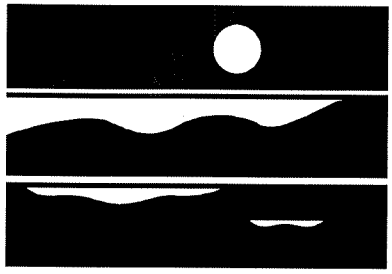

LONGVIEW FIBRE COMPANY
CLASS II INSPECTION
NOVEMBER 2-3, 1993

October 1994

Water Body N. WA-CR-1010
Publication No. 94-160
printed on recycled paper

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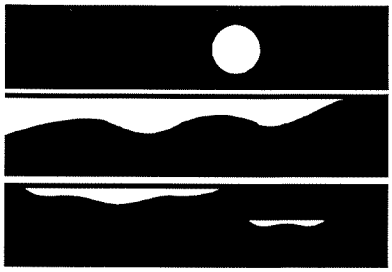

Longview Fibre Company
Class II Inspection
November 1993

by
Paul Stasch

Environmental Investigations and Laboratory Services Program
Olympia, Washington 98504-7710

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Abstract

A Class II Inspection was conducted in November 1993 at the Longview Fibre Company, Pulp and Paper Mill. The facility discharges combined industrial and sanitary wastewater to the Columbia River. The inspection data found Longview Fibre discharging a good quality effluent for the conventional parameters analyzed. Effluent concentrations were within the NPDES permit limitations. Effluent priority pollutant concentrations for mercury, copper and lead were at or near the chronic State/USEPA Water Quality Criteria. Bioassay testing documented limited toxicity to two of the test organisms.

Summary

Flow Measurements

No instantaneous flow measurements could be made to validate the accuracy of the Longview Fibre in-line flow meter.

The flow calculated for the sanitary discharge matched the Longview Fibre instantaneous reading.

General Chemistry

Process Wastewater

The final effluent received good treatment for the conventional parameters BOD_5 and TSS. Nutrients and AOX were low throughout the treatment process.

Flow partitioning across the UNOX treatment unit appears uneven. Solids concentrations suggest a higher hydraulic loading is routed through the center train. A more balanced flow may result in a better treated effluent.

The solids concentrations in the RAS were lower than the concentrations seen in the WAS.

Sanitary Wastewater

The final effluent received good treatment for the conventional parameters BOD_5 and TSS. Removal efficiencies were 88% and 86%, respectively. The plant was partially nitrifying at the time of the inspection.

Priority Pollutant Organics - VOA and BNA Scans

No organic compounds detected in the effluent exceeded the USEPA Water Quality Criteria (USEPA, 1986) or the Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC.

Chloroform was the only VOA compound detected in the final effluent. Only three BNA compounds were detected and positively identified in the final effluent at concentrations under 1 μg/L.

Priority Pollutant Inorganics - Metals Scans

The metals concentrations were reduced across the treatment facility. The estimated mercury concentration exceeded the chronic State/USEPA Water Quality Criteria for fresh and marine water. The estimated lead and copper concentrations were at the chronic criteria for fresh water.

Dioxin/Furan

Total TCDD and HpCDD were detected in the final effluent. The isomer 2,3,7,8-tetrachloro-dibenzo-*p*-dioxin was not detected in the effluent. No dioxin or furan compounds were detected in the bleach plant effluent.

Bioassay

The chronic *Ceriodaphnia* and acute *Daphnia* tests demonstrated no adverse effects. The chronic fathead minnow test had an NOEC for survival of 50%. The acute rainbow trout test exhibited an 80% survival of test organisms in 100% effluent.

NPDES Permit Compliance

No violations of the permit were documented for either the sanitary effluent or the final effluent.

The 2,3,7,8-TCDD isomer was not detected in the final effluent. If the detection limit is used to calculate the loadings, the result is greater than the annual average and the daily maximum permit limits. The 2,3,7,8-TCDD limit was not in effect during the inspection, but became effective on March 8, 1994.

Split Sample Analyses

The Longview Fibre sample results were similar to the Ecology results and appear representative. The Longview Fibre effluent composite sampler failed.

Recommendations

- The final effluent flow meter maintenance records should be reviewed to assure the meter is routinely calibrated.

- Further balancing of the hydraulic loading to the UNOX trains could improve treatment.

- Investigating and balancing the hydraulic loading to the secondary clarifiers could improve treatment.

- The apparent inability to detect 2,3,7,8-TCDD at the permit limit should be resolved.

- Longview Fibre should take the necessary steps to ensure a representative effluent sample can be collected.

- More suitable primary clarifier influent sampling location is recommendation to aid Longview Fibre internal monitoring.

Introduction

A Class II Inspection was conducted at the Longview Fibre Company's pulp and paper mill (LF), on November 2-3, 1993. The inspection was conducted by Paul Stasch and Marc Heffner, of the Washington State Department of Ecology's Compliance Monitoring Unit of the Toxics Investigations Section. David Mendenhall, an environmental engineer at LF, provided onsite assistance during sampling. Mike Hoyles of Ecology's Industrial Section requested the inspection.

The facility is located in the industrial area of Longview, Washington. Secondary treatment is provided for both process and sanitary wastewater. Treated wastewater is discharged to the Columbia River under the provisions of NPDES Permit No. WA-000007-8. The permit was issued on May 10, 1991, amended on June 7, 1991, and expires on May 10, 1996.

Specific objectives of the inspection included:

1. determine compliance with NPDES permit limits,
2. assess plant self-monitoring program,
3. evaluate wastewater treatment plant performance, and
4. characterize effluent toxicity with chemical scans and with bioassays.

The Longview Fibre Company produces kraft paperboard and paper. In the process approximately 60 million gallons per day (MGD) of wastewater is produced. Approximately 10% of the pulp produced is bleached, however, during the first day of the inspection the bleach plant was not operating.

The process wastewater first receives primary clarification prior to introduction into the UNOX high purity oxygen activated sludge treatment unit (Figure 1). Following the UNOX treatment, the wastewater receives secondary clarification. Sludge is wasted from only two of the clarifiers, while sludge is recycled from the others. Nutrients are added to the RAS when it is reintroduced back into the headworks of the UNOX unit. Overflow from the seven clarifiers is collected and pumped to the Columbia River. The primary and secondary clarifiers solids are mechanically dried then burned onsite as hog fuel. A surge basin is available to hold untreated wastewater when the wastewater characteristics or treatment plant operations necessitate.

Sanitary wastes are treated in a small trickling filter package plant (Figure 1). The wastewater receives primary clarification before entering the trickling filter. After chlorination, the sanitary effluent passes over a V-notch weir before joining the treated process wastewater effluent.

Procedures

Ecology collected composites from four locations within the facility; at the forebay of the UNOX unit, at the final process wastewater effluent surge basin, and at the influent and effluent of the sanitary treatment plant. A composite of the process wastewater entering the primary clarifier could not be collected because of access problems. Ecology used Isco composite samplers to collect equal volumes of sample every 30 minutes for a 24-hour period. A grab-composite sample of the final effluent was collected for bioassay testing. A sample was also proportionally composited from the bleach plant acid wastestream and the bleach plant alkaline wastestream to represent the combined bleach plant process wastewater. The acid wastestream comprises approximately 60% of the combined flow while the alkaline wastestream comprises the remaining 40%.

Grab samples were collected from the composite sample locations. Grab samples were also collected of the process wastewater entering the primary clarifier, the bleach plant acid wastestream, the bleach plant alkaline wastestream, the return activated sludge, the waste activated sludge, the sanitary influent and effluent, and from five separate locations within the UNOX unit.

LF also collected composite samples. A composite was collected of the process wastewater entering the primary clarifier and of the influent to the UNOX unit. The final effluent composite sampler failed to collect a sample. Ecology and LF composite samples were split for analyses by both the Ecology and LF laboratories. LF grab samples of the sanitary influent and effluent were also split for analyses.

Sample station descriptions are provided on Table 1. Sampling locations are depicted on Figures 1 and 2. Samples collected, sampling times and parameters analyzed are summarized in Appendix A. Ecology's analytical methods and laboratories used are identified in Appendix B.

Quality Assurance/Quality Control

Sampling quality assurance/quality control (QA/QC) measures included priority pollutant cleaning of sampling equipment (Appendix C), icing the compositors, and maintaining chain-of-custody on all samples. Samples collected were immediately placed on ice and delivered to the Ecology Manchester Laboratory. All samples were received in good condition with chain-of-custody intact. All analyses were performed within the USEPA Contract Laboratory Program specified holding times. All results can be used noting the data qualifiers provided on the tables and described in Appendix D.

Results and Discussion

Flow Measurements

The discharge of the final plant effluent is measured with an in-line venturi flow meter immediately downstream of the effluent wet well pumping station and after introduction of the sanitary effluent. Therefore, no instantaneous flow measurements could be made to validate the accuracy of the LF meter. Maintainance records should be reviewed to assure the meter is routinely calibrated. The discharge from the 001 outfall during the inspection was 60.7 MGD (Mendenhall, 1993).

The discharge of the sanitary effluent was checked at the 90^0 V-notched weir. The flow calculated for the discharge matched the LF instantaneous reading. The average flow of 0.026 MGD during the inspection is thought to be accurate.

General Chemistry

Process Wastewater

General chemistry data for process water samples collected during the inspection are shown on Table 2. The final effluent received good treatment for the conventional parameters BOD_5 and TSS. Nutrients were low throughout the treatment process. The effluent total phosphorus concentration was approximately 1 mg/L, the NH_3-N concentration was approximately 0.05 mg/L and NO_2+NO_3-N concentration was <0.01 mg/L. Caution should be used to maintain a proper nutrient balance to avoid system upsets.

Fecal coliform counts using the membrane filter technique were very high but a high background count makes the number unreliable. Fecal coliform counts using the most probable number technique (1,300 and 330/100 mL) were one to two orders of magnitude lower. The AOX concentration was 22 mg/L in the bleach plant effluent, but was under 1 mg/L in the final effluent.

Flow partitioning across the UNOX treatment unit appears uneven based on MLSS concentrations (Figure 2). Solids concentrations suggest a higher hydraulic loading is routed through the center train. Additional balancing of hydraulic loading to the UNOX trains should be investigated. A more balanced flow may result in a better treated effluent.

The solids concentrations in the return activated sludge (RAS) were lower than the concentrations seen in the waste activated sludge (WAS). Since the WAS and RAS were

pulled from different clarifiers, the observation suggests balancing hydraulic loading to the clarifiers should be investigated.

Sanitary Wastewater

The general chemistry data for the sanitary water are provided on Table 2. The final effluent received good treatment for the conventional parameters BOD_5 and TSS in the trickling filter package plant. Removal efficiencies were 88% and 86%, respectively. The plant was partially nitrifying at the time of the inspection. Low effluent alkalinity (approximately 70 mg/L as $CaCO_3$) could hinder additional nitrification.

Priority Pollutant Organics - VOA and BNA Scans

Priority pollutant organic data are provided on Table 3. None of the compounds detected in the effluent exceeded the USEPA Water Quality Criteria (USEPA, 1986) or the Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC.

Chloroform was the only VOA compound detected in the final effluent. It was detected in concentrations of less than 10 ug/L. The compounds 2-Butanone (MEK) and 4-Methyl-2-Pentanone (MIBK) were detected in the UNOX influent but were removed by treatment. Chloroform was detected in the highest concentration (approximately 180 ug/L) in the bleach plant waste streams. Eight BNA compounds were detected in the UNOX influent at low concentrations. Only three were detected and positively identified in the final effluent at concentrations under 1 ug/L. Twenty tentatively identified compounds (TICs) were also detected in the effluent at or below 30 ug/L.

A list of target analytes and their detection limits is provided in Appendix E.

Priority Pollutant Inorganics - Metals Scans

Priority pollutant metals data are provided on Table 3. The metals concentrations were reduced across the treatment facility. The estimated mercury concentration exceeded the chronic State/USEPA Water Quality Criteria, for both fresh and marine water. The estimated lead and copper concentrations were at the chronic criteria for fresh water.

A list of target analytes and their detection limits is provided in Appendix E.

Dioxins/Furans

Dioxin and furan data are provided on Table 4. Total tetrachlorodibenzodioxin (TCDD) and 1,2,3,4,6,7,8-heptachlorodibenzodioxin (HpCDD) were detected in the final effluent.

However, the total TCDD concentration reported was below the practical quantification limit (PQL) and is therefore an estimate. The isomer 2,3,7,8-tetrachlorodibenzo-*p*-dioxin was not detected in the effluent. No dioxin or furan compounds were detected in the bleach plant effluent.

Bioassay

The bioassay data are provided on Table 5. The chronic *Ceriodaphnia* and acute *Daphnia* tests demonstrated no adverse effects. The chronic fathead minnow test had an NOEC for survival of 50%. The acute rainbow trout test exhibited an 80% survival of test organisms in 100% effluent and a 93.2% survival in 65% effluent.

NPDES Permit Compliance

A comparison of the effluent and sanitary wastewater data to the NPDES permit limitations is presented on Table 6. Sanitary and final effluent concentrations were within the monthly averages or daily maximums specified in the permit.

The 2,3,7,8-TCDD isomer was not detected in the final effluent. If the detection limit is used to calculate the loadings, the result is greater than the annual average and the daily maximum permit limits. Therefore, the available detection limit is inadequate to assess compliance with the permit limitation. It should be noted that neither the dioxin nor the AOX permit limitation were in effect at the time of the inspection. The dioxin limit became effective on March 8, 1994 and the AOX limit will become effective in November 1995.

Split Sample Analyses

A comparison of the split sample results is presented on Table 7. No anomalies were noted between the Ecology and LF laboratory analyses. The LF laboratory is accredited for the permit parameters.

The LF samples were similar to the Ecology samples and appear representative. The LF effluent composite sampler failed. LF should take the necessary steps to ensure a representative sample can be collected. Also, the LF primary clarifier influent composite sample was collected at a tap prone to plugging. Although a primary clarifier influent sample is not required by the permit, LF should improve or relocate the station if useful data are required.

References

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

Mendenhall, D., 1993. Personal Communication. Longview Fibre Company, Longview, Washington.

USEPA, 1986. Quality Criteria for Water. U.S. Environmental Protection Agency, EPA 440/5-86-002, 1986.

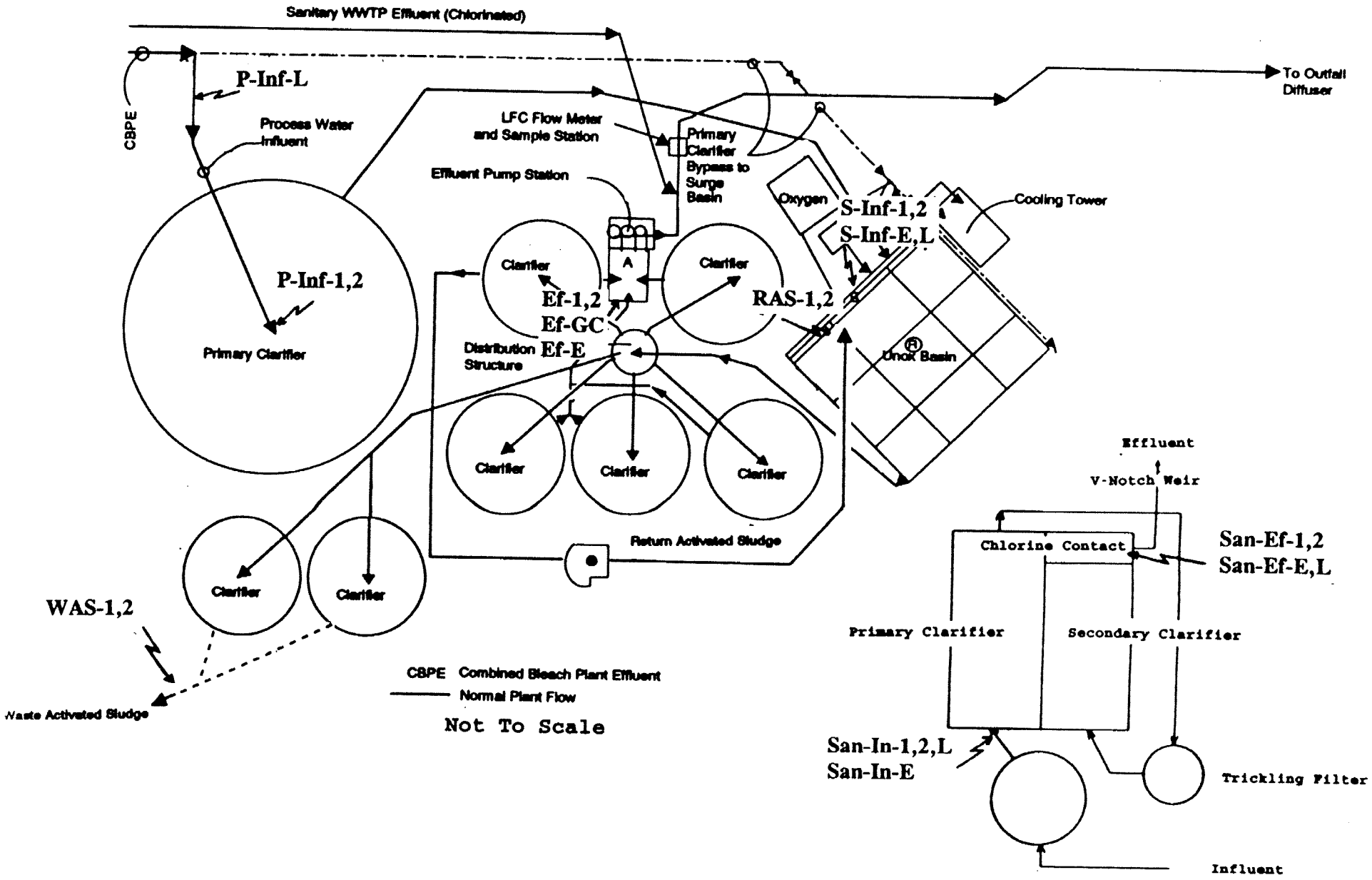

Figure 1
Generalized Flow Schematic - Longview Fibre - November 1994.

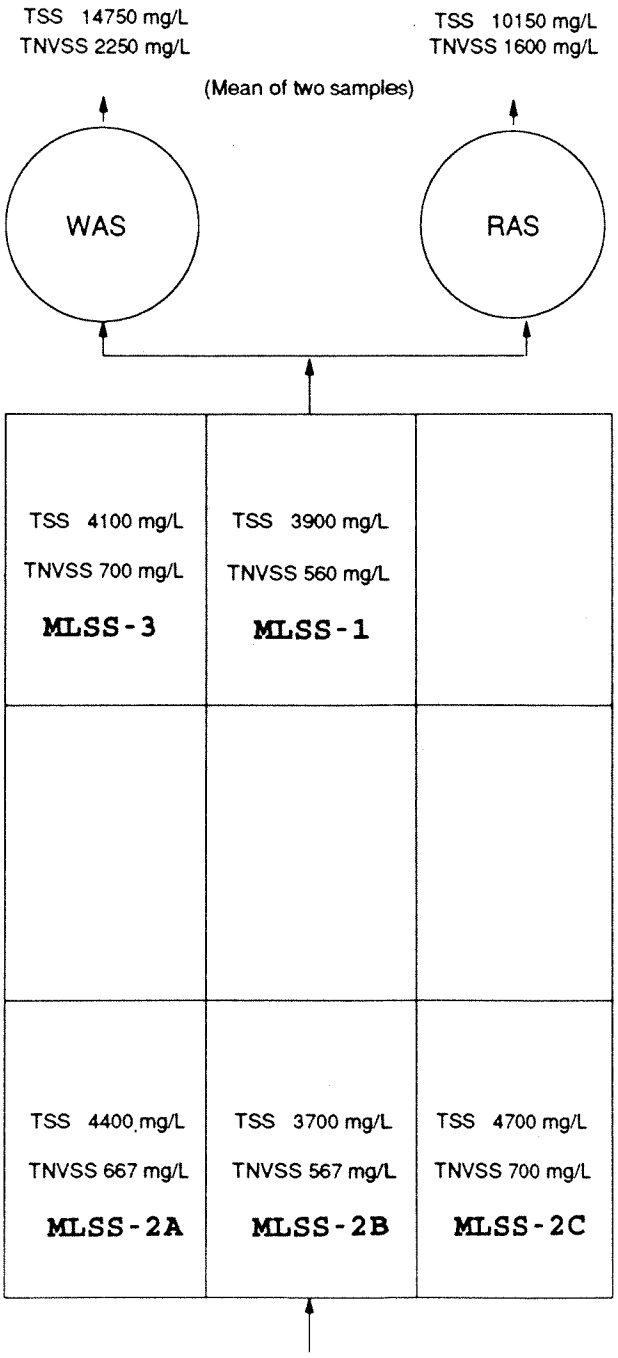

Figure 2 - UNOX Basin Mixed Liquor Results - Longview Fibre - November 1993.

Table 1 - Sample Station Descriptions - Longview Fibre - November 1993.

P-Inf-1,2	Grab samples of process wastewater to the primary clarifier, taken from the center well of the PC.
P-Inf-L	Longview Fibre composite sample of process wastewater to the primary clarifier, taken from a tap in the line to the PC.
S-Inf-1,2	Grab samples of the process wastewater taken at the headworks of the UNOX basin.
S-Inf-E,L	Ecology and Longview Fibre composite samples of the process wastewater taken at the headworks of the UNOX basins.
MLSS-1,2A,2B,2C MLSS-3	Grab samples from within the UNOX basins, see Figure 1.
RAS-1,2	Grab samples of the RAS, taken from a tap at the UNOX basin.
WAS-1,2	Grab samples of the WAS.
Blch-Acd	Grab sample of the acid stream effluent, taken from a hose at the bleach plant.
Blch-Alk	Grab sample of the alkaline stream effluent, taken from a hose at the bleach plant.
Blch-E	Grab-composite comprised of 60% acid and 40% alkaline wastestreams.
San-In-1,2,L	Grab samples of the sanitary influent, taken at the headworks to the trickling filter package plant.
San-In-E	Ecology composite sample of sanitary influent, taken at the headworks to the trickling filter package plant.
San-Ef-1,2	Grab samples of the sanitary effluent wastewater.
San-Ef-E,L	Ecology composite sample of sanitary effluent wastewater.
Ef-1,2	Grab samples of process effluent, taken from the effluent wet well.
Ef-GC	Grab-composite sample of effluent, taken at the effluent wet well for bioassay analyses.
Ef-E	Ecology composite sample of process effluent.

Table 2 – General Chemistry Results – Longview Fibre – November 1993.

Parameter	Location:	P-Inf-1	P-Inf-2	P-Inf-L	S-Inf-1	S-Inf-2	S-Inf-E	S-Inf-L	Ef-1	Ef-2	Ef-GC	Ef-E
	Type:	grab	grab	L-comp	grab	grab	E-comp	L-comp	grab	grab	gr-comp	E-comp
	Date:	11/2	11/2	11/2-3	11/2	11/2	11/2-3	11/2-3	11/2	11/2	11/2	11/2-3
	Time:	1105	1600	8AM-8AM	1125	1615	8AM-8AM	8AM-8AM	1150	1510	@	8AM-8AM
	Lab Log #:	458280	458281	458302	458282	458283	458303	458304	458284	458285	458286	458305
GENERAL CHEMISTRY												
Alkalinity (mg/L CaCO3)				162			220	223			153	189
Hardness (mg/L CaCO3)				48.9			66.2	67.1			63.4	70.4
TS (mg/L)				756			773	839				584
TNVS (mg/L)				210			457	491				384
TSS (mg/L)		870	723	211	50	31	57	142	16	15	16	24
TNVSS (mg/L)				36			13	26				5
BOD5 (mg/L)				220			200	170				13
COD (mg/L)				580			370	430				130
TOC (water mg/L)		151	147	138	128	121	127	124	34	33.2		38.1
NH3-N (mg/L)				0.024			0.326	0.018				0.049
NO2+NO3-N (mg/L)				0.048			0.084	0.013				0.01 U
Total-P (mg/L)				0.373			0.556	0.806				0.934
Oil and Grease (mg/L)									2	1		
F-Coliform MF (#/100mL)									11000 X	24000 X		
F-Coliform MPN (#/100mL)									1300	330		
AOX (mg/L)							0.28 J	0.52				0.43 J
FIELD OBSERVATIONS												
Temperature (C)		30.7	32.5		25.0	25.0			27.7	28.0		
Temp-cooled (C)*+				14.4			5	13.2				4.9
pH		10.1	9.9		8.9	8.4			6.7	6.7		
Chlorine (mg/L)	total											
	free											

X	High background count.
J	The analyte was positively detected. The associated numerical result is an estimate.
U	The analyte was not detected at or above the reported result.
@	The composite is comprized of two grab samples of equal volume at 1150 and 1510.
P-Inf	process wastewater to primary clarifier
S-Inf	process wastewater to UNOX
Ef	process wastewater effluent
MLSS	UNOX basin solids
RAS	return activated sludge
WAS	waste activated sludge
San-In	sanitary wastewater influent
San-Ef	sanitary wastewater effluent
Blch-Acd	acid stream from bleach plant
Blch-Alk	alkaline stream from bleach plant
Blch-E	combined bleach plant sample, 60% acid and 40% alkaline.
E-comp	Ecology composite sample
L-comp	Longview Fibre composite sample
gr-comp	grab composite sample

Table 2 (cont.) – General Chemistry Results – Longview Fibre – November 1993.

Parameter	Location:	Blch-Acd	Blch-Alk	Blch-E	MLSS-1	MLSS-2A	MLSS-2B	MLSS-2C	MLSS-3	RAS-1	RAS-2	WAS-1
	Type:	grab	grab	gr-comp	grab	grab	grab	grab	grab	grab	grab	grab
	Date:	11/3	11/3	11/3	11/2	11/2	11/2	11/2	11/2	11/2	11/2	11/3
	Time:	1220	1230	1240	1405	1410	1415	1420	1425	1430	PM	PM
	Lab Log #:	458287	458288	458307	458289	458290	458291	458292	458293	458294	458295	458296
GENERAL CHEMISTRY												
Alkalinity (mg/L CaCO3)												
Hardness (mg/L CaCO3)												
TS (mg/L)												
TNVS (mg/L)												
TSS (mg/L)		22	28	31	3900	4400	3700	4700	4100	9300	11000	15800
TNVSS (mg/L)					560	667	567	700	700	1400	1800	2400
BOD5 (mg/L)												
COD (mg/L)												
TOC (water mg/L)												
NH3-N (mg/L)												
NO2+NO3-N (mg/L)												
Total-P (mg/L)												
Oil and Grease (mg/L)												
F-Coliform MF (#/100mL)												
F-Coliform MPN (#/100mL)												
AOX (mg/L)		29	10.1	22								
FIELD OBSERVATIONS												
Temperature (C)		41.7	37.1									
Temp-cooled (C)*+												
pH		2.6	8.6									
Chlorine (mg/L)	total											
	free											

X	High background count.
J	The analyte was positively detected. The associated numerical result is an estimate.
U	The analyte was not detected at or above the reported result.
@	The composite is comprized of two grab samples of equal volume.
P-Inf	process wastewater to primary clarifier
S-Inf	process wastewater to UNOX
Ef	process wastewater effluent
MLSS	UNOX basin solids
RAS	return activated sludge
WAS	waste activated sludge
San-In	sanitary wastewater influent
San-Ef	sanitary wastewater effluent
Blch-Acd	acid stream from bleach plant
Blch-Alk	alkaline stream from bleach plant
Blch-E	combined bleach plant sample
E-comp	Ecology composite sample
L-comp	Longview Fibre composite sample
gr-comp	grab composite sample

Table 2 (cont.) – General Chemistry Results – Longview Fibre – November 1993.

Parameter	Location:	WAS-2	San-In-1	San-In-2	San-In-E	San-In-L	San-Ef-1	San-Ef-2	San-Ef-E	San-Ef-L
	Type:	grab	grab	grab	E-comp	grab	grab	grab	E-comp	grab
	Date:	11/3	11/2	11/2	11/2-3	11/3	11/2	11/2	11/2-3	11/3
	Time:	PM	1205	1530	8AM-8AM	1137	1215	1545	8AM-8AM	1140
	Lab Log #:	458297	458298	458299	458308	458309	458300	458301	458310	458311
GENERAL CHEMISTRY										
Alkalinity (mg/L CaCO3)					165	232			73.1	68.1
Hardness (mg/L CaCO3)										
TS (mg/L)										
TNVS (mg/L)										
TSS (mg/L)		13700	107	59	118	136	17	21	17	16
TNVSS (mg/L)		2100								
BOD5 (mg/L)					120	130			14	13
COD (mg/L)					230	320			62	62
TOC (water mg/L)			95.3	46.2	47.4	60.9	18.7	22.8	21.0	20.2
NH3-N (mg/L)					25.1	33.3			11.0	7.45
NO2+NO3-N (mg/L)					0.176	0.160			8.97	8.95
Total-P (mg/L)					3.8	5.33			2.67	2.41
Oil and Grease (mg/L)										
F-Coliform MF (#/100mL)							71	160		
F-Coliform MPN (#/100mL)										
AOX (mg/L)										
FIELD OBSERVATIONS										
Temperature (C)			22.0	21.5			19.7	20.1		
Temp-cooled (C)*+					2.9				2.9	
pH			7.9	7.7			7.2	7.4		
Chlorine (mg/L)	total						2	0.6		
	free						0.1	<0.1		

X	High background count.
J	The analyte was positively detected. The associated numerical result is an estimate.
U	The analyte was not detected at or above the reported result.
@	The composite is comprized of two grab samples of equal volume.
P-Inf	process wastewater to primary clarifier
S-Inf	process wastewater to UNOX
Ef	process wastewater effluent
MLSS	UNOX basin solids
RAS	return activated sludge
WAS	waste activated sludge
San-In	sanitary wastewater influent
San-Ef	sanitary wastewater effluent
Blch-Acd	acid stream from bleach plant
Blch-Alk	alkaline stream from bleach plant
Blch-E	combined bleach plant sample
E-comp	Ecology composite sample
L-comp	Longview Fibre composite sample
gr-comp	grab composite sample

Table 3 – VOA, BNA, and Metals Scan Results – Longview Fibre – November 1993.

Location:	P-Inf-1	P-Inf-2	S-Inf-1	S-Inf-2	S-Inf-E	State/EPA Water Quality Criteria Summary			
Type:	grab	grab	grab	grab	E-comp				
Date:	11/2	11/2	11/2	11/2	11/2-3	Acute Fresh	Chronic Fresh	Acute Marine	Chronic Marine
Time:	1105	1600	1125	1615	8AM-8AM				
Lab Log#:	458280	458281	458282	458283	458303				
VOA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Acetone	118 UJ	118 UJ	103 UJ	95.5 UJ					
Chloroform	6 J	6.2 J	3.9 J	3.7 J		28,900 *	1,240 *	12,000 *(a)	6,400 *(a)
2-Butanone (MEK)	43.7 J	59.7 J	32 J	33.7 J					
Bromodichloromethane	10 U	10 U	10 U	10 U		11,000 *(a)		12,000 *(a)	6,400 *(a)
Benzene	10 UJ	10 UJ	10 UJ	10 UJ		5,300 *		5,100 *	700 *
4-Methyl-2-Pentanone (MIBK)	20 U	5.7 J	20 U	3.8 J					
BNA Compounds									
Retene					1.5 U				
Dibutyl Phthalate					8.4	940 *(i)	3 *(i)	2,944 *(i)	3.4 *(i)
Phenol					8.6	10,200 *	2,560 *	5,800 *	
Benzyl Alcohol					16.8				
4-Methylphenol					3.6				
Isophorone					1.5 U	117,000 *		12,900 *	
Benzoic Acid					34.7				
Diethyl Phthalate					3	940 *(i)	3 *(i)	2,944 *(i)	3.4 *(i)
Butylbenzyl Phthalate					2	940 *(i)	3 *(i)	2,944 *(i)	3.4 *(i)
Bis(2-Ethylhexyl)Phthalate					1.8	940 *(i)	3 *(i)	2,944 *(i)	3.4 *(i)
Metals									
Arsenic					2.9 P				
Pentavalent						850 *	48 *	2,319 *	13 *
Trivalent						360	190	69	36
Cadmium					0.57 P	2.3 +	0.7 +	43	9.3
Copper					14 P	11 +	8 +	2.9	
Lead					3.1 P	36 +	1.4 +	140	5.6
Mercury					0.16 P	2.4	0.012	2.1	0.025
Zinc					40 P	77 +	70 +	95	86

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 quantification limit.
*	Insufficient data to develop criteria. Value presented is the LOEL – Lowest Observed Effect Level.
**	pH dependent criteria (7.8 pH used).
+	Hardness dependent criteria (70 mg/L used).
a	Total Halomethanes.
i	Total Phthalate Esters.
P-Inf	Primary influent.
S-Inf	Secondary influent.
Ef	Effluent.
Blch-Acd	Bleach plant acid stream.
Blch-Alk	Bleach Plant alkaline stream.

Table 3 (cont.) – VOA, BNA, and Metals Scan Results – Longview Fibre – November 1993.

Location:	Ef-1	Ef-2	Ef-E	Bich-Acd	Bich-Alk	State/EPA Water Quality Criteria Summary			
Type:	grab	grab	E-comp	grab	grab				
Date:	11/2	11/2	11/2-3	11/3	11/3	Acute Fresh	Chronic Fresh	Acute Marine	Chronic Marine
Time:	1150	1510	8AM-8AM	1220	1230				
Lab Log#:	458284	458285	458305	458287	458288				
VOA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Acetone	100 UJ	100 UJ		36.2 UJ	29.1 J				
Chloroform	8.3 J	6.3 J		183 J	179	28,900 *	1,240 *	12,000 *(a)	6,400 *(a)
2-Butanone (MEK)	50 UJ	50 UJ		50 UJ	50 UJ				
Bromodichloromethane	10 U	10 U		0.54 J	0.94 J	11,000 *(a)		12,000 *(a)	6,400 *(a)
Benzene	10 UJ	10 UJ		1.2 J	10 UJ	5,300 *		5,100 *	700 *
4-Methyl-2-Pentanone (MIBK)	20 U	20 U		20 U	20 U				
BNA Compounds									
Retene			0.44 J						
Dibutyl Phthalate			1.4 U			940 *(i)	3 *(i)	2.944 *(i)	3.4 *(i)
Phenol			1.4 U			10,200 *	2,560 *	5,800 *	
Benzyl Alcohol			1.4 U						
4-Methylphenol			1.4 U						
Isophorone			0.43 J			117,000 *		12,900 *	
Benzoic Acid			14.1 U						
Diethyl Phthalate			0.41 J			940 *(i)	3 *(i)	2.944 *(i)	3.4 *(i)
Butylbenzyl Phthalate			1.4 U			940 *(i)	3 *(i)	2.944 *(i)	3.4 *(i)
Bis(2-Ethylhexyl)Phthalate			1.4 U			940 *(i)	3 *(i)	2.944 *(i)	3.4 *(i)
Metals									
Arsenic			2.5 P						
Pentavalent						850 *	48 *	2,319 *	13 *
Trivalent						360	190	69	36
Cadmium			0.27 P			2.3 +	0.7 +	43	9.3
Copper			8.0 P			11 +	8 +	2.9	
Lead			1.9 P			36 +	1.4 +	140	5.6
Mercury			0.056 P			2.4	0.012	2.1	0.025
Zinc			14 P			77 +	70 +	95	86

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 quantification limit.
*	Insufficient data to develop criteria. Value presented is the LOEL – Lowest Observed Effect Level.
**	pH dependent criteria (7.8 pH used).
+	Hardness dependent criteria (70 mg/L used).
a	Total Halomethanes
i	Total Phthalate Esters

Table 4 – Dioxin/Furan Results – Longview Fibre – November 1993.

Parameter	Location:	EF-E		BLCH-E	
	Type:	comp		grab-comp	
	Date:	11/2-3		11/2-3	
	Time:	8AM-8AM		1240	
	Lab Log#:	458305		458307	
		pg/L		pg/L	
TCDD (total)		2.7	J	4.1	U
2,3,7,8-TCDD		5	U	4.1	U
PCDD (total)		5.5	U	4.4	U
1,2,3,7,8-PCDD		5.5	U	4.4	U
HxCDD (total)		6.4	U	4.8	U
1,2,3,4,7,8-HxCDD		6.9	U	5.1	U
1,2,3,7,8,9-HxCDD		6.2	U	4.6	U
1,2,3,6,7,8-HxCDD		6.2	U	4.7	U
HpCDD (total)		9.2		6.8	U
1,2,3,4,6,7,8-HpCDD		9.2		6.8	U
'1,2,3,4,6,7,8,9-OCDD		67	UJ	54	UJ
TCDF (total)		6.3	UJ	19.1	U
2,3,7,8-TCDF		6.3	UJ	5.9	UJ
PCDF (total)		5.5	U	3.2	U
1,2,3,7,8-PCDF		4.5	U	3.3	U
2,3,4,7,8-PCDF		3.8	U	3.0	U
HxCDF (total)		6.4	U	3.4	U
1,2,3,4,7,8-HxCDF		4.6	U	3.4	U
1,2,3,7,8,9-HxCDF		5.0	U	3.8	U
1,2,3,6,7,8-HxCDF		3.8	U	2.8	U
2,3,4,6,7,8-HxCDF		3.7	U	3.4	UJ
HpCDF (total)		5.2	U	4.0	U
1,2,3,4,6,7,8-HpCDF		4.3	U	3.3	U
1,2,3,4,7,8,9-HpCDF		6.5	U	5.0	U
1,2,3,4,6,7,8,9-OCDF		9.2	U	7.2	U

U	Tha analyte was not detected at or above the reported result.
J	The analyte was positively identified. The associated numerical result is an estimate.
UJ	Tha analyte was not detected at or above the reported estimated result.
Ef-E	Process wastewater effluent.
Blch-E	Combined bleach plant sample.

Table 5 – Effluent Bioassay Results – Longview Fibre – November 1993.

NOTE: all tests were run on the effluent (EF-GC sample) – lab log # 458286.

Fathead Minnow (Pimephales promelas) – 7-Day Chronic Renewal Toxicity Test

Sample	# Tested*	Mean Percent Survival	Mean Dry Weight per Organism
Control	40	100	0.75
6.25 % Effluent	40	90	0.81
12.5 % Effluent	40	97.6	0.87
25 % Effluent	40	92.5	0.89
50 % Effluent	40	97.5	0.96
100 % Effluent	40	77.5	0.87

* 4 replicates of 10 organisms

LC50 = >100% effluent
NOEC for Survival = 50% effluent
NOEC for Growth = 100% effluent

Ceriodaphnia dubia – Chronic Renewal Toxicity Test

Sample	# Tested*	Mean Percent Survival	Mean # Offspring
Control	10	100	17.9
6.25 % Effluent	10	100	30.1
12.5 % Effluent	10	90	40.9
25 % Effluent	10	100	36.5
50 % Effluent	10	100	40.3
100 % Effluent	10	90	29.4

* 10 replicates of 1 organisms

LC50 = >100% effluent
NOEC for Survival = 100% effluent
NOEC for Reproduction = 100% effluent

Daphnia magna – 48-Hour Acute Toxicity Test

Sample	# Tested*	Mean Percent Survival
Control	20	100
6.25 % Effluent	20	100
12.5 % Effluent	20	100
25 % Effluent	20	100
50 % Effluent	20	100
100 % Effluent	20	100

* 4 replicates of 5 organisms

LC50 = >100% effluent
NOEC for Survival = 100% effluent

Rainbow trout (Oncorhynchus mykiss) – 96-Hour Static Acute Fish Toxicity Test

Sample	# Tested*	Mean PercentSurvival
Control	30	100
65 % Effluent	30	93.2
100% Effluent	30	80

* 3 replicates of 10 organisms

NOEC – no observable effects concentration
LOEC – lowest observable effects concentration
LC50 – lethal concentration for 50% of the organisms
EC50 – effect concentration for 50% of the organisms

Table 6 – NPDES Effluent Limits/Ecology Inspection Data Comparison – Longview Fibre – November 1993.

	Sewage Treatment Plant NPDES Permit Limitations Monthly Average	Daily Maximum	Location: Type: Date: Lab Log #:	San-Ef-E Composite 11/2-3 458310	San-Ef-1 grab 11/2 458300	San-Ef-2 grab 11/2 458301	
5 Day Biochemical Oxygen Demand	30 mg/L 38 lbs/day+	45 mg/L 90 lbs/day+		14 3.0			
Total Suspended Solids	30 mg/L 38 lbs/day+	45 mg/L 90 lbs/day+		17 3.7	17 3.7	21 4.6	
Fecal Coliform Bacteria	200/100mL	400/100mL			71	160	
Chlorine Residual	Shall not be outside the range of 0.1 to 4.0 mg/L				2.0	0.6	
pH	Shall not be outside the range of 6.0 – 9.0				7.2	7.4	

	Effluent 001 Discharge NPDES Permit Limitations Monthly Average	Daily Maximum	Location: Type: Date: Lab Log #:	Ef-E Composite 11/2-3 458305	Ef-1 grab 11/2 458284	Ef-2 grab 11/2 458285	Ef-GC gr-comp 11/2 458286
5 Day Biochemical Oxygen Demand	10,800 lbs/day	40,200 lbs/day		6,580*			
Total Suspended Solids	38,800 lbs/day	76,400 lbs/day		12,150*	8,100*	7,600*	
pH	Shall be within the range of 5.4 – 9.0				6.7	6.7	
Acute Salmonid Bioassay	80% survival in 65% effluent						93.2
	Annual Average	Daily Maximum					
Dioxin@	0.21 mg/day 4.6 x 10-7 lbs/day	0.34 mg/day 7.6 x 10-7 lbs/day		1.15*$ 2.5 x 10-6*$			
	Annual Average	Monthly Maximum					
AOX@	1,240 lbs/day	1,590 lbs/day		218* J			

J The analyte was positively identified. The reported numerical result is an estimate.
\+ A flow of .026 MGD was used to calculate loadings from the sewage treatment plant.
* A flow of 60.7 MGD was used to calculate loadings from the 001 discharge.
$ This dioxin isomer was not detected in the effluent. The loading was calculated using the detection limit.
@ Neither the dioxin nor AOX permit limitation were in effect at the time of the inspection.

Table 7 – Split Sample Results Comparison – Longview Fibre – November 1993.

		Location:	P-Inf-L	S-Inf-E	S-Inf-L	Ef-E	San-In-L	San-Ef-L
		Type:	composite	composite	composite	composite	grab	grab
		Date:	11/2-3	11/2-3	11/2-3	11/2-3	11/3	11/3
		Lab Log #:	458280	458303	458304	458305	458309	458311
		Sampler:	LF	Ecology	LF	Ecology	LF	LF
PARAMETER	Analyzed by:							
Alkalinity (mg/L, CaCO3)	Ecology			220	223		232	68.1
	Longview Fibre							
Hardness (mg/L, CaCO3)	Ecology			66.2	67.1			
	Longview Fibre							
TS (mg/L)	Ecology			773	839			
	Longview Fibre							
TNVS (mg/L)	Ecology			457	491			
	Longview Fibre							
TSS (mg/L)	Ecology		211	57	142	24	136	16
	Longview Fibre		159	57		18	158	26
TNVSS (mg/L)	Ecology			13	26			
	Longview Fibre							
BOD5 (mg/L)	Ecology		220	200	170	13	130	13
	Longview Fibre		199	157		6	139	11.9
COD (mg/L)	Ecology			370	430		320	62
	Longview Fibre							
TOC (mg/L)	Ecology			127	124		60.9	20.2
	Longview Fibre							
NH3-N (mg/L)	Ecology			0.326	0.018		33.3	7.45
	Longview Fibre							
NO2+NO3-N (mg/L)	Ecology			0.084	0.013		0.160	8.95
	Longview Fibre							
Total-P (mg/L)	Ecology			0.556	0.806		5.33	2.41
	Longview Fibre							
F-Coliform MF (#/100 mL)	Ecology							
	Longview Fibre							

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

Appendices

Appendix A – Ecology Sampling Schedule and Parameters Analyzed – Longview Fibre – November 1993.

Parameter	Location:	P-Inf-1	P-Inf-2	P-Inf-L	S-Inf-1	S-Inf-2	S-Inf-E	S-Inf-L	Ef-1	Ef-2	Ef-GC	Ef-E	Blch-Acd	Blch-Alk
	Type:	grab	grab	L-comp	grab	grab	E-comp	L-comp	grab	grab	gr-comp	E-comp	grab	grab
	Date:	11/2	11/2	11/3	11/2	11/2	11/3	11/3	11/2	11/2	11/2	11/3	11/3	11/3
	Time:	1105	1600	AM-8AM	1125	1615	8AM-8AM	8AM-8AM	1150	1510	@	8AM-8AM	1220	1230
	Lab Log #:	458280	458281	458302	458282	458283	458303	458304	458284	458285	458286	458305	458287	458288
GENERAL CHEMISTRY														
Alkalinity				1			1	1			1	1		
Hardness				1			1	1			1	1		
SOLIDS 4				1			1	1				1		
TSS		1	1		1	1			1	1	1		1	1
TNVSS														
BOD5				1			1	1				1		
COD				1			1	1				1		
TOC (water)		1	1	1	1	1	1	1	1	1		1		
NH3-N				1			1	1				1		
NO2+NO3-N				1			1	1				1		
Total-P				1			1	1				1		
Oil and Grease (water)									1	1				
F-Coliform MF									1	1				
F-Coliform MPN									1	1				
ORGANICS														
AOX							1	1				1	1	1
VOC (water)		1	1		1	1			1	1			1	1
BNAs (water)							1					1		
Dioxin/Furans												1		
METALS														
PP Metals (water)							1					1		
BIOASSAYS														
Salmonid (acute 65%)											1			
Salmonid (acute 100%)											1			
Daphnia magna (acute)											1			
Ceriodaphnia (chronic)											1			
Fathead Minnow (chronic)											1			
FIELD OBSERVATIONS														
Temperature		1	1		1	1			1	1				
Temp-cooled*+				1			1	1				1		
pH		1	1	1	1	1	1	1	1	1		1		
Chlorine														

@	The composite sample is comprized of two grab samples of equal volume collected at 1150 and 1510.
P-Inf	process wastewater to primary clarifier
S-Inf	process wastewater to UNOX
Ef	process wastewater effluent
MLSS	UNOX basin solids
RAS	return activated sludge
WAS	waste activated sludge
San-In	sanitary wastewater influent
San-Ef	sanitary wastewater effluent
Blch-Acd	acid stream from bleach plant
Blch-Alk	alkaline stream from bleach plant
Blch-E	combined bleach plant sample
E-comp	Ecology composite sample
L-comp	Longview Fibre composite sample
gr-comp	grab composite sample

Appendix A (cont.) – Ecology Sampling Schedule and Parameters Analyzed – Longview Fibre – November 1993.

Parameter	Location:	Blch-E	MLSS-1	MLSS-2A	MLSS-2B	MLSS-2C	MLSS-3	RAS-1	RAS-2	WAS-1	WAS-2	San-In-1	San-In-2	San-In-E
	Type:	gr-comp	grab	grab	grab	grab	grab	grab	grab	grab	grab	grab	grab	E-comp
	Date:	11/3	11/2	11/2	11/2	11/2	11/2	11/2	11/2	11/3	11/3	11/2	11/2	11/2-3
	Time:	1240	1405	1410	1415	1420	1425	1430	PM	PM	PM	1205	1530	8AM-8AM
	Lab Log #:	458307	458289	458290	458291	458292	458293	458294	458295	458296	458297	458298	458299	458308
GENERAL CHEMISTRY														
Alkalinity														1
Hardness														
SOLIDS 4														
TSS		1	1	1	1	1	1	1	1	1	1	1	1	1
TNVSS			1	1	1	1	1	1	1	1	1			
BOD5														1
COD														1
TOC (water)												1	1	1
NH3-N														1
NO2+NO3-N														1
Total-P														1
Oil and Grease (water)														
F-Coliform MF														
F-Coliform MPN														
ORGANICS														
AOX		1												
VOC (water)														
BNAs (water)														
Dioxin/Furans		1												
METALS														
PP Metals (water)														
BIOASSAYS														
Salmonid (acute 65%)														
Salmonid (acute 100%)														
Daphnia magna (acute)														
Ceriodaphnia (chronic)														
Fathead Minnow (chronic)														
FIELD OBSERVATIONS														
Temperature												1	1	
Temp-cooled*+														1
pH												1	1	1
Chlorine														

Appendix A (cont.) – Ecology Sampling Schedule and Parameters Analyzed – Longview Fibre – November 1993.

Parameter	Location:	San-In-L	San-Ef-1	San-Ef-2	San-Ef-E	San-Ef-L
	Type:	grab	grab	grab	E-comp	grab
	Date:	11/3	11/2	11/2	11/2-3	11/3
	Time:	1137	1215	1545	8AM-8AM	1140
	Lab Log #:	458309	458300	458301	458310	458311
GENERAL CHEMISTRY						
Alkalinity		1			1	1
Hardness						
SOLIDS 4						
TSS		1	1	1	1	1
TNVSS						
BOD5		1			1	1
COD		1			1	1
TOC (water)		1	1	1	1	1
NH3-N		1			1	1
NO2+NO3-N		1			1	1
Total-P		1			1	1
Oil and Grease (water)						
F-Coliform MF			1	1		
F-Coliform MPN						
ORGANICS						
AOX						
VOC (water)						
BNAs (water)						
Dioxin/Furans						
METALS						
PP Metals (water)						
BIOASSAYS						
Salmonid (acute 65%)						
Salmonid (acute 100%)						
Daphnia magna (acute)						
Ceriodaphnia (chronic)						
Fathead Minnow (chronic)						
FIELD OBSERVATIONS						
Temperature			1	1		
Temp-cooled*+		1			1	1
pH		1	1	1	1	1
Chlorine			1	1		

Appendix B – Ecology Analytical Methods and Laboratories Used – Longview Fibre – November 1993.

PARAMETER	MANCHESTER METHODS	LABORATORY USED
GENERAL CHEMISTRY		
Alkalinity	EPA, Revised 1983: 310.1	Manchester Laboratory
Hardness	EPA, Revised 1983: 130.2	Manchester Laboratory
TS	EPA, Revised 1983: 160.2	Manchester Laboratory
TNVS	EPA, Revised 1983: 160.2	Manchester Laboratory
TSS	EPA, Revised 1983: 160.2	Manchester Laboratory
TNVSS	EPA, Revised 1983: 160.2	Manchester Laboratory
BOD5	EPA, Revised 1983: 405.1	Sound Analytical Services, Inc.
COD	EPA, Revised 1983: 410.1	Sound Analytical Services, Inc.
TOC (water)	EPA, Revised 1983: 415.1	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 MF	APHA, 1989: 9222D.	Manchester Laboratory
F-Coliform MPN	APHA, 1989: 9221C.	Manchester Laboratory
AOX	EPA, 1986: 9020	Manchester Laboratory
VOC (water)	EPA, 1986: 8260	Manchester Laboratory
BNAs (water)	EPA, 1986: 8270	Manchester Laboratory
Dioxin/Furans	EPA, 1986: 1613A	Triangle Laboratories of RTP, Inc.
PP Metals (water)	EPA, Revised 1983: 200-299	Manchester Laboratory
Salmonid (acute 65%)	Ecology, Revised 1990.	Manchester Laboratory
Salmonid (acute 100%)	Ecology, Revised 1990.	Manchester Laboratory
Daphnia magna (acute)	ASTM, 1986.	Manchester Laboratory
Ceriodaphnia (chronic)	EPA, Revised 1989: 600/4-89/001	Manchester Laboratory
Fathead Minnow (chronic)	EPA, Revised 1989: 600/4-89/001	Manchester Laboratory

METHOD BIBLIOGRAPHY

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Appendix C - Priority Pollutant Cleaning Methodology - Longview Fibre - November 1993.

Priority Pollutant Cleaning Methodology

1. Wash with laboratory grade detergent (Liqui-Nox).
2. Rinse several times with tap water.
3. Rinse with 10% nitric acid solution.
4. Rinse three (3) times with distilled/deionized water.
5. Rinse with reagent-grade methylene chloride.
6. Rinse with reagent-grade acetone.
7. Allow to air dry and seal with aluminum foil.

Appendix D. Data Qualifiers - Longview Fibre - November 1993.

Code	Definition
B	Analyte was also found in the analytical method blank indicating the sample may have been contaminated.
EXP	The result is equal to the number before EXP times 10 to the power of the number after EXP. As an example 3EXP6 equals 3 X 10^6.
E	Reported result is an estimate because of the presence of interference.
J	The analyte was positively identified. The associated numerical result is an estimate.
N	For organic analytes there is evidence the analyte is present in the sample. For metals analytes the spike sample recovery is not within control limits.
NJ	There is evidence that the analyte is present. The associated numerical result is an estimate.
NAF	Not analyzed for.
P	The analyte was detected above the instrument detection limit but below the established minimum quantitation limit.
REJ	The data are unusable for all purposes.
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.
"*"	The analyte was present in the sample. Used as a visual aid to locate detected compounds on the report sheet.

Data Qualifiers for Microbiology

X	High background count
P	Greater than
A	Less than
S	Spreader
O	Bottle overfull; can't shake sample

Appendix E – VOA, BNA and Metals Scan Results – Longview Fibre – November 1993.

Location:	P-Inf-1	P-Inf-2	S-Inf-1	S-Inf-2	S-Inf-E	Ef-1	Ef-2	Ef-E	Bich-Acd	Bich-Alk
Type:	grab	grab	grab	grab	E-comp	grab	grab	E-comp	grab	grab
Date:	11/2	11/2	11/2	11/2	11/2-3	11/2	11/2	11/2-3	11/3	11/3
Lab Log#:	458280	458281	458282	458283	458303	458284	458285	458305	458287	458288
VOA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Chloromethane	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		10 UJ	10 UJ
Bromomethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Vinyl Chloride	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		10 UJ	10 UJ
Chloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Methylene Chloride	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		10 UJ	10 UJ
Acetone	118 UJ	118 UJ	103 UJ	95.5 UJ		100 UJ	100 UJ		36.2 UJ	29.1 J
Carbon Disulfide	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,1-Dichloroethene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,1-Dichloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Chloroform	6 J	6.2 J	3.9 J	3.7 J		8.3 J	6.3 J		183 J	179
1,2-Dichloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
2-Butanone (MEK)	43.7 J	59.7 J	32 J	33.7 J		50 UJ	50 UJ		50 UJ	50 UJ
1,1,1-Trichloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Carbon Tetrachloride	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Bromodichloromethane	10 U	10 U	10 U	10 U		10 U	10 U		0.54 J	0.94 J
1,2-Dichloropropane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
cis-1,3-Dichloropropene	5.3 U	5.3 U	5.3 U	5.3 U		5.3 U	5.3 U		5.3 U	5.3 U
Trichloroethene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Dibromochloromethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,1,2-Trichloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Benzene	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		1.2 J	10 UJ
trans-1,3-Dichloropropene	4.7 U	4.7 U	4.7 U	4.7 U		4.7 U	4.7 U		4.7 U	4.7 U
Bromoform	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		10 UJ	10 UJ
4-Methyl-2-Pentanone (MIBK)	20 U	5.7 J	20 U	3.8 J		20 U	20 U		20 U	20 U
2-Hexanone	20 UJ	20 UJ	20 UJ	20 UJ		20 UJ	20 UJ		20 UJ	20 UJ
Tetrachloroethene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Toluene	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		10 UJ	10 UJ
Chlorobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Ethylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
o-Xylene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
m p-Xylene	20 U	20 U	20 U	20 U		20 U	20 U		20 U	20 U
Total Xylenes	30 U	30 U	30 U	30 U		30 U	30 U		30 U	30 U
1,3-Dichloropropane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
tert-Butylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Bromochloromethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Propylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2,3-Trichlorobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Isopropylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Dibromomethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
cis-1,2-Dichloroethene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2,3-Trichloropropane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Dichlorodifluoromethane	10 UJ	10 UJ	10 UJ	10 UJ		10 UJ	10 UJ		10 UJ	10 UJ
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Bromobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
sec-Butylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,3,5-Trimethylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Butylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2-Dibromo-3-Chloropropane	20 U	20 U	20 U	20 U		20 U	20 U		20 U	20 U
2,2-Dichloropropane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
p-Isopropyltoluene	9.2 J	10 U	10 U	10 U		10 U	10 U		10 U	10 U

Appendix E (cont.)– VOA, BNA and Metals Scan Results – Longview Fibre – November 1993.

Location:	P-Inf-1	P-Inf-2	S-Inf-1	S-Inf-2	S-Inf-E	Ef-1	Ef-2	Ef-E	Blch-Acd	Blch-Alk
Type:	grab	grab	grab	grab	E-comp	grab	grab	E-comp	grab	grab
Date:	11/2	11/2	11/2	11/2	11/2-3	11/2	11/2	11/2-3	11/3	11/3
Lab Log#:	458280	458281	458282	458283	458303	458284	458285	458305	458287	458288
VOA Compounds	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
trans-1,2-Dichloroethene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
4-Chlorotoluene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Trichlorofluoromethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,1,1,2-Tetrachloroethane	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2-Dibromoethane (EDB)	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Styrene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,1-Dichloropropene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,2,4-Trimethylbenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U		10 U	10 U		10 U	10 U
BNA Compounds										
1-Methylnaphthalene					1.5 U			1.4 U		
Retene					1.5 U			0.44 J		
Dibutyl Phthalate					8.4			1.4 U		
o-Chlorophenol					1.5 U			1.4 U		
Carbazole					1.5 U			1.4 U		
Pyridine					2.9 U			2.8 U		
Aniline					1.5 U			1.4 U		
1,2-Diphenylhydrazine					2.9 U			2.8 U		
Benzidine					7.3 U			7 U		
Phenol					8.6			1.4 U		
Bis(2-Chloroethyl)Ether					1.5 U			1.4 U		
2-Chlorophenol					1.5 U			1.4 U		
1,3-Dichlorobenzene					1.5 U			1.4 U		
1,4-Dichlorobenzene					1.5 U			1.4 U		
Benzyl Alcohol					16.8			1.4 U		
1,2-Dichlorobenzene					1.5 U			1.4 U		
2-Methylphenol					1.5 U			1.4 U		
Bis(2-Chloroisopropyl)Ether					1.5 U			1.4 U		
4-Methylphenol					3.6			1.4 U		
N-Nitroso-di-n-Propylamine					1.5 U			1.4 U		
Hexachloroethane					1.5 U			1.4 U		
Nitrobenzene					1.5 U			1.4 U		
Isophorone					1.5 U			0.43 J		
2-Nitrophenol					3.7 U			1.4 U		
2,4-Dimethylphenol					1.5 U			1.4 U		
Benzoic Acid					34.7			14.1 U		
Bis(2-Chloroethoxy)Methane					1.5 U			1.4 UJ		
2,4-Dichlorophenol					1.5 U			1.4 U		
1,2,4-Trichlorobenzene					1.5 U			1.4 U		
Naphthalene					1.5 U			1.4 U		
4-Chloroaniline					1.5 U			1.4 U		
Hexachlorobutadiene					1.5 U			1.4 U		
4-Chloro-3-Methylphenol					1.5 U			1.4 U		
2-Methylnaphthalene					1.5 U			1.4 U		
Hexachlorocyclopentadiene					7.3 UJ			7 UJ		
2,4,6-Trichlorophenol					1.5 U			1.4 U		
2,4,5-Trichlorophenol					1.5 U			1.4 U		
2-Chloronaphthalene					1.5 U			1.4 U		
2-Nitroaniline					3.7 UJ			3.5 UJ		
Dimethyl Phthalate					1.5 U			1.4 U		
Acenaphthylene					1.5 U			1.4 U		
2,6-Dinitrotoluene					3.7 U			3.5 U		

Appendix E (cont.) – VOA, BNA and Metals Scan Results – Longview Fibre – November 1993.

Location:	P-Inf-1	P-Inf-2	S-Inf-1	S-Inf-2	S-Inf-E	Ef-1	Ef-2	Ef-E	Blch-Acd	Blch-Alk
Type:	grab	grab	grab	grab	E-comp	grab	grab	E-comp	grab	grab
Date:	11/2	11/2	11/2	11/2	11/2-3	11/2	11/2	11/2-3	11/3	11/3
Lab Log#:	458280	458281	458282	458283	458303	458284	458285	458305	458287	458288
BNA Compounds					ug/L			ug/L		
3-Nitroaniline					3.7 U			3.5 U		
Acenaphthene					1.5 U			1.4 U		
2,4-Dinitrophenol					14.6 UJ			14.1 UJ		
4-Nitrophenol					1.5 U			1.4 U		
Dibenzofuran					1.5 U			1.4 U		
2,4-Dinitrotoluene					3.7 U			3.5 U		
Diethyl Phthalate					3			0.41 J		
4-Chlorophenyl Phenylether					1.5 U			1.4 U		
Fluorene					1.5 U			1.4 U		
4-Nitroaniline					3.7 U			3.5 U		
4,6-Dinitro-2-Methylphenol					7.3 U			7 U		
N-Nitrosodiphenylamine					1.5 U			1.4 U		
4-Bromophenyl Phenylether					1.5 U			1.4 U		
Hexachlorobenzene					1.5 U			1.4 U		
Pentachlorophenol					7.3 U			1.4 U		
Phenanthrene					1.5 U			1.4 U		
Anthracene					1.5 U			1.4 U		
Dimethyl-Nitrosamine					1.5 U			1.4 U		
Fluoranthene					1.5 U			1.4 U		
Pyrene					1.5 U			1.4 U		
Butylbenzyl Phthalate					2			1.4 U		
3,3'-Dichlorobenzidine					2.9 U			2.8 U		
Benzo(a)Anthracene					1.5 U			1.4 U		
Chrysene					1.5 U			1.4 U		
Bis(2-Ethylhexyl)Phthalate					1.8			1.4 U		
Di-n-Octyl Phthalate					1.5 UJ			1.4 UJ		
Benzo(b)Fluoranthene					1.5 U			1.4 U		
Benzo(k)Fluoranthene					1.5 U			1.4 U		
Benzo(a)Pyrene					1.5 U			1.4 U		
Indeno(1,2,3-cd)Pyrene					1.5 U			1.4 U		
Dibenzo(a,h)Anthracene					1.5 U			1.4 U		
Benzo(g,h,i)Perylene					1.5 U			1.4 U		
Metals										
Antimony					30 U			30 U		
Arsenic					2.9 P			2.5 P		
Beryllium					1 U			1 U		
Cadmium					0.57 P			0.27 P		
Chromium					5 U			5 U		
Copper					14 P			8 P		
Lead					3.1 P			1.9 P		
Mercury					0.16 P			0.056 P		
Nickel					10 U			10 U		
Selenium					2 U			2 U		
Silver					0.5 UJ			0.5 UJ		
Thallium					2.5 U			2.5 U		
Zinc					40 P			14 P		

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 quantification limit.

Appendix F. Glossary - Longview Fibre - November 1993.

ABN	Acid base-neutral, semivolatile organics, see BNA
AED	Atomic Emission Detector
BNA	Base-neutral acids, semivolatiles, see ABN
BOD	Biochemical Oxygen Demand
CLP	Contract Laboratory Program
COD	Chemical Oxygen Demand
co-elutants	When two or more compounds have the same chromatographic retention time
CVAA	Cold Vapor Atomic Absorption
d-deuterium	An isotope of hydrogen
DL	Detection Limit
DOC	Dissolved Organic Carbon
DW	Dangerous Waste
ECD	Electron Capture Detector-Sensitive to halogen compounds - use: halogenated hydrocarbons
EHW	Extremely Hazardous Waste
ELD	Electrolytic Detector - Hall
EP TOX	Extraction Procedure Toxicity
Fatty Acid	Monobasic organic acids derived from hydrocarbons; include both saturated and unsaturated acids
FID	Flame Ionization Detector-Sensitive to carbon compounds, used in the determination of hydrocarbons
Flash Point	Minimum temperature that will enable combustion or explosions to take place
FTIR	Fourier Transform Infra-Red
GC	Gas Chromatography
GCMS	Gas Chromatography Mass Spectrometry, also GC/MS
HC	Hydrocarbon
HDPE	High Density Polyethylene
HH	Halogenated Hydrocarbon
HPLC	High Performance Liquid Chromatography
HSD	Halogen-Specific Detector - use: halogenated hydrocarbons
HW	Hazardous Waste
HWPAH	Hazardous Waste Polynuclear Aromatic Hydrocarbon
ICP	Inductively Coupled Plasma
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
IDL	Instrument Detection Limit
isomer	One of two or more substances which have the same elementary composition but differ in structure and hence in properties
isotope	One of two or more nuclides having the same atomic number, but differing in mass number

Isotopically labelled	The substitution of one or more isotopes for elements in a compound
kg	kilogram (1 X 10^3 grams)
L	Liter (1 X 10^3 milliliters)
LC50	Concentration which is lethal to 50% of the test organisms
LOD	Limit of Detection
LOEC	Lowest Observable Effect Concentration
m^3	Cubic meter (1 X 10^3 liters)
MBAS	Methylene Blue Active substances
metalloids	Elements that exhibit transitional characteristics between metals and non-metals, examples include silver, selenium, antimony
MF	Membrane Filter
mg	milligram (1 X 10^{-3} grams)
mL	Milliliter (1 X 10^{-3} liters)
MPN	Most Probable Number
ng	Nanogram (1 X 10^{-9} grams)
nm	Nanometer (1 X 10^{-9} meters)
NOEC	No Observable Effect Concentration
NPDES	National Pollution Discharge Elimination System
NPOC	Non-Purgeable Organic Carbon
NTU	Nephelometric Turbidity Unit
OSHA	Occupation Safety and Health Administration
OSW	Office of Solid Waste
PCB	Polychlorinated Biphenyl
PE	Polyethylene
pg	Picogram (1 X 10^{-12} grams)
pH	Hydrogen Ion Concentration
PID	Photoionization Detector - use: aromatic hydrocarbons
PLM	Polarized Light Microscopy
POC	Purgeable Organic Carbon
Polyvalent	Capable of having more than one valance state
PP	Priority Pollutant
ppb	Parts per billion (1 X 10^{-9} ug/L or ug/kg)
ppm	Parts per million (1 X 10^{-6} ug/L or ug/kg)
ppt	Parts per thousand (1 X 10^{-3} ug/L or ug/kg)
PQL	Practical Quantitation Limit
PUF	Polyurethane Foam
SDWA	State Drinking Water Act
SOW	Statement of Work
SW	Solid Waste

TC	Target Compounds or Total Carbon
TCD	Thermal Conductivity Detector
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TIC	Total Inorganic Carbon or for GCMS Tentatively Identified Compound
TNVS	Total Non-Volatile Solids
TNVSS	Total Non-Volatile Suspended Solids
TOC	Total Organic Carbon
TP	Total Phosphorous
TPH	Total Petroleum Hydrocarbons
TS	Total Solids
TSS	Total Suspended Solids
TVS	Total Volatile Solids
ug	Microgram (1×10^{-6} grams)
ug/m^3	Microgram per cubic meter
VOA	Volatile Organic Analysis
VOC	Volatile Organic Carbon
ZHE	Zero Headspace Extractor