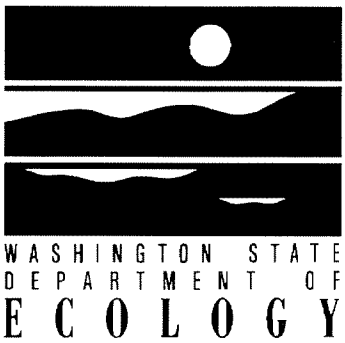

GEORGIA-PACIFIC CORPORATION (BELLINGHAM) APRIL 1993, CLASS II INSPECTION

Water Body No. WA-01-0080
94-54

April 1994

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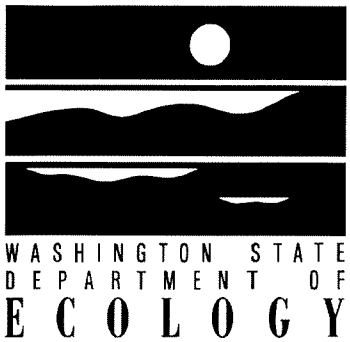

GEORGIA-PACIFIC CORPORATION (BELLINGHAM) APRIL 1993, CLASS II INSPECTION

By
Steven Golding

Environmental Investigations and Laboratory Services Program
Toxics, Compliance and Ground Water Investigations Section
Olympia, Washington 98504-7710

April 1994

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ABSTRACT

A Class II Inspection was conducted at the Georgia-Pacific Corporation (GP) pulp and paper mill in Bellingham, Washington on April 13-15, 1993, with related sediment sampling conducted April 27, 1993. The effluent met NPDES permit limits for BOD_5, TSS, and pH during the inspection. Total mercury was within the daily limit but higher than the monthly average limit. Copper was found at a concentration over four times EPA acute marine water quality criteria. Eight organic compounds were detected in the effluent VOA, BNA, and Pesticide/PCB scans. Those detected were at concentrations less than EPA marine water quality criteria. 2,3,7,8-TCDD and 2,3,7,8-TCDF were not detected in the effluent sample. *Ceriodaphnia dubia* and Pacific oyster demonstrated chronic toxicity in the mill effluent.

None of the VOAs or BNAs analyzed in the sediments were found in concentrations higher than Marine Sediment Quality Standards. Mercury was found in concentrations up to 74% above criteria. Dioxin congeners were found in the composite sediment sample at concentrations of 911 pg/g-dry wt or less. Bioassay sensitivity to sediment samples was variable. *Rhepoxinius abronius* in Sed-1 and *Neanthes* in Sed-2 showed a biologically significant response. *Mytilus sp.* demonstrated sensitivity in Sed-1.

SUMMARY

Wastewater

GP uses water meter readings to estimate wastewater flow. Ecology was unable to verify GP flow records. GP has stated its plans to calibrate and use its effluent in-line meter.

Most permit parameters were within permit limits during the inspection. **Total mercury was within the daily maximum limit but higher than the monthly average limit.** GP reported effluent mercury concentrations as undetected below a quantitation limit of 1.0 ug/L. This limit is too high to assess compliance.

The GP clearwater sample (ClWtr-G) yielded a total mercury concentration of 2 ug/L, seven times Ecology's results.

TSS concentrations in the GP influent sample were high compared with the Ecology grab and composite samples.

All VOA and BNA organics in the effluent for which there are EPA water quality criteria were at concentrations well below the criteria. No pesticide/PCB compounds were found in the effluent. Chloroform (1400; 1500 ug/L) was the VOA found in the influent in the highest concentration. All other VOA's in the influent were found in concentrations of 37 ug/L or lower. Effluent chromium and mercury concentrations were above EPA chronic marine water criteria. **Copper was found in concentrations over four times above EPA acute criteria.** A number of TICs were found in the influent and effluent.

Nine guaiacols/catechols and five resin acids/fatty acids were found in the effluent. Five resin acids/fatty acids were found in the effluent. Available toxicity data suggest no effluent toxicity due to guaiacols/catechols and resin acids/fatty acids.

Five dioxin and two furan congeners were detected in the influent in concentrations of 2200 pg/L or less. No dioxin/furan congeners were found in the effluent sample.

In bioassay tests, *Daphnia magna*, rainbow trout and fathead minnow showed no acute toxicity to the outfall 009 effluent. *Ceriodaphnia dubia* demonstrated chronic toxicity. Pacific oyster (*Crassostrea gigas*) larvae showed a significant response to a survival test. Considerable abnormality, comparable to that of typical pulp mill effluents, was evident for Pacific oyster larvae.

Sediment

The four sediment samples had similar physical characteristics.

None of the VOA or BNA compounds in the sediment samples were in concentrations higher than marine sediment quality standards criteria. **Mercury concentrations were higher than Marine Sediment Quality Standards criteria at all three sample locations near the diffuser.** The Sed-1 sample had the highest concentration (0.713 mg/kg dr-wt), 74% above criteria. A number of TICs were found in the sediment samples at concentrations up to 19,100 ug/kg-dry wt (est.).

Dioxin congeners were found in the composite sediment sample at concentrations of up to 911 pg/g.

Bioassay sensitivity to sediment samples was variable. *Rhepoxinius abronius* in Sed-1 and *Neanthes* in Sed-2 each showed a response. *Mytilus sp.* in Sed-1 showed 65% survival. Abnormality for *Mytilus sp.* in Sed-1 was considerably greater than in the other sediment samples.

RECOMMENDATIONS

Flow Measurements

- Flows should be measured in accordance with the permit. A properly installed, calibrated, and maintained primary flow measurement device should be used.

NPDES Permit Limits Comparison/General Chemistry

- GP should report results to 0.17 ug/L or less for total mercury to properly evaluate permit compliance at the inspection flow rate.

QA/QC

- Particular attention should be paid to TSS analyses during the next QA performance evaluation.

- If GP plans to use the ClWtr-G sampler to collect samples for mercury analysis, it is suggested that GP run a transfer blank through the sampler to assure the sampler is not contaminating the sampler.

Split Sample Results

- Causes of high influent TSS in the GP sample should be investigated.

INTRODUCTION

A Class II Inspection was conducted at the Georgia-Pacific Corporation (GP) pulp and paper mill in Bellingham, Washington, on April 13-15, 1993 (Figure 1). Conducting the inspection were Mark Dirkx of the Ecology Industrial Section and Steven Golding of the Toxics, Compliance, and Groundwater Investigations Section. John Anderson, Environmental Control Director, represented GP. Dick McLeod, Lab Assistant with GP, assisted during the inspection. Also, sediments were collected in Bellingham Bay near the plant outfall on April 27, 1993. Bernie Strong, Guy Hoyle-Dodson and Steven Golding collected the sediment samples. Scott Bertram of ENSR Consultants assisted for GP in the collection of sediments.

A glossary of terms used in this report appears in Appendix I.

FACILITY DESCRIPTION

GP operates a mill in Bellingham using the sulfite process to produce bleached pulp and paper products. The mill produces a daily average of 716 tons of pulp. Sulfite pulp accounts for 674 tons per day and 42 tons per day is chemi-mechanical pulp. Chlorine used by the mill in bleaching operations is produced on site by a mercury cell chlor-alkali plant.

Wastewater from the debarking plant, bleach plant, pulp dryer and tissue plant is treated by a primary clarifier. The primary clarifier effluent is then pumped to the aerated lagoon for secondary treatment (Figure 2). Wastewater from the lignin plant, chlorine plant, alcohol plant, bleach plant, and filter plant are also pumped to the aerated lagoon. Treated effluent discharges to outer Bellingham Bay through an 8,000 foot outfall line with a 2,000 foot diffuser. The discharge is regulated by National Pollutant Discharge Elimination System (NPDES) Permit No. WA000109-1. The permit was issued May 15, 1991, and expires May 15, 1996.

OBJECTIVES

Objectives of the inspection included:

1. Assess effluent compliance with NPDES permit limits.

2. Verify NPDES permit self monitoring. Split samples with the permittee to determine the comparability of sampling methods and laboratory results.

3. Determine total mercury concentrations in the mercury recovery unit effluent.

4. Assess effluent toxicity with bioassays and pollutant scans.

5. Assess impacts to receiving water sediments with chemical analyses and bioassays.

PROCEDURES

Ecology collected composite and grab samples of influent to the aerated lagoon. These consisted of process water from the primary clarifier and the alcohol plant (Inf), and non-contact "clear water" from the alcohol and chlor-alkali plants (ClWtr). Wastewater from the mercury recovery unit (MRU), which contributed to the "clear water," was also sampled. Composite and grab samples of effluent from the aerated lagoon (Eff) were also collected.

Georgia-Pacific also collected influent, clear water and effluent composite samples (Figure 2, Table 1). A more detailed description of Ecology and GP sampling procedures appears in Appendix A.

Sediment samples were collected from Bellingham Bay by Ecology (Figure 1, Table 1).

Wastewater and sediment samples collected, sampling times, and parameters analyzed are summarized in Appendix B. Ecology analytical methods and laboratories performing the analyses are summarized in Appendix C.

For a discussion of QA/QC including an audit of the permittee's laboratory, see Appendix D. Priority pollutant cleaning procedures appear in Appendix E.

RESULTS AND DISCUSSION

Wastewater

Flow Measurements

GP uses meter readings for water use to represent flow. Ecology was unable to verify wastewater flow values provided by GP.

Flow should be measured in accordance with the permit. **A properly installed, calibrated, and maintained flow measurement device should be used.**

There is an in-line outflow doppler meter that has not been recently calibrated. GP has stated its plans to have the outflow meter calibrated and to use it as a primary flow measuring device when ENCOGEN, the new cogeneration plant comes online.

NPDES Permit Limits Compliance/General Chemistry

Total mercury was within the daily maximum limit but higher than the monthly average limit based on the Ecology laboratory estimated concentration (Table 3). Georgia Pacific reported an effluent mercury concentration of <1 ug/L. Reporting this quantitation limit does allow compliance to be assessed. At the inspection flow rate, a mercury concentration of

or less is necessary to meet the daily maximum limit, and 0.17 ug/L or less is necessary to evaluate the monthly average limit. A number of laboratories have detection limits of 0.1 ug/L and quantitation limits of 1.0 ug/L. These laboratories are able to report estimated mercury concentrations less than 1.0 ug/L (Knox, 1993). **Georgia Pacific should report estimated total mercury at concentrations low enough so that compliance can be evaluated**.

General chemistry data showed 92% removal of BOD_5 (Table 2). Total mercury loading during the inspection (0.084 lbs/day est.) was higher than the permitted monthly average (0.05 lbs/day) but lower than the permitted maximum daily loading (0.11 lbs/day). Permit parameters were within limits during the inspection (Table 3). BOD_5 and TSS met all permit requirements. The pH was within the permitted range.

TSS increased during treatment from 46 mg/L to 72 mg/L. This is likely a result of microbial growth resulting from the high influent BOD_5 of 512 mg/L. The difference in influent BOD_5 and TSS concentrations indicates the BOD_5 was dissolved rather than associated with suspended solids. Influent total volatile solids of 1290 mg/L compared with influent suspended volatile solids of 29 mg/L.

Colorimetric field analyses for chlorine and sulfide could not be performed because the influent and effluent were too darkly colored.

Data qualifiers are defined in Appendix J.

Split Sample Results

Comparisons between Ecology and GP samples and between Ecology and GP analyses show close agreement. Georgia-Pacific TSS analyses were consistently higher than Ecology's. The difference was significant but results were within expected precision (Table 4). Both Ecology and GP analyses show that the GP influent sample had approximately twice the TSS concentration as the Ecology sample. The Ecology result appears to be more representative. There was also disagreement in the results of clear water mercury analyses.

Priority Pollutant Scans

Several VOA organics were detected in the samples collected (Table 5). The compound detected in the highest concentration in the influent was chloroform (1400; 1500 ug/L). All other VOA organics in the influent were in concentrations of 37 ug/L (est.) or lower.

Chloroform (32 ug/L; 29 ug/L), acetone (5.0 ug/L est; 6.9 ug/L est.) and methylene chloride (1.3 ug/L est.) were the VOA compounds found in the effluent. Because acetone and methylene chloride are used for cleaning of sampling apparatus and in the laboratory, their concentrations may not represent GP wastewater concentrations.

All VOA organics in the effluent for which there were EPA water quality criteria were found well below the criteria (Table 5).

Eight BNA organics were found in the influent. The compound found in the highest concentration was 2,4,6-Trichlorophenol (28.8 ug/L).

Of the five BNA compounds found in the effluent, 4-methylphenol (2.3 ug/L) was found in the highest concentration. All BNA compounds in the effluent for which there were EPA water quality criteria were found in concentrations well below the criteria.

No pesticide/PCB compounds were found in the effluent.

Seven metals were detected in the influent. Chromium (184 ug/L) and zinc (79.1 ug/L) were found in the highest concentrations.

Seven metals were detected in the effluent. **Copper was found in concentrations over four times the EPA acute marine water quality criterion**. Arsenic, cadmium, lead, and zinc were found in concentrations below acute and chronic EPA water quality criteria. Chromium was found in concentrations below EPA acute marine water criteria for both the hexavalent and trivalent forms. Chromium concentrations were higher than EPA chronic marine water criteria for hexavalent chromium, although it is unlikely the chromium was in the hexavalent form. Mercury effluent estimated concentrations were roughly one tenth of the acute criterion and ten times chronic criterion.

Five metals were detected in the clear water from the MRU. Three of these metals exceeded the concentrations of metals detected in the effluent: copper (47.2 ug/L), mercury (9.20 ug/L est.), and nickel (17 ug/L est.). The duplicate Ecology analysis for mercury (8.92 ug/L) was in close agreement.

A complete list of parameters analyzed and analytical results is included in Appendix F.

A number of Tentatively Identified Compounds (TICs) were found in the influent samples at concentrations up to 1620 ug/L (est.). TICs were found in the effluent samples at concentrations up to 22.6 ug/L (est.). Appendix H summarizes TICs found in GP wastewater and in sediments.

Guaiacols/Catechols & Resin Acids/Fatty Acids

Fifteen guaiacols/catechols were detected in the influent (Table 6). Of these, guaiacol (2-methoxy-phenol; 138 ug/L est.) was present in the highest concentration. All other guaiacols/catechols were found in concentrations less than 25 ug/L.

Nine guaiacols/catechols were detected in the effluent. Tetrachlorocatechol (10.1 ug/L) was found in the highest concentration. This concentration is well below the salmonid LC_{50} (320 ug/L) for tetrachlorocatechol (Verschueren, 1983).

Available toxicity data for 2,4-dichlorophenol; 3,4,5,6-tetrachloguaiacol; 3,4,5-trichloroguaiacol; and 2,3,5-trichlorophenol indicate LC_{50}s of 320 ug/L or greater for a number of fish species (Verschueren, 1983). The concentrations of guaiacol/catechols found in the effluent are well below the LC_{50}s.

The guaiacol/catechol found in the next highest concentration was 3,4,5-trichloroguaiacol (3.5 ug/L est.). An LC_{50} of 750 ug/L for juvenile rainbow trout (*Oncorhynchus mykiss*) has been found for tetrachloroguaiacol (Verschueren, 1983).

Nine resin acid/fatty acids were detected in the influent. Of these, 12-Cl-dehydroabietic acid (12.2 ug/L) was present in the highest concentration. Five resin acids/fatty acids were found in the effluent. Of these, octadecanoic acid (2.9 ug/L est.) was found in the highest concentration.

Available toxicity data for oleic acid, octadecanoic acid, dehydroabietic acid, and dichlorodehydroabietic acid indicate LC_{50}s of 600 ug/L or greater for a number of fish species (Verschueren, 1983). The concentrations of resin acid/fatty acids found in the effluent are well below the LC_{50}s.

Dioxin/Furan

Five dioxin and two furan congeners were detected in the influent in concentrations of 2200 pg/L or less (Table 7). 2,3,7,8-TCDF was detected in the influent at a concentration of 182 pg/L while 2,3,7,8-TCDD was not detected (<8.3 pg/L est.). The total for dioxin compounds detected in the influent was 52,260 pg/L. Total furans were below detection limits.

No dioxin/furan tetra-octa congeners were found in the effluent sample. Total HxCDF was 5.9 pg/L.

Bioassays

Three of the five organisms tested showed no toxicity to outfall 009 effluent (Table 8). *Daphnia magna*, fathead minnow and rainbow trout survival tests revealed no acute toxicity.

The *Ceriodaphnia dubia* chronic test showed no toxicity for survival but reduced reproduction (NOEC = 12.5%).

Pacific oyster (*Crassostrea gigas*) larvae showed significant mortality with an LC_{50} of 54.8% effluent and an NOEC of 35% effluent. Considerable abnormality was evident for pacific oyster larvae with an NOEC of less than 4.38% effluent. NOEC's for pacific oyster larvae exposed to pulp mill effluent range from 1% to 20% and are typically 3% effluent (McCall, 1993).

Sediment

General Chemistry/Physical Characteristics

The four sediment samples had similar physical characteristics (Table 9). The samples consisted of 46% to 51% silt and 41% to 50% clay. Percent solids ranged from 33.1 (est.) to 40.8. Percent volatile solids ranged from 6.8 to 8.9 (est.). Organic carbon content measured as percent TOC varied from 3.2 to 4.0.

Priority Pollutant Scans

Of the eleven metals detected in the sediment samples, mercury was found in concentrations above Marine Sediment Quality Standards criteria.

Mercury concentrations were 74% above criteria for Sed-1 (0.713 mg/kg dr-wt) near the upstream end of the diffuser, decreasing to 9% above criteria at Sed-3 near the downstream end of the diffuser. The mercury estimated concentration for Sed-4, the background station, was 43% below criteria.

Five VOA compounds were found in the sediments (Table 10). VOA compounds were found in the greatest number and in the highest concentrations in the Sed-3 sample (near the downstream end of the diffuser). Of the VOA compounds found, Acetone (52 ug/kg-dr est.) was found in the highest concentration. Marine sediment quality standards criteria are not available for any of the VOA compounds found (Ecology, 1991).

Twelve BNA compounds were found in the sediment composite sample which consisted of equal volumes of Sed-1, Sed-2, and Sed-3. None were found in concentrations above marine sediment quality standards criteria.

Metals concentrations were similar at the three stations near the diffuser and the background station. Mercury and cadmium concentrations showed the most variability. Mercury and cadmium concentrations in Sed-1 (near the upstream end of the diffuser) were highest at concentrations approximately two times those of background concentrations.

A complete list of parameters analyzed and analytical results is included in Appendix G.

A number of Tentatively Identified Compounds (TICs) were found in the sediment samples at concentrations up to 19,100 ug/kg (est.). Appendix H summarizes TICs found in GP sediments.

Dioxin/Furan

2,3,7,8-TCDF was detected in the sediment composite sample at a concentration of 70.9 pg/g-dry wt (Table 7). The congener 2,3,7,8-TCDD was not detected (<1.7 pg/g-dry wt). Dioxin and furan

congeners were found in the composite sediment sample at concentrations of 911 pg/g-dry wt or less (Table 7). Total dioxins detected were 11,450 pg/g. Total furans were less than detection limits.

Bioassays

Bioassay sensitivity to sediment samples was variable (Table 11). *Rhepoxinius abronius* (in Sed-1) and *Neanthes* (in Sed-2) each showed a biologically significant response to one sample near the outfall diffuser. Survival for both organisms was 76%. This is slightly lower than 80% survival, the level at which a response is seldom considered biologically significant (Stinson, 1993).

Mytilus sp. showed mortality in two samples collected near the outfall. Both samples showed less than 80% survival. Tests showed 65.1% survival for Sed-1 and 76% survival for Sed-2. While survival for *Mytilus sp.* in Sed-2 was slightly below the 80% criterion for biological significance, the low control survival (82%) indicates that the mortality shown in Sed-2 may not be significant. Mortality was close to the control mortality for the background sample and for the sample taken near the downstream end of the diffuser.

Abnormality for *Mytilus sp.* was significant in Sed-1 (26.4%), the sample taken near the upstream end of the outfall. That was also the sample with the highest mortality.

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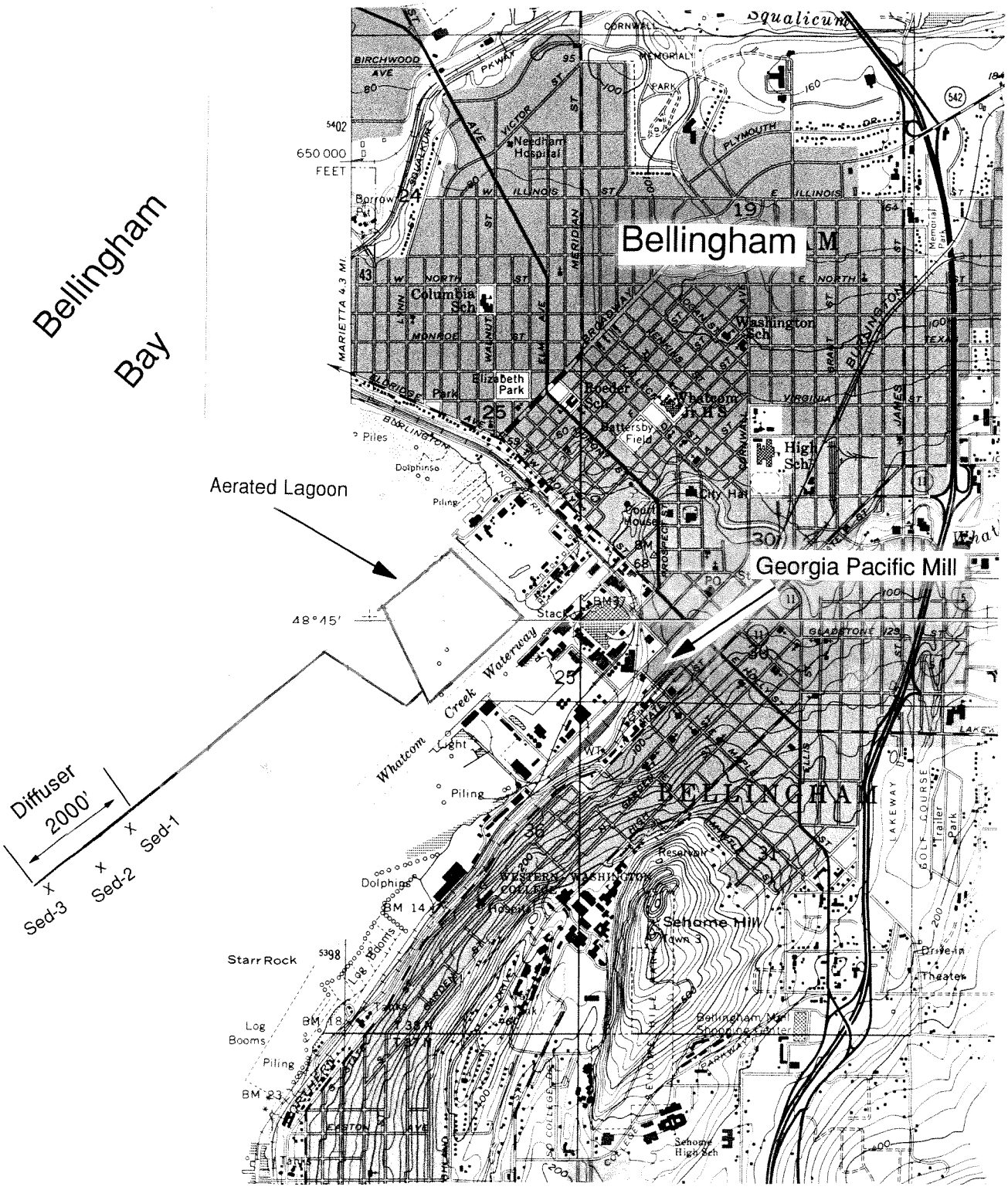

Figure 1 – Location Map – Georgia–Pacific (Bellingham), April 1993.

Figure 2 - Flow Schematic - Georgia Pacific (Bellingham), April 1993.

(Diagram from Georgia Pacific)

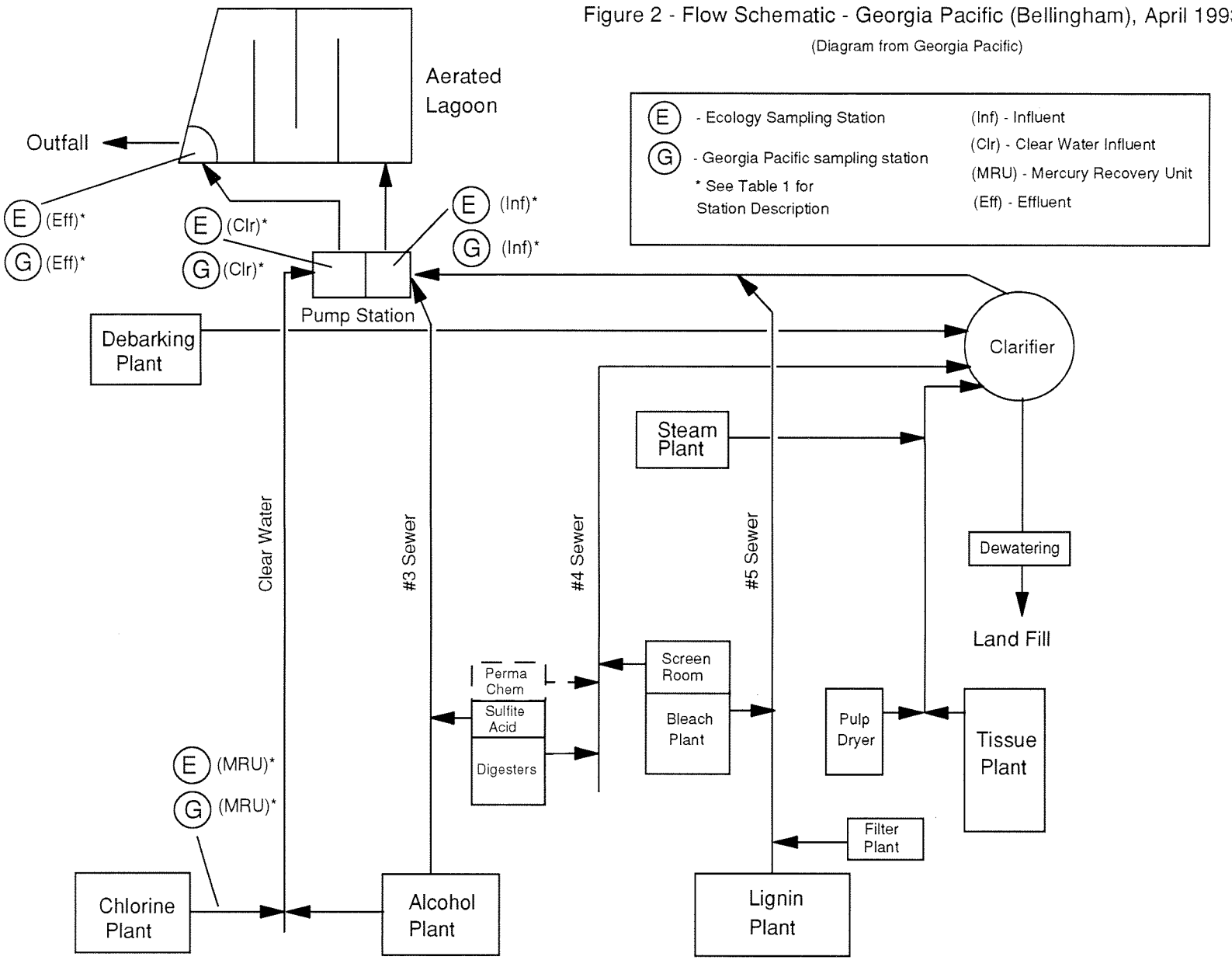

Table 1 - Sampling Station Descriptions - Georgia-Pacific (Bellingham), April 1993.

Sampling Locations

Influent (Inf)

Process water influent to the aerated lagoon. Ecology grab samples and GP grab and composite samples were collected from the tap on the downstream side of the influent pumps. Ecology composite samples were taken through the grate over the process water sump. The hose inlets were placed three feet below surface in an area that appeared to be well mixed. Tubing from the two compositers was taped to keep the strainers together.

Clear water influent (ClWtr)

Non-contact cooling water from the alcohol and chlor-alkali plants. Ecology grab samples and GP grab and composite samples were collected from tap on the downstream side of the clear water influent pumps. Ecology composite samples were taken through the grate over the clear water sump. The hose inlets were placed three feet below the surface in a well mixed area. Tubing from the two compositers was taped to keep the strainers together.

Mercury Recovery Unit (MRU)

Process water from the mercury recovery unit of the chlorine plant. Composite and grab samples were collected from a tap in a permanently installed sampling tank. A tap from the tank supplies GP's continuous mercury monitor.

Effluent (Eff-E)

Effluent from the aerated lagoon. Ecology grab samples and GP grab and composite samples were collected from a tap at the dock pump station. Flow is maintained for the tap by a continuous pump. The sample is pumped from the entrance of the outfall pipe. Ecology composite samples were taken through a grate on the deck of the dock pump station. The hose inlets were placed three feet from the discharge inlet pipe and three feet below the surface in a well mixed area. Tubing from the two compositers was taped to keep the strainers together.

Sed-1 (48°44'06"N 122°30'59"W)

Sediment sample collected 100 feet along the diffuser from the upstream end, 50 feet out (southeast) from the diffuser.

Sed-2 (48°44'14"N 122°30'41"W)

Sediment sample collected at mid diffuser, 250 feet out (southeast) from the diffuser.

Sed-3 (48°44'23"N 122°30'35"W)

Sediment sample collected 100 feet along the diffuser from the downstream end of the diffuser, 50 feet out (southeast) from the diffuser.

Sed-4 (48°44'46"N 122°31'22"W)

Background station. Sediment sample collected approximately 2600 feet northwest of diffuser.

Sed-Comp

Composite sample consisting of equal portions of Sed-1, Sed-2 and Sed-3 samples.

Table 2 – General Chemistry Results – Georgia–Pacific (Bellingham), April 1993.

Parameter	Location:	Trns Blnk	Inf–E	Inf–G	Inf–1	Inf–2	ClWtr–E	ClWtr	MRU–E	MRU–ED	MRU	Eff–E	Eff–G	Eff–GC
	Type:	grab	comp	comp	grab	grab	comp	grab	comp	comp	grab	comp	comp	grab–comp
	Date:	4/13	4/14–15	4/14–15	4/14	4/14	4/14–15	4/14	4/14–15	4/14–15	4/14	4/14–15	4/14–15	4/14
	Time:	1630	0300–0300	0300–0300	0930	1405	0300–0300	0940	0900–0900	0900–0900	1240	0300–0300	0300–0300	*
	Lab Log #:	168132	168133	168134	168135	168136	168137	168138	168139	168141	168152	168142	168143	168144
GENERAL CHEMISTRY														
Conductivity (umhos/cm)			2530	2630								2880		2750
Alkalinity (mg/L CaCO3)			158									223		
Hardness (mg/L CaCO3)			1020J									759J		739J
TS (mg/L)			3020	3130								2590	2580	
TNVS (mg/L)			1730	1800								1810	1790	
TSS (mg/L)			46	92	50	48	1		1U			72	90	70
TNVSS (mg/L)			17	45								13	13	
% Solids														
% Volatile Solids														
BOD5 (mg/L)			512	474								39	37	
COD (mg/L)			1900						150			820	750	
TOC (water mg/L)			606		664	610	3.3		2.2			323	308	
TOC (soil/sed %dry wt)														
NH3–N (mg/L)			11.3	8.62								7.89	7.51	
NO2+NO3–N (mg/L)			0.165J	0.147J								0.087J	0.228J	
Total–P (mg/L)			5.36	5.85								4.03	4.10	
F–Coliform MF (#/100mL)														
% Klebsiella (KES)														
Cyanide total (mg/L)					0.004	0.002U								
Cyanide (wk & dis mg/L)					0.005	0.004								
Chlorate (ug/L)			19									0.5		
AOX (mg/L)			54									21		
Phenolics total (ug/L)			133									7.6		
FIELD OBSERVATIONS														
Temperature (C)					22.1			13.3			19.5			
Temp–cooled (C)			5.3				1.5		4.7	4.7		4.6		
pH			6.34		6.0	6.1	6.5	6.6	3.3	3.3	3.4	7.6		
Conductivity (umhos/cm)			2670			2650	3380	3.33	>20000	>20000	>20000	2920		
Chlorine (mg/L)														
Sulfide (mg/L)								0.2						

* grab composite sample collected as two equal volumes at 1110 and 1530 on 4/14.

Table 2 – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Parameter	Location:	Eff–1	Eff–2	Eff–3	Sed–1	Sed–2	Sed–3	Sed–4	Sed–Comp
	Type:	grab	grab	grab	grab	grab	grab	grab	grab–comp
	Date:	4/14	4/14	4/15	4/27	4/27	4/27	4/27	4/27
	Time:	1315	1500	1630	1245	1540	1400	1715	1245–1715
	Lab Log #:	168145	168146	168153	168147	168148	168149	168150	168151
GENERAL CHEMISTRY									
Conductivity (umhos/cm)									
Alkalinity (mg/L CaCO3)									
Hardness (mg/L CaCO3)									
TS (mg/L)									
TNVS (mg/L)									
TSS (mg/L)		62	58						
TNVSS (mg/L)									
% Solids					33.1J	34.0	35.5	40.8	34.2
% Volatile Solids					8.9J	8.7	8.1	6.8	9.3
BOD5 (mg/L)									
COD (mg/L)									
TOC (water mg/L)		322	336						
TOC (soil/sed %dry wt)					3.2	4.0	3.6	3.8	2.9
NH3–N (mg/L)									
NO2+NO3–N (mg/L)									
Total–P (mg/L)									
F–Coliform MF (#/100mL)				31					
% Klebsiella (KES)				36					
Cyanide total (mg/L)		<0.002	<0.002						
Cyanide (wk & dis mg/L)		<0.002	<0.002						
Chlorate (ug/L)									
AOX (mg/L)									
Phenolics total (ug/L)									
FIELD OBSERVATIONS									
Temperature (C)		21.5	22.0						
Temp–cooled (C)									
pH		7.3	7.0						
Conductivity (umhos/cm)		2900	3040						
Chlorine (mg/L)									
Sulfide (mg/L)									

TrnsBlnk – transfer blank
Inf – plant influent
ClWtr – clear water influent
MRU – mercury recovery unit wastewater

E – Ecology sample
ED – Ecology duplicate sample
grab – grab sample
comp – composite sample

Sed – sediment sample
G – Georgia Pacific sample
Eff – effluent
GC – grab composite sample

Table 3 – NPDES Permit Limits and Inspection Results – Georgia–Pacific (Bellingham), April 1993.

Outfall 009

Parameter	NPDES Limits		Ecology Inspection Results
	Monthly Avg.	Daily Max.	
BOD5 (lbs/day)	24,736	47,394	11,300
TSS (lbs/day)	38,991	72,572	20,900
Total mercury (lbs/day)	0.05	0.11	0.084 (est.)
pH	5.0 to 9.0		7.3; 7.0
AOX (lbs/day)*	--	--	6,100
Flow (MGD)*	--	--	34.8**
Temperature (C)*	--	--	21.5

* monitoring required by permit

** determined by Georgia Pacific based on water use for 4/14/93.

Table 4 – Split Sample Results Comparison – Georgia–Pacific (Bellingham), April 1993.

Location:	ClWtr–E	ClWtr–G	Inf–1	Inf–2	Inf–E	Inf–G	MRU–E	MRU–G	Eff–1	Eff–2	Eff–E	Eff–G
Type:	comp	comp	grab	grab	comp	comp	comp	comp	grab	grab	comp	comp
Date:	4/14–15	4/14–15	4/14	4/14	4/14–15	4/14–15	4/14–15	4/14–15	4/14	4/14	4/14–15	4/14–15
Time:	0300–0300	0300–0300	0930	1405	0300–0300	0300–0300	0900–0900	continuous	1315	1500	0300–0300	0300–0300
Lab Log #:	168137		168135	168136	168133	168134	168139		168145	168146	168142	168143
Sampled by:	Ecology	GP	Ecology	Ecology	Ecology	GP	Ecology	GP	Ecology	Ecology	Ecology	GP
Parameter: Analysis by:												
BOD5 (mg/L)												
Ecology					512	474					39	37
Georgia Pacific						530					37	38
TSS (mg/L)												
Ecology	1		50	48	46	92			62	58	72	90
Georgia Pacific	11		77	51	55	103			78	77	89	94
Mercury (ug/L – total)												
Ecology:	0.27J				0.050UN		9.20 N				0.29J	0.28J
Georgia Pacific	<1	2			<1		10	10.20*			<1	<1

* – Average of 9.4 ug/L at 0300 on 4/14 and 11.0 ug/L at 0300 on 4/15.

J – The analyte was positively identified. The associated numerical result is an estimate.
N – The spike sample recovery is not within control limits.
UN – The analyte was not detected at or above the reported result. The spike recovery is not within control limits.

Inf – plant influent
Eff – effluent
ClWtr – clear water influent
MRU – mercury recovery unit
E – Ecology sample
G – Georgia Pacific sample
grab – grab sample
comp – composite sample

Table 5 – VOA, BNA, Pesticide/PCB Compounds, Metals Detected – Georgia–Pacific (Bellingham), April 1993.

	Location:	Inf–1	Inf–2	Eff–1	Eff–2	EPA Water Quality Criteria Summary	
	Type:	grab	grab	grab	grab		
	Date:	4/14	4/14	4/14	4/14	Acute Marine	Chronic Marine
	Time:	0930	1405	1315	1500		
	Lab Log#:	168135	168136	168145	168146		
(Group)	VOA Compounds	ug/L	ug/L	ug/L	ug/L	(ug/L)	(ug/L)
a	Chloromethane	2.3 J	20 UJ	2.0 UJ	2.0 UJ	12,000 *(a)	6,400 *(a)
a	Methylene Chloride	2.0 U	20 U	2.0 U	1.3 J	12,000 *(a)	6,400 *(a)
	Acetone	37 J	50 U	5.0 J	6.9 J		
a	Chloroform	1400	1500	32	29	12,000 *(a)	6,400 *(a)
a	Bromodichloromethane	1.7	10 U	1.0 U	1.0 U	12,000 *(a)	6,400 *(a)
	4–Methyl–2–Pentanone (MIBK)	3.4 J	50 U	5.0 U	5.0 U		
	Ethylbenzene	0.7 J	10 U	1.0 U	1.0 U	430 *	
	Total Xylenes	8.7	20 U	2.0 U	2.0 U		

	Location:	Inf–E	Eff–E	EPA Water Quality Criteria Summary	
	Type:	comp	comp		
	Date:	4/14–15	4/14–15	Acute Marine	Chronic Marine
	Time:	0300–0300	0300–0300		
	Lab Log#:	168133	168142		
(Group)	BNA Compounds	ug/L	ug/L	(ug/L)	(ug/L)
	Benzoic Acid	17.8	3.0 U		
n	Phenanthrene	1.3	0.17 J	300 *(n)	
	Pentachlorophenol	1.3 J	3.0 U	13	7.9 *
	2,4,6–Trichlorophenol	28.8	0.98 J		
n	Naphthalene	14.5	0.67 J	2,350 *	
	4–Methylphenol	3.5	2.3		
	2,4–Dichlorophenol	5.3	1.4		
n	Pyrene	0.58 U	1.2 U	300 *(n)	
	Dibenzofuran	1.1	1.2 U		

Pesticides/PCB Compounds

(none detected)

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.

Inf – plant influent
Eff – effluent
TrnsBlnk – transfer blank
ClWtr – clear water influent
MRU – mercury recovery unit wastewater

E – Ecology sample
G – Georgia Pacific sample
D – duplicate sample
grab – grab sample
comp – composite sample

Table 5 – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Location:	TrnsbInk		Inf–E		Inf–G		Clwtr–E		MRU–E		MRU–ED		Eff–E		Eff–G		EPA Water Quality Criteria Summary	
Type:	grab		comp		comp		comp		comp		comp		comp		comp			
Date:	4/15		4/14–15		4/14–15		4/14–15		4/14–15		4/14–15		4/14–15		4/14–15		Acute Marine	Chronic Marine
Time:	1100		0300–0300		0300–0300		0300–0300		0900–0900		0900–0900		0300–0300		0300–0300			
Lab Log#:	168132		168133		168134		168137		168139		168141		168142		168143			
	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		ug/L		(ug/L)	(ug/L)
Metals**																		
Arsenic	1.5	U	2.0	P					6.0	U			1.8	P	1.6	P	69	36
Cadmium	0.10	P	3.38						0.40	U			1.97		1.95		37	8.0
Chromium	5	U	184						23	P			131		127			
Hexavalent																	1,100	50
Trivalent																	10,300 *	
Copper	3	U	14	P					47.2				11	P	30	P	2.5	
Lead	1.0	UN	4.0	J					4.0	UN			2.3	J	1.7	J	151	5.8
Mercury (total)	0.05	UN	0.050	UN	0.050	UN	0.27	J	9.20	N	8.92	N	0.29	J	0.28	J	2.1	0.025
Nickel	10	U	12	P					17	P			10	U	10	U	71	7.9
Zinc	5.9	P	79.1						40.7				47.7		51.7		85	77

[ ] – acute or chronic criteria exceeded

[1]NOTE: SOME INDIVIDUAL COMPOUND CRITERIA OR LOELS MAY NOT AGREE WITH GROUP CRITERIA OR LOELS. REFER TO APPROPRIATE EPA DOCUMENT ON AMBIENT WATER QUALITY CRITERIA FOR FULL DISCUSSION.

U The analyte was not detected at or above the reported result.
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.
P The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
N The spike sample recovery is not within control limits.
* Insufficient data to develop criteria. Value presented is the LOEL – Lowest Observed Effect Level.
UN The analyte was not detected at or above the reported result. The spike sample recovery is not within control limits.

Inf – plant influent
Eff – effluent
TrnsBlnk – transfer blank
ClWtr – clear water influent
MRU – mercury recovery unit wastewater

E – Ecology sample
G – Georgia Pacific sample
D – duplicate sample
grab – grab sample
comp – composite sample

** – total recoverable metals unless otherwise specified

a Total Halomethanes
n Total Polynuclear Aromatic Hydrocarbons

Table 6 - Guaiacol/Catechol and Resin Acid/Fatty Acid Scan Results
Georgia-Pacific (Bellingham), April 1993.

	Inf-E comp 4/14-15 0300-0300 168133 ug/L		Eff-E comp 4/14-15 0300-0300 168142 ug/L	
GUAIACOLS/CATECHOLS				
Pentachlorophenol	7.4	U	4.2	U
2,4,6-Trichlorophenol	7.4	U	4.2	U
Guaiacol (2-methoxyphenol)	138	J	4.2	U
2-Methylphenol	7.4	U	4.2	U
o-Chlorophenol	0.14	J	4.2	U
4-Allylguaiacol (eugenol)	23.4		4.2	U
3-Cyclohexene-1-Methanol	3.1	J	4.2	U
2,4,5-Trichlorophenol	7.4	U	4.2	U
2,4-Dimethylphenol	7.4	U	4.2	U
4-Methylphenol	2.9	J	4.2	UJ
Phenol	12.7		4.2	UJ
2,4-Dichlorophenol	5.0	J	1.3	J
3-Methyl-4-chlorophenol	7.4	U	4.2	U
2,3,5-Trichlorophenol	7.4	U	4.2	U
Isoeugenol	7.4	U	4.2	U
Tetrachlorocatechol	1.9	J	1.9	J
4-Chlorocatechol	7.4	U	4.2	U
4,5-Dichloroguaiacol	2.1	J	0.11	J
Tetrachloroguaiacol	23.3		10.1	
Trichlorosyringol	0.65	J	0.22	J
4,5,6-Trichloroguaiacol	3.0	J	1.9	J
4,5-Dichlorocatechol	7.4	U	4.2	U
2,3,4-Trichlorophenol	19.0		0.68	J
4-Chloroguaiacol	7.4	U	4.2	U
6-Chlorovanillin	1.4	J	2.8	J
5-Chlorovanillin (AC)	7.4	U	4.2	U
3,4,5-Trichloroguaiacol	12.1		3.5	J
RESIN ACID/FATTY ACIDS				
Palmitoleic acid (EE)	1.4	U	5.0	UJ
Decanoic acid, Hexa-	7.5	UJ	4.1	UJ
Linoleic acid	3.0	J	5.0	UJ
Oleic acid	4.2	J	1.1	J
Octadecanoic acid	1.8	J	2.9	J
Retene	5.1	U	5.0	UJ
Pimaric acid	5.0	U	5.0	UJ
Sandaracopimaric acid	5.1	U	5.0	UJ
Isopimaric acid	0.80	J	5.0	UJ
Palustric acid	5.1	U	5.1	UJ
Dehydroabietic acid	6.7		5.0	UJ
Abietic acid	1.2	J	5.0	UJ
Neoabietic acid	5.1	UJ	5.0	UJ
Dichlorostearic acid	5.1	U	5.0	UJ
14-Cl Dehydroabietic acid	7.2		0.041	J
12-Cl Dehydroabietic acid	12.2		0.22	J
Dichlorodehydroabietic acid	4.4	J	0.26	J

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

Inf E - Ecology influent sample
Eff-E - Ecology effluent sample
comp - composite sample

Table 7 – Dioxin/Furan Results – Georgia-Pacific (Bellingham), April 1993.

Location:	Inf-E		Eff-E		Sed-Comp	
Type:	comp		comp		grab-comp	
Date:	4/14/-15		4/14-15		4/15	
Time:	0300-0300		0300-0300		1245-1715	
Lab Log:	168133		168142		168151	
Dioxins	**pg/L**		**pg/L**		**pg/g**	
2,3,7,8-TCDD	8.3	UJ	6.9	UJ	1.7	U
1,2,3,7,8-PeCDD	135		11.0	U	35.5	
1,2,3,4,7,8-HxCDD	873		14.5	UJ	214	
1,2,3,6,7,8-HxCDD	345		9.9	UJ	131	
1,2,3,7,8,9-HxCDD	413		11.6	U	145	
1,2,3,4,6,7,8-HpCDD	2200		123	UJ	911	
1,2,3,4,6,7,8,9-OCDD	1500	UJ	639	UJ	1300	UJ
Total TCDD	23780	UJ	697	UJ	8340	UJ
Total PeCDD	23600		623	UJ	8490	UJ
Total HxCDD	25170		613	UJ	9920	
Total HpCDD	3490		177	UJ	1530	
Furans						
2,3,7,8-TCDF	182		23.2	UJ	70.9	
1,2,3,7,8-PeCDF	16.9	UJ	7.0	U	10.4	UJ
2,3,4,7,8-PeCDF	18.2		7.1	U	12.0	UJ
1,2,3,4,7,8-HxCDF	26.8	UJ	9.2	U	16.9	UJ
1,2,3,6,7,8-HxCDF	8.8	U	5.8	U	1.4	U
2,3,4,6,7,8-HxCDF	12.8	U	6.2	UJ	5.9	UJ
1,2,3,7,8,9-HxCDF	14.3	U	9.4	U	2.2	U
1,2,3,4,6,7,8-HpCDF	12.3	U	9.1	U	29.7	
1,2,3,4,7,8,9-HpCDF	20.9	U	15.4	U	3.0	U
1,2,3,4,6,7,8,9-OCDF	42.5	U	43.0	U	108	UJ
Total TCDF	740	UJ	35.4	UJ	309	UJ
Total PeCDF	207	UJ	7.1	U	133	UJ
Total HxCDF	70.4	UJ	5.9		90.8	UJ
Total HpCDF	15.5	U	11.4	U	106	UJ

Inf-E – Ecology influent sample
Eff-E – Ecology effluent sample
comp – composite sample
Sed-comp – composite sample of grab sediment samples

U – The analyte was not detected at or above the reported result.
UJ – The analyte was not detected at or above the reported estimated result.

Table 8 – Effluent Bioassay Results – Georgia-Pacific (Bellingham), April 1993.

Daphnia magna - 48-hour survival test
(Daphnia magna)
Sample No. 168144

Sample Concentration	# Tested*	Percent Survival
0 % effluent	20	100
6.25 % effluent	20	95
12.5 % effluent	20	100
25 % effluent	20	95
50 % effluent	20	95
100 % effluent	20	95

NOEC = 100 % Effluent
LC50>100%

* Four replicates per concentration, five organisms per replicate

Ceriodaphnia dubia - survival/reproduction test
(Ceriodaphnia dubia)
Sample No. 168144

Sample Conc.	# Tested*	# Young Produced/Adult	Percent Survival
0 % effluent	10	19.9	100
6.25 % effluent	10	27.9	100
12.5 % effluent	10	23.3	100
25 % effluent	10	13.6	100
50 % effluent	10	8.8	90
100 % effluent	10	0.2	80

Reproduction
NOEC = 12.5 % Effluent

Survival
NOEC = 100 Effluent
LC50 > 100 %

* Ten replicates per concentration, one organism per replicate

Fathead Minnow larval - survival test
(Pimephales promelas)
Sample No. 168144

Sample Conc.	# Tested*	Percent Survival
0 % effluent	40	100
6.25 % effluent	40	100
12.5 % effluent	40	100
25 % effluent	40	100
50 % effluent	40	100
100 % effluent	40	100

NOEC = 100 % effluent
LC50 > 100 % effluent

* four replicates per concentration, ten organisms per replicate

Rainbow Trout - 96 hour survival test
(Oncorhynchus mykiss)
Sample No. 168144

Sample Conc.	Number Tested*	Percent Survival
Control	30	100
6.25 % effluent	30	100
12.5 % effluent	30	97
25 % effluent	30	97
50 % effluent	30	97
100 % effluent	30	87

LC50 > 100 % effluent

* three replicates per concentration, ten organisms per replicate

Table 8 – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Bivalve Larvae Test*

(Crassostrea gigas)

Sample No. 168144

Sample Conc.**	% Mortality+	% Abnormality++
Control	0	1.2
4.38 % effluent	16.8	93.2
8.75 % effluent	25.0	99.8
17.5 % effluent	11.3	100
35 % effluent	14.5	100
70 % effluent	67.6	100

Survival	Abnormality
LC50 = 54.8% effluent	NOEC < 4.38% effluent
NOEC = 35% effluent	

* Average initial count: 251 per replicate

** Salinity adjustment to a salinity of 30ppt with natural seawater collected from Possesion Point

\+ adjusted for control mortality

++ adjusted for control abnormality

Table 9 – Sediment Grain Size Analysis and General Chemistry Results
Georgia–Pacific (Bellingham), April 1993.

Station:	Sed-1	Sed-2	Sed-3	Sed-4	Sed-Comp
Type:	grab	grab	grab	grab	grab-comp
Date:	4/27	4/27	4/27	4/27	4/27
Time:	1245	1542	1400	1715	1245-1715
Lab Log#:	168147	168148	168149	168150	168151
Grain Size Analysis*	(%)	(%)	(%)	(%)	(%)
Gravel					
>4750	0	0	0	0	0
4750-2000	0	0	0	0	0
	0	0	0	0	0
Sand					
2000-850	1	1	0	1	0
850-425	0	1	1	0	2
425-250	1	2	1	2	1
250-106	1	2	2	5	2
106-75	0	1	1	1	1
75-62.5	1	1	1	1	1
	4	8	6	10	7
Silt					
62.5-31.2	2	3	4	3	2
31.2-15.6	10	13	12	9	13
15.6-7.8	15	17	17	15	17
7.8-3.9	19	18	18	19	19
	46	51	51	46	51
Clay					
3.9-1.9	15	13	13	13	15
1.9-0.9	13	14	10	11	12
<0.9	22	14	20	20	15
	50	41	43	44	42
% Solids	33.1 J	34.0	35.5	40.8	34.2
% Volatile Solids	8.9 J	8.7	8.1	6.8	9.3
% TOC (dry wt. basis)	3.2	4.0	3.6	3.8	2.9

* Grain sizes are in microns.

Sed-1 - near the upstream end of the diffuser
Sed-2 - near the middle of the diffuser
Sed-3 - near the downstream end of the diffuser
Sed-4 - background station approximately 2600 feet northwest of diffuser

J - indicates an estimated value.

Table 10 – Sediment VOA, BNA, Metals Detected – Georgia–Pacific (Bellingham), April 1993.

	Location:	Sed–1	Sed–2	Sed–3	Sed–4	Marine Sediment Quality Standards Chemical Criteria	
	Type:	grab	grab	grab	grab		
	Date:	4/15	4/15	4/15	4/15		
	Time:	1245	1540	1400	1715	Sed–comp data Normalized to TOC	Criteria
	Lab Log#:	168147	168148	168149	168150		
(Group)[1]	VOA Compounds	ug/kg–dr	ug/kg–dr	ug/kg–dr	ug/kg–dr		
	Acetone	39 J	25 J	52 J	18 J		
	Carbon Disulfide	31 U	31 U	1 J	22 U		
a	Chloroform	31 U	31 U	1 J	22 U		
	2–Butanone (MEK)	31 U	31 U	15 J	6 J		
	Toluene	31 U	31 U	0.6 J	22 U		

	Location:	Sed–Comp	Marine Sediment Quality Standards Chemical Criteria	
	Type:	grab–comp		
	Date:	4/15		
	Time:	1245–1715	Sed–comp data Normalized to TOC	Criteria
	Lab Log#:	168151		
	BNA Compounds	ug/kg–dr	mg/L	mg/L
	Fluorene	62.4 J	2.15 J	23
	1–Methylnaphthalene	74.0 J	2.55 J	
	Naphthalene	1390	47.9	
	2–Methylnaphthalene	68.0 J	2.34 J	
	Phenol	235 J		420 ug/kg–dr
				mg/L
	1,3,5–Tribromophenol	76	2.62	
	Anthracene	74.5 J	2.57 J	220
	Pyrene	432 J	14.9 J	1,000
	Dibenzofuran	281 J	9.69 J	15
	Fluoranthene	715 J	24.7 J	960
	Acenaphthylene	192 J	6.62 J	99
	Chrysene	86.2 J	2.97 J	110

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.

[ ] – criteria exceeded

Sed–1 near the upstream end of the diffuser
Sed–2 near the middle of the diffuser
Sed–3 near the downstream end of the diffuser
Sed–4 background station approximately 2600 feet northwest of diffuser.

Sed–Comp composite sample of Sed–1, Sed–2, Sed–3

a – total Halomethanes

Table 10 – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

	Sed–1 grab 4/15 1245 168147 mg/kg–dr	Sed–2 grab 4/15 1540 168148 mg/kg–dr	Sed–3 grab 4/15 1400 168149 mg/kg–dr	Sed–4 grab 4/15 1715 168150 mg/kg–dr	Marine Sediment Quality Standards Chemical Criteria Criteria mg/kg–dr
Metals (total)					
Arsenic	9.85	10.4	10.9 U	10.1	57
Beryllium	0.44 P	0.43 P	0.43 P	0.43 P	
Cadmium	0.689	0.455	0.459	0.323	5.1
Chromium	85.6	82	85.1	81.4	260
Hexavalent					
Trivalent					
Copper	51.2	46.5	48.4	46.9	390
Lead	15.3	14.9	14.2	13.6	450
Mercury	0.713	0.638 J	0.445 J	0.232 J	0.41
Nickel	107	101	106	113	
Selenium	0.74 J	0.70 J	0.83 J	0.54 J	
Silver	1.4 J	1.3 J	1.1 J	1 UJ	6.1
Zinc	125	114	112	107	410

J	The analyte was positively identified. The associated numerical result is an estimate.
U	The analyte was not detected at or above the reported result.
UJ	The analyte was not detected at or above the reported estimated result.
P	The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.

[ ] – criteria exceeded

Sed–1	near the upstream end of the diffuser
Sed–2	near the middle of the diffuser
Sed–3	near the downstream end of the diffuser
Sed–4	background station approximately 2600 feet northwest of diffuser.
Sed–comp	composite sample of Sed–1, Sed–2, Sed–3

Table 11 – Sediment Bioassay Results – Georgia-Pacific (Bellingham), April 1993.

Marine Amphipod Sediment Test

(Rhepoxinius abronius)

Sample	Sample No.	No. Tested*	% Survival
Control		100	99
Sed-1	168147	100	76
Sed-2	168148	100	83
Sed-3	168149	100	85
Sed-4	168150	100	85

* 5 replicates of 20 organisms each per treatment.

Bivalve Larvae Sediment Test

(Mytilus sp.)

Sample	Sample No.	No. Tested*	% Abnormal	% Abnormal/Dead	% Mortality
Control	Control	1308	2.1	19.2	17.5
Sed-1	168147	1032	26.4	49.0	34.9
Sed-2	168148	1202	3.9	26.9	24.0
Sed-3	168149	1229	2.8	22.5	20.3
Sed-4	168150	1225	3.3	22.7	20.2

* 5 replicates per treatment

Juvenile Polychaete Sediment Test

(Neanthes)

Sample	Sample No.	No. Tested*	Avg. Biomass/Worm (mg)	% Survival
Control	Control	25	10.9	92
Sed-1	168147	25	9.6	100
Sed-2	168148	25	8.8	76
Sed-3	168149	25	10.6	92
Sed-4	168150	25	9.5	100

*Five replicates of five organisms each per treatment.

Sed-1 -	near the upstream end of the diffuser
Sed-2 -	near the middle of the diffuser
Sed-3 -	near the downstream end of the diffuser
Sed-4 -	background station approximately 2600 feet northwest of diffuser

APPENDICES

Appendix A. Sampling Procedures - Georgia Pacific (Bellingham), April 1993.

Ecology Isco samplers were set up to collect equal volumes of sample every 30 minutes for 24 hours. Sampler configurations and locations are summarized in Figure 2 and Table 1.

Inf, ClWtr and Eff samplers collected sample from 3 AM to 3 AM to coincide with plant sampler collection times. The MRU began operating at midnight and was sampled from 9AM to 9AM after the unit resumed operating. Two compositors were set up at both the (Inf) and (Eff) locations to collect sufficient sample for the parameters to be analyzed. The compositors were iced to keep samples cool.

The GP influent and clear water composite samples were time proportioned with samples taken every 55 minutes. The GP effluent composite sampler collected equal volume samples every 30 minutes. The influent samplers were not cooled as the samples are not required by Ecology and are used by GP for internal use only. The effluent composite sample was kept cooled as it was collected.

Sediment samples were collected with a 0.1 m^2 van Veen grab sampler at four stations; one at a background site approximately 2500 feet northwest of the center of the diffuser (Sed-4), one approximately 100 feet in from the upstream end (beginning) of the diffuser and within 50 feet outward from the diffuser (Sed-1), one approximately 250 feet southeast from the center of the diffuser (Sed-2), and one approximately 100 feet in from the downstream end of the diffuser pipe and within 50 feet outward from the diffuser (Sed-3 - Figure 1). The sites were located by GPS satellite receiver and sonar (Table 1).

At each sediment station, the top two centimeters of sample from successive grab samples were collected. For each station, sediment was placed in a three gallon stainless steel bucket, homogenized and put in appropriate containers for analyses. In addition a stainless steel cylinder was filled with equal portions of sample from Sed-1, Sed-2, and Sed-3 to form a composite sample. The sample was homogenized by mixing then put in appropriate containers for analysis.

Appendix B – Sampling Schedule – Georgia-Pacific (Bellingham), April 1993.

Parameter	Location:	Trns Blnk	Inf-E	Inf-G	Inf-1	Inf-2	MRU-E	MRU-ED	MRU	Chl-E	ClWtr-E	ClWtr
	Type:	grab	comp	comp	grab	grab	comp	comp	grab	comp	comp	grab
	Date:	4/12	4/14-15	4/14-15	4/14	4/14	4/14-15	4/14-15	4/14	4/14-15	4/14-15	4/14
	Time:	300-0300	00-0300	00-0300	0930	1405	0900-0900	0900-0900	1240	0300-0300	0300-0300	0940
	Lab Log #:	168132	168133	168134	168135	168136	168139	168141	168152	168141	168137	168138
GENERAL CHEMISTRY												
Conductivity			E	E								
Alkalinity			E									
Hardness			E									
Grain Size												
SOLIDS 4			E	E								
TSS			EG	EG	EG	EG	E				EG	
% Solids												
% Volatile Solids												
BOD5			E	EG								
COD			E				E					
TOC (water)			E		E	E	E				E	
TOC (soil/sed)												
NH3-N			E	E								
NO2+NO3-N			E	E								
Total-P			E	E								
F-Coliform MPN												
%Klebsiella (KES)												
Cyanide (total)					E	E						
Cyanide (wk & dis)					E	E						
Chlorate			E									
ORGANICS												
AOX			E									
VOC (water)					E	E						
VOC (soil/sed)												
BNAs (water)			E									
BNAs (soil/sed)												
Pest/PCB (water)												
Resin/Fatty Acids (eff)			E									
Guaiacols (effluent)			E									
Phenolics Total(water)			E									
Dioxin/Furans			E									
METALS												
PP Metals (water)		E	E				E					
Total mercury		E	EG				EG	E		E	EG	
BIOASSAYS												
Salmonid (acute series)												
Daphnia magna (acute)												
Bivalve Larvae (chronic)												
Ceriodaphnia (chronic)												
Fathead Minnow (acute)												
Rhepoxinius (solid acute)												
Neanthes (solid chronic)												
Blue mussel larvae (solid acute)												
FIELD OBSERVATIONS												
Temperature					E	E			E			E
Temp-cooled*+			E				E	E		E	E	
pH			E		E	E	E	E	E	E	E	E
Conductivity			E		E	E	E	E	E	E	E	E
Chlorine					E	E			E	E		E
Sulfide					E	E						E

Appendix B – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Parameter	Location:	Eff-E	Eff-G	Eff-GC	Eff-1	Eff-2	Eff-3	Sed-1	Sed-2	Sed-3	Sed-4	Sed-Comp
	Type:	comp	comp	grab–comp	grab	grab	grab	grab	grab	grab	grab	grab–comp
	Date:	4/14–15	4/14–15	4/13	4/14	4/14	4/15	4/27	4/27	4/27	4/27	4/27
	Time:	300–0300	0300–0300	*	1315	1500	1630	1245	1540	1400	1715	1245–1715
	Lab Log #:	168142	168143	168144	168145	168146	168153	168147	168148	168149	168150	168151
GENERAL CHEMISTRY												
Conductivity		E	E	E								
Alkalinity		E	E									
Hardness		E	E	E								
Grain Size								E	E	E	E	E
SOLIDS 4		E										
TSS		EG	EG	E	EG	EG						
% Solids								E	E	E	E	E
% Volatile Solids								E	E	E	E	E
BOD5		EG	EG									
COD		E	E									
TOC (water)		E	E		E	E						
TOC (soil/sed)								E	E	E	E	E
NH3–N		E	E									
NO2+NO3–N		E	E									
Total–P		E	E									
F–Coliform MPN							E					
%Klebsiella (KES)							E					
Cyanide (total)					E	E						
Cyanide (wk & dis)					E	E						
Chlorate		E										
ORGANICS												
AOX		E	E									
VOC (water)					E	E						
VOC (soil/sed)								E	E	E		
BNAs (water)		E										
BNAs (soil/sed)												E
Pest/PCB (water)		E										
Resin/Fatty Acids (eff)		E										
Guaiacols (effluent)		E										
Phenolics Total(water)		E	E									
Dioxin/Furans		E										E
METALS												
PP Metals (water)		E	E					E	E	E	E	
Total mercury		EG	EG					E	E	E	E	
BIOASSAYS												
Salmonid (acute series)				E								
Daphnia magna (acute)				E								
Bivalve Larvae (chronic)				E								
Ceriodaphnia (chronic)				E								
Fathead Minnow (acute)				E								
Rhepoxinius (solid acute)								E	E	E	E	
Neanthes (solid chronic)								E	E	E	E	
Blue mussel larvae (solid acute)								E	E	E	E	
FIELD OBSERVATIONS												
Temperature					E	E						
Temp–cooled		E	E									
pH		E	E		E	E						
Conductivity		E	E		E	E						
Chlorine												
Sulfide												

* – grab composite sample collected as two equal volumes at 1110 and 1530 on 0414.

Trns Blnk – transfer blank
Inf – influent sample
E – Ecology analysis
ED – duplicate Ecology analy
G – Georgia–Pacific analysis
GC – grab composite sample

MRU – mercury recovery unit
Chl – chlorine plant
ClWtr – clear water influent
Eff – effluent sample
Sed – sediment sample

Appendix C – Ecology Analytical Methods – Georgia–Pacific (Bellingham), April 1993.

Laboratory Analysis	Method Used for Ecology Analysis	Laboratory Performing Analysis
GENERAL CHEMISTRY		
Conductivity	EPA, 1979: 120.1	Ecology Manchester Laboratory
Alkalinity	EPA, 1979: 310.1	Ecology Manchester Laboratory
Hardness	EPA, 1979: 130.2	Ecology Manchester Laboratory
TS	EPA, 1979: 160.3	Ecology Manchester Laboratory
TNVS	EPA, 1979: 160.4	Ecology Manchester Laboratory
TSS	EPA, 1979: 160.2	Ecology Manchester Laboratory
TNVSS	EPA, 1979: 160.4	Ecology Manchester Laboratory
% Solids	APHA, 1989: 2540G	Ecology Manchester Laboratory
% Volatile Solids	EPA, 1979: 160.4	Ecology Manchester Laboratory
BOD5	EPA, 1979: 405.1	Ecology Manchester Laboratory
COD	EPA, 1979: 410.1	Laucks Testing Laboratories
TOC (water)	EPA, 1979: 415.1	Ecology Manchester Laboratory
TOC (soil)	APHA, 1989: 5310	Weyerhaeuser
NH3–N	EPA, 1979: 350.1	Ecology Manchester Laboratory
NO2+NO3–N	EPA, 1979: 353.2	Ecology Manchester Laboratory
Phosphorous – Total	EPA, 1979: 365.1	Ecology Manchester Laboratory
F–Coliform MF	APHA, 1989: 922D	Ecology Manchester Laboratory
% Klebsiella (KES)	APHA, 1989: 922F	Ecology Manchester Laboratory
Grain Size	Tetra Tech, 1986	Ecology Manchester Laboratory
Cyanide total	APHA, 1989: 4500CN	Ecology Manchester Laboratory
Cyanide (wk & dis)	APHA, 1989: 4500–CN I.	Ecology Manchester Laboratory
Chlorate	EPA, 1979: 300.0	Laucks Testing Laboratories
ORGANICS		
AOX	EPA, 1986: 9020	Weyerhaeuser
VOC (water)	EPA, 1984: 624	Ecology Manchester Laboratory
VOC (soil)	EPA, 1986: 8260	Weyerhaeuser
BNAs (water)	EPA, 1984: 625	Ecology Manchester Laboratory
BNAs (soil)	EPA, 1986: 8270	Ecology Manchester Laboratory
Pest/PCB (water)	EPA, 1984: 608	Ecology Manchester Laboratory
Resin/Fatty Acids (water)	NCASI, 1986a	Ecology Manchester Laboratory
Phenolics Total(water)	EPA, Revised 1983: 420.2	Ecology Manchester Laboratory
Phenolics Total(soil/sed)	EPA, Revised 1983: 420.2	Ecology Manchester Laboratory
Dioxin/Furans	EPA, 1989 :1613	Triangle Laboratories
METALS		
PP Metals	EPA, 1979: 200	Ecology Manchester Laboratory
BIOASSAYS		
Salmonid (acute)	EPA, 1991.	Parametrix, Inc.
Bivalve Larvae (acute)	ASTM, 1992: V.11.04 (334–351)	Parametrics, Inc.
Bivalve Larvae (sediment)	EPA, 1990: NAS–XXX–CG4 (Test 461–4)	Northwestern Aquatic Sciences
Ceriodaphnia (chronic)	EPA, 1989	Parametrix, Inc.
Fathead Minnow (acute)	EPA, 1991	Parametrix, Inc.
Daphnia magna	EPA, 1991	Parametrix, Inc.
Rhepoxinius (solid acute)	EPA, 1990: NAS–XXX–RA4 (Test 461–2)	Northwestern Aquatic Sciences
Juvenile Polychaete	EPA, 1990: NAS–XXX–NA4 (Test 461–1)	Northwestern Aquatic Sciences

APHA–AWWA–WPCF, 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed.

ASTM, 1992. Standard Practice for Conducting Static Acute Toxicity Tests with Larvae of Four Species of Bivalve Molluscs. Annual Book of ASTM Standards, Water and Environmental Technology, American Society for Testing and Materials, Philadelphia, PA.

EPA, 1979. Methods for Chemical Analysis of Water and Wastes, EPA–600/4–79–020 (Rev. March, 1983).

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EPA, 1984. 40 CFR Part 136, October 26, 1984.

EPA, 1986. Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW–846, 3rd. ed.,November, 1986.

EPA, 1987. A Short–Term Chronic Toxicity Test Using Daphnia magna, EPA/600/D–87/080.

EPA, 1989. Short–term Methods for Estimating the Chronic Toxicity of Effluents and Receiving waters to Freshwater Organisms. Second edition. EPA/600/4–89/001.

EPA, 1990. Toxicity of Marine Sediments Using a 10–day amphipod, Rhepoxinius abronius Sediment Bioassay. June 20, 1990 (rev. 1–18–92). Based on Puget Sound Estuary Program, 1991. Interim final recommended guidelines for conducting laboratory bioassays on Puget Sound sediments. U.S EPA Region 10, Seattle, WA.

EPA, 1991. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition), EPA/600/4–90/027, September 1991.

NCASI, 1986a. Procedures for Analysis of Resin and Fatty Acids in Pulp Mill Effluents. Tech. Bull. no. 501. National Council of Paper Industry for air and Stream Improvement Inc., New York, NY.

NCASI, 1986b. Methods for the Analysis of Chlorinated Phenolics in Pulp Industry Wastewater, Tech. Bull. no. 498. National Council of Paper Industry for air and Stream Improvement Inc., New York, NY.

Tetra Tech, 1986. Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound, Prepared for Puget Sound Estuary Program.

Appendix D - Quality Assurance/Quality Control (QA/QC) - Georgia Pacific (Bellingham), April 1993.

SAMPLING

Ecology quality assurance procedures for sampling included priority pollutant cleaning of the sampling equipment prior to the inspection to prevent sample contamination (Appendix E). Also, a field transfer blank was collected (Appendix E).

For sediment samples, sampling quality assurance/quality control steps included collecting only sediments not in direct contact with the sampler and pre-inspection priority pollutant cleaning of equipment that would touch the samples (Appendix E).

Chain of custody procedures were followed to assure the security of the samples (Huntamer and Hyre, 1991).

LABORATORY ANALYSES

Most Ecology laboratory data met Ecology QA/QC guidelines and are considered to be reliable. Those data that did not meet the guidelines are appropriately qualified on the data tables. Comments on specific tests are included in the following paragraphs.

General Chemistry Analysis

TOC, COD, and chlorate results were acceptable. Other general chemistry results were acceptable other than as qualified.

AOX Analysis

Holding times, calibration, method blanks, and matrix spikes met standards for data use without qualification.

VOA Analysis - Plant Samples

VOA results for the plant samples were acceptable other than as qualified for chloromethane and vinyl chloride. Chloromethane and vinyl chloride deviated unacceptably from calibration standards. Positive results for these analytes have been qualified with a "J", and non-detect results have been qualified with a "UJ".

VOA Analysis - Sediment Samples

VOA results for the sediment samples were acceptable, other than as qualified for acetone and 2-butanone. Acetone and 2-butanone deviated unacceptably from calibration standards. Detected results for these two analytes have been qualified with a "J". Non-detected results were unaffected.

BNA Analysis

Low levels of some target compounds were detected in the laboratory blanks. The EPA five times rule was applied: compounds were considered real if the levels in the sample were greater than or equal to five times the amount of compound in the associated method blank. Matrix spike recoveries were outside acceptable limits for hexachloroethane, 2-methylnaphthalene, 2-nitroaniline, and N-nitrosodiphenylamine. The "J" qualifier was added to results for these compounds in sample 168133. Four other compounds, 4-chloroaniline, 3-nitroaniline, 4-nitrophenol, and 2,4-dinitrophenol had low recoveries and data for these compounds was rejected ("REJ") as unusable.

Pesticide/PCB Analysis

Except for 4,4'DDT, all recoveries and relative percent differences were within QC limits.

Metals Analysis - Plant Samples

Spike recoveries for lead, selenium, mercury and beryllium were not within CLP acceptance limits. Results for these elements are qualified with N or J. The result for mercury in the Sed-1 sample is not qualified because a confirming analysis was made for Sed-1. Analyses for metals in the transfer blank yielded results below detection limits with the exceptions of cadmium (0.10 ug/L est.) and zinc (5.9 ug/L est.).

Metals Analysis - Sediment Samples

Interferences in the sample caused silver calibrations to degrade. Silver results are qualified with a "J". Spike recoveries for antimony and mercury were not within acceptance limits. These elements are qualified with "J".

Guaicols/Catechols Analysis

Low levels of the target compounds phenol and 2,4-dimethylphenol were detected in laboratory blanks. The EPA five times rule was applied. Tetrachlorocatechol had high matrix spike recoveries and the compound was qualified "J" for sample no. 168133.

Resin Acids/Fatty Acids Analysis

Low levels of some fatty acids were detected in laboratory blanks. The EPA five times rule was applied. Matrix spike recoveries were low for sample 168142 and the "J" qualifier was added to results.

Dioxin/Furan Analysis, Plant Samples

OCDD was detected in the plant samples in concentrations less than five times the amount detected in the method blank. A
"UJ" qualifier was applied because the OCDD detected in the samples was likely due to

laboratory contamination. HpCDD was also detected in the method blank. The EPA five times rule was applied. Several other Dioxins/Furans were found in the method blank. These compounds were detected in plant samples at concentrations less than five times the concentration in the method blank. The "UJ" qualifier was applied to these results.

Dioxin/Furan Analysis, Sediment Samples

OCDD and HpCDD were detected in the method blank. The EPA five times rule was applied. The amount of HpCDD detected in the sample was much greater than five times the amount detected in the sediment method blank. Therefore no qualifier is applied.

SPLIT SAMPLE RESULTS

The GP composite sample and Ecology grab samples were collected from a tap on the downstream side of of the influent pumps. TSS concentrations from the Ecology grab samples agreed closely with those from the Ecology composite sample collected from a large well-mixed sump.

Because the Ecology grab sample and GP composite sample were collected in the same manner, it appears that the high influent TSS concentration in the GP composite sample may be a result of sample handling after collection. GP does not cool the composite sample because the sample is used only by GP and not for purposes of reporting to Ecology. This may result in microbial growth in the relatively warm sample, with corresponding higher TSS concentrations.

The results of analyses by Ecology and GP for TSS were close. However in eight of eight analyses for TSS, GP's results were higher than Ecology's (4% to 54% higher for influent and effluent samples). Using a paired comparison test with Student's t-distribution, the difference of the pairs was significant at the 99% confidence level. It is unclear which results were more representative.

The GP analysis of the ClWtr-GP composite sample yielded a total mercury concentration of 2 ug/L. This was seven times the result from Ecology's analysis of the Ecology clear water sample (0.27 ug/L). The Georgia Pacific analysis of the Ecology sample resulted in a mercury concentration of < 1 ug/L.

LABORATORY AUDIT

The GP laboratory was audited by Ecology's Quality Assurance Section, and was accredited by Ecology on February 14, 1992. The accreditation was renewed on February 14, 1993.

Appendix E. Priority Pollutant Cleaning Procedures - Georgia-Pacific (Bellingham), April 1993

PRIORITY POLLUTANT SAMPLING EQUIPMENT CLEANING PROCEDURES

1. Wash with laboratory detergent
2. Rinse several times with tap water
3. Rinse with 10% HNO3 solution
4. Rinse three (3) times with distilled/deionized water
5. Rinse with high purity methylene chloride
6. Rinse with high purity acetone
7. Allow to dry and seal with aluminum foil

FIELD TRANSFER BLANK PROCEDURE

1. Run approximately 1L of organic free water through a compositor and discard.

2. Run approximately 2L of organic free water through the same compositor and put the water into appropriate bottle for metals analysis.

Appendix F – VOA, BNA, Pesticide/PCB and Metals Scan Results – Georgia–Pacific (Bellingham), April 1993.

Location:	Inf–1	Inf–2	Eff–1	Eff–2
Type:	grab	grab	grab	grab
Date:	4/14	4/14	4/14	4/14
Time:	0930	1405	1315	1500
Lab Log#:	168135	168136	168145	168146
VOA Compounds	ug/L	ug/L	ug/L	ug/L
Chloromethane	2.3 J	20 UJ	2.0 UJ	2.0 UJ
Bromomethane	2.0 U	20 U	2.0 U	2.0 U
Vinyl Chloride	2.0 UJ	20 UJ	2.0 UJ	2.0 UJ
Chloroethane	2.0 U	20 U	2.0 U	2.0 U
Methylene Chloride	2.0 U	20 U	2.0 U	1.3 J
Acetone	37 J	50 U	5.0 J	6.9 J
Carbon Disulfide	1.0 U	10 U	1.0 U	1.0 U
1,1–Dichloroethene	1.0 U	10 U	1.0 U	1.0 U
1,1–Dichloroethane	1.0 U	10 U	1.0 U	1.0 U
1,2–Dichloroethene (total)				
Trans–1,2–Dichloroethene	1.0 U	10 U	1.0 U	1.0 U
Cis–1,2–Dichloroethene	1.0 U	10 U	1.0 U	1.0 U
Chloroform	1400	1500	32	29
1,2–Dichloroethane	1.0 U	10 U	1.0 U	1.0 U
2–Butanone (MEK)	5.0 U	50 U	5.0 U	5.0 U
1,1,1–Trichloroethane	1.0 U	10 U	1.0 U	1.0 U
Carbon Tetrachloride	1.0 U	10 U	1.0 U	1.0 U
Vinyl Acetate	1.0 U	10 U	1.0 U	1.0 U
Bromodichloromethane	1.7	10 U	1.0 U	1.0 U
1,2–Dichloropropane	1.0 U	10 U	1.0 U	1.0 U
cis–1,3–Dichloropropene	1.0 U	10 U	1.0 U	1.0 U
Trichloroethene	1.0 U	10 U	1.0 U	1.0 U
Dibromochloromethane	1.0 U	10 U	1.0 U	1.0 U
1,1,2–Trichloroethane	1.0 U	10 U	1.0 U	1.0 U
Benzene	1.0 U	10 U	1.0 U	1.0 U
trans–1,3–Dichloropropene	1.0 U	10 U	1.0 U	1.0 U
2–Chloroethylvinyl Ether	1.0 U	10 U	1.0 U	1.0 U
Bromoform	1.0 U	10 U	1.0 U	1.0 U
4–Methyl–2–Pentanone (MIBK)	3.4 J	50 U	5.0 U	5.0 U
2–Hexanone	5.0 U	50 U	5.0 U	5.0 U
Tetrachloroethene	1.0 U	10 U	1.0 U	1.0 U
1,1,2,2–Tetrachloroethane	1.0 U	10 U	1.0 U	1.0 U
Toluene	1.0 U	10 U	1.0 U	1.0 U
Chlorobenzene	1.0 U	10 U	1.0 U	1.0 U
Ethylbenzene	0.7 J	10 U	1.0 U	1.0 U
Styrene	1.0 U	10 U	1.0 U	1.0 U
Total Xylenes	8.7	20 U	2.0 U	2.0 U
Trichlorofluoromethane	2.0 U	20 U	2.0 U	2.0 U
1,1,2–Trichloro–1,2,2–Trifluoroethane (Freon 113)	2.0 U	20 U	2.0 U	2.0 U

Inf – influent
Eff – effluent

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

–detected analyte

Appendix F – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Location:	Inf–E		Eff–E	
Type:	comp		comp	
Date:	4/14–15		4/14–15	
Time:	0300–0300		0300–0300	
Lab Log#:	168133		168142	
BNA Compounds	ug/L		ug/L	
Benzo(a)Pyrene	0.58	U	1.2	U
2,4–Dinitrophenol	5.8	U	12.1	U
Dibenzo(a,h)Anthracene	0.58	U	1.2	U
Benzo(a)Anthracene	0.58	U	1.2	U
4–Chloro–3–Methylphenol	0.58	U	1.2	U
Aniline	0.58	U	1.2	U
Benzoic Acid	17.8		3.0	U
Hexachloroethane	0.58	UJ	1.2	U
Hexachlorocyclopentadiene	2.9	UJ	6.1	UJ
Isophorone	0.58	U	1.2	U
Acenaphthene	0.58	U	1.2	U
Diethyl Phthalate	0.58	U	1.2	U
Di–n–Butyl Phthalate	0.58	U	1.2	U
Phenanthrene	1.3		0.17	J
Butylbenzyl Phthalate	0.58	U	1.2	U
N–Nitrosodiphenylamine	0.58	UJ	1.2	U
Fluorene	0.58	U	1.2	U
Carbazole	0.58	U	1.2	U
Hexachlorobutadiene	0.58	UJ	1.2	U
Pentachlorophenol	1.3	J	3.0	U
2,4,6–Trichlorophenol	28.8		0.98	J
2–Nitroaniline	0.58	UJ	1.2	U
2–Nitrophenol	0.58	U	1.2	U
1–Methylnaphthalene	0.58	U	1.2	U
Naphthalene	14.5		0.67	J
2–Methylnaphthalene	0.58	UJ	1.2	U
2–Chloronaphthalene	0.58	U	1.2	U
3,3'–Dichlorobenzidine	0.58	U	1.2	U
Benzidine	0.58	UJ	1.2	UJ
2–Methylphenol	0.58	U	1.2	U
1,2–Dichlorobenzene	0.58	U	1.2	U
o–Chlorophenol	0.58	U	1.2	U
2,4,5–Trichlorophenol	0.58	U	1.2	U
Nitrobenzene	0.58	U	1.2	U
3–Nitroaniline		REJ	1.2	U
4–Nitroaniline		REJ	3.0	U
4–Nitrophenol		REJ	6.1	U
Benzyl Alcohol	0.58	U	1.2	U

–detected analyte

Inf – influent
Eff – effluent
E – Ecology sample

U – The analyte was not detected at or above the associated value.
J – The analyte was positively identified. The associated numerical result is an estimate.
UJ – The result was not detected at or above associated estimated value.
REJ – The data are unusable for all purposes.

Appendix F – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Location:	Inf–E		Eff–E	
Type:	comp		comp	
Date:	4/14–15		4/14–15	
Time:	0300–0300		0300–0300	
Lab Log#:	168133		168142	
BNA Compounds (cont'd)	ug/L		ug/L	
4–Bromophenyl Phenylether	0.58	U	1.2	U
2,4–Dimethylphenol	0.58	U	1.2	U
4–Methylphenol	3.5		2.3	
1,4–Dichlorobenzene	0.58	U	1.2	U
4–Chloroaniline		REJ	1.2	U
Phenol	11.5		1.2	U
Bis(2–Chloroethyl)Ether	0.58	U	1.2	U
Bis(2–Chloroethoxy)Methane	0.58	U	1.2	U
Bis(2–Ethylhexyl)Phthalate	0.58	U	1.2	U
Di–n–Octyl Phthalate	1.4	U	3.0	U
Hexachlorobenzene	0.58	U	1.2	U
Anthracene	0.58	U	1.2	U
1,2,4–Trichlorobenzene	0.58	U	1.2	U
2,4–Dichlorophenol	5.3		1.4	
2,4–Dinitrotoluene		REJ	3.0	U
Pyrene	0.58	U	1.2	U
Dimethyl Phthalate	0.58	U	1.2	U
Dibenzofuran	1.1		1.2	U
Benzo(g,h,i)Perylene	0.58	U	1.2	U
Indeno(1,2,3–cd)Pyrene	0.58	U	1.2	U
Benzo(b)Fluoranthene	0.58	U	1.2	U
Fluoranthene	0.58	U	1.2	U
Benzo(k)Fluoranthene	0.58	U	1.2	U
Acenaphthylene	0.58	U	1.2	U
Chrysene	0.58	U	1.2	U
Retene	0.58	U	1.2	U
4,6–Dinitro–2–Methylphenol	5.8	U	12.1	U
1,3–Dichlorobenzene	0.58	U	1.2	U
2,6–Dinitrotoluene	1.4	U	3.0	U
N–Nitroso–di–n–Propylamine	0.58	U	1.2	U
4–Chlorophenyl Phenylether	0.58	U	1.2	U
1,2–Diphenylhydrazine	0.58	U	1.2	U
Bis(2–Chloroisopropyl)Ether	0.58	U	1.2	U

Inf – influent
Eff – effluent
E – Ecology sample

U – The analyte was not detected at or above the associated value.
J – The analyte was positively identified. The associated numerical result is an estimate.
UJ – The result was not detected at or above associated estimated value.
REJ – The data are unusable for all purposes

[ ] – detected analyte

Appendix F – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Location:	Eff–E	
Type:	comp	
Date:	4/14–15	
Time:	0300–0300	
Lab Log#:	168142	
Pesticide/PCB Compounds	ug/L	
alpha–BHC	0.03	U
beta–BHC	0.03	U
delta–BHC	0.03	U
gamma–BHC (Lindane)	0.03	U
Heptachlor	0.03	U
Aldrin	0.03	U
Heptachlor Epoxide	0.03	U
Endosulfan I	0.03	U
Dieldrin	0.03	UJ
4,4'–DDE	0.03	U
Endrin	0.03	UJ
Endosulfan II	0.03	U
4,4'–DDD	0.03	U
Endosulfan Sulfate	0.03	U
4,4'–DDT	0.03	UJ
Methoxychlor	0.03	UJ
Endrin Ketone	0.03	UJ
Toxaphene	3.0	U
Aroclor–1016	0.61	U
Aroclor–1221	0.61	U
Aroclor–1232	0.61	U
Aroclor–1242	0.61	U
Aroclor–1248	0.61	U
Aroclor–1254	0.61	U
Aroclor–1260	0.61	U
Endrin Aldehyde	0.03	UJ
Chlordane	0.61	U

Eff – effluent
E – Ecology sample

U – The analyte was not detected at or above the associated value.
UJ – The result was not detected at or above associated estimated value.

[ ] – detected analyte

Appendix F – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

	Location:	TrnsbInk	Inf–E	Inf–G	Clwtr–E	Eff–E	Eff–G	MRU–E	MRU–ED
	Type:	grab	comp	comp	comp	comp	comp	comp	comp
	Date:	4/15	4/14–15	4/14–15	4/14–15	4/14–15	4/14–15	4/14–15	4/14–15
	Time:	1100	0300–0300	0300–0300	0300–0300	0300–0300	0300–0300	0900–0900	0900–0900
Metals	Lab Log#:	168132	168133	168134	168137	168142	168143	168139	168141
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Antimony		30 U	30 U			30 U	30 U	30 U	
Arsenic		1.5 U	2.0 P			1.8 P	1.6 P	6.0 U	
Beryllium		1 UJ	1 UJ			1 UJ	1 UJ	1 UJ	
Cadmium		0.10 P	3.38			1.97	1.95	0.40 U	
Chromium		5 U	184			131	127	23 P	
Copper		3 U	14 P			11 P	30 P	47.2	
Lead		1.0 UN	4.0 J			2.3 J	1.7 J	4.0 UN	
Mercury (total)		0.05 UN	0.050 UN	0.050 UN	0.27 J	0.29 J	0.28 J	9.20 N	8.92 N
Nickel		10 U	12 P			10 U	10 U	17 P	
Selenium		4.0 UN	4.0 UN			4.0 UN	4.0 UN	4.0 UN	
Silver		0.50 U	0.50 U			0.50 UJ	0.50 UJ	2.0 UJ	
Thallium		2.5 U	2.5 U			2.5 U	2.5 U	10 U	
Zinc		5.9 P	79.1			47.7	51.7	40.7	

TrnsbInk – transfer blank
Inf – influent
Clwtr – non–contact cooling water influent
Eff – effluent
MRU – mercury recovery unit process water
E – Ecology sample
ED – duplicate Ecology sample
G – Georgia Pacific sample

U The analyte was not detected at or above the reported result.
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.
N The spike sample recovery is not within control limits.
P The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
UN The analyte was not detected at or above the reported result. The spike sample recovery is not within control limits.

– detected analyte

Appendix G – Sediment VOA, BNA, Pesticide/PCB and Metals Scan Results – Georgia–Pacific (Bellingham), April 1993.

Location:	Sed–1	Sed–2	Sed–3	Sed–4	Sed–Comp
Type:	grab	grab	grab	grab	grab–comp
Date:	4/15	4/15	4/15	4/15	4/15
Time:	1245	1540	1400	1715	1245–1715
Lab Log#:	168147	168148	168149	168150	168151
VOA Compounds	ug/kg–dr	ug/kg–dr	ug/kg–dr	ug/kg–dr	ug/kg–dr
Chloromethane	31 U	31 U	27 U	22 U	
Bromomethane	31 U	31 U	27 U	22 U	
Vinyl Chloride	31 U	31 U	27 U	22 U	
Chloroethane	31 U	31 U	27 U	22 U	
Methylene Chloride	31 U	31 U	27 U	22 U	
Acetone	39 J	25 J	52 J	18 J	
Carbon Disulfide	31 U	31 U	1 J	22 U	
1,1–Dichloroethene	31 U	31 U	27 U	22 U	
1,1–Dichloroethane	31 U	31 U	27 U	22 U	
1,2–Dichloroethene (total)	31 U	31 U	27 U	22 U	
Trans–1,2–Dichloroethene					
Cis–1,2–Dichloroethene					
Chloroform	31 U	31 U	1 J	22 U	
1,2–Dichloroethane	31 U	31 U	27 U	22 U	
2–Butanone (MEK)	31 U	31 U	15 J	6 J	
1,1,1–Trichloroethane	31 U	31 U	27 U	22 U	
Carbon Tetrachloride	31 U	31 U	27 U	22 U	
Bromodichloromethane	31 U	31 U	27 U	22 U	
1,2–Dichloropropane	31 U	31 U	27 U	22 U	
cis–1,3–Dichloropropene	31 U	31 U	27 U	22 U	
Trichloroethene	31 U	31 U	27 U	22 U	
Dibromochloromethane	31 U	31 U	27 U	22 U	
1,1,2–Trichloroethane	31 U	31 U	27 U	22 U	
Benzene	31 U	31 U	27 U	22 U	
trans–1,3–Dichloropropene	31 U	31 U	27 U	22 U	
2–Chloroethylvinyl Ether	31 U	31 U	27 U	22 U	
Bromoform	31 U	31 U	27 U	22 U	
4–Methyl–2–Pentanone (MIBK)	31 U	31 U	27 U	22 U	
2–Hexanone	31 U	31 U	27 U	22 U	
Tetrachloroethene	31 U	31 U	27 U	22 U	
1,1,2,2–Tetrachloroethane	31 U	31 U	27 U	22 U	
Toluene	31 U	31 U	0.6 J	22 U	
Chlorobenzene	31 U	31 U	27 U	22 U	
Ethylbenzene	31 U	31 U	27 U	22 U	
Styrene	31 U	31 U	27 U	22 U	
Total Xylenes	31 U	31 U	27 U	22 U	
1,3–Dichlorobenzene	31 U	31 U	27 U	22 U	
1,4–Dichlorobenzene	31 U	31 U	27 U	22 U	
1,2–Dichlorobenzene	31 U	31 U	27 U	22 U	

Sed – sediment sample
Sed–Comp – composite sediment sample
grab – grab sample
comp – composite sample
U – The analyte was not detected at or above the associated value.
J – The analyte was positively identified. The associated numerical result is an estimate.

☐ –detected analyte

Appendix G – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Location:	Sed–Comp	
Type:	grab–comp	
Date:	4/15	
Time:	1245–1715	
Lab Log#:	168151	
BNA Compounds	ug/kg–dr	
Benzo(a)Pyrene	48.2	UJ
2,4–Dinitrophenol	15700	U
Dibenzo(a,h)Anthracene	787	U
Benzo(a)Anthracene	787	U
4–Chloro–3–Methylphenol	787	U
Aniline	787	U
Dimethyl–Nitrosamine	797	U
Benzoic Acid	297	UJ
Hexachloroethane	787	U
Hexachlorocyclopentadiene		REJ
Isophorone	787	U
Acenaphthene	787	U
Diethyl Phthalate	787	U
Di–n–Butyl Phthalate	787	U
Phenanthrene	800	UJ
Butylbenzyl Phthalate	787	U
N–Nitrosodiphenylamine	787	U
Fluorene	62.4	J
Carbazole	787	U
Hexachlorobutadiene	787	U
Pentachlorophenol	3930	U
2,4,6–Trichlorophenol	787	U
2–Nitroaniline	787	U
2–Nitrophenol	1970	U
1–Methylnaphthalene	74.0	J
Naphthalene	1390	
2–Methylnaphthalene	68.0	J
2–Chloronaphthalene	787	U
3,3'–Dichlorobenzidine	1570	U
Benzidine	1570	UJ
2–Methylphenol	787	U
1,2–Dichlorobenzene	787	U
o–Chlorophenol	787	U
2,4,5–Trichlorophenol	787	U
Nitrobenzene	787	U
3–Nitroaniline	787	U
4–Nitroaniline	787	U
4–Nitrophenol	1970	U
Benzyl Alcohol	787	U
4–Bromophenyl Phenylether	787	U

Sed – sediment sample
Comp – composite sample
U – The analyte was not detected at or above the associated value.
J – The analyte was positively identified. The associated numerical result is an estimate.
UJ – The result was not detected at or above associated estimated value.
REJ – The data are unusable for all purposes

[ ] – detected analyte

Appendix G – (cont'd) – Georgia–Pacific (Bellingham), April 1993.

Location:	Sed–Comp	
Type:	grab–comp	
Date:	4/15	
Time:	1245–1715	
Lab Log#:	168151	
BNA Compounds (cont'd)	ug/kg–dr	
2,4–Dimethylphenol	787	U
4–Methylphenol	2450	U
1,4–Dichlorobenzene	787	U
4–Chloroaniline	787	UJ
Phenol	235	J
Pyridine	749	UJ
Bis(2–Chloroethyl)Ether	787	U
Bis(2–Chloroethoxy)Methane	787	U
Bis(2–Ethylhexyl)Phthalate	677	UJ
Di–n–Octyl Phthalate	787	U
Hexachlorobenzene	787	U
1,3,5–Tribromophenol	76	
Anthracene	74.5	J
1,2,4–Trichlorobenzene	787	U
2,4–Dichlorophenol	73.1	U
2,4–Dinitrotoluene	1970	U
Pyrene	432	J
Dimethyl Phthalate	787	U
Dibenzofuran	281	J
Benzo(g,h,i)Perylene	787	U
Indeno(1,2,3–cd)Pyrene	787	UJ
Benzo(b)Fluoranthene	787	U
Fluoranthene	715	J
Benzo(k)Fluoranthene	787	U
Acenaphthylene	192	J
Chrysene	86.2	J
Retene	787	U
4,6–Dinitro–2–Methylphenol	7870	U
1,3–Dichlorobenzene	787	U
2,6–Dinitrotoluene	1970	U
N–Nitroso–di–n–Propylamine	787	U
4–Chlorophenyl Phenylether	787	U
1,2–Diphenylhydrazine	1570	U
Bis(2–Chloroisopropyl)Ether	787	U

Sed – sediment sample
Comp – composite sample
U – The analyte was not detected at or above the associated value.
J – The analyte was positively identified. The associated numerical result is an estimate.

[ ] –detected analyte

Appendix G – (cont'd) – Georgia Pacific (Bellingham), April 1993.

Location:	Sed-1	Sed-2	Sed-3	Sed-4
Type:	grab	grab	grab	grab
Date:	4/15	4/15	4/15	4/15
Time:	1245	1540	1400	1715
Lab Log#:	168147	168148	168149	168150
	mg/kg-dr	mg/kg-dr	mg/kg-dr	mg/kg-dr
Metals				
Antimony	3 UJ	3 UJ	3 UJ	3 UJ
Arsenic	9.85	10.4	10.9	10.1
Beryllium	0.44 P	0.43 P	0.43 P	0.43 P
Cadmium	0.689	0.455	0.459	0.323
Chromium	85.6	82	85.1	81.4
Copper	51.2	46.5	48.4	46.9
Lead	15.3	14.9	14.2	13.6
Mercury	0.713	0.638 J	0.445 J	0.232 J
Nickel	107	101	106	113
Selenium	0.74 J	0.70 J	0.83 J	0.54 J
Silver	1.4 J	1.3 J	1.1 J	1.0 UJ
Thallium	0.50 U	0.50 U	0.50 U	0.50 U
Zinc	125	114	112	107

Sed – sediment

U – The analyte was not detected at or above the associated value.

J – The analyte was positively identified. The associated numerical result is an estimate.

UJ – The result was not detected at or above the associated estimated value.

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

– detected analyte

Appendix H – VOA and BNA Scan Tentatively Identified Compounds (TICs) – Georgia-Pacific (Bellingham), April 1993.

Tic data are presented on the laboratory report sheets that follow. Fractions are identified as VOA or B/N/Acid (BNA). Locations corresponding to the Lab Log# (called Sample No. on the laboratory report sheet) and data qualifiers are summarized on this page. If sheets are not included for a station, no TICs were detected.

Location:	Inf-E	Inf-1	Inf-2	Eff-E	Eff-1	Eff-2
Type:	comp	grab	grab	comp	grab	grab
Date:	4/14-15	4/14	4/14	4/14-15	4/14	4/14
Time:	0300-0300	0930	1405	0300-0300	1315	1500
Lab Log#:	168133	168135	168136	168142	168145	168146

Location:	Sed-1	Sed-2	Sed-3	Sed-4	Sed-Comp
Type:	grab	grab	grab	grab	grab-comp
Date:	4/27	4/27	4/27	4/27	4/27
Time:	1245	1540	1400	1715	1245-1715
Lab Log#:	168147	168148	168149	168149	168151

J – the associated numerical value is an estimate.

NJ – indicates there is evidence the analyte is present.

Inf – influent

Eff – effluent

comp – composite sample

grab – grab sample

E – Ecology sample

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168135

Lab ID: D558A
Matrix: Waters
Instrument: FINN 3

QC Report No: D558 - WDOE
Project No: Georgia Pacific

VTSR: NA

Data Release Authorized: _____
Report: 05/06/93 MAC:sk

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)	
1	7446-09-5	Sulfur Dioxide	VOA	207	760 J NJ	KF
2	-	Unknown (bp m/e 45)	VOA	279	14 J	
3	-	Unknown (bp m/e 59)	VOA	310	130 J	
4	79-20-9	Methyl Ester Acetic Acid	VOA	364	130 J NJ	KF
5	141-78-6	Ethyl Ester Acetic Acid	VOA	484	123 J NJ	KF
6	-	Unknown (bp m/e 55)	VOA	672	28 J	
7	-	C9.H12 Isomer (bp m/e 105)	VOA	1048	29 J NJ	KF
8	-	Ethylmethylbenzene Isomer (bp m/e 105)	VOA	1079	5 J	↓
9	-	Trimethylbenzene Isomer (bp m/e 105)	VOA	1092	27 J	↓
10	-	Methylmethylethylbenzene Isomer	VOA	1118	11 J	↓
11						
12						
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Form 1, Part B

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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168136

Lab ID: D558B
Matrix: Waters
Instrument: FINN 3

QC Report No: D558 - WDOE
Project No: Georgia Pacific

VTSR: 04/19/93

Data Release Authorized: _____
Report: 05/06/93 MAC:sk

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	7446-09-5	Sulfur Dioxide	VOA	207	330 J NJ KF
2	-	Unknown (bp m/e 59)	VOA	311	130 J
3	79-20-9	Methyl Ester Acetic Acid	VOA	366	160 J NJ KF
4	141-78-6	Ethyl Ester Acetic Acid	VOA	486	77 J NJ KF
5					
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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168145

Lab ID: D558C
Matrix: Waters
Instrument: FINN 3

QC Report No: D558 - WDOE
Project No: Georgia Pacific

VTSR: 04/19/93

Data Release Authorized: _____
Report: 05/05/93 MAC:sk

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-	-
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
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ORGANIC ANALYSIS DATA SHEET - Tentatively Identified Compounds

Sample No: 168146

Lab ID: D558D
Matrix: Waters
Instrument: FINN 3

QC Report No: D558 - WDOE
Project No: Georgia Pacific

VTSR: 04/19/93

Data Release Authorized: _____
Report: 05/05/93 MAC:sk

	CAS Number	Compound Name	Fraction	Scan Number	Estimated Concentration (µg/L)
1	-	No UNKNOWN pks >10% IS peak height	VOA	-	-
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
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29					
30					

Sample No: 93 168133 Description: INF-E

Tent Ident - B/N/Aci	Water-Total Result	Units
BENZENEETHANOL	71.0NJ*	ug/l
Guaicol (2-methoxyphen+	97.2NJ*	ug/l
2-FURANMETHANOL	360NJ*	ug/l
BENZALDEHYDE, 4-HYDROX+	43.2NJ*	ug/l
ETHANOL, 2-(2-BUTOXYET+	19.4NJ*	ug/l
NAPHTHO[2,3-C]FURAN-1(+	1620NJ*	ug/l
2(3H)-FURANONE, DIHYDR+	250NJ*	ug/l
2-FURANCARBOXALDEHYDE,+	163NJ*	ug/l
2-Propanone, 1,1,3,3-t+	54.7NJ*	ug/l
2-PROPANONE, 1-(4-HYDR+	105NJ*	ug/l
UNKNOWN COMPOUND 1	32.4NJ*	ug/l
UNKNOWN COMPOUND 2	52.6NJ*	ug/l
UNKNOWN COMPOUND 3	34.0NJ*	ug/l
UNKNOWN COMPOUND 4	127NJ*	ug/l
UNKNOWN COMPOUND 5	15.5NJ*	ug/l
UNKNOWN COMPOUND 6	77.8NJ*	ug/l
UNKNOWN COMPOUND 7	22.9NJ*	ug/l
UNKNOWN COMPOUND 8	19.3NJ*	ug/l
UNKNOWN COMPOUND 9	22.5NJ*	ug/l
PHENANTHRENE, 1,2,3,4,+	17.5NJ*	ug/l
Benzeneacetic acid, .a+	105NJ*	ug/l
Ethanone, 1-(1H-pyrazo+	54.3NJ*	ug/l
PHENANTHRENE, 7-ETHENY+	32.4NJ*	ug/l

Sample No: 93 168142 Description: EFF-E

B/N/Acid Scan *** Continued ***	Water-Total Result	Units
1,2-DICHLOROBENZENE-D4	59	% Recov
Surrog: D5-Nitrobenzene	77	% Recov
Surrog: Phenol D5	63	% Recov
D4-2-CHLOROPHENOL (SS)	82	% Recov

Tent Ident - B/N/Aci	Water-Total Result	Units
Decanoic Acid, Hexa-	22.6NJ*	ug/l
CYCLOHEXENE, 4-METHYLE+	4.1NJ*	ug/l
Decanoic Acid, Tetra-	3.3NJ*	ug/l
Decanoic Acid, Penta-	5.2NJ*	ug/l
9-HEXADECENOIC ACID	11.4NJ*	ug/l
NAPHTHALENE, DECAHYDRO+	4.7NJ*	ug/l
UNKNOWN HYDROCARBON 1	4.2NJ*	ug/l
UNKNOWN COMPOUND 1	4.6NJ*	ug/l
UNKNOWN COMPOUND 2	20.8NJ*	ug/l
UNKNOWN COMPOUND 3	13.9NJ*	ug/l
UNKNOWN COMPOUND 4	2.6NJ*	ug/l
UNKNOWN COMPOUND 5	4.1NJ*	ug/l
UNKNOWN COMPOUND 6	5.5NJ*	ug/l
UNKNOWN COMPOUND 7	2.7NJ*	ug/l
UNKNOWN COMPOUND 8	3.9NJ*	ug/l
3,4,5-Trichloroguaiaco+	2.4NJ*	ug/l

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

168147

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 11719 SAS No.: SDG No.: 168147

Matrix: (soil/water) SOIL Lab Sample ID: 8208

Sample wt/vol: 5.0 (g/mL) G Lab File ID: A4348

Level: (low/med) LOW Date Received: 04/29/93

% Moisture: not dec. 68 Date Analyzed: 05/03/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

168148

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 11719 SAS No.: SDG No.: 168147

Matrix: (soil/water) SOIL Lab Sample ID: 8209

Sample wt/vol: 5.0 (g/mL) G Lab File ID: A4349

Level: (low/med) LOW Date Received: 04/29/93

% Moisture: not dec. 68 Date Analyzed: 05/03/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 3/90

00020

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

168149

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 11719 SAS No.: SDG No.: 168147

Matrix: (soil/water) SOIL Lab Sample ID: 8210

Sample wt/vol: 5.0 (g/mL) G Lab File ID: A4350

Level: (low/med) LOW Date Received: 04/29/93

% Moisture: not dec. 63 Date Analyzed: 05/03/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

168150

Lab Name: WEYERHAEUSER Contract: 046-5751

Lab Code: WEYER Case No.: 11719 SAS No.: SDG No.: 168147

Matrix: (soil/water) SOIL Lab Sample ID: 8211

Sample wt/vol: 5.0 (g/mL) G Lab File ID: A4351

Level: (low/med) LOW Date Received: 04/29/93

% Moisture: not dec. 55 Date Analyzed: 05/03/93

GC Column: CAP ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: (uL) Soil Aliquot Volume: (uL)

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

FORM I VOA-TIC 3/90

Project: DOE-706Y GEORGIA PACIFIC (BELLINGHAM)

Laboratory: Ecology, Manchester

Sample No: 93 168151 Description: SED-COMP

Begin Date: 93/04/27 :

Tent Ident - B/N/Aci *** Continued ***	Sediment Result	Units
PHYTOL	1810NJ*	ug/kg
Decanoic Acid, Tetra-	1010NJ*	ug/kg
STIGMAST-4-EN-3-ONE	3420NJ*	ug/kg
9-HEXADECENOIC ACID, M+	1910NJ*	ug/kg
9-HEXADECENOIC ACID	3360NJ*	ug/kg
TETRADECANOIC ACID, 12+	1380NJ*	ug/kg
PENTADECANOIC ACID, ME+	589NJ*	ug/kg
UNKNOWN HYDROCARBON 1	2510NJ*	ug/kg
UNKNOWN HYDROCARBON 2	4050NJ*	ug/kg
UNKNOWN HYDROCARBON 3	2070NJ*	ug/kg
UNKNOWN COMPOUND 1	18700NJ*	ug/kg
UNKNOWN COMPOUND 2	3090NJ*	ug/kg
UNKNOWN COMPOUND 3	4700NJ*	ug/kg
UNKNOWN COMPOUND 4	1620NJ*	ug/kg
UNKNOWN COMPOUND 5	19100NJ*	ug/kg
UNKNOWN COMPOUND 6	12600NJ*	ug/kg
UNKNOWN COMPOUND 7	1120NJ*	ug/kg
UNKNOWN COMPOUND 8	999NJ*	ug/kg
UNKNOWN COMPOUND 9	2550NJ*	ug/kg
UNKNOWN COMPOUND 10	4310NJ*	ug/kg
KAUR-16-ENE, (8.BETA.,+	2100NJ*	ug/kg
1-CYCLOHEXENE-1-CARBOX+	1680NJ*	ug/kg

Appendix I - Glossary of Terms - Georgia-Pacific (Bellingham), April 1993.

AOX - adsorbable organic halides
BOD - biochemical oxygen demand
BNA - base-neutral acids (semivolatile organics)
ClWtr - clearwater sample
COD - chemical oxygen demand
comp - composite sample
E - Department of Ecology
Eff - effluent
EPA - United States Environmental Protection Agency
G - Georgia-Pacific sample
g - gram
grab - grab sample
grab-comp - grab-composite sample
GP - Georgia-Pacific Corporation
Inf - influent
LC50 - concentration which is lethal to 50% of the test organisms
MF - membrane filter
mg - milligram
mg/L - milligram per liter
MRU - mercury recovery unit
NOEC - no observable effect concentration
NPDES - National Pollutant Discharge Elimination System
pg - picogram
pH - hydrogen ion concentration
QA - quality assurance
QC - quality control
Sed - sediment sample
TIC - tentatively identified compound
TNVS - total nonvolatile solids
TNVSS - total nonvolatile suspended solids
TOC - total organic carbon
TS - total solids

Appendix I - (cont'd) - Georgia-Pacific (Bellingham) - April 1993.

TSS - total suspended solids
μ - microgram
μ/L - microgram per liter
VOA - volatile organic acid

Appendix J - Glossary of Data Qualifiers - Port Townsend Paper, 1993.

DATA QUALIFIERS

J	The analyte was positively identified. The associated numerical result is an estimate.
N	The spike sample recovery is not within control limits.
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.
UJ	The analyte was not detected at or above the reported estimated result.
UN	The analyte was not detected at or above the reported result. The spike recovery is not within control limits.