided into subsamples for analysis. The compositors were iced to preserve samples.

The composite samplers operated by Boise Cascade were set to collect time-proportionate samples with equal volume subsamples taken every 5-20 minutes. Recirculation loops are employed to provide fresh samples.

Ecology influent and effluent composite samples and Boise Cascade influent and effluent composite samples were split for both Ecology and Boise Cascade laboratory analysis. Sampler configurations and locations are summarized in Figure 2 and Table 1.

Appendix B - Sampling Schedule - Boise Cascade (Wallula), July 1996.

Location	Inf-1	Inf-2	Inf-E	Prm-1	Prm-2	Prm-E	ASBin-1	ASBin-2	ASB in-E
Type:	grab	grab	comp	grab	grab	comp	grab	grab	comp
Date:	7/16	7/16	7/16-17	7/16	7/16	7/16-17	7/16	7/16	7/16-17
Time:	0925	1420	0730-0730	0930	1425	0730-0730	0945	1455	0730-0730
Lab Log #:	298180	298181	298182	298183	298184	298185	298186	298187	298188
GENERAL CHEMISTRY									
Conductivity	E	E	E	E	E	E	E	E	E
Alkalkinity			E			E			E
Hardness			E			E			E
Color									E
Phenolics									
TS			E			E			E
TNVS			E			E			E
TSS	E	E	EB	E	E	EB	E	E	EB
TNVSS			E			E			E
BOD5			EB			EB			EB
BOD5(INH)			E			E			E
TOC (water)	E	E	E	E	E	E	E	E	E
NH3-N									E
NO2 + NO3-N									E
Total-P									E
Oil and Grease (water)									
F-Coliform MPN									
% Klebsiella (KES)									
Cyanide (wk & dis)									
METALS									
PP Metals (total recoverable)			E						E
PP Metals (total)									E
FIELD OBSERVATIONS									
Temperature	E	E		E	E		E	E	
Temp-Cooled			E			E			E
pH	E	E	E	E	E	E	E	E	E
Conductivity	E	E	E	E	E	E	E	E	E

Inf - influent to primary clarifier
Prm - primary clarifier effluent
ASBin - Aerated Stabilization Basin influent
ASBef - Aerated Stabilization Basin effluent
grab - grab sample
comp - composite sample
-E- Ecology sample
- B - Boise Cascade sample
E - Ecology analysis
B - Boise Cascade analysis

Appendix B - (cont'd) - Boise Cascade Wallula, July 1996.

Location:	ASBef-1	ASBef-2	ASBef-E	Eff-1	Eff-2	Eff-E	Trnsblnk	Eff-B	Eff-3	Eff-4
Type:	grab	grab	comp	grab	grab	comp	grab	comp	grab	grab
Date:	7/16	7/16	7/16-17	7/16	7/16	7/16-17	7/15	7/16-17	7/17	7/17
Time:	0955	1455	0730-0730	0850	1345	0730-0730	1810	0730-0730	0805	1020
Lab Log #:	298189	298190	298191	298192	298193	298194	298195	298196	298197	298198
GENERAL CHEMISTRY										
Conductivity	E	E	E	E	E	E		E		
Alkalinity			E			E				
Hardness			E			E		E		
Color			E			E				
Phenolics						E				
TS			E			E				
TNVS			E			E				
TSS	E	E	EB	E	E	E		EB	E	E
TNVSS			E			E				
BOD5			EB			E		EB		
BOD5 (INH)			E			E		E		
TOC (water)	E	E	E	E	E	E		E		
NH3-N			E			E				
NO2 + NO3-N			E			E				
Total P			E			E				
Oil and Grease (water)	E	E		E	E					
F-Coliform MPN									E	E
%Klebsiella (KES)									E	E
Cyanide (wk & dis)	E	E		E	E					
METALS										
PP Metals (total recoverable)						E				
PP Metals (total)										
FIELD OBSERVATIONS										
Temperature	E	E		E	E				E	E
Temp-Cooled			E			E		E		
pH	E	E	E	E	E	E		E	E	E
Conductifvity	E	E	E	E	E	E		E	E	E

Appendix C - Ecology Analytical Methods - Boise Cascade Wallula, July 1996.

Laboratory Analysis	Method Used for Ecology Analysis	Laboratory Performing Analysis
Conductivity	EPA, Revised 1983: 120.1	Manchester Laboratory
Alkalinity	EPA, Revised 1983: 310.1	Manchester Laboratory
Hardness	EPA, Revised 1983: 130.2	Manchester Laboratory
Color	EPA, Revised 1983: 110.1	Manchester Laboratory
TS	EPA, Revised 1983: 160.3	Manchester Laboratory
TNVS	EPA, Revised 1983: 160.3	Manchester Laboratory
TSS	EPA, Revised 1983: 160.2	Manchester Laboratory
TNVSS	EPA, Revised 1983: 160.2	Manchester Laboratory
BOD5	EPA, Revised 1983: 405.1	Manchester Laboratory
BOD INH	EPA, Revised 1983: 405.1	Manchester Laboratory
TOC (water)	EPA, Revised 1983: 415.1	Manchester Laboratory
Total Kjeldahl N	EPA, Revised 1983: 351.3	Manchester Laboratory
NH3-N	EPA, Revised 1983: 350.1	Manchester Laboratory
NO2 + NO3-N	EPA, Revised 1983: 353.2	Manchester Laboratory
Total-P	EPA, Revised 1983: 365.3	Manchester Laboratory
Oil and Grease (water)	EPA, Revised 1983: 413.1	Manchester Laboratory
F-Coliform MPN	APHA, 1989: 9221C.	Manchester Laboratory
% Klebsiella (KES)	APHA, 1989: 9222F.	Manchester Laboratory
Cyanide (wk & dis)	APHA, 1989: 4500-CNI.	Manchester Laboratory
Pest/PCB (water)	EPA, 1986: 8081	Manchester Laboratory
Phenolics Total(water)	EPA, Revised 1983: 420.2	Manchester Laboratory
PP Metals (water)	EPA, Revised 1983: 200-299	Manchester Laboratory

METHOD BIBLIOGRAPHY

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Appendix D - Quality Assurance/Quality Control (QA/QC) - Boise Cascade (Wallula), July 1996.

SAMPLING QA/QC

Ecology quality assurance procedures for sampling include cleaning of the sampling equipment for priority pollutant analyses prior to the inspection to prevent sample contamination (Appendix E). Chain-of-custody procedures were followed to assure the security of the samples (Ecology, 1994).

LABORATORY QA/QC

General Chemistry Analysis

All MF fecal coliform samples were qualified with an "X" indicating estimated results. An abundance of background growth made it difficult to read the plates.

All color samples were qualified with a "J" indicating an estimated result. Due to their high color and high turbidity, the samples had to be filtered and diluted. Therefore, these results are considered true color rather than apparent color. Also, according to Standard Methods 2120B, "The color value of water is extremely pH-dependent and invariably increases as the pH of the water is raised." The laboratory used estimates for pH as measured in the laboratory rather than the pH determined in the field.

Metals Analysis

Data quality for this project is generally good, except for low recoveries of thallium by GFAA from the total prep - and thallium, selenium, and cadmium by GFAA from the total recoverable prep. Selenium recovery in both total recoverable and total preps shows poor precision. Thallium recovery precision is low only with total recoverable samples. Antimony recovery from one of the spiked total samples was below the 75% limit. No other significant quality assurance issues are noted with the data.

Pesticide/PCBs

All surrogate recoveries for the samples were very low. Recoveries ranged from 3% to 36%. Surrogate recoveries for the blanks ranged from 55% to 106% and were within acceptable limits. This pattern indicates significant matrix problems during extraction. A discussion with the extraction personnel indicated that the samples were prone to emulsification during extraction and centrifugation was required to separate the organic phase from the sample matrix. From the surrogate data it is apparent that poor separation was achieved and consequently a significant amount of the surrogates and target analytes may have been retained by the sample matrix.

Recoveries for dibutylchlorendate are reported as 0%. The combination of dilutions due to the sample matrix and the low surrogate recoveries resulted in a failure to detect dibutylchlorendate in the samples. All sample results were "J" qualified because of surrogate recoveries.

LABORATORY AUDIT

The Boise Cascade (Wallula) laboratory was accredited on December 18, 1991. The accreditation expires on April 27, 1996.

Appendix E - Priority Pollutant Cleaning Procedures - Boise Cascade (Wallula), July 1996.

PRIORITY POLLUTANT SAMPLING EQUIPMENT CLEANING PROCEDURES

1. Wash with laboratory detergent
2. Rinse several times with tap water
3. Rinse with 10% HNO_3 solution
4. Rinse three (3) times with distilled/deionized water
5. Rinse with high purity acetone
6. Rinse with high purity hexane
7. Rinse with high purity acetone
8. Allow to dry and seal with aluminum foil

Appendix F - Glossary of Terms - Boise Cascade (Wallula), July 1996.

ASB - aerated stabilization basin
B - Boise Cascade (Wallula)
B.C. - Boise Cascade (Wallula)
BOD_5 - five day biochemical oxygen demand
comp - composite sample
est. - estimated concentration
E - Department of Ecology
Eff - effluent
EPA - United States Environmental Protection Agency
F-coli - fecal coliform bacteria
g - gram
grab-grab sample
Inf - influent
MF - membrane filter
MPN - most probable number
mg - milligram
mg/L - milligram per liter
NPDES - National Pollutant Discharge Elimination System
pH - $-\log_{10}$ (hydrogen ion concentration)
QA - quality assurance
QC - quality control
TIC - tentatively identified compound
TNVS - total nonvolatile solids
TNVSS - total nonvolatile suspended solids
TOC - total organic carbon
TS - total solids
TSS - total suspended solids
µg - microgram