WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES

October 9, 1989

TO: Don Kjosness

FROM: Art Johnson A.J. and Pat Hallinan PH

SUBJECT: NPDES Permit Violations by Weyerhaeuser, Cosmopolis, During Ecology Monitoring Program of March - June, 1989

As you are aware, Pat and I collected a series of effluent samples from the Weyerhaeuser and ITT Rayonier pulp mills in Grays Harbor between March 7 and June 20 of this year. The objective was to assess variability of these effluents during Fisheries' study of low survival of Chehalis River salmon.

The data from chemical analyses and rainbow trout bioassays are now in. During this study, three of the eight samples collected of Weyerhaeuser effluent failed the rainbow trout bioassay requirement in their NPDES permit of 80 percent survival in 65 percent effluent. The results of these bioassays are described in the attached reports by Margaret Stinson. Violations of Weyerhaeuser permit requirements for TSS and pH were not observed; no analysis was done for BOD and fecal coliform, the other parameters in the permit. ITT effluent was meeting permit requirements (rainbow trout, TSS, and pH) on the four occasions it was sampled.

The Weyerhaeuser samples were 10 gallons each, hand composited over a 2-hour period during the discharge cycle. The sampling location was the catwalk just upstream of the outlet structure on pond D. The mill was not given prior notification that the samples were to be collected. Additional sample collection information is given below:

Sample No.	Date	Time
12-8013	March 21, 1989	1305 - 1505
22-8000	May 31, 1989	1145 - 1345
25-8005	June 20, 1989	1605 - 1805

AJ5:pb
Attachments
cc: Dick Cunningham
Norm Glenn
Steve Hunter
Bill Yake

M E M O R A N D U M

April 12, 1989

To: Art Johnson

From: Margaret Stinson MDS

Re: Weyco, Grays Harbor
Results of Salmonid Bioassay

Sample Identification

Laboratory Reference Number: 12-8013
Date Sample Collected: March 21, 1989
Sample Description: "Weyco, GH Mills"
a pale brown liquid, changing to darker red-brown on neutralizing pH

Methods

Testing for toxic properties was in accordance with the Department of Ecology procedure for "Static Acute Fish Toxicity Test." The test organism was rainbow trout (Oncorhynchus mykiss, formerly Salmo gairdneri). The sample was tested at 65% effluent concentration. Ten trout were added to ten liters of sample/water mixture in each aquarium. Dechlorinated Manchester city water was used for dilution of samples, and as a control. Three replicates were run at each concentration. Cadmium chloride (EPA/EMSL, Cincinnati) was used as a reference toxicant. Test duration was 96 hours. Length, weight, and loading data were based on measurements of control organisms at the end of the test.

The initial pH of this sample measured 2.52 the day testing commenced. To adjust, 45 ml of sodium hydroxide (50 gm/L) solution was added to each ten liter tank of test mixture. This resulted in a pH of approximately 7.23 at the beginning of testing.

Test Results

A full report of test data is attached. Mortality is summarized below.

65% effluent	-	26/30 fish died =	87% mortality
Control	-	0/30 fish died =	0% mortality

The LC50 for the cadmium chloride reference toxicant was estimated at 1.4 ug/L using the graphical method . This is within the range of values normally expected for this organism.

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Manchester
Analyst: M. Stinson

Industry/Toxicant: Control
Address:
Collector:
Date Sample Collected:

Beginning: Date 3/23/89 Time 1600
Ending: Date 3/27/89 Time 1600
Test Organism: Oncorhynchus mykiss (formerly Salmo gairdneri)
Required Test Temperature Range: 12 ± 1 °C

Laboratory Reference Number	Test Container No.	Conc (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/L as $CaCO_3$)		Total Alkalinity (mg/L as $CaCO_3$)		Conductivity uMHOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
Control	3	Dechlorinated	0	0	0	0	0	9.45	8.4	--	-	8.3	8.16	7.68	-	-	7.66	11.6	11.4	11.8	11.9	12.4	61	68	86	92	270	260
	16	Manchester	0	0	0	0	0	9.45	-	8.65	-	8.4	8.26	-	7.53	-	7.69	11.9	11.6	12.0	12.1	11.8	69	69	86	93	240	310
	19	City Water	0	0	0	0	0	8.35	-	-	8.95	8.0	8.25	-	-	7.63	7.66	11.9	11.6	12.0	12.1	11.8	62	75	86	80	230	280

Sample Description:
Average Weight: 0.6 gm Mean Length: 32.6 mm Longest: 38 mm Shortest: 29 mm Ratio (long/short): 1.3
Number of organisms per chamber: 10 Ratio of flesh to water: 0.6 gm/L Comments:

* Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

DATA VERIFIED BY: Pam Carey DATE: 4/10/89

____ EHW > 10/30
____ DW > 11/30

ECY 030-1-40

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Manchester
Analyst: M. Stinson

Industry/Toxicant: Weyco - Grays Harbor
Address:
Collector: Art Johnson
Date Sample Collected: 3/21/89

Beginning: Date 3/23/89 Time 1601
Ending: Date 3/27 Time 1600
Test Organism: Oncorhynchus mykiss (formerly Salmo gairdneri)
Required Test Temperature Range: 12±1°C

Laboratory Reference Number	Test Container No.	Conc (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as $CaCO_3$)		Total Alkalinity (mg/l as $CaCO_3$)		Conductivity uMHOS/	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
12-8013	5	65%	0	0	0	1	3	9.0	8.35	-	-	5.0	7.26	7.21	-	-	7.03	11.6	11.4	11.8	11.9	12.4	230	330	49	25	1600	23
	8	(	0	0	0	6	3	8.8	-	7.6	-	5.85	7.14	-	7.11	-	7.03	11.6	11.4	11.8	11.9	12.4	240	330	47	25	1600	33
	11		0	0	0	3	4	8.80	-	-	6.15	5.85	7.12	-	-	6.93	6.97	11.9	11.6	12.0	12.1	11.8	230	330	47	27	1600	31

Sample Description: "Weyco Gil Mills", a pale brown liquid changing to darker red brown on neutralizing pH.
Average Weight: 2.6 gm Mean Length: 33.6 mm Longest: 38 mm Shortest: 29 mm Ratio (long/short): 1.3
Number of organisms per chamber: 10 Ratio of flesh to water: 0.6 gm/L Comments:
pH adjustment: Initial pH 2.52. Required 45 ml (NaOH 150gm/liter solution) to raise pH to 7.23.

* Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

DATA VERIFIED BY Pam Cuney DATE 4/10/89

EHW > 10/30
DW > 11/30

ECY 030-1-40

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

To: Art Johnson

From: Margaret Stinson MDS

Subject: Weyco, Grays Harbor
Results of Salmonid Bioassay

Date: June 26, 1989

Sample Identification

Laboratory Reference Number:	22-8000
Date Sample Collected:	May 31, 1989
Sample Description:	"Weyco, GH Mills" A brown liquid that darkened on neutralizing pH

Methods

Testing for toxic properties was in accordance with the Department of Ecology procedure for "Static Acute Fish Toxicity Test." The test organism was rainbow trout (Oncorhynchus mykiss, formerly Salmo gairdneri). The sample was tested at 65% effluent concentration. Ten trout were added to ten liters of sample/water mixture in each aquarium. Dechlorinated Manchester city water was used for dilution of samples, and as a control. Three replicates were run at each concentration. Cadmium chloride (EPA/EMSL, Cincinnati) was used as a reference toxicant. Test duration was 96 hours. Length, weight, and loading data were based on measurements of control organisms at the end of the test.

The initial pH of the sample was 2.66. To neutralize, 36 ml of NaOH solution (50 gm/L) was added to each ten liter tank of effluent/dilution water mixture. After equilibration, the pH was approximately 7.4 in each tank.

Test Results

A full report of test data is attached. Mortality is summarized below.

65% effluent	-	29/30 fish died =	97% mortality
Control	-	2/30 fish died =	6.7% mortality

The LC50 for the cadmium chloride reference toxicant was greater than 2.5 ug/L.

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Manchester
Analyst: M. Stinson

Industry/Toxicant: Weyco, Grays Harbor
Address:
Collector:
Date Sample Collected: 5/31/89

Beginning: Date 6/1/89 Time 1600
Ending: Date 6/4/89 Time 1600
Test Organism: Rainbow Trout (Oncorhynchus mykiss, formerly Salmo gairdneri)
Required Test Temperature Range: 12±1°C

Laboratory Reference Number	Test Container No.	Conc (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as $CaCO_3$)		Total Alkalinity (mg/l as $CaCO_3$)		Conductivity uMHOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
27-8000	4	65%	0	0	0	10	-	8.3	8.5	-	4.8	-	7.58	7.34	-	7.14	-	12.4	12.4	13.0	13.0	-	211	211	54	52	1590	1600
	9	}	0	0	0	8	9	8.4	-	8.1	-	5.4	7.44	-	7.34	-	7.13	12.4	12.4	13.0	13.0	13.1	205	250	48	50	1570	1510
	11		0	0	0	10	-	8.15	-	-	5.0	-	7.69	-	-	7.00	-	12.5	12.5	13.0	13.0	-	205	208	44	44	1590	1570

Sample Description: "Weyco, GH Mills," Brown liquid that darkened on neutralizing pH
Average Weight: 0.24 gm Mean Length: 27.3 mm Longest: 30 mm Shortest: 22 mm Ratio (long/short): 1.4
Number of organisms per chamber: 10 Ratio of flesh to water: 0.24 gm/L Comments:
Sample neutralized using NaOH solutions. Initial pH 2.66; 36 ml of NaOH (50gm/L) added to 10 Lit to produce approximate pH of 7.9.

Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

DATA VERIFIED BY: Pam Carey DATE: 6/27/89

_____ EHW > 10/30
_____ DW > 11/30

ECY 030-1-40

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Manchester
Analyst: M. Stinson

Industry/Toxicant: Control
Address:
Collector:
Date Sample Collected:

Beginning: Date 6/1/89 Time 1600
Ending: Date 6/4/89 Time 1600
Test Organism: Rainbow Trout (Oncorhynch. mykiss, formerly Salmo gairdneri)
Required Test Temperature Range:

Laboratory Reference Number	Test Container No.	Conc ~~mg/l~~	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as $CaCO_3$)		Total Alkalinity (mg/l as $CaCO_3$)		Conductivity uMHOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
Control	5	Dechlorinated	0	0	0	0	0	9.2	8.65	-	-	7.9	8.13	7.71	-	-	7.46	12.4	12.4	13.0	13.0	13.0	69	69	85	85	232	238
	12	Manchester	0	0	1	2	2	9.2	-	8.4	-	8.25	8.22	-	7.76	-	7.65	12.5	12.5	13.0	13.0	13.0	68	63	84	83	232	236
	15	City Water	0	0	0	0	0	9.25	-	-	-	8.05	8.22	-	-	-	7.68	12.5	12.5	13.0	13.0	13.0	68	65	84	85	227	240

Sample Description:
Average Weight: 0.24 gm Mean Length: 27.3 mm Longest: 30 mm Shortest: 22 mm Ratio (long/short): 1.4
Number of organisms per chamber: 10 Ratio of flesh to water: 0.24 gm/L Comments:

Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

ECY 030-1-40

DATA VERIFIED BY: Pam Cuney DATE: 6/27/89

_____ EHW > 10/30
_____ DW > 11/30

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

To: Art Johnson

From: Margaret Stinson MS

Subject: Weyco, Grays Harbor
Results of Salmonid Bioassay

Date: July 11, 1989

Sample Identification

Laboratory Reference Number:	25-8005
Date Sample Collected:	June 20, 1989
Sample Description:	"Weyco, GH Mills" An amber-colored liquid that darkened on neutralizing pH

Methods

Testing for toxic properties was in accordance with the Department of Ecology procedure for "Static Acute Fish Toxicity Test." The test organism was rainbow trout (Oncorhynchus mykiss, formerly Salmo gairdneri). The sample was tested at 65% effluent concentration. Ten trout were added to five liters of sample/water mixture in each aquarium. Dechlorinated Manchester city water was used for dilution of samples, and as a control. Three replicates were run at each concentration. Cadmium chloride (EPA/EMSL, Cincinnati) was used as a reference toxicant. Test duration was 96 hours. Length, weight, and loading data were based on measurements of control organisms at the end of the test.

The initial pH of the sample was 2.56. To neutralize, 27 ml of sodium hydroxide solution (50 gm/L) was added to each five liter tank of effluent/dilution water mixture. After equilibration, the pH was approximately 7.4 in each tank. In previous tests, pH drifted downward only slightly as the test progressed. Downward drift was much more marked in this test, with final pH ranging from 6.53 to 6.78 in the three replicates.

Test Results

A full report of test data is attached. Mortality is summarized below.

65% effluent	-	30/30 fish died =	100% mortality
Control	-	0/30 fish died =	0% mortality

The LC50 for the cadmium chloride reference toxicant was estimated at 2.7 ug/L using the graphical method. This is within the range of values normally expected for this organism.

State of Washington
Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Manchester
Analyst: M Stinson

Industry/Test cust: Control
Address:
Collector:
Date Sample Collected:

Beginning Date: 6/23/89 Time: 1615
Ending: Date: 6/27/89 Time: 1615
Test Organism: Rainbow Trout (Oncorhynchus mykiss, formerly Salmo gairdneri)
Required Test Temperature Range: 12 ± 1°C

Laboratory reference number	Test Container No.	Conc. (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as $CaCO_3$)		Total Alkalinity (mg/l as $CaCO_3$)		Conductivity uMHOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
Control	2	Dechlorinated	0	0	0	0	0	9.55	-	8.3	-	8.2	8.12	-	7.46	-	7.45	12.0	12.0	12.6	12.1	12.1	79	70			295	252
	7	Manchester	0	0	0	0	0	9.35	-	8.1	-	7.9	8.29	-	7.51	-	7.50	12.0	12.0	12.0	12.0	12.0	73	76			240	253
	12	City Water	0	0	0	0	0	9.35	-	-	8.35	7.75	8.33	-	-	7.50	7.49	12.0	12.0	11.8	11.9	11.8	65	72			236	277

Sample Description:
Average Weight: 0.4 gm Mean Length: 28.5 mm Longest: 34 mm Shortest: 24 mm Ratio (long/short): 1.4
Number of organisms per chamber: 10 Ratio of flesh to water: 0.5 gm/L Comments:

Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

ECY 030-1-40

DATA VERIFIED BY: Pam Covey DATE: 7/28/89

_____ EHW > 10/30
_____ DW > 11/30

State of Washington
Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: Manchester
Analyst: [illegible]

Industry/Toxicant: [illegible] Mills
Address:
Collector: [illegible]
Date Sample Collected: 6/20/89

Beginning Date: 6/23/89 Time: 1615
Ending: Date: 6/27/89 Time: 1615
Test Organism: Rainbow Trout (Oncorhynchus mykiss, formerly Salmo gairdneri)
Required Test Temperature Range: 12 ± 1°C

Laboratory Reference Number	Test Container No.	Conc (mg/l)	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as $CaCO_3$)		Total Alkalinity (mg/l as $CaCO_3$)		Conductivity uMHOS/cm	
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96	0	96	0	96
25 80[illegible]	3	65%	0	2	10			7.85	-	6.8			7.31	-	6.78			12.0	12.0	12.0			305	217	43	43	2190	2200
	9	"	0	0	10			7.85	-	6.15			7.06	-	6.6			12.0	12.0	12.0			299	216	37	42	2100	2200
	11	"	0	1	10			7.85	-	6.35			6.96	-	6.53			12.0	12.0	11.8			216	315	92	43	2150	2240

Sample Description: "[illegible] Harbor Mills" An [illegible] liquid that [illegible] on neutralizing pH
Average Weight: .4 gm/fish Mean Length: 28.3 mm Longest: 34 mm Shortest: 24 mm Ratio (long/short): 1.4
Number of organisms per chamber: 10 Ratio of flesh to water: .8 gm/L Comments: pH drifted down [illegible] much more than in previous tests of this effluent (3-6/89)
[illegible] pH = 2.56; To neutralize added 27 ml NaOH (50 gm/L); resulted in approximate pH of 7.0

*Method on file with the Department of Ecology:
GENERAL PROCEDURE FOR STATIC BASIC ACUTE FISH TOXICITY TEST

DATA VERIFIED BY [signature] DATE 7/28/89

_____ EHW > 10/30
_____ DW > 11/30

ECY 030-1-40