Post-it™ Fax Note 7671	Date 4-11-95	# of pages ▶ 10
To Sandra Archer	From M. Stromberg	
Co./Dept. Wacker SiHronics	Co. CH2M Hill	
Phone # 503-243-2020	Phone # 503-752-4271	
Fax # 503-241-7599	Fax # 503-752-0276	

CH2M HILL Engineers Planners Economists Scientists

April 4, 1995

OPE40202.A0

Attention: Gary Hickman/CH2M HILL/CVO

RE: Analytical Data for Wacker Siltronic Corp.
CVO Laboratory Reference No. 8338

On March 21, 1994, the CH2M HILL Corvallis Applied Sciences Laboratory received one sample with a request for analysis of selected parameters.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. The analyses for MBAS was performed by QAL/LRD, their report is attached.

Under CH2M HILL policy, your samples will be stored for up to 30 days after reporting. If you have not given us prior instructions for disposal, we will contact you if any samples require disposal as hazardous waste.

The CH2M HILL Applied Sciences Laboratory appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ms. Kathy McKinley at (503)752-4271, extension 3144.

Sincerely,

Lynn White

Lynn White
Senior Data Package Specialist

Enclosures

Corvallis Office 2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
503 752-4271
Fax No. 503 752-0276

870713

Corvallis Applied Sciences Laboratory

Client Information
Project Name: Wacker Siltronic Corp.
Project Manager: Gary Hickman/CVO
Sampled By: T. Rothschild
Client Sample ID: 95-19
Sampling Date: 03/20/95
Sampling Time: 8:45
Type: Composite
Matrix: Water
Basis: As Rec'd

Lab Information
Date Rec'd: 03/21/95
Lab ID: 833801
Report Revision No.: 0
Reported By: H. VanNice
Reviewed By: CM Moore

Analyte	Reporting Limit	Sample Result	Qualifier	Units	Method	Date Analyzed
General Chemistry						
COD	5	5	U	mg/L	EPA410.1	3/27/95
Ammonia-N	0.05	0.31		mg/L	EPA350.3	3/27/95
Total Kjeldahl-N	0.20	0.36		mg/L	EPA351.4	3/27/95
Total Dissolved Solids	1	554		mg/L	EPA160.1	3/23/95
Total Suspended Solids	1	8		mg/L	EPA160.2	3/22/95
Hydrogen Peroxide	--	20		mg/L		3/21/95
Metals						
Chromium, Hexavalent	0.008	0.008	U	mg/L	EPA7196	3/21/95
Chromium, ICP	0.0006	0.0011		mg/L	EPA200.7	3/27/95
MBAS	0.10 mg/L	0.10				

U=Not detected at specified reporting limits

Engineers
Planners
Economists
Scientists

Corvallis Office

March 23, 1995

OPE40202.A0

Attention: Gary Hickman/CH2M HILL/CVO

RE: Analytical Data for Wacker Siltronic Corp.
CVO Laboratory Reference No. 8279

On March 7, 1995, the CH2M HILL Corvallis Applied Sciences Laboratory received one sample with a request for analysis of selected parameters.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. The analyses for MBAS were performed by QAL/LRD (Laboratory Reference No. R9604), their report is attached.

Under CH2M HILL policy, your samples will be stored for up to 30 days after reporting. If you have not given us prior instructions for disposal, we will contact you if any samples require disposal as hazardous waste.

The CH2M HILL Applied Sciences Laboratory appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ms. Kathy McKinley at (503)752-4271, extension 3144.

Sincerely,

Lynn White

Lynn White
Senior Data Package Specialist

Enclosures

Serving Oregon and Southwest Washington from two locations:

Corvallis Office	2300 NW Walnut Blvd., Corvallis, OR 97330-3538	503.752.4271	503.752.0276 FAX
Portland Office	825 N.E. Multnomah, Suite 1300, Portland, OR 97232-2146	503.235.5000	503.235.2445 FAX

Corvallis Applied Sciences Laboratory

Client Information
Project Name: Wacker Siltronic Corp
Project Manager: Gary Hickman/CVO
Sampled By: T. Rothschild
Client Sample ID: 95-4
Sampling Date: 03/06/95
Sampling Time: 8:30
Type: Composite
Matrix: Water
Basis: As Rec'd

Lab Information
Date Rec'd: 03/07/95
Lab ID: 827901
Report Revision No.: 0
Reported By: H. VanNice
Reviewed By: L. McMurray

Analyte	Reporting Limit	Sample Result	Qualifier	Units	Method	Date Analyzed
General Chemistry						
COD	5	14		mg/L	EPA410.1	3/15/95
Fluoride Free	0.05	4.43		mg/L	EPA340.2	3/14/95
N-Ammonia	0.05	1.68		mg/L	EPA350.3	3/13/95
Total Kjeldahl-N	0.25	1.81		mg/L	EPA351.4	3/13/95
pH	–	7.1		pH units	EPA150.1	3/7/95
Total Dissolved Solids	1	604		mg/L	EPA160.1	3/10/95
Total Suspended Solids	1	7		mg/L	EPA160.2	3/10/95
Sulfide	1	1	U	mg/L	EPA376.1/2	3/14/95
Sulfite	0.5	0.5	U	mg/L	EPA377.1	3/7/95
Hydrogen Peroxide	–	17		mg/L		3/7/95
Ox-Red Potential	–	170		MV		3/7/95
Metals						
Chromium, ICP	0.001	0.001		mg/L	EPA200.7	3/22/95
Chromium, Hexavalent	0.02	0.02	U	mg/L	EPA7196	3/9/95
MBAS	0.100 mg/L	0.246				

U=Not detected at specified reporting limits

BIOASSAY REPORT
ACUTE AND CHRONIC
DEFINITIVE BIOASSAYS
Conducted March 7 through 14, 1995

Prepared for

WACKER SILTRONICS
PORTLAND, OREGON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

March 23, 1995
Lab ID No. C01355

RESULTS AND DISCUSSION

ACUTE BIOASSAYS

The raw data sheets and ammonia analysis are presented in Appendix A and the results are summarized below.

Table 1
Summary of Results
Ceriodaphnia dubia

Percent Survival			
Concentration	0 hr	24 hr	48 hr
Control	100	100	100
95-5			
33%	100	80	15
95-6			
33%	100	90	60
95-7			
33%	100	100	100

Samples 95-5 and 95-6 both showed a statistically significant reduction in survival at 48 hours when compared to the control. Dissolved oxygen concentrations remained at 40 percent saturation or greater throughout the test period. Test temperatures remained in the range of 20±1 °C. The tests proceeded without interruption or incidence that could have affected test results.

CHRONIC BIOASSAYS

Table 2 summarizes the survival and reproduction data for the *Ceriodaphnia dubia* test conducted.

Table 2
***Ceriodaphnia Dubia* Results**

Concentration (%)	Percent Survival	No. Young Per Adult
Control	90	19.7
3	100	23.3
10	70	12.0[b]
17	0[a]	0.0
33	0[a]	0.0
100	0[a]	0.0

[a] Indicates a statistically significant reduction from control at p less than 0.05 using Fisher's Exact Test.
[b] Indicates a statistically significant reduction from control at p less than 0.05 using Steel's Many-One Rank Test.

The *Ceriodaphnia dubia* showed a statistically significant reduction in survival at the 17, 33, and 100 percent effluent concentrations and in reproduction at the 10 percent effluent concentration when compared to the control. The no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC) for survival and reproduction were 3 and 10 percent effluent, respectively. Control survival was 90 percent.

The IC_{25} values calculated for *Ceriodaphnia dubia* survival and reproduction were 9.7 and 7.0 percent effluent, respectively.

ble 3 summarizes the survival and growth data for the fathead minnow test conducted.

Table 3
Fathead Minnow Chronic Results

Sample Concentration (%)	Percent Survival	Mean Dry Weight Per Fish (mg)
Control	90.0	0.69
3	85.0	0.67
10	85.0	0.63
17	85.0	0.63
33	87.5	0.65
100	47.5[a]	0.33

[a] Indicates a statistically significant reduction from control at p less than 0.05 using Dunnett's T-test.

The fathead minnows showed a statistically significant reduction in survival at the 100 percent effluent concentration when compared to the control. Control survival was 90 percent. The NOEC and LOEC were 33 and 100 percent effluent, respectively.

The IC_{25} value was calculated on the fathead minnow survival and growth. The IC_{25} values for survival and growth were 64.9 and 58.7 percent effluent, respectively.

The EPA has indicated that the IC_{25} is the approximate analogue of the NOEC (Technical Support Document for Water-Quality-Based Toxics Control EPA/505/2-90-001, March 1991), making it a valuable indicator of chronic aquatic toxicity.

REFERENCE TOXICANT TESTS

The results of monthly reference toxicant tests with sodium chloride (*Ceriodaphnia* and fathead minnow) conducted in March indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1989). The LC_{50} values, IC_{25} values, and Control Chart limits are listed in the tables below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 4
Reference Toxicant Tests

Species	LC_{50} (g/L)	Control chart limits
Pimephales promelas (FHM 413)	7.5	6.3 to 9.3 g/L
Ceriodaphnia dubia	1.8	1.7 to 3.1 g/L

BIOASSAY REPORT
48-HOUR DEFINITIVE BIOASSAYS
Conducted March 21 through 23, 1995
and April 4 through 6, 1995

Prepared for

WACKER SILTRONICS
PORTLAND, OREGON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

April 25, 1995
Lab ID Nos. C01364, C01376

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. REFERENCE TOXICANT DATA FORMS
APPENDIX C. CHAIN OF CUSTODY FORMS

INTRODUCTION

CH2M HILL conducted abbreviated acute definitive tests using the water flea (*Ceriodaphnia dubia*) on samples provided by Wacker Siltronics, Portland, Oregon. The tests were conducted from March 21 through 23, 1995 and April 4 through 6, 1995. The acute testing was performed as part of a Toxicity Identification Evaluation Study.

METHODS AND MATERIALS

TEST METHODS

The acute tests were performed according to: *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, Weber C., et. al. (1991); EPA/600/4-90/027F, and Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures, (1991); EPA 600/6-91/003.

TEST ORGANISMS

The *Ceriodaphnia dubia* used in the acute tests were obtained from CH2M HILL's in-house cultures and were less than 24 hours old at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (1991). All test organisms appeared vigorous and in good condition prior to testing.

DILUTION WATER

The dilution water used in the *Ceriodaphnia* tests was moderately hard well water (EPA, 1991), with a total hardness and alkalinity of 88, 86 and 72, 68 mg/l as $CaCO_3$, respectively, and a pH of 6.8, 7.8.

TEST CONCENTRATIONS

The concentrations tested in the March 21, 1995 acute test were 3, 10, 33, 66, and 100 percent effluent with dilution water for the control. The concentrations were run in duplicate with 5 organisms per replicate. The concentrations tested in the April 4, 1995 acute test were 3, 10, 17, 33, 66, and 100 percent effluent with dilution water for the control. An extra 50 and 100 percent effluent concentrations were performed at 25°C. The concentrations were run in quadruplicate with 5 organisms per replicate.

SAMPLE COLLECTION

The samples were collected by Wacker personnel on March 20, and April 3, 1995 and delivered to CH2M HILL's Corvallis Aquatic Toxicology Laboratory by UPS. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SCOEPA00028279

SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 µm net and temperature adjusted prior to test initiation.

MONITORING OF BIOASSAYS

The acute tests were monitored at test initiation for pH, hardness, alkalinity, conductivity, ammonia and dissolved oxygen in the 100 percent concentration, and every 24 hours thereafter for mortality. Temperature was monitored continuously throughout the 48-hour test periods.

DATA ANALYSIS

The effects measured during the *Ceriodaphnia dubia* acute test included survival over the 48-hour exposure period. The statistical analyses performed were those outlined in *Short-Term Methods for Estimating the Acute Toxicity of Effluent and Receiving Waters to Freshwater Organisms and Marine Organisms*, EPA/600/4-90/027F, using Toxcalc version 5.

RESULTS AND DISCUSSION

ACUTE BIOASSAYS

The raw data sheets are presented in Appendix A and the results are summarized in Tables 1 and 2. The March 21, 1995 test resulted in 50 percent survival in the 100 percent effluent. The acute NOEC was 66 percent effluent.

Table 1
Summary of Results March 21, 1995
Ceriodaphnia dubia

Percent Survival			
Concentration	0 hr	24 hr	48 hr
Control	100	100	100
3	100	100	100
10	100	100	100
33	100	100	80
66	100	100	100
100	100	90	50

SCOEPA00028280

The results of the April 4, 1995 test showed 20 percent survival in the 100 percent effluent at 20° C. The LC50 was 56.6 percent effluent. The acute NOEC was 33 percent effluent. The sample tested at 25°C resulted in 5 percent survival in the 100 percent effluent.

Table 2 **Summary of Results April 4, 1994** ***Ceriodaphnia dubia***			
Percent Survival			
Concentration	0 hr	24 hr	48 hr
Control	100	100	100
3	100	100	100
10	100	100	100
17	100	100	100
33	100	100	80
66	100	100	35
100	100	90	20
50 (25°C)	100	100	25
100 (25°C)	100	70	5

Test temperatures remained in the range of 20±1°C. The tests proceeded without interruption or incidence that could have affected test results.

REFERENCE TOXICANT TESTS

The results of monthly reference toxicant tests with sodium chloride conducted in March indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1991). The LC_{50} value and Control Chart limits are listed in the table below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 3 **Reference Toxicant Tests**		
Species	**LC_{50} (g/L)**	**Control chart limits**
Ceriodaphnia dubia	1.8	1.6 to 3.1g/L

SCOEPA00028281

APPENDIX A
RAW DATA SHEETS

CH2M HILL TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Wacker Siltronics
Address: 7200 Front St, Portland, OR
Contact: Ms Sandra Archer

Test Initiation: Date 3-21-95 Time 1330 Test Termination: Date 3-24-95 Time 0815
Technician: Schut
Test Species/ID: Ceriodaphnia dubia 1 Cd 459 — 1
Ceriodaphnia dubia 1 Cd 464 — 1

Sample Information

Sample ID Number	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Tested	Dechlorinated (Yes or No)	Salinity (ppt)	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
C01364	3-20-95	0815	0.04 mg/l	No		244	20
			1				
C01376	4-3-95	0820	0.06 1	No		164	12
			1				
			1				
			1				
			1				
			1				
			1				
			1				
			1				
			1				
			1				
			1				
			1				
			1				

Test Species Information	ID # Cd 459	ID # Cd 464	ID #	ID #
Age or Size	<24 h	<24 h		
Loading Rate	—	—		
Test Container Size	25 ml	25 ml		
Test Volume	15 ml	15 ml		
Feeding: Type	None	None		
Amount	—	—		
Aeration: Began	None	None		
Amount	—	—		
Dilution Water ID #	902	910		
Acclimation Period	—	—		
Test Location	#3	#3		
Condition of Survivors				

Comments

Dilution Water Source	ID #	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
MH Well	902	88	72
MH Well	910	96	68

Water Quality Meters Used/ID #

Dissolved Oxygen 1 pH 1 Temperature ____

Conductivity 1 Refractometer ____ Other ____

SCOEPA00028283

CHMHill **FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA**

Client: Wacker Siltronics

Sample Description: Day 1 - Initial Toxicity Test 24 hr.

Test Species: Ceriodaphnia dubia ID#: Cd 459

Beginning, Date: 3-21-95 Time: 13:30

Ending, Date: 3-23-95 Time: 08:15

Technician: 0 hr JS 24 hr JS 48 hr JS 72 hr ____ 96 hr ____

Time: 0 hr 13:30 24 hr 13:30 48 hr 08:15 72 hr ____ 96 hr ____

Conc or ~~Percent~~	Test Container Number	Number of Live Organisms					Disolved Oxygen (mg/l)					pH					Temperature(°C)					Conductivity (µmohs/cm)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
control	A	5	5	5													20	20	20							
	B	5	5	5																						
3%	A	5	5	5																						
	B	5	5	5																						
10%	A	5	5	5																						
	B	5	5	5																						
33%	A	5	5	5																						
	B	5	5	3																						
66%	A	5	5	5																						
	B	5	5	5																						
100%	A	5	4	3													20	20	20							
	B	5	5	2																						

CH2M HILL **FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA**

Client: Wacker

Sample Description: Initial Toxicity Test C01376-01

Test Species: Ceriodaphnia dubia ID#: Cd 464

Beginning, Date: 4-4-95 Time: 14:00

Ending, Date: 4-6-95 Time: 1100

Technician: 0 hr JS 24 hr JS 48 hr JS 72 hr ____ 96 hr ____

Time: 0 hr 14:00 24 hr 14:30 48 hr 1110 72 hr ____ 96 hr ____

Conc or Percent	Test Container Number	Number of Live Organisms					Disolved Oxygen (mg/l)					pH					Temperature(°C)					Conductivity (µmohs/cm)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
control	A	5	5	5													20	20	20							
	B	5	5	5																						
	C	5	5	5																						
	D	5	5	5																						
10%	A	5	5	5													20	20	20							
	B	5	5	5																						
	C	5	5	5																						
	D	5	5	5																						
17 JS	A	5	5	5													20	20	20							
	B	5	5	5																						
	C	5	5	5																						
	D	5	5	5																						
33	A	5	5	5													20	20	20							
	B	5	5	2																						
	C	5	5	5																						
	D	5	5	5																						

CH2M HILL **FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA**

Client: Wacker Fss
Sample Description: Initial Test
Test Species: Ceriodaphnia dubia ID#: Cd 464

Beginning, Date: 4-4-95 Time: 14:00
Ending, Date: 4-6-95 Time: 11:00
Technician: 0 hr JS 24 hr JS 48 hr JS 72 hr ____ 96 hr ____
Time: 0 hr 14:00 24 hr 1430 48 hr 11:10 72 hr ____ 96 hr ____

Conc or Percent	Test Container Number	Number of Live Organisms					Disolved Oxygen (mg/l)					pH					Temperature(°C)					Conductivity (µmohs/cm)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
66%	A	5	5	2													20	20	20							
	B	5	5	1																						
	C	5	5	2																						
	D	5	5	2																						
100%	A	5	4	1			9.4	~~9.4~~ JS									20	20	20			710				
	B	5	5	1																						
	C	5	3	1																						
	D	5	4	1																						
50%	A	5	5	1													25	25	25							
	B	5	5	2																						
	C	5	5	1																						
	D	5	5	1																						
100%	A	5	4	1			9.2										25	25	25			710				
	B	5	4	0																						
	C	5	3	1																						
	D	5	3	0																						

Acute Test-48 Hr Survival

Start Date:	04 Apr-95 00:00	Test ID:	137601cdai	Sample ID:	WACKER-SILTRONICS
End Date:	06 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:	03 Apr-95 00:00	Protocol:	EPAA 91-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	Initial Toxicity Test				

Conc-%	1	2	3	4
D-Control	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000
33	1.0000	0.4000	1.0000	0.8000
66	0.4000	0.2000	0.4000	0.4000
100	0.2000	0.2000	0.2000	0.2000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			0	20
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
17	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
33	0.8000	0.8000	1.1206	0.6847	1.3453	27.799	4	14.00	10.00	4	20
*66	0.3500	0.3500	0.6295	0.4636	0.6847	17.561	4	10.00	10.00	13	20
*100	0.2000	0.2000	0.4636	0.4636	0.4636	0.000	4	10.00	10.00	16	20

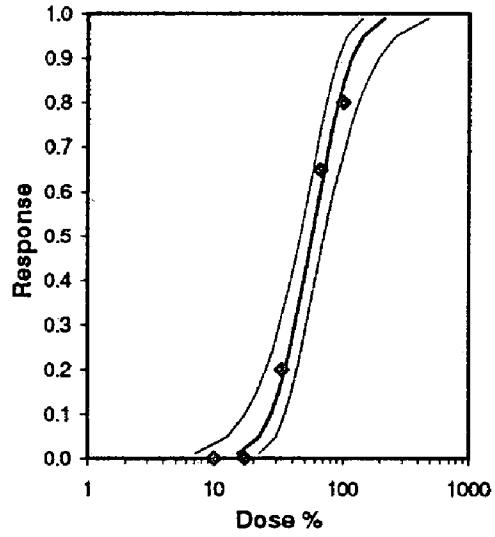
Auxillary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.63757	0.884	-1.7895	8.23516
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	33	66	46.669	3.0303

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.04419	0.74136	2.59114	5.49725	0	0.90346	11.3449	0.82	1.753	0.24727	4
Intercept	-2.0895	1.3009	-4.6392	0.4603							
TSCR											

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	15.058	7.01384	22.0417
EC05	3.355	22.1962	12.6596	29.7688
EC10	3.718	27.2968	17.2515	35.1278
EC15	3.964	31.385	21.1759	39.4298
EC20	4.158	35.0665	24.8381	43.3682
EC25	4.326	38.5673	28.3856	47.2166
EC40	4.747	49.0178	38.9212	59.724
EC50	5.000	56.6238	46.143	70.1601
EC60	5.253	65.4099	53.8089	83.792
EC75	5.674	83.134	67.4606	115.917
EC80	5.842	91.4334	73.2827	132.77
EC85	6.036	102.159	80.4471	156.032
EC90	6.282	117.459	90.1467	191.85
EC95	6.645	144.45	106.208	261.849
EC99	7.326	212.927	143.231	473.318



 ToxCalc v5.0 Reviewed by:_____

APPENDIX B
REFERENCE TOXICANT DATA SHEETS

REFERENCE TOXICANT DATA SHEET

Client: QA/QC
Reference Toxicant: NaCl
Test Begin Date: 3-7-95 Time: 1540
Test Organism: Ceriodaphnia dubia
CID#: 91 Stock Solution: 20 g/L
Test End Date: 3-9-95 Time: 1600
Source: In house
Solvent: distilled
ID#: CD 454 Age: <24hrs
*Dilution Water: MH well H_2O ID#: 899
Size: —
Total Hardness as CaCO3: 102 Total Alkalinity as CaCO3: 72
Conductivity (umhos/cm)/ Salinity (ppt): 228 Temperature: 20±1°C
Technician 0h: BM 24h: BM 48h: BM 72h: 96h:

Toxicant Concentration g/L	Test Chamber Number	Number Surviving					Dissolved Oxygen mg/l					pH					Temperature °C				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
control	A	5	5	5			8.8	-	8.5			7.7	-	8.2			20	20	20		
	B	5	5	5			8.8	-	8.6												
1	A	5	5	5			8.8	-	8.5			7.8	-	8.1			20	20	20		
	B	5	5	4			8.8	-	8.6												
2	A	5	5	3			8.9	-	8.6			7.8	-	8.1			20	20	20		
	B	5	5	2			8.9	-	8.6												
2.5	A	5	5	1			8.9	-	8.6			7.8	-	8.0			20	20	20		
	B	5	5	1			8.9	-	8.5												
3	A	5	5	0			8.0	-	8.5			7.8	-	8.0			20	20	20		
	B	5	4	0			8.8	-	8.6												
4	A	5	0	-			8.8	8.5	-			7.8	8.0	-			20	20	-		
	B	5	0	-			8.8	8.5	-												

*Dilution Water Code
Recon. - reconstituted water
VS - very soft
S - soft
MH - moderately hard
H - hard
VH - very hard

48 h LC50: 1.8
95% conf. int.: 1.3 to 2.1
Statistical Method: Probit

We verify this data is true and correct.
Task Manager: [signature]
Project Manager: Doug Winn
QA Officer: [signature]
Signature

SCOEPA00028289

Acute Test-48 Hr Survival

Start Date:	07 Mar-95 00:00	Test ID:	rcda454	Sample ID:	REF-Ref Toxicant
End Date:	09 Mar-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	CD-Ceriodaphnia dubia

Comments:

Conc-gm/L	1	2
D-Control	1.0000	1.0000
1	1.0000	0.8000
2	0.6000	0.4000
2.5	0.2000	0.2000
3	0.0000	0.0000
4	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	0	10
1	0.9000	0.9000	1.2262	1.1071	1.3453	13.732	2	1	10
2	0.5000	0.5000	0.7854	0.6847	0.8861	18.129	2	5	10
2.5	0.2000	0.2000	0.4636	0.4636	0.4636	0.000	2	8	10
3	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	2	10	10
4	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	2	10	10

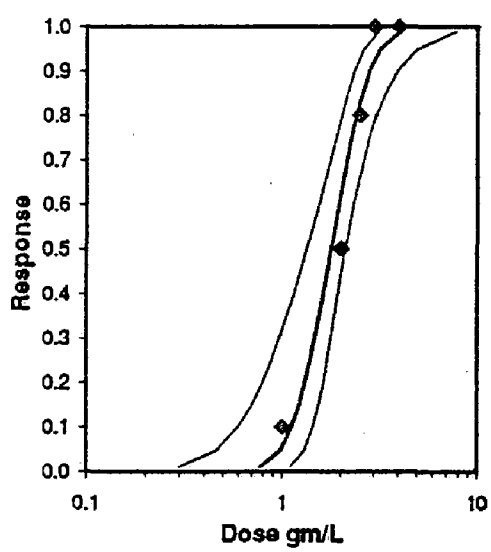
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.43771	1.57378	3.3531	9.52232	0	2.09442	11.3449	0.55	0.24848	0.15533	4
Intercept	3.40039	0.572	2.27927	4.5215							

TSCR

Point	Probits	gm/L	95% Fiducial Limits	
EC01	2.674	0.7711	0.29403	1.10391
EC05	3.355	0.98395	0.46539	1.31314
EC10	3.718	1.12049	0.59307	1.44387
EC15	3.964	1.22316	0.69737	1.54175
EC20	4.158	1.31142	0.79217	1.62635
EC25	4.326	1.39221	0.88263	1.70471
EC40	4.747	1.61853	1.15007	1.93433
EC50	5.000	1.77205	1.33696	2.10522
EC60	5.253	1.94012	1.538	2.31536
EC75	5.674	2.25552	1.87971	2.80099
EC80	5.842	2.39447	2.01136	3.05709
EC85	6.036	2.56726	2.16084	3.40983
EC90	6.282	2.8025	2.34485	3.94533
EC95	6.645	3.19138	2.61676	4.95376
EC99	7.326	4.07229	3.15495	7.73603



 ToxCalc v5.0 Reviewed by:_____

APPENDIX C
CHAIN OF CUSTODY

CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Wacker Siltronic Corporation NPDES# _____

Address 7200 NW Front Avenue
Portland, Oregon 97210

Composite Sample Information _____

Samples/Hour 0.5 Volume/Sample 3.5 gallons
Total Hours 24 Total Volume 42 gallons
Initiated: Date 2 Apr 95 Time 0800
Ended: Date 3 Apr 95 Time 0830
Chilled During Collection Yes ☐ No ☒

Contact Person: Sandra Archer
Phone: 503-243-2020
CH2M HILL Project # ASE 14431

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P. O.#

Check Chlorine (Y/N) _____
Temp. Upon Arrival (°C) 3°C
Check Ammonia (Y/N) _____ Dechlorinate (Y/N) _____

Analysis Required/Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste				Concentrations and/or Comments
95-20	3 Apr 95	0820	X		1	C01376-01																		Continueing Toxicology Identification Evaluation

Sampled By & Title (Please sign and print name) Thomas J. Rothschild, Facilities Chemist	Date/Time 3 Apr 95 0820	Relinquished By (Please sign and print name) Thomas J. Rothschild	Date/Time 3 Apr 95 / 0820
Received By (Please sign and print name)	Date/Time 4/4/95	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ✓ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

Rev. 3/94

SCOEPA00028292

CH2M HILL
APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project #: AGE 14431
Purchase Order #: 31302
Project Name:
Company Name/CH2M HILL Office: Wacker Siltronic Corporation
Project Manager & Phone #: Mr. [X] Ms. [ ] Dr. [ ] Thomas J. Rothschild
Report Copy to: Sandie Archer
Requested Completion Date:
Sampling Requirements: SDWA [ ] NPDES [X] RCRA [ ] OTHER ____
Sample Disposal: Dispose [X] Return [ ]

LAB TEST CODES

ANALYSES REQUESTED: Toxicity Identification Evaluation

SHADED AREA-- FOR LAB USE ONLY: Lab 1 #; Lab 2 #; Quote #; Kit Request #; Project #; No. of Samples; Page of; Login; LIMS Ver; REMARKS; LAB 1 ID; LAB 2 ID

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	Toxicity Identification Evaluation	LAB 1 ID	LAB 2 ID
20 mar 95	0815	X		X			95-19	1	X	C913640	

Sampled By & Title: Thomas J. Rothschild / Facilities Chem. — Date/Time: 20 Mar 95 / 0815
Relinquished By: Thomas J. Rothschild — Date/Time: 20 Mar 95 / 1020
Received By: [signature] — Date/Time: 21 Mar. 95 / 0730
Relinquished By (Please sign and print name) — Date/Time
Received By (Please sign and print name) — Date/Time
Relinquished By (Please sign and print name) — Date/Time
Received By (Please sign and print name) — Date/Time
Shipped Via: UPS BUS Fed-Ex Hand Other ____ — Shipping #
Work Authorized By (Please sign and print name) — Remarks

QC Level: 1 2 3 Other: ____
COC Rec | ICE
Ana Req | TEMP 7°C
Cust Seal | Ph

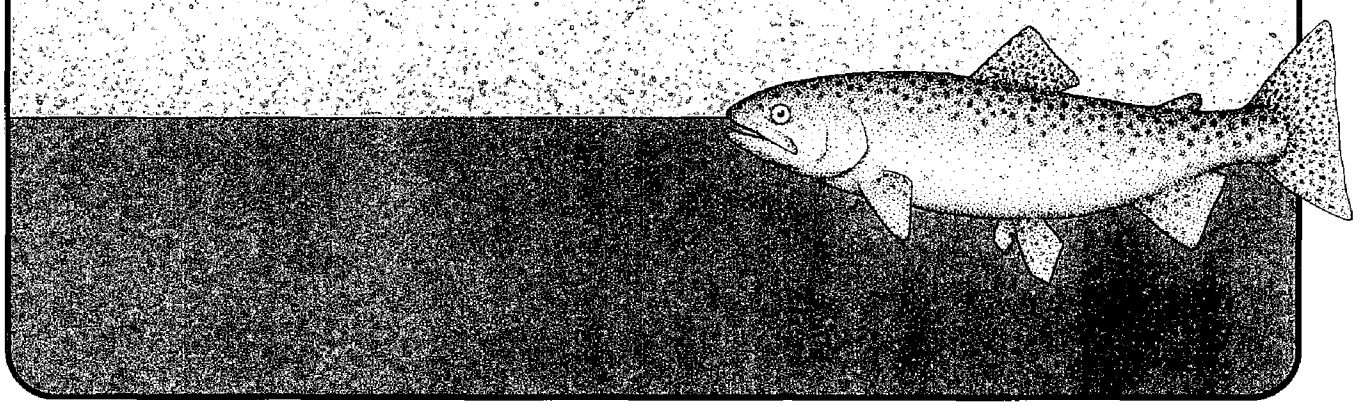
Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client
REV 3/94 FORM 340

SCOEPA00028293

Biomonitoring Services

BIOASSAY REPORT
CHRONIC
DEFINITIVE BIOASSAY
Conducted April 21 through 28, 1995



CH2M HILL

BIOASSAY REPORT
CHRONIC
DEFINITIVE BIOASSAY
Conducted April 21 through 28, 1995

Prepared for

WACKER SILTRONICS
PORTLAND, OREGON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

May 9, 1995
Lab ID No. C01387

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INTRODUCTION

CH2M HILL conducted one chronic definitive test using the water flea (*Ceriodaphnia dubia*) on samples provided by Wacker Siltronics, Portland, Oregon. The test was conducted from April 21 through 28, 1995. The test was conducted as part of a Toxicity Investigation Evaluation (TIE). An extra test was set up on the second sample (April 24th, 1995) with only the 50 and 17 percent concentrations to assess whether or not the 2nd sample was acutely or chronically toxic.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Weber, C. et al. (1989); EPA/600/4-89/001.

TEST ORGANISMS

The *Ceriodaphnia dubia* used in the chronic test were obtained from CH2M HILL's in-house cultures and were less than 24 hours old and within an eight hour age at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (1989). All test organisms appeared vigorous and in good condition prior to testing.

DILUTION WATER

The dilution water used in the *Ceriodaphnia* tests was moderately hard well water (EPA, 1989), with a total hardness and alkalinity of 98 and 82 mg/l as $CaCO_3$, respectively, and a pH of 8.0.

TEST CONCENTRATIONS

The concentrations tested in the chronic test were 3, 10, 17, 50, and 100 percent effluent with dilution water for the control. For the *Ceriodaphnia* chronic test, 1 organism per chamber with ten chambers per concentration for a total of 10 organisms per concentration were used.

SAMPLE COLLECTION

The samples were collected by Wacker personnel on April 21, 24, and 26, 1995 and delivered to CH2M HILL's Corvallis Aquatic Toxicology Laboratory by CH2M HILL personnel and bus. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C. The samples ID's were 95-24, 95-25, and 95-26.

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SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 μm net and temperature adjusted prior to each daily renewal.

MONITORING OF BIOASSAY

For the chronic test, pre- and post-renewal solutions were monitored for dissolved oxygen and pH daily in the control, low, middle, and high concentrations. Conductivity, ammonia, alkalinity, and hardness were measured in each new sample (100 percent effluent) and in the control. *Ceriodaphnia dubia* survival and neonate production was measured daily in the chronic tests. According to EPA (1989), *Ceriodaphnia* tests should be terminated when 60 percent or more of the surviving female *Ceriodaphnia* in the controls have produced their third brood and at least 15 neonates per adult are produced. Temperature was monitored continuously throughout the testing periods.

DATA ANALYSIS

The effects measured during the *Ceriodaphnia dubia* chronic test included survival and reproduction over the 7-day exposure period. The statistical analyses performed were those outlined in *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms*, EPA/600/4-89/001, using Toxcalc version 5. Dunnett's Procedure, Bonferroni's T-Test or Fisher's Exact Test was used to compare the survival data and Dunnett's Procedure or Bonferroni's T-Test was used to compare the reproduction or growth data between the control and each effluent treatment. When the assumptions of normality or homogeneity of variance necessary for Dunnett's Procedure or T-test with Bonferroni Adjustment could not be met, Steel's Many-One Rank Test or Wilcoxon Rank Sum with Bonferroni Adjustment was used to analyze the data.

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RESULTS AND DISCUSSION

CHRONIC BIOASSAYS

Table 1 summarizes the survival and reproduction data for the *Ceriodaphnia dubia* test conducted.

Table 1
***Ceriodaphnia Dubia* Results**

Concentration (%)	Percent Survival	No. Young Per Adult
Control	100	27.9
3	100	28.9
10	100	28.3
17	100	28.0
50	100	20.6[a]
100	0	0.0

[a] Indicates a statistically significant reduction from control at p less than 0.05 using Steel's Many-One Rank Test.

The *Ceriodaphnia dubia* showed a statistically significant reduction in reproduction at the 50 percent effluent concentration when compared to the control. The no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC) for survival and reproduction were 17 and 50 percent effluent, respectively. Control survival was 100 percent.

The IC_{25} values calculated for *Ceriodaphnia dubia* survival and reproduction were 62.5 and 46.9 percent effluent, respectively.

ACUTE DUAL-END POINT

The results of the 48-hour *Ceriodaphnia dubia* dual end-point tests resutled in no statistically significant reduction in survival at the 50 percent effluent concentration, in either the 1st or 2nd samples. The allowable acute Zone of Initial Dilution (ZID) for Wacker Siltronic is 50 percent effluent. The results indicate the effluent discharge is in compliance with the Oregon DEQ water quality criteria for toxic substances.

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REFERENCE TOXICANT TESTS

The results of monthly reference toxicant tests with sodium chloride conducted in April indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1989). The LC_{50} values, IC_{25} values, and Control Chart limits are listed in the tables below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 2
Acute Reference Toxicant Test (g/L)

Species	LC_{50}	Control chart limits
Ceriodaphnia dubia	1.5	1.3 to 2.1

Table 3
Chronic Reference Toxicant Tests with Sodium Chloride (g/L)

Species (test)	IC_{25}	Control chart limits
Ceriodaphnia dubia (survival)	2.1	1.0 to 2.6
Ceriodaphnia dubia (reproduction)	1.2	0.2 to 1.7

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APPENDIX A
RAW DATA SHEETS

CH2M HILL TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Walker Stitronics
Address: 7200 N.W. Front, Portland, OR 97210
Contact: Gary Hickman / CVO

Test Initiation: Date 4-21-95 Time 1600 Test Termination: Date 4-28-95 Time 0930
Technician: Janssen, Schut, Muckey
Test Species/ID: Ceriodaphnia dubia / cd 471 / / / /

Sample Information

Sample ID Number	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Tested	Dechlorinated (Yes or No)	Salinity (ppt)	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
C01381-01	4-21-95	0800	0.041	No		248	10
-02	4-24-95	0810	NA /	No		252	14
-03	4-26-95	0800	NA /	No		220	16
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				

Dilution Water Source	ID #	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
MH Well H_2O	924	98	82

Test Species Information

	ID # cd 471	ID # cd 472	ID #	ID #
Age or Size	<24 hrs old	<24 hr		
Loading Rate	8 hr span	8 hr span		
Test Container Size	30 ml	30 ml		
Test Volume	15 ml	15 ml		
Feeding: Type Amount	0.1 ml Algae	0.1 ml Algae		
	1 YCT daily	1 YCT Daily		
Aeration: Began Amount				
Dilution Water ID #	924	924		
Acclimation Period	<24 hrs	<24 hrs		
Test Location	#6	#6		
Condition of Survivors	Good	Good		

Comments

Water Quality Meters Used/ID #

Dissolved Oxygen #1 pH #1 Temperature

Conductivity #1 Refractometer Other

CH2M HILL

Ceriodaphnia dubia Survival and Reproduction Test Data Summary

Client: Wacker Silicones Test Start Date: 4-21-95

Sample Description: (95-24) w/ renewals Sample ID #: C01387-01

Ceriodaphnia Lot #: 471 Statistician: Bm

Percent or Concentration	Total Young Per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
Control	30	33	31	12	28	30	27	29	33	26	10	279
3%	30	25	30	29	33	28	27	33	29	25	10	289
10%	32	24	28	29	27	30	30	28	29	26	10	283
17%	27	13	29	31	38	26	29	30	28	29	10	280
50%	24	19	20	23	21	23	18	16	26	16	10	206
100%	0	0	0	0	0	0	0	0	0	0	0	0

CH2M HILL CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client Wacker Silicones Test Beginning: Date 4-21-95 Time 1600

Sample Description samples w/ renewals (95-24) 601367-01 Test Ending: Date 4-28-95 Time 0930

Ceriodaphnia Lot# Cd 471 Dilution Water MH Well Water ID# 924

Technician Day 1 KJ Day 2 KJ Day 3 JS Day 4 JS Day 5 Bm Day 6 Bm Day 7 Bm

Time Day 1 1212 Day 2 0900 Day 3 1600 Day 4 1115 Day 5 1520 Day 6 1345 Day 7 0930

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
CONTROL	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	6	7	6	0	4	5	4	6	6	5	10	49
	4	0	0	0	0	0	0	0	0	2	0	10	2
	5	10	12	11	3	11	11	9	10	13	9	10	99
	6	0	0	0	9	13	0	14	13	12	12	10	73
	7	14	14	14	0	0	14	0	0	0	0	10	56
3%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	3	5	5	4	5	6	6	5	4	10	47
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5	9	9	11	11	14	9	13	12	11	10	10	109
	6	17	13	14	13	15	14	8	15	13	11	10	133
	7	0	0	0	0	0	0	0	0	0	0	10	0
10%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	6	4	4	3	0	5	5	5	4	10	40
	4	0	0	0	0	0	4	0	0	0	0	10	4
	5	12	8	11	12	12	12	11	10	10	10	10	108
	6	16	10	13	13	12	0	14	13	14	12	10	117
	7	0	0	0	0	0	14	0	0	0	0	10	14
17%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	5	6	5	4	4	4	6	5	6	10	49
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5	7	8	13	10	10	9	11	10	11	8	10	97
	6	16	0	10	16	12	13	14	14	12	15	10	122
	7	0	0	0	0	12	0	0	0	0	0	10	12
50%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	4	3	5	3	3	0	0	6	0	10	28
	4	0	0	0	0	0	0	3	3	0	4	10	10
	5	10	10	9	9	8	8	6	4	10	4	10	78
	6	10	5	8	9	10	12	0	0	10	0	10	64
	7	0	0	0	0	0	0	9	9	0	8	10	26
100%	1	0	0	0	0	0	—	—	0	0	0	8	0
	2	0	—	—	—	0	—	—	0	—	0	4	0
	3	—				—			—		—	0	0
	4												
	5												
	6												
	7												

CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client Walker Stitzenberg Test Beginning: Date 4-21-95 Time 1600

Sample Description 95-24 Test Ending: Date 4-28-95 Time 0930

Ceriodaphnia Lot# Cd 471 Dilution Water MH Well Water ID# 924

Technician Day 1 KJ Day 2 KJ Day 3 JS Day 4 JS Day 5 Bm Day 6 Bm Day 7 Bm

Time Day 1 1215 Day 2 0900 Day 3 1615 Day 4 1100 Day 5 1520 Day 6 1350 Day 7 0930

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
17% utilizing 1st sample only	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	5	4	5	4	3	4	5	6	4	5	10	45
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5	9	12	10	10	8	9	12	13	12	12	10	107
	6	0	0	14	10	10	0	0	0	0	12	10	46
	7	10	13	0	0	0	11	11	11	9	0	10	65
	1												
	2												
	3												
	4												
	5												
	6												
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CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client Wacker 2nd Sample Test Beginning: Date 4-24-95 Time 15:40

Sample Description 17% on C01387-02-95-25 Test Ending: Date _____ Time _____

Ceriodaphnia Lot# 472 Dilution Water _____ ID# _____

Technician Day 1 JS Day 2 DM Day 3 DM Day 4 DM Day 5 _____ Day 6 _____ Day 7 _____

Time Day 1 1100 Day 2 1535 Day 3 1400 Day 4 0935 Day 5 _____ Day 6 _____ Day 7 _____

Percent or Concentration %	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	3	5	4	6	6	4	5	6	4	0	10	43
	4	0	0	0	0	0	0	0	0	0	4	10	4
	5												
	6												
	7												
17%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	5	6	6	6	4	5	4	5	5	3	10	49
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5												
	6												
	7												
50%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	3	6	0	3	5	6	0	5	0	10	32
	4	0	0	0	4	0	0	0	4	0	4	10	12
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client Walker Stillwater Initiated: Date 4-21-95 Time 1600 Adults Isolated Date 4-20-95 Time 08:45

Sample Description 95-24 Terminated: Date _____ Time _____ Neonates Collected Date 4-20-95 Time 14:10

Technician Day 0 Jm Day 1 KJ Day 2 KJ Day 3 JS Day 4 JS Day 5 Bm Day 6 Bm Day 7 Bm

Time Day 0 1405 Day 1 1220 Day 2 0920 Day 3 1630 Day 4 1120 Day 5 1600 Day 6 1445 Day 7 1620

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Control	7.9	7.8 / 8.2	8.1 / 8.3	8.0 / 8.2	8.0 / 8.1	8.6 / 8.2	8.2 / 7.8	8.9	7.7	7.8 / 8.0	7.7 / 7.9	8.0 / 8.0	7.9 / 8.0	8.2 / 7.9	8.1 / 7.9	7.2	216			244		253		
3%	8.0	8.0 / 8.2	8.1 / 8.3	8.0 / 8.4	8.0 / 8.5	8.5 / 8.5	8.1 / 7.9	9.0	7.9	8.1 / 7.9	8.0 / 7.9	8.0 / 8.0	8.1 / 8.0	8.0 / 7.8	8.0 / 7.8	7.9								
10%																								
17%	8.0	8.0 / 8.2	8.1 / 8.4	8.0 / 8.2	8.0 / 8.5	8.3 / 8.6	8.1 / 7.9	8.5	7.7	8.0 / 7.9	7.9 / 7.8	8.0 / 8.0	8.1 / 7.9	8.0 / 7.7	8.0 / 7.7	7.9								
50%				– / 8.2	8.0 / 8.5	8.3 / 8.6	8.2 / 8.0	8.6				– / 7.5	7.9 / 7.5	8.0 / 7.9	7.8 / 7.9	7.8				585		609		
100%	8.1	8.1 / 8.4	8.2 / 8.8	8.0					6.4	7.3 / 6.7	7.2 / 6.5	7.3					1013							

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client Wacker 95-25 Initiated: Date 4-24-95 Time 15:40 Adults Isolated Date 4-23-95 Time 07:00

Sample Description 17% on Day 3 sample C01387-02 Terminated: Date _____ Time _____ Neonates Collected Date 4-24-95 Time 09:00

Technician Day 0 JS Day 1 JS Day 2 BM Day 3 BM Day 4 BM Day 5 _____ Day 6 _____ Day 7 _____

Time Day 0 16:40 Day 1 1120 Day 2 1605 Day 3 1450 Day 4 1620 Day 5 _____ Day 6 _____ Day 7 _____

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
control	8.2	8.0 / 8.1	7.9 / 8.2	7.8 / 7.8	8.5				8.0	8.0 / 7.9	8.2 / 7.9	8.2 / 7.9	8.0				244		259					
17%	8.3	8.0 / 8.4	8.0 / 8.3	7.9 / 8.0	8.5				7.9	8.0 / 7.9	8.1 / 7.7	8.1 / 7.7	8.0											
50%	8.3	8.0 / 8.4	8.0 / 8.5	7.9 / 8.1	8.6				7.5	7.9 / 7.5	7.9 / 7.3	7.9 / 7.4	7.8				567							

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

SCOEPA00028308

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Winder Saltmarsh — Initiated: Date 4-21-95 Time 1600 — Adults Isolated Date 4-20-95 Time 08:45

Sample Description: 95-24 — Terminated: Date _____ Time _____ — Neonates Collected Date 4-20-95 Time 14:10

Technician: Day 0 BM, Day 1 KJ, Day 2 KJ, Day 3 JS, Day 4 JS, Day 5 BM, Day 6 BM, Day 7 BM

Time: Day 0 1405, Day 1 1220, Day 2 0920, Day 3 1640, Day 4 1120, Day 5 1600, Day 6 1450, Day 7 1620

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1 KJ	2	3	4	5	6	7	0	1 KJ	2	3	4	5	6	7	0	1	2	3	4	5	6	7
17% (1 sample only)	7.9	7.8 / 8.0 / 8.2	8.2 / 8.4	8.0 / 8.4	8.0 / 8.4	8.4 / 8.4	8.1 / 7.9	8.4	7.7	7.8 / 8.0 / 7.9 / 8.0	7.9 / 7.8	8.1 / 7.9	8.1 / 8.0	8.0 / 7.7	8.0 / 7.6	8.0	410			369		259		

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	21 Apr-95 00:00	Test ID:	138701cdc	Sample ID:	WACKER-SILTRONICS
End Date:	28 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

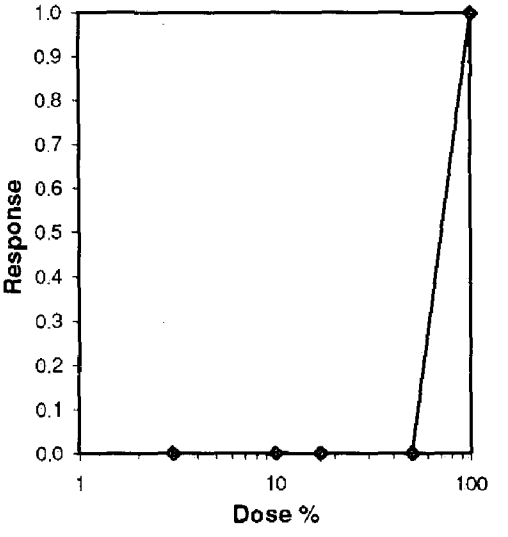
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
D-Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
3	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
10	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
17	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
50	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
100	0.0000	0.0000	10	0	10	10			0.0000	0.0000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	50	100	70.7107	2

Linear Interpolation (80 Resamples)

Point	%	SE	95% CL		Skew
IC05	52.500	0.000	52.500	52.500	#DIV/0!
IC10	55.000	0.000	55.000	55.000	#DIV/0!
IC15	57.500	0.000	57.500	57.500	#DIV/0!
IC20	60.000	0.000	60.000	60.000	#DIV/0!
IC25	62.500	0.000	62.500	62.500	#DIV/0!
IC40	70.000	0.000	70.000	70.000	#DIV/0!
IC50	75.000	0.000	75.000	75.000	#DIV/0!



 ToxCalc v5.0 Reviewed by: MS

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	21 Apr-95 00:00	Test ID:	138701cdc	Sample ID:	WACKER-SILTRONICS
End Date:	28 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	30.000	33.000	31.000	12.000	28.000	30.000	27.000	29.000	33.000	26.000
3	30.000	25.000	30.000	29.000	33.000	28.000	27.000	33.000	29.000	25.000
10	32.000	24.000	28.000	29.000	27.000	30.000	30.000	28.000	29.000	26.000
17	27.000	13.000	29.000	31.000	38.000	26.000	29.000	30.000	28.000	29.000
50	24.000	19.000	20.000	23.000	21.000	23.000	18.000	16.000	26.000	16.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

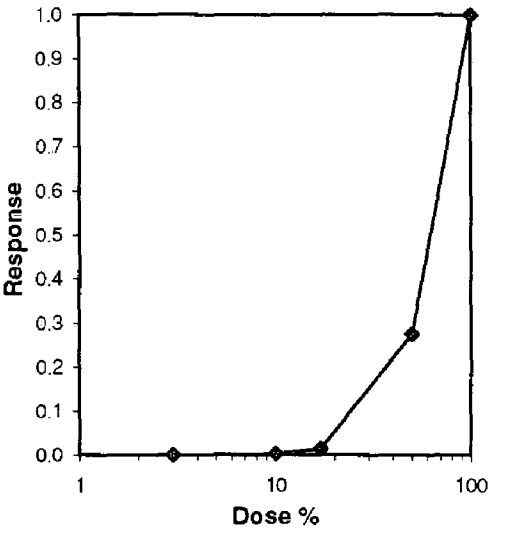
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	27.900	1.0000	27.900	12.000	33.000	21.667	10			28.400	1.0000
3	28.900	1.0358	28.900	25.000	33.000	9.712	10	102.00	76.00	28.400	1.0000
10	28.300	1.0143	28.300	24.000	32.000	7.997	10	96.00	76.00	28.300	0.9965
17	28.000	1.0036	28.000	13.000	38.000	22.144	10	100.50	76.00	28.000	0.9859
*50	20.600	0.7384	20.600	16.000	26.000	16.533	10	65.50	76.00	20.600	0.7254
100	0.000	0.0000	0.000	0.000	0.000	0.000	10			0.000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.86163	0.93	-1.6491	5.75422
Bartlett's Test indicates unequal variances (p = 9.25E-03)	13.457	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	17	50	29.1548	5.88235

Linear Interpolation (80 Resamples)

Point	%	SE	95% CL		Skew
IC05	21.549	6.429	2.171	24.438	-0.8177
IC10	27.881	5.612	13.489	31.876	-0.5042
IC15	34.214	6.209	15.699	39.490	-0.6894
IC20	40.546	6.183	21.519	47.243	-0.7192
IC25	46.878	5.407	31.941	52.033	-0.3778
IC40	58.641	2.481	53.598	61.626	0.2109
IC50	65.534	2.068	61.331	68.022	0.2109



 ToxCalc v5.0 Reviewed by: MS

APPENDIX B
REFERENCE TOXICANT DATA SHEETS

REFERENCE TOXICANT DATA SHEET

Client: QA/QC - April Ref Tox
Reference Toxicant: NaCl
Test Begin: Date 4-12-95 Time 1100
Test Organism: Ceriodaphnia dubia
CID#: 91 Stock Solution: 20 g/L
Test End: Date 4-14-95 Time 1130
Source: In House Cultures
Solvent: distilled water
ID#: Cd 468 Age: <24 hrs
*Dilution Water: MH Well H_2O ID#: 918
Size: —
Total Hardness as CaCO3: 106
Total Alkalinity as CaCO3: 80
Conductivity (umhos/cm)/ Salinity (ppt): 220
Temperature: 20 ± 1 °C
Technician: 0h DW 24h DW 48h JS 72h 96h

Toxicant Concentration g/L	Test Chamber Number	Number Surviving					Dissolved Oxygen mg/l					pH					Temperature °C				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
CONTROL	A	5	5	5			8.4	~~8.2~~	8.2			8.0	–	8.0			20	20	20		
	B	5	5	5			8.4	~~8.2~~	8.2												
1	A	5	5	5			8.4	~~8.2~~	8.2			8.1	–	8.0			20	20	20		
	B	5	5	5			8.4	–	8.3												
2	A	5	5	1			8.4	–	8.3			8.1	–	8.0			20	20	20		
	B	5	5	1			8.4	–	8.3												
2.5	A	5	4	0			8.4	–	8.3			8.0	–	8.0			20	20	20		
	B	5	4	0			8.4	–	8.3												
3	A	5	3	0			8.4	–	8.3			8.0	–	8.0			20	20	20		
	B	5	2	0			8.4	–	8.3												
4	A	5	0	—			8.4	8.5	—			8.0	7.8	—			20	20	—		
	B	5	0	—			8.4	8.5	—												

*Dilution Water Code
Recon. - reconstituted water
VS - very soft
S - soft
MH - moderately hard
H - hard
VH - very hard

48 h LC50: 1.5
95% conf. int.: 1.4 to 1.7
Statistical Method: Spearman Karber

We verify this data is true and correct.
Task Manager: Doug Winn
Project Manager: Jeffrey Stout
QA Officer: [signature]
Signature

SCOEPA00028313

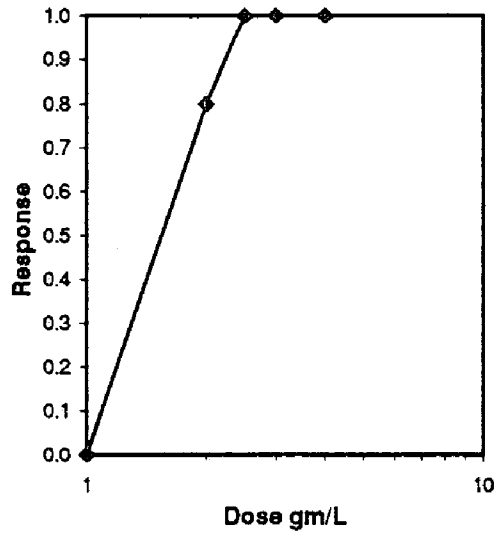
Acute Test-48 Hr Survival

Start Date:	12 Apr-95 00:00	Test ID:	Rcda468	Sample ID:	REF-Ref Toxicant
End Date:	14 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-gm/L	1	2
D-Control	1.0000	1.0000
1	1.0000	1.0000
2	0.2000	0.2000
2.5	0.0000	0.0000
3	0.0000	0.0000
4	0.0000	0.0000

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	1.5499	1.3803	1.7404
5.0%	1.5470	1.3622	1.7569
10.0%	1.5446	1.3458	1.7728
20.0%	1.5422	1.3448	1.7686
Auto-0.0%	1.5499	1.3803	1.7404



CH2M HILL

Ceriodaphnia dubia Survival and Reproduction Test Data Summary

Client: QA/QC Total Retbox Test Start Date: 3-31-05

Sample Description: NaCl Sample ID #: —

Ceriodaphnia Lot #: 462 Statistician: Bn

Percent or Concentration	Total Young Per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
CONTROL	27	26	28	19	13	24	24	29	26	8	10	224
0.5 %	24	30	25	25	22	27	*	26	25	21	9/9	215
1.0 %	13	18	23	23	12	19	19	20	25	21	10	193
1.5 %	19	20	13	18	11	0 MD	18	10	11	21	9	141
2.0 %	1	0 MD	0 MD	5	2	4	10	1	3	2	8	28
4.0 %	0	0	0	0	0	0	0	0	0	0	0	0

* 0.5% G adult lost - do not include in statistics Bn

CH2M HILL CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client: QA/QC (Ap[illegible]) Test Beginning: Date 3-31-95 Time [illegible]
Sample Description: Nail Test Ending: Date 4-6-95 Time 1345
Ceriodaphnia Lot#: 462 Dilution Water: MH Well ID#: 910
Technician: Day 1 [illegible] Day 2 [illegible] Day 3 [illegible] Day 4 [illegible] Day 5 [illegible] Day 6 [illegible] Day 7 [illegible]
Time: Day 1 1215 Day 2 1440 Day 3 1445 Day 4 1350 Day 5 1330 Day 6 1345 Day 7

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	3	4	0	0	4	5	4	5	0	10	25
	4	4	0	0	0	3	0	0	0	0	1	10	8
	5	10	8	10	7	0	9	8	10	9	7	10	78
	6	13	15	14	12	10	11	11	15	12	0	10	113
	7												
0.5 (SS)	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	4	4	4	5	4	7	4	4	4	10	40
	4	0	0	0	0	0	0	0	0	0	0	9	0
	5	0	0	9	10	8	9	NA	9	8	7	9	77
	6	11	8	12	11	9	14	NA	13	13	10	9	101
	7							NA					
1.0	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	1	4	4	0	3	4	2	4	4	10	26
	4	4	6	0	0	4	0	0	0	0	0	10	14
	5	9	0	7	8	8	8	6	8	9	7	10	70
	6	0	11	12	11	0	8	9	10	12	10	10	83
	7												
1.5	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	9	0
	3	4	4	3	4	1	–	0	0	0	3	9	19
	4	0	0	0	0	0	–	4	4	3	0	9	11
	5	8	8	4	7	3	–	7	6	8	7	9	53
	6	7	8	6	7	7	–	7	0	0	11	9	53
	7						–						
2.0	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	AD	0	0	0	0	0	0	0	9	0
	4	0	0 MD	–	0	0	0	0	0	0	0	8	0
	5	1	–	–	2	0	1	4	1	0	2	8	11
	6	0	–	–	3	2	3	6	0	3	0	8	17
	7		–	–									
4.0	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3												
	4												
	5												
	6												
	7												

* 0.5% G
Cnd dbl lost
day 3 [illegible]

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: QA/QC (April Ref. Tox) Initiated: Date 3-31-95 Time 1050 Adults Isolated Date 3-30-95 Time 0830

Sample Description: NaCl Terminated: Date 4-6-95 Time 1345 Neonates Collected Date 3-31-95 Time 1440

Technician: Day 0 Bn Day 1 Bn Day 2 Bn Day 3 JS Day 4 Bn Day 5 JS Day 6 JS Day 7

Time: Day 0 1100 Day 1 1215 Day 2 1445 Day 3 1500 Day 4 1350 Day 5 1545 Day 6 1400 Day 7

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
control	8.1	7.8 / 7.7	7.9 / 7.7	8.0 / 7.3	7.9 / 7.9	7.9 / 8.1	8.1 / –		8.1	8.0 / 8.0	8.1 / 8.0	8.0 / 7.9	8.3 / 8.2	8.2 / 8.2	8.1 / –		241							
0.5	8.5	7.8 / 7.9	7.9 / 7.8	8.0 / 7.1	7.7 / 8.0	8.0 / 8.0	7.9 / –		8.0	8.1 / 8.0	8.1 / 8.0	8.0 / 7.7	8.2 / 8.0	8.1 / 8.0	8.2 / –									
1.0																								
1.5	8.3	7.8 / 7.9	7.9 / 7.9	8.0 / 7.0	7.9 / 8.0	8.1 / 7.7	8.1 / –		8.0	8.1 / 8.0	8.1 / 8.0	8.0 / 8.0	8.2 / 7.9	8.1 / 8.1	8.2 / –									
2.0		– / 7.9	7.9 / 7.9	8.0 / 7.0	7.9 / 8.0	8.1 / 7.7	8.0 / –			– / 8.0	8.0 / 8.0	8.1 / 8.0	8.2 / 7.9	8.1 / 8.1	8.2 / –									
4.0	8.3	7.9 / –							7.9	8.0 / –							6720							

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments:

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	31 Mar-95 00:00	Test ID:	rcdc462	Sample ID:	REF-Ref Toxicant
End Date:	06 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

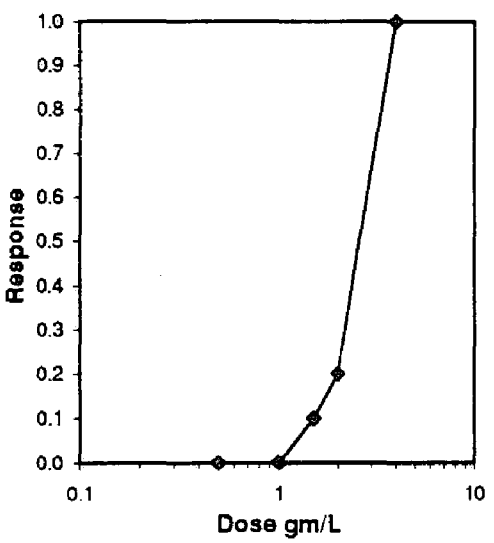
Conc-gm/L	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000
2	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-gm/L	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
D-Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
0.5	1.0000	1.0000	0	9	9	9	1.0000	0.0500	1.0000	1.0000
1	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
1.5	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9000	0.9000
2	0.8000	0.8000	2	8	10	10	0.2368	0.0500	0.8000	0.8000
4	0.0000	0.0000	10	0	10	10			0.0000	0.0000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	2	4	2.82843	

Linear Interpolation (80 Resamples)

Point	gm/L	SE	95% CL		Skew
IC05	1.2500	0.2490	1.1250	2.0025	0.8182
IC10	1.5000	0.2666	1.2500	2.1076	0.3437
IC15	1.7500	0.2556	1.3750	2.2128	0.0686
IC20	2.0000	0.2099	1.5000	2.3179	-0.2313
IC25	2.1250	0.2025	1.7500	2.4230	-0.0605
IC40	2.5000	0.2187	1.9000	2.7384	-0.8220
IC50	2.7500	0.2096	2.0000	2.9487	-1.4466



SCOEPA00028318

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	31 Mar-95 00:00	Test ID:	rcdc462	Sample ID:	REF-Ref Toxicant
End Date:	06 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-gm/L	1	2	3	4	5	6	7	8	9	10
D-Control	27.000	26.000	28.000	19.000	13.000	24.000	24.000	29.000	26.000	8.000
0.5	24.000	20.000	25.000	25.000	22.000	27.000	26.000	25.000	21.000	
1	13.000	18.000	23.000	23.000	12.000	19.000	19.000	20.000	25.000	21.000
1.5	19.000	20.000	13.000	18.000	11.000	0.000	18.000	10.000	11.000	21.000
2	1.000	0.000	0.000	5.000	2.000	4.000	10.000	1.000	3.000	2.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

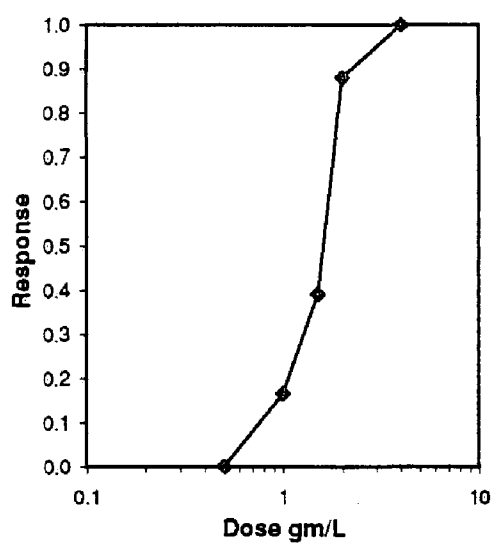
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	22.400	1.0000	22.400	8.000	29.000	31.015	10			23.144	1.0000
0.5	23.889	1.0665	23.889	20.000	27.000	9.916	9	86.50	62.00	23.144	1.0000
1	19.300	0.8616	19.300	12.000	25.000	21.716	10	81.50	75.00	19.300	0.8339
*1.5	14.100	0.6295	14.100	0.000	21.000	45.652	10	72.00	75.00	14.100	0.6092
*2	2.800	0.1250	2.800	0.000	10.000	107.539	10	56.00	75.00	2.800	0.1210
4	0.000	0.0000	0.000	0.000	0.000	0.000	10			0.000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.92192	0.929	-1.0857	1.74281
Bartlett's Test indicates equal variances (p = 0.01)	12.8773	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	1	1.5	1.22474	

Linear Interpolation (80 Resamples)

Point	gm/L	SE	95% CL		Skew
IC05	0.6505	0.1464	0.3598	1.0144	0.0848
IC10	0.8010	0.1466	0.5981	1.0839	-0.0249
IC15	0.9515	0.1374	0.7532	1.2203	-0.2554
IC20	1.0754	0.1380	0.8556	1.3989	0.1151
IC25	1.1867	0.1389	0.9792	1.5141	0.2258
IC40	1.5094	0.0899	1.2817	1.6363	-0.6343
IC50	1.6118	0.0686	1.4236	1.7107	-0.8669



APPENDIX C
CHAIN OF CUSTODY

CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Wacker Siltronic Corp.
Address: 7200 N.W. Front Avenue

Contact Person: Sandra Archer
Phone: 243-2020
CH2M HILL Project #: ASE 14431

NPDES#:
Composite Sample Information:

Samples/Hour: 0.5 Volume/Sample: 3.5 gallons
Total Hours: 24 Total Volume: 42 gallons
Initiated: Date 20 Apr 95 Time 0800
Ended: Date 21 Apr 95 Time 0800
Chilled During Collection: Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P.O.#

Check Chlorine (Y/N):
Temp. Upon Arrival (°C): 10
Check Ammonia (Y/N): Dechlorinate (Y/N):

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste				Concentrations and/or Comments
95-24	21 Apr 95	0800	X		3	C01387-01																		Bioassay

Sampled By & Title (Please sign and print name) Thomas J. Rothschild, Facilities Chem	Date/Time 21 Apr 95 0800 0830	Relinquished By (Please sign and print name) Thomas J. Rothschild	Date/Time 21 Apr 95 0835
Received By (Please sign and print name) Michael J. Sinaway	Date/Time 4-21-95 0835	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name) Doug Mann (Lab)	Date/Time 4-21-95 1300	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus ___ Fed-Ex ___ Hand X Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Wacker Siltronic
Address 7200 N.W. Front
Portland, OR

Contact Person: Sandra Archer
Phone: 243-2020 x 4684
CH2M HILL Project # ASE 14431

NPDES# _____
Composite Sample Information _____

Samples/Hour 0.5 Volume/Sample 3.5 gallons
Total Hours 24 Total Volume 42 gallons
Initiated: Date 4-23-95 Time 0800
Ended: Date 4-24-95 Time 0800
Chilled During Collection Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160
P. O.#

Check Chlorine (Y/N) _____
Temp. Upon Arrival (°C) 7°C
Check Ammonia (Y/N) _____ Dechlorinate (Y/N) _____

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste				Concentrations and/or Comments
95-25	4-24-95	~~0815~~ 0810	X		3	C013872 03				✓														Bioassay

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Dianne Mullan Dianne Mullan	4-24-95/0810	Dianne Mullan Dianne Mullan	4-24-95 0820
Received By (Please sign and print name) Sandra Archer Sandra Archer	4/24/95 0820	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	4/24/95 1430	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus X Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

Rev 3/94

SCOEPA00028322

CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Wacker Siltronic
Address 7200 N.W. Front Ave
Portland, OR

Contact Person: Sandra Archer
Phone: 243-2020 x 4684
CH2M HILL Project # ASE 14431

NPDES# _____
Composite Sample Information _____

Samples/Hour 0.5 Volume/Sample 3.5 gal
Total Hours 24 Total Volume 42 gal
Initiated: Date 4-25-95 Time 0800
Ended: Date 4-26-95 Time 0800
Chilled During Collection Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P. O.#

Check Chlorine (Y/N) _____
Temp. Upon Arrival (°C) 10°C
Check Ammonia (Y/N) _____ Dechlorinate (Y/N) _____

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	Bioassay			Concentrations and/or Comments
95-26	4-26-95	0800	X		3	601387-03															X			Bioassay -

Sampled By & Title (Please sign and print name) Lab Tech Dianne Mullan Dianne Mullan	Date/Time 4-26-95/0800	Relinquished By (Please sign and print name) Lab Tech Dianne Mullan Dianne Mullan	Date/Time 4/26-95/0900
Received By (Please sign and print name) Sandra Archer Sandra Archer	Date/Time 4/26/95/0900	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name) Brett Mickey	Date/Time 4/26/95 1420	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus X Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

June 6th, 1995 SER25:SA

Mr. Elliot Zais
Northwest Region
Department of Environmental Quality
2020 S.W. Fourth Avenue, Suite 400
Portland, Oregon 97201

Dear Mr. Zais:

In November of 1994 Wacker Siltronic Corporation, NPDES permit Number 101128, was notified of a second bioassay failed the chronic toxicity on *Ceriodaphnia dubia*. Procedures outlined in schedule D, section h, of the permit have been followed. In addition, CH_2M Hill was hired in December of 1994 as a consultant to assist in determining the source of toxicity.

Attached is the final report from CH_2M Hill. The past two chronic and past four acute results using *Ceriodaphnia dubia* have shown no toxicity using the currrent Zone of Immediate Dilution (ZID) and the Mixing Zone.

As indicated in the final report by CH_2M Hill many Toxic Identification Evaluation (TIE) studies have been attempted by Wacker Siltonic, but due to the samples being non-toxic the TIE tests were cancelled. Any future TIE attempts or additional bioassay tests would be unproductive.

A new Mixing Zone Effluent Dilution Evaluation was conducted by CH_2M Hill in April of 1995. Prior to the most recent mixing zone study Wacker Siltronic was using a river velocity of 0 fps. The most recent study indiactes that this value can be increased to >0.1 fps. The attached river velocity graph shows that the river flows >0.1 fps during all times of the day with exception to two 15 minute intervals. Therefore, the river flows at >0.1 fps 97.9 % of the time.

With this information the chronic dilution at the 50 foot mixing zone will decrease from the current 17% effluent concentration to 2% effluent concentration. In addition the acute dilution at the 5 foot zone of immediate dilution will decrease from 50% effluent dilution to 18% effluent dilution. We do not anticipate any futher bioassay test failures with the dilutions increased both for the chronic and acute toxicity studies.

If you have any questions regarding the test results, please contact me at 241-7532.

Very truly yours,

WACKER SILTRONIC CORPORATION

Thomas M. McCue
Environmental, Health and Safety Manager

enclosure:
(1) River velocity chart
(1) CH_2M Hill Report Bioassay Report

101128

Original

CH2M HILL

MEMORANDUM

TO: Tom McCue/Wacker

COPIES: Sandra Archer/Wacker
Mike Stanaway/CH2M HILL/CVO

FROM: Gary Hickman/CH2M HILL/CVO

DATE: May 3, 1995

SUBJECT: Wacker Siltronic Corporation
Wastewater Toxicity Study
Project Approach and Progress Report

PROJECT: OPE40202.A0

This memo summarizes the wastewater toxicity study approach, work completed and study results to-date, and work planned for the next month or so of the project.

Unless otherwise stated, the use of the terms "effluent" and "whole effluent" in this memo refers to Effluent 001, which is discharged to the Willamette River under NPDES Permit Number 101128. This effluent consists primarily of three waste streams: concentrated acid drain (CAD), weak acid drain (WAD) and (RO/DI water concentrate, boiler, and cooling water) blow down (BD). Wastewater treatment includes fluoride precipitation of CAD and neutralization of combined CAD and WAD.

Approach

The proposed stepwise approach to this study is as follows:

1. **Site visit, kickoff meeting, and initial data gathering.** Visit the site to review processes and wastewater sources, and meet with Wacker staff to discuss toxicity issues and initiate data gathering.

Purpose: To gain familiarity with the facility and staff, develop mutual understanding of problem and the project objectives, and kickoff the project.

2. **Existing data review.** Compile and review existing data on effluent toxicity and physical chemical characteristics, as well as known and potential constituents of the waste streams comprising the final effluent.

Purpose: To obtain, to the extent possible, a preliminary indication of wastewater characteristics and potential toxic constituents, and to evaluate the toxicity history of the facility's effluent.

3. **Current effluent toxicity evaluation and toxicity data base expansion.** Conduct fathead minnow and *Ceriodaphnia* dual endpoint acute/chronic tests on whole effluent samples.

Purpose: To enlarge the very limited existing toxicity data base (only one test per year is required by the discharge permit) to obtain a better picture of the variation and magnitude of wastewater toxicity. Also, to allow a more confident identification of the more sensitive test species (if one is in fact significantly more sensitive) and the appropriate bioassay endpoint (acute versus chronic) for use in Toxicity Identification Evaluation (TIE) testing.

4. **Toxicity source investigation**. At the same time as Step 3, collect samples of the CAD (after treatment but before combining with WAD), WAD, and BD streams for toxicity testing. To reduce cost, this testing could involve only *Ceriodaphnia* acute screening tests. There is some risk that existing toxicity will not show up without doing chronic tests or without testing fatheads, but the *Ceriodaphnia* acute screen seems to be the single best, low-cost choice based on the available data.

Purpose: To help focus in on the source(s) of toxicity, and narrow the list of possible toxicity-causing constituents, if appropriate.

5. **Chemical characterization**. Characterize the whole effluent samples used in bioassay testing under Step 3 for the following parameters (based on preliminary review of waste stream constituents): pH, oxidation-reduction potential (ORP), alkalinity, hardness, conductivity, chlorine residual, ammonia-nitrogen (NH_3-N), total Kjeldahl nitrogen (TKN), anionic surfactants as MBAS, total suspended solids (TSS), total dissolved solids (TDS), Total and hexavalent chromium, hydrogen peroxide (measured at time of bioassay testing), sulfide, sulfite, fluoride, COD.

Purpose: To provide a more thorough chemical characterization of Wacker's effluent and to potentially identify possible causes of any toxicity measured.

6. **Housekeeping and chemical use information gathering**.
(A) Continue to maintain thorough records of any production changes, atypical batch operations, process upsets, known spills, etc. during the period of sample collection for bioassay and chemical testing.
(B) Efforts to estimate usage rates of vendor-supplied products (such as polymers, surfactants, biocides, and defoamers) should continue, and product toxicity data should be requested from the suppliers.

Purpose: (A) To identify any occurrences at the facility that might influence the measured toxicity. (B) To try to assess the potential toxicity related to use of products which are difficult to measure directly.

7. **Phase I TIE testing**. Conduct Phase I TIE testing, involving a array of sample manipulations followed by toxicity testing, either after the above steps are completed or concurrently with that testing. The conditions employed in this testing will be selected based on the results of steps 3 through 6. TIE testing is contingent on obtaining bioassay results indicating that the effluent is toxic at the edge of the ZID or mixing zone.

Purpose: To identify the class(es) of toxic constituents in whole effluent, and provide direction for Phase II and III TIE testing, if necessary.

8. **Phase II and III TIE testing (if needed)**. Conduct Phase II and III TIE testing, if necessary, to confirm the findings of Phase I and identify specific toxic constituents.

Purpose: To identify the cause(s) of effluent toxicity and provide a basis for evaluating mitigation methods.

9. Investigate methods for controlling toxicity (if needed). If effluent is found to be toxic, and after the toxic constituent(s) is(are) identified, investigate one or more methods for controlling toxicity, such as product substitution, process modification, wastewater treatment, source treatment or removal, or outfall/dilution improvement.

10 Control method selection and implementation and follow-up confirmation monitoring (if needed).

Work Performed To-Date

Project work performed to-date includes:

- Site visit, kickoff meeting, and initial data gathering (Step 1) -- 13 January 1995.
- Review of waste streams and constituents (Step 2) -- memo dated 6 February 1995.
- Review of existing effluent toxicity and chemical data (Step 2) -- memo dated 15 February 1995.
- Analysis of existing effluent toxicity data considering ZID and mixing zone dilutions.
- Current effluent toxicity evaluation and chemical characterization (Steps 3 and 5) -- 6 and 21 March, 3 and 21 April 1995. Results of first three test dates presented at project meeting on 13 April 1995.
- Toxicity source evaluation (Step 4) -- 6 March 1995.
- Test plan for Phase I TIE (Step 7) -- memo dated 17 March 1995.
- Housekeeping and chemical use information (Step 6) -- performed by Wacker staff and presented in memo dated 15 February and at project meeting on 13 April 1995.
- Phase I TIE trials (Step 7) -- 21 March, 3 and 21 April 1995 (TIE testing not completed because of lack of or low effluent toxicity.
- Project status meeting -- 13 April 1995.
- Progress report memo -- 2 May 1995.

Results To-Date

Toxicity Data

Table 1 summarizes Wacker's historical effluent toxicity data for 1993 and 1994, and 1995 effluent toxicity data generated under this study. Pertinent observations are summarized below:

- Wacker staff reported that their effluent was nontoxic prior to 1993.

- The historical toxicity data base was quite limited; it consisted of three fathead minnow bioassay tests and four *Ceriodaphnia* tests conducted during 1993 and 1994. The historical data did not provide a good indication of toxicity variability or frequency of pass/fail.

- **Effluent toxicity to fathead minnows**. The August 1993 sample failed to meet the fathead minnow acute toxicity guideline based on 100% effluent and the raw data were not available to determine whether the sample would have passed or failed at 50% effluent; however, when re-tested in September 1993 the effluent passed the fathead toxicity guideline. Two subsequent fathead minnow tests in 1994 and 1995 passed the acute toxicity guideline at 50% effluent. All four fathead minnow chronic test results in 1993-5 passed the chronic toxicity guideline at the allowed mixing zone dilution of 17% effluent.

- **Effluent toxicity to *Ceriodaphnia*.**. The two *Ceriodaphnia* acute tests conducted in 1993 passed the acute toxicity guideline at 50% effluent; in 1994, one sample failed and one passed the acute toxicity guideline; and in 1995, two samples failed and three samples passed the acute toxicity guideline. The two *Ceriodaphnia* chronic tests conducted in 1993 passed the chronic toxicity guideline at 17% effluent; three subsequent samples tested in 1994 and 1995 failed; and the most recent sample passed the chronic toxicity guideline.

- Except for August 1993 sample, effluent toxicity to *Ceriodaphnia* was equal to or greater than the toxicity to fathead minnows (i.e., *Ceriodaphnia* was generally the more sensitive species to Wacker effluent).

- Based on the 6 March 1995 toxicity testing results, Phase I TIE testing was planned using *Ceriodaphnia* acute tests for effluent samples collected on 20 March and 3 and 21 April, but the TIE testing was canceled because of the lack of acute toxicity (actually, the 3 April sample was toxic according to the acute toxicity guideline, but only marginally so).

- *Ceriodaphnia* acute toxicity single-dilution screening tests performed on CAD, WAD, and BD samples from 6 March 1995 indicated that the CAD and WAD samples were acutely toxic at less than 33% effluent (the only dilution tested), but that the BD sample was not acutely toxic at 33%.

Chemical Data

Table 2 summarizes effluent characterization data for 1995. Comparison of the chemical data between the acutely- and chronically-toxic 6 March sample and the acutely-nontoxic 21 March sample yields mostly negative conclusions with respect to toxicity:

- Ammonia-nitrogen, chlorine residual, and fluoride concentrations were low in both samples, although NH3-N was slightly higher in the toxic sample.
- H2O2 concentrations were high in both samples but not higher in the toxic sample.
- MBAS (indicative of anionic surfactants) concentrations were low in both samples, although somewhat higher in the toxic sample.
- COD was somewhat higher in the toxic sample, possibly indicating the presence of more organic compounds.
- TDS and conductivity levels were not indicative of osmotic problems in either sample.
- Chromium concentrations were low in both samples.
- Wacker staff have reported that there is no specific reason to suspect the presence of elevated levels of other metals in their wastewater.

Upcoming Work

Activities planned for the coming month include collecting and testing another effluent sample for acute/chronic toxicity to *Ceriodaphnia* , with the intent of conducting Phase I TIE testing on the sample if it is found to be toxic. As with the previous testing event (started on 21 April), two chronic tests will being performed concurrently: one according to the specified test protocol involving three separate effluent samples over the 7-day test period; the other using only the sample collected on the starting date. The purpose of the former is to obtain chronic toxicity results acceptable to DEQ for regulatory purposes; while the purpose of the latter is to determine whether the initial sample is chronically toxic without the interfering and complicating effects of three separate samples, for potential TIE testing purposes. If the bioassay results show that the initial effluent sample is toxic, Phase I TIE testing will be performed on that sample. The sample will also be analyzed for chemical characterization parameters.

A meeting or teleconference with Oregon DEQ staff is also planned for the coming month or so, to discuss Wacker's wastewater toxicity investigation approach and results. This conference will be scheduled after DEQ has an opportunity to review this memorandum.

Table 1

Effluent Toxicity Data

			Toxicity [% Effluent]										
			Fathead minnow, *Pimephales promelas*					Water flea, *Ceriodaphnia dubia*					
			ACUTE		CHRONIC			ACUTE		CHRONIC			
Date	Lab	Sample ID	Survival NOEC	Pass/ Fail	Survival NOEC	Growth NOEC	Pass/ Fail	Survival NOEC	Pass/ Fail	Survival NOEC	Repro NOEC	Pass/ Fail	Comments
18-Aug-93	NAS	93-?		F?	25	25	P	100	P	50	25	P	FH acute failed @ 100%; no data available for other dilutions.
27-Sep-93	NAS	93-?	100	P	50	25	P	100	P	50	50	P	
15-Aug-94	NAS	94-50	100	P	50	50	P	25	F	25	<6.25	F	
12-Oct-94	NAS	94-61						50	P	6.25	<6.25	F	Cerio acute NOEC=50% (Steel's test), NOEC=25% (Wilcoxon test)
12-Oct-94	CAS	94-62								6.25		F	This was a split sample (duplicate) test
6-Mar-95	CH2M	95-4	100	P	33	33	P	17	F	10	3	F	
20-Mar-95	CH2M	95-19						66	P				
3-Apr-95	CH2M	95-20						33	F				
21-Apr-95	CH2M	95-24						50	P	50	*17	P	* Preliminary results
24-Apr-95	CH2M	95-25						50	P				

Notes:

NAS = Northwestern Aquatic Sciences, Newport, OR; CAS = Columbia Aquatic Sciences, Carlsbad, CA; CH2M = CH2M HILL, Corvallis, OR

Pass/Fail criteria - Oregon DEQ toxicity guidelines with a 1:1 ZID dilution (acute limit=50% effluent) and a 5:1 mixing zone dilution (chronic limit=17% effluent).

SCOEPA00028332

Table 2					
Effluent Characterization Data					
		Sample ID and Date Collected			
Parameter	**Units**	**95-4 6-Mar-95**	**95-19 21-Mar-95**	**95-20 3-Apr-95**	**95- 21-Apr-95**
Bioassay					NA
Fathead Acute NOEC	%	100	-	-	
Fathead Chronic NOEC	%	33	-	-	
Cerio Acute NOEC	%	17	66	33	
Cerio Chronic NOEC	%	3	-	-	
Chemical					NA
pH	pH units	7.1	6.7	6.7	
Alkalinity	mg/L as CaCO3	5	20	12	
Hardness	mg/L as CaCO3	300	244	184	
Conductivity	µmhos/cm	868	690	710	
TDS	mg/L	604	554	-	
TSS	mg/L	7	8	-	
COD	mg/L	14	5	-	
NH3-N	mg/L	1.68	0.31	-	
TKN	mg/L	1.81	0.36	-	
Chlorine Residual	mg/L	0.05	0.08	0.06	
H2O2	mg/L	17	20	-	
Ox-Red Potential	mV	170	-	-	
Fluoride	mg/L	4.4	2.8	-	
Sulfide	mg/L	U 1	-	-	
Sulfite	mg/L	U 0.5	-	-	
MBAS	mg/L	0.25	0.1	-	
Chromium, Total	µg/L	1	1.1	-	
Chromium (VI)	µg/L	U 20	U 8	U 8	
Notes:					
U = less than specified method detection limit (MDL)					
NA = data not yet available					

Parametrix, Inc.

Consultants in Engineering and Environmental Sciences

5808 Lake Washington Blvd. N.E. Kirkland, WA 98033-7350
206-822-8880 • Fax: 206-889-8808

Ms. Cindy Hetrick
North Creek Analytical
9405 SW Nimbus Avenue
Beaverton, OR 97008-7132

September 18, 1995
55-1945-05 (01)

SUBJECT: FINAL RESULTS OF TOXICITY EVALUATION OF AN EFFLUENT TO *C. dubia* and *P. promelas*

Dear Ms. Hetrick:

Please find enclosed three (3) copies of a final report outlining the results of biological testing conducted on effluent samples P508259-1, P508288-1 and P508333-1 collected from Wacker Siltronics on 21, 23 and 25 August 1995. Testing was initiated on 22-29 August 1995 and consisted of dual endpoint bioassays using *Pimephales promelas* and *Ceriodaphnia dubia* as the test species.

In summary, toxicity was observed in the acute data taken at 48 hours for the *C. dubia* bioassay with a NOEC of 50% effluent for survival and a LC50 of 77% effluent. No significant toxicity was observed in the acute data taken at 48 hours for the *P. promelas* bioassay with a NOEC of 100% effluent. Toxicity was observed in the final results for the chronic *C. dubia* bioassay with a NOEC of 50% effluent for survival and reproduction and a LC50 of 73% effluent. It should be noted that this data point is based on an unusually low female to male ratio. No significant toxicity was observed in the final results for the chronic *P. promelas* bioassay with NOECs of 100% effluent for both survival and growth.

Should you have any questions or comments concerning these results, please feel free to call Mr. Kevin Brix or myself at (206) 822-8880.

Sincerely,

PARAMETRIX, INC.

Sallyanne Bartlett

Sallyanne Bartlett
Project Manager

cc: K.Brix KJB
file

SIGNATURE PAGE

Submitted by: Parametrix, Inc.
5808 Lake Washington Blvd. NE
Kirkland, Washington 98033

Prepared by: Sallyanne Bartlett 9/14/95
Sallyanne Bartlett — Date
Project Manager

Approved by: K. U. Brix 9/17/95
Kevin Brix — Date
Director, Toxicology Laboratory

Approved by: for: Steve Cappellino 9/18/95
Steve Cappellino — Date
QA/QC Officer

NORTH CREEK ANALYTICAL

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-9508 (206) 481-9200 • FAX 485-2992
East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

September 20, 1995

Thomas J. Rothschild
Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180

RE: Bioassay

Dear Thomas:

In response to your request, we are providing three copies of the bioassay report from Parametrix, Inc. The chain of custody forms are also included. The samples were received on the following dates:

1) August 21, 1995, NCA# P508259, 95-52

2) August 23, 1995, NCA# P508288, 95-53

3) August 25, 1995, NCA# P508333, 95-54

Each of these samples were shipped overnight to Parametrix, Inc., Kirkland, WA. If you have any questions, please call me at (503) 643-9200.

Sincerely,

Howard Holmes
Project Manager

Report

Toxicity Evaluation of an Effluent to *Ceriodaphnia dubia* and *Pimephales promelas*

Prepared for:
North Creek Analytical

September 1995 Project No.: 55-1945-05 (01)

Parametrix, Inc.

NORTH CREEK ANALYTICAL

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

CHAIN OF CUSTODY REPORT

CLIENT: Wacker Siltronic Corporation
ADDRESS: 7200 NW Front Avenue
Portland, Oregon 97210
PHONE: 243-2020 FAX: 241-7599

PROJECT NAME: Bioassay
PROJECT NUMBER: 95-52
SAMPLED BY: Thomas J. Rothschild

REPORT TO: Thomas J. Rothschild
BILLING TO: Wacker Siltronic
P.O. NUMBER: 46998
NCA QUOTE #:

TURNAROUND REQUEST in Business Days *

Organic & Inorganic Analyses: [10] [5] [3] [2] [1]

(Please Select One)

Fuels & Hydrocarbon Analyses: [5] [3] [2] [1]

** Turnaround Requests less than standard will incur Rush Charge..*

FAX RESULTS BY : ASAP

SAMPLE IDENTIFICATION: (NUMBER OR DESCRIPTION)	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Analysis Request: Bioassay (1)	COMMENTS & PRESERVATIVES USED	NCA SAMPLE NUMBER
1. 95-52	21 Aug 95 0830	W	1	X	Cool, 4°C 19.1°	P508259
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

RELINQUISHED BY: Thomas J. Rothschild DATE: 21 Aug 95
PRINT NAME: Thomas J. Rothschild FIRM: Wacker TIME: 1055

RECEIVED BY: [signature] DATE: 8/21/95
PRINT NAME: FIRM: NCA TIME: 1055

RELINQUISHED BY: [signature] DATE:
PRINT NAME: FIRM: TIME:

RECEIVED BY: Sara McClung DATE: 8/21/95
PRINT NAME: Sara McClung FIRM: NCA TIME: 1320

ADDITIONAL REMARKS: (1) Dual endpoint - acute and chronic; IAW EPA/600/4-85/001 and EPA/600/4-90/027

PAGE OF

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SCOEPA00028338

NORTH CREEK ANALYTICAL

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East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

CHAIN OF CUSTODY REPORT

CLIENT: Wacker Siltronic Corporation
ADDRESS: 7200 N.W. Front Avenue
Portland, Oregon 97210
PHONE: 243-2020 FAX: 241-7599

REPORT TO: Thomas J. Rothschild
BILLING TO: Wacker Siltronic
P.O. NUMBER: 46998
NCA QUOTE #:

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: [10] [5] [3] [2] [1]
(Please Select One)
Fuels & Hydrocarbon Analyses: [5] [3] [2] [1]
* Turnaround Requests less than standard will incur Rush Charg
FAX RESULTS BY :

PROJECT NAME:
PROJECT NUMBER: 95-53
SAMPLED BY: Thomas J. Rothschild

Analysis Request: Bioassay (1)

SAMPLE IDENTIFICATION: (NUMBER OR DESCRIPTION)	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Bioassay (1)	COMMENTS & PRESERVATIVES USED	NCA SAMPLE NUMBER
1. 95-53	23 Aug95 0730	W	1	X	Cool, 4°C 15.8°	P508288-1
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

RELINQUISHED BY: Thomas J. Rothschild DATE: 23 Aug95
PRINT NAME: Thomas J. Rothschild FIRM: Wacker TIME: 1110
RECEIVED BY: [signature] DATE: 8/23/95
PRINT NAME: FIRM: NCA TIME: 1110

RELINQUISHED BY: [signature] DATE:
PRINT NAME: FIRM: TIME:
RECEIVED BY: Sara McClurg DATE: 8/23/95
PRINT NAME: Sara McClurg FIRM: NCA TIME: 1400

ADDITIONAL REMARKS: (1) Dual End-Point - acute and chronic; IAW EPA/600/4-89/001 and EPA/600/4-90/027

PAGE OF

COC Rev 6, 10/94

SCOEPA00028339

NORTH CREEK ANALYTICAL

SAMPLES ORIGINATING FROM:
18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508 (206) 481-9200 FAX 485-2992
East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202 X

SUBCONTRACTING CHAIN OF CUSTODY REPORT

SUBCONTRACTOR: Parametrix

ADDRESS:

PHONE: FAX:

NCA PROJECT NUMBER: P508333

REPORT RESULTS ATTN. TO: Cindy Hetrick

INVOICE IN DUPLICATE WITH CHAIN TO:
NCA BOTHELL, ATTN: ACCOUNTS PAYABLE

P.O. NUMBER:

DATE RESULTS DUE NORTH CREEK: 9-1-95

NEXT BUSINESS DAY RUSH	
2 BUSINESS DAY RUSH	
3 BUSINESS DAY RUSH	
5 BUSINESS DAY RUSH	
10 BUSINESS DAY STANDARD	✓

Analysis Request: Bioassay

NORTH CREEK SAMPLE NUMBER	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Bioassay	COMMENTS & PRESERVATIVES USED	SUBCONTRACTOR SAMPLE NUMBER
1. P508333-1	8/25/95 0815	W	1	X		
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

NO PAYMENT WILL BE MADE UNLESS NCA C.O.C. IS ATTACHED TO INVOICE

RELINQUISHED BY: Sara McClurg	DATE: 8-25-95	RECEIVED BY:	DATE:
FIRM: NORTH CREEK ANALYTICAL Inc.	TIME: 1420	FIRM:	TIME:
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
FIRM:	TIME:	FIRM:	TIME:

ADDITIONAL REMARKS:

PAGE 1 OF 1

SCOEPA00028340

TOXICITY EVALUATION OF AN EFFLUENT TO

Ceriodaphnia dubia AND *Pimephales promelas*

Prepared for

North Creek Analytical
9405 SW Nimbus Avenue
Beaverton, Oregon 97008-7132

Prepared by

PARAMETRIX, INC.
5808 Lake Washington Blvd. NE
Kirkland, Washington 98033

SEPTEMBER 1995

SIGNATURE PAGE

Submitted by: Parametrix, Inc.
5808 Lake Washington Blvd. NE
Kirkland, Washington 98033

Prepared by: Sallyanne Bartlett 9/14/95
Sallyanne Bartlett — Date
Project Manager

Approved by: 9/17/95
Kevin Brix — Date
Director, Toxicology Laboratory

Approved by: 9/18/95
for: Steve Cappellino — Date
QA/QC Officer

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C Reference toxicant data
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SCOEPA00028343

SUMMARY OF TEST CONDITIONS AND RESULTS

Dual Endpoint *Ceriodaphnia dubia* and *Pimephales promelas* Bioassays.

Test Title:	Toxicity Evaluation of an Effluent to *Ceriodaphnia dubia* and *Pimephales promelas*
Testing Dates:	*Ceriodaphnia dubia*: 22-29 August 1995 *Pimephales promelas*: 22-29 August 1995
Test Facility:	Parametrix, Inc.; 5808 Lake Washington Boulevard NE; Kirkland, Washington 98033
Test Sponsor:	Ms. Cindy Hetrick; North Creek Analytical; 9405 SW Nimbus Avenue; Beaverton, Oregon 97008-7132
Test Material:	Effluent samples collected on 21, 23 and 25 August 1995
Test Species:	*Ceriodaphnia dubia* *Pimephales promelas* (Fathead minnow)
Source:	*Ceriodaphnia dubia*: laboratory stock cultures *Pimephales promelas*: Aquatic BioSystems; Fort Collins, CO
Test Type:	Dual Endpoint for *Ceriodaphnia dubia* and *Pimephales promelas*
Duration:	*Ceriodaphnia dubia:* 48 hours and 7 days *Pimephales promelas*: 48 hours and 7 days
Test Concentrations:	0, 6.25, 12.5, 25, 50 and 100%

SCOEPA00028344

Summary of 48-hour results:

Evaluation	*Ceriodaphnia dubia* Survival	*Pimephales promelas* Survival
NOEC	50%	100%
LOEC	>100%	>100%
LC50	77%	>100%

Summary of final results:

Evaluation	*Ceriodaphnia dubia* Survival	*Ceriodaphnia dubia* Reproduction	*Pimephales promelas* Survival	*Pimephales promelas* Growth
NOEC	50%	50%	100%	100%
LOEC	100%	>50%	>100%	>100%
LC50	73%	N/A	>100%	N/A
Reference toxicant (LC50)	4 ppb Cu	N/A	131 ppb Cu	N/A

N/A = Not applicable

SCOEPA00028345

1. INTRODUCTION

This report summarizes the procedures and results of biological testing conducted on effluent samples P508259-1, P508288-1 and P508333-1 collected from Wacker Siltronics on 21, 23 and 25 August 1995. All testing was conducted by Parametrix' Toxicology Laboratory in Kirkland, Washington. Testing consisted of two dual endpoint chronic bioassays using *Ceriodaphnia dubia* and *Pimephales promelas* as test organisms.

SCOEPA00028346

2. TEST METHODS AND CONDITIONS

2.1 Sample Handling

Whole effluent samples were collected on 21, 23 and 25 August 1995 and shipped via overnight carrier to Parametrix' Toxicity Testing Laboratory, where they were stored in a refrigerator set at 4° C until used for testing. Upon sample arrival, a subsample was collected for analysis of temperature, pH, salinity, dissolved oxygen, conductivity, hardness, alkalinity, ammonia and total residual chlorine. Whole, dechlorinated samples were used to conduct both bioassays.

2.2 Source and Condition of Organisms

C. dubia were obtained from laboratory stock cultures and were ≤24 hours old at test initiation. *P. promelas* were obtained from Aquatic BioSystems in Fort Collins, CO and were ≤24 hours old at test initiation. A reference toxicant test was conducted on each test species to assess the relative health of the test organisms and to ensure that their sensitivity fell within an expected concentration range. Copper as copper sulfate, was used as the reference toxicant for the *C. dubia* and *P. promelas* tests.

2.3 Test Methods

All chronic toxicity testing was conducted in accordance with Short Term Methods for Measuring the Chronic Toxicity of surface and Receiving Waters to Freshwater Organisms (Second Edition), EPA/600/4-89/001, March 1989. Test procedures were modified in accordance with Whole Effluent Toxicity Testing Guidance Document, Oregon Department of Environmental Quality, January 1993. Summaries of test conditions are presented in Tables 1 and 2.

SCOEPA00028347

Table 1. Summary of test conditions for the dual endpoint *Ceriodaphnia dubia* bioassay.

Job Name: North Creek Analytical

Job Number: 55-1945-05 (01)

Date: 22-29 August 1995

Test Protocol:	Short Term Methods for Measuring the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms (Second Edition), EPA/600/4-89/001, March 1989. Whole Effluent Toxicity Testing Guidance Document, Oregon Department of Environmental Quality, January 1993.
Test Material:	Whole effluent collected from Wacker Siltronics
Test Organisms/Age:	*C. dubia*; ≤24 hrs old
Source:	In-house culture
Number/Container:	1
Volume/Container:	15 ml
Test Concentrations:	0, 6.25, 12.5, 25, 50 and 100%
Replicates:	10
Reference Toxicant:	Copper as copper sulfate
Test Duration:	7 days
Control/Dilution Media:	Lab prepared synthetic water (80-120 mg/l as $CaCO_3$)
Test Chambers:	30 ml polypropylene beakers
Lighting:	Fluorescent bulbs (50-100 foot candles)
Photoperiod:	16 hours light; 8 hours dark
Aeration:	None
Feeding:	Daily: 100 µl *Selenastrum* suspension; 100 µl yeast/Cerophyll/trout chow (YCT)
Temperature:	25 ± 1° C
Chemical Data:	pH and dissolved oxygen measured at renewal for each concentration and the control (both initial and final solutions); temperature measured in environmental chamber at initiation and every 24 hours; specific conductivity measured at test initiation and termination in control and 100% effluent; conductivity, salinity, hardness, alkalinity, ammonia and residual chlorine measured for each new effluent sample
Effect Measured:	Mortality and reproduction
Test Acceptability:	Control mortality ≤20%; ≥60% of control organisms produce three broods with an average total of 15 or more offspring for the first three broods

SCOEPA00028348

Table 2. Summary of test conditions for the dual endpoint *Pimephales promelas* bioassay.

Job Name: North Creek Analytical — Job Number: 55-1945-05 (01)

Date: 22-29 August 1995

Test Protocol:	Short Term Methods for Measuring the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms (Second Edition), EPA/600/4-89/001, March 1989. Whole Effluent Toxicity Testing Guidance Document, Oregon Department of Environmental Quality, January 1993.
Test Material:	Whole effluent collected from Wacker Siltronics
Test Organisms/Age:	*P. promelas* (fathead minnow); ≤24 hrs old
Source:	Aquatic BioSystems, Inc.; Fort Collins, CO
Number/Container:	10
Volume/Container:	400 ml
Test Concentrations:	0, 6.25, 12.5, 25, 50 and 100%
Replicates:	4
Reference Toxicant:	Copper as copper sulfate
Test Duration:	7 days
Renewal:	Daily
Control/Dilution Media:	Lab prepared synthetic water (80-120 mg/l as $CaCO_3$)
Test Chambers:	1 liter glass beakers
Lighting:	Fluorescent bulbs (50-100 foot candles)
Photoperiod:	16 hours light; 8 hours dark
Aeration:	None
Feeding:	0.15 ml newly hatched (<24 hrs old) brine shrimp nauplii twice daily
Temperature:	25 ± 1° C
Chemical Data:	pH and dissolved oxygen measured at renewal for concentration and the control (both initial and final solutions); specific conductivity measured at test initiation and termination in control and 100% effluent; temperature measured in environmental chamber at test initiation and every 24 hours; conductivity, hardness, alkalinity, ammonia, and residual chlorine measured for each new effluent sample
Effect Measured:	Mortality and growth
Test Acceptability:	Control mortality ≤20%; control final mean dry weight ≥ 0.25 mg

SCOEPA00028349

3. RESULTS

Daily records of biological and chemical data collected during testing are included in the appendices of this report.

3.1 Initial Chemical and Physical Determinations

The results of initial chemical and physical determinations made for the effluent samples are summarized in Table 3.

Table 3. Initial chemical and physical determinations for effluent samples

Parameter Measured	Effluent Collection Date		
	8/21/95	8/23/95	8/25/95
Receiving Temperature (°C)	12	11	5
Salinity (ppt)	0	1	0
Dissolved oxygen (ppm)	9.2	10.0	9.8
Receiving pH	6.9	7.1	7.2
Conductivity (μHMOS)	800	850	700
Hardness (ppm as $CaCO_3$)	311	294	292
Alkalinity (ppm as $CaCO_3$)	11	12	14
Residual Chlorine (ppm) Initial:	0.03	0.03	0.03
Final:	<0.01	<0.01	<0.01
Ammonia (ppm)	2	1	1

3.2 Test Results

Toxicity test results are summarized in the Executive Summary at the front of this report and again in Table 4. The results of reference toxicant testing and control responses were within the expected ranges. In summary, toxicity was observed in the acute data taken at 48 hours for the *C. dubia* bioassay with a NOEC of 50% effluent for survival and a LC50 of 77% effluent. No significant toxicity was observed in the acute data taken at 48 hours for the *P. promelas* bioassay with a NOEC of 100% effluent. Toxicity was observed in the final results for the chronic *C. dubia* bioassay with a NOEC of 50% effluent for survival and reproduction and a LC50 of 73% effluent. It should be noted that this data point is based on an unusually low female to male ratio. No significant toxicity was observed in the final results for the chronic *P. promelas* bioassay with NOECs of 100% effluent for both survival and growth.

SCOEPA00028350

Table 4. Summary of toxicity test results

Summary of 48-hour results:

Evaluation	*Ceriodaphnia dubia* Survival	*Pimephales promelas* Survival
NOEC	50%	100%
LOEC	>100%	>100%
LC50	77%	>100%

Summary of final results:

Evaluation	*Ceriodaphnia dubia* Survival	*Ceriodaphnia dubia* Reproduction	*Pimephales promelas* Survival	*Pimephales promelas* Growth
NOEC	50%	50%	100%	100%
LOEC	100%	>50%	>100%	>100%
LC50	73%	N/A	>100%	N/A
Reference toxicant (LC50)	4 ppb Cu	N/A	131 ppb Cu	N/A

N/A = Not applicable

SCOEPA00028351

4. REFERENCES

EcoAnalysis, Inc. 1994. TOXIS Version 2.2. EcoAnalysis, Inc., Ojai, California.

ODEQ. 1993. Whole effluent toxicity testing guidance document. January 1993. Oregon Department of Environmental Quality, Portland, Oregon.

U.S. EPA 1989. Short term methods for measuring the chronic toxicity of surface and receiving waters to freshwater organisms (Second Edition), EPA/600/4-89/001. United States Environmental Protection Agency, Cincinnati, Ohio.

SCOEPA00028352

Appendix A

SCOEPA00028353

APPENDIX A

DUAL ENDPOINT *Ceriodaphnia dubia* TOXICITY TEST DATA

5808 Lake Washington Blvd
Kirkland, WA 98033

CHRONIC CERIODAPHNIA DAILY MONITORING

Sample: Effluent
Source: NCA Beaverton

	1	2	3
Collection Dates	8/21	8/23	8/25
Test Dates	8/22/95 – 8/29/95		

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Temp (°C)	25	25	25	25	25	25	25	25	

pH

Conc.	Rep.	Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control		8.1	8.1	8.1	7.9	8.1	8.0	8.0	8.0	8.0	8.0	8.0	8.1	8.1		8.0				
6.25%		8.0	8.0	8.1	8.0	8.0	7.9	8.0	8.0	8.0	7.9	8.0	8.0	8.1		8.0				
12.5%		8.0	8.0	8.1	7.9	8.0	7.9	8.0	7.9	8.0	7.9	8.0	8.0	8.0		8.0				
25%		7.9	7.9	8.1	7.9	8.0	7.8	8.0	7.9	8.0	7.8	8.1	8.0	8.0		7.9				
50%		7.7	7.7	8.0	7.7	7.9	7.5	7.8	7.7	7.9	7.7	8.0	7.8	7.9		7.8				
100%		7.0	7.2	7.5	7.5	7.5	7.0	7.5												

Dissolved Oxygen (mg/L)

		Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control		7.8	7.8	7.7	8.0	7.6	7.8	7.6	7.4	7.4	7.4	8.0	7.8	8.0		7.4				
6.25%		7.8	7.7	7.6	8.0	7.6	7.8	7.5	7.4	7.2	7.4	7.8	7.8	8.0		7.4				
12.5%		7.8	7.7	7.6	7.9	7.6	7.8	7.5	7.5	7.5	7.4	8.0	7.8	8.0		7.4				
25%		7.8	7.7	7.6	7.9	7.4	7.9	7.5	7.5	7.5	8.0	7.7	7.8	8.0		7.4				
50%		7.8	7.7	7.6	8.0	7.4	7.9	7.5	7.6	7.4	8.0	8.0	7.8	8.0		7.4				
100%		7.8	7.7	7.7	8.1	7.4	8.0	7.5												

Specific Conductivity (µS)

		Initial															Final		Final	
Control		340															340			
100%		750															750			
Initials		SB	BB/LB	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	DH	DH	[illegible]	[illegible]	AC	AC		BB	BB			
Date		8/22	8/23	8/25	8/24	8/24	8/25	8/25	8/26	8/26	8/27	8/27	8/28	8/28		8/29	8/29			

	Control	100% Effluent 1st Delivery	2nd Delivery	3rd Delivery
Hardness	90	311	294	292
Alkalinity	55	11	12	14
Chlorine (total residual)	/	0.03 / <0.01	0.03 / <0.01	0.03 / <0.01
Ammonia (mg/L)	/	2	1	1

NT = Not Taken
Shading respresents areas for which data collection is not required.

BB
9/6

Sample	Effluent	Test Dates	8/22/95–8/29/95	Page 2 of 3	
Source	NCA Beaverton	Test Organism	C. dubia	Time	
Date Collected	8/21/95 · 8/23 · 8/25	Dilution Media	EPA SFW		
Date Delivered	8/22 · 8/24 · 8/26	Volume/Container	15ml	Staff	

Conc.	Rep.	No. Org.	Mortality 0	24	48	72	96	120	144	168			# Offspring 0	24	48	72	96	120	144	168			Total
CON	A	1	1	1	1	1	1	1	1	1			0	0	0	0	4	4	0	9	F		17
	B	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	C	1	1	1	1	1	1	1	1	1			0	0	0	0	3	7	0	5	F		15
	D	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	E	1	1	1	1	1	1	1	1	1			0	0	0	0	4	5	1	7	F		17
	F	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	G	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	H	1	1	1	1	1	1	1	1	1			0	0	0	0	2	5	0	8	F		15
	I	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	J	1	1	1	1	1	1	1	0	/			0	0	0	0	0	0	0	0	M		0
6.25%	A	1	1	1	1	1	1	1	1	1			0	0	0	0	3	8	0	2	F		13
	B	1	1	1	1	1	1	1	0-1	0			0	0	0	0	3	8	0	0			11
	C	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	D	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	E	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	F	1	1	1	1	1	1	1	1	1			0	0	0	0	4	0	7	2	F		13
	G	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	H	1	1	1	1	1	1	1	1	1			0	0	0	0	5	6	0	7	F		18
	I	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	J	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
12.5%	A	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	B	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	C	1	1	1	1	1	1	1	1	1			0	0	0	0	2	7	1	6	F		16
	D	1	1	1	1	1	1	1	1	1			0	0	0	0	2	8	0	9	F		19
	E	1	1	1	1	1	1	1	1	1			0	0	0	0	2	7	1	5	F		15
	F	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	G	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	H	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	I	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	J	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
25%	A	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	B	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	C	1	1	1	1	1	1	1	1	1			0	0	0	0	2	5	0	9	F		16
	D	1	1	1	1	1	1	1	1	1			0	0	0	0	3	9	0	8	F		20
	E	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
	F	1	1	1	1	1	1	1	1	1			0	0	0	0	0	0	0	0	M		0
Initials			SB	MS	DEO	MI	DH	[illegible]	AC	BR			SB	MS	DEO	MI	DH	[illegible]	AC	BR			SB
Date			8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29			8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29			8/30

Comments: M = male
F = Female

SB

SCOEPA00028356

Sample	Effluent	Test Dates	8/22/95 - 8/29/95	Page	3 of 3
Source	NCA Beaverton	Test Organism	Ceriodaphnia	Time	
Date Collected	8/21, 8/23, 8/25	Dilution Media	EPA SFW		
Date Delivered	8/22, 8/24, 8/26	Volume/Container	15 ml	Staff	

Conc.	Rep.	No. Org.	Mortality 0	24	48	72	96	120	144	168	# Offspring 0	24	48	72	96	120	144	168		Total
	G	1	1	1	1	1	1	1	1	1	0	0	0	0	3	8	6	9	F	20
	H	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	I	1	1	1	1	1	1	1	1	1	0	0	0	0	3	10	0	8	F	21
	J	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
50%	A	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	B	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	C	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	D	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	E	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	F	1	1	1	1	1	1	1	1	1	0	0	0	0	2	3	0	5	F	10
	G	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	H	1	1	1	1	1	1	1	1	1	0	0	0	0	3	7	0	9	F	19
	I	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
	J	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	M	0
100%	A	1	1	1	0-1	—	/				0	0	0	—	/					0
	B	1	1	1	1	0-1	/				0	0	0	0	/					0
	C	1	1	1	1	0-1	/				0	0	0	0	/					0
	D	1	1	1	0-1	—	/				0	0	0	—	/					0
	E	1	1	1	0-1	—	/				0	0	0	—	/					0
	F	1	1	1	0-1	—	/				0	0	0	—	/					0
	G	1	1	1	0-1	—	/				0	0	0	—	/					0
	H	1	1	1	0-1	—	/				0	0	0	—	/					0
	I	1	1	1	0-1	—	/				0	0	0	—	/					0
	J	1	1	1	0-1	—	/				0	0	0	—	/					0
Initials			SB	[illegible]	DW	MP	DH	[illegible]	AC	BC	SB	[illegible]	DW	MP	DH	[illegible]	AC	BC		88
Date			8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29		8/30

Comments

SB

SCOEPA00028357

Parametrix Toxicology Laboratory

WATER FLEA TEST DATA

Test Number: 571 (x) Chronic ( ) Acute hours
Test Date: 22-Aug-95
Source: N. CREEK Test Material: EFF2 (%)

Conc	Rep	Cont. No.	Sex	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Total Young	Max Young
0.00 D	1		F	1	1						1	1.00	17	
0.00 D	2		M	1	1						1	1.00		
0.00 D	3		F	1	1						1	1.00	15	
0.00 D	4		M	1	1						1	1.00		
0.00 D	5		F	1	1						1	1.00	17	
0.00 D	6		M	1	1						1	1.00		
0.00 D	7		M	1	1						1	1.00		
0.00 D	8		F	1	1						1	1.00	15	
0.00 D	9		M	1	1						1	1.00		
0.00 D	10		M	1	1						0	0.00		
6.25 D	1		F	1	1						1	1.00	13	
6.25 D	2		F	1	1						0	0.00	11	
6.25 D	3		M	1	1						1	1.00		
6.25 D	4		M	1	1						1	1.00		
6.25 D	5		M	1	1						1	1.00		
6.25 D	6		F	1	1						1	1.00	13	
6.25 D	7		M	1	1						1	1.00		
6.25 D	8		F	1	1						1	1.00	18	
6.25 D	9		M	1	1						1	1.00		
6.25 D	10		M	1	1						1	1.00		
12.50 D	1		M	1	1						1	1.00		
12.50 D	2		M	1	1						1	1.00		
12.50 D	3		F	1	1						1	1.00	16	
12.50 D	4		F	1	1						1	1.00	19	
12.50 D	5		F	1	1						1	1.00	15	
12.50 D	6		M	1	1						1	1.00		
12.50 D	7		M	1	1						1	1.00		
12.50 D	8		M	1	1						1	1.00		
12.50 D	9		M	1	1						1	1.00		
12.50 D	10		M	1	1						1	1.00		
25.00 D	1		M	1	1						1	1.00		
25.00 D	2		M	1	1						1	1.00		
25.00 D	3		F	1	1						1	1.00	16	
25.00 D	4		F	1	1						1	1.00	20	
25.00 D	5		M	1	1						1	1.00		
25.00 D	6		M	1	1						1	1.00		
25.00 D	7		F	1	1						1	1.00	20	
25.00 D	8		M	1	1						1	1.00		
25.00 D	9		F	1	1						1	1.00	21	
25.00 D	10		M	1	1						1	1.00		
50.00 D	1		M	1	1						1	1.00		
50.00 D	2		M	1	1						1	1.00		
50.00 D	3		M	1	1						1	1.00		
50.00 D	4		M	1	1						1	1.00		
50.00 D	5		M	1	1						1	1.00		
50.00 D	6		F	1	1						1	1.00	10	
50.00 D	7		M	1	1						1	1.00		

Parametrix Toxicology Laboratory

WATER FLEA TEST DATA

Test Number: 571 (x) Chronic ( ) Acute hours
Test Date: 22-Aug-95
Source: N. CREEK Test Material: EFF2 (%)

Conc	Rep	Cont. No.	Sex	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Total Young	Max Young
50.00 D	8		F	1		1					1	1.00	19	
50.00 D	9		M	1		1					1	1.00		
50.00 D	10		M	1		1					1	1.00		
100.00 D	1		F	1		0					0	0.00	0	
100.00 D	2		F	1		1					0	0.00	0	
100.00 D	3		F	1		1					0	0.00	0	
100.00 D	4		F	1		0					0	0.00	0	
100.00 D	5		F	1		0					0	0.00	0	
100.00 D	6		F	1		0					0	0.00	0	
100.00 D	7		F	1		0					0	0.00	0	
100.00 D	8		F	1		0					0	0.00	0	
100.00 D	9		F	1		0					0	0.00	0	
100.00 D	10		F	1		0					0	0.00	0	

Parametrix Toxicology Laboratory

Test Date: 8/22/95
Sample Date: 8/21/95
Species: Ceriodaphnia dubia
Test Type: Chronic

Test Number: 571
Test Material: Effluent - Industry %
Source: N. CREEK
North Creek Analytical

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	No transformation							
			X	0.000	D	10	1.00	0.000	
			X	6.250	D	10	1.00	0.000	
			X	12.500	D	10	1.00	0.000	
			X	25.000	D	10	1.00	0.000	
			X	50.000	D	10	1.00	0.000	
			X	100.000	D	10	.20	.422	
Proportion Alive	7	No transformation							
			X	0.000	D	10	.90	.316	
			X	6.250	D	10	.90	.316	
			X	12.500	D	10	1.00	0.000	
			X	25.000	D	10	1.00	0.000	
			X	50.000	D	10	1.00	0.000	
				100.000	D	10	0.00	0.000	
Reproduction		No transformation							
			X	0.000	D	4	16.00	1.155	
			X	6.250	D	4	13.75	2.986	
			X	12.500	D	3	16.67	2.082	
			X	25.000	D	4	19.25	2.217	
			X	50.000	D	2	14.50	6.364	
				100.000	D	10	0.00	0.000	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	No transformation Fisher Exact	50.000	100.000	2.00		
Proportion Alive	7	No transformation Fisher Exact	50.000	100.000	2.00		
Reproduction		No transformation Multiple t-tests w/Bonfe	> 50.000	> 50.000 <	2.00	7.889	

- PROPORTION POINT ESTIMATE -

End Point	Day	Method	P	Conc	95% CI	TU
Proportion Alive	2		EC 50	77.111	-	1.30
Proportion Alive	7	Spearman-Karber	EC 50	72.621	-	1.38

- GROWTH POINT ESTIMATE -

End Point	P	IC	95% CI
Reproduction	IC 50	71.724	50.14 - 76.64

9/13/95- 9:03 am TOXIS ANALYSIS SUMMARY

Water Flea

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
WAPTL	CD	8/22/95	EFF2 (%)	N. CREEK	EPAF 89	571

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	Fisher Exact	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: S (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point:	GR Reproduction		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	907	Cannot compute confidence limits for Spearman-Karber LC/EC 50
IC	0	Analysis completed with no errors
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

Inhibition Concentration (ICp) Using Linear Interpolation Analysis

Parametrix Toxicology Laboratory

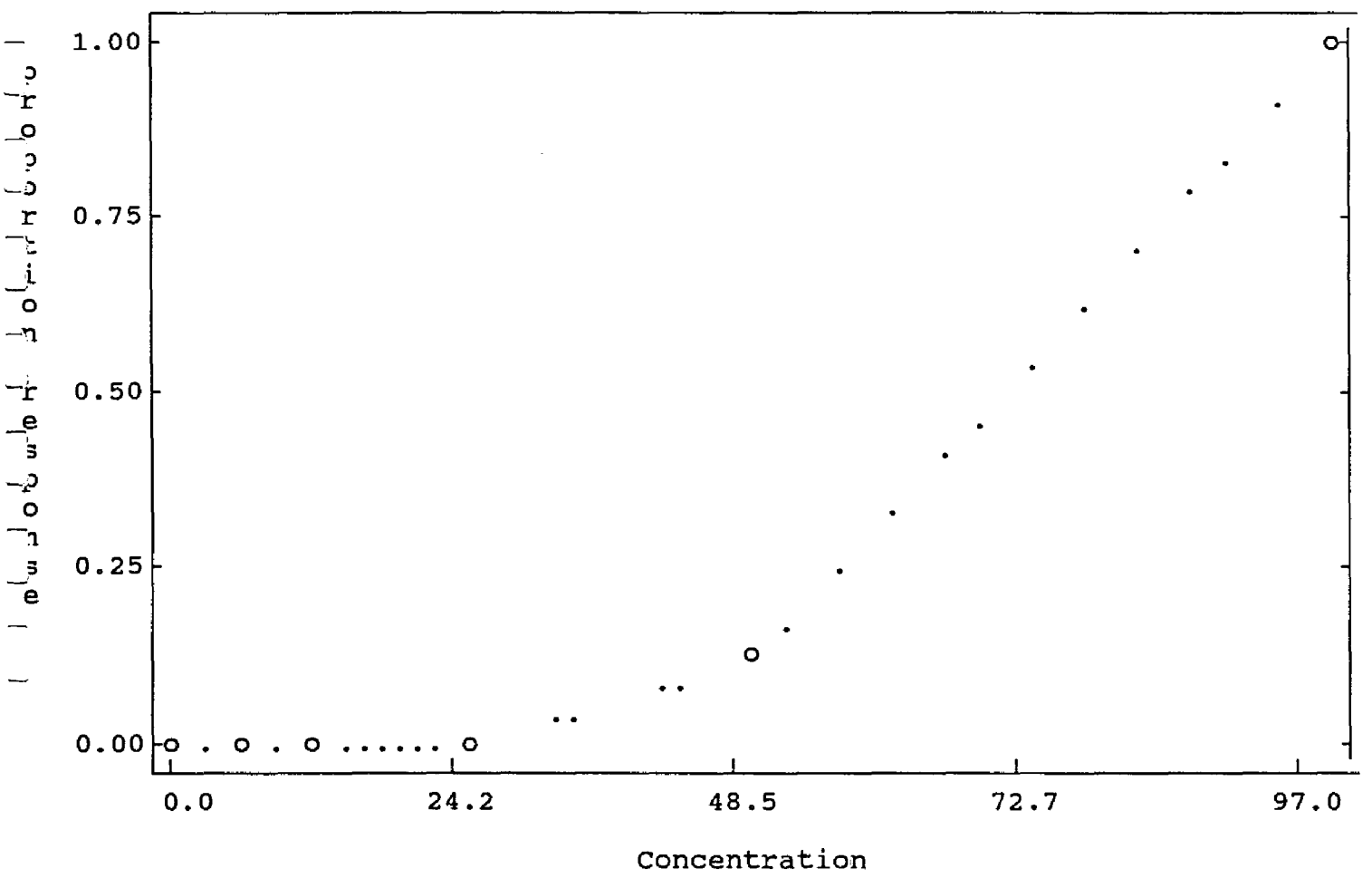
Species: Ceriodaphnia dubia
Test Material: Effluent - Industry (%)
Endpoint: Total young

Test Number: 571
Test Date: 8/22/95

Concentration	Mean	Pooled Mean	Proportion Response
0.0000	16.0000	16.4000	0.0000
6.2500	13.7500	16.4000	0.0000
12.5000	16.6667	16.4000	0.0000
25.0000	19.2500	16.4000	0.0000
50.0000	14.5000	14.5000	0.1159
100.0000	0.0000	0.0000	1.0000

P Value	Estimated Concentration	95% Confidence Limits Lower	Upper
50	71.7241	50.138	76.638

Note: # bootstrap resamplings = 120
Note: Confidence limit adjustment factor = 1.5



Spearman-Karber Analysis for EC/LC 50

Parametrix Toxicology Laboratory

Species: Ceriodaphnia dubia
Test Material: Effluent - Industry
Endpoint: End

Test Number: 571
Test Date: 8/22/95

Conc	Number Exposed	Mortalities
0.00	10	1
6.25	10	1
12.50	10	0
25.00	10	0
50.00	10	0
100.00	10	10

Spearman-Karber EC/LC 50 estimate: 72.621
95% lower confidence: -1.000
95% upper confidence: -1.000

Untrimmed Spearman-Karber

9/13/95 TOXIS ANALYSIS SUMMARY

Ceriodaphnia	Proportion Alive	Day 7

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
WAPTL	CD	8/22/95	EFF2 (%)	N. CREEK	EPAF 89	571

Fisher Exact	Auto growth select	1 control

Transformation		Prop. Conc	Alive	P
No transformation				
	X	0.00D	.90	
	X	6.25D	.90	1.000
	X	12.50D	1.00	1.000
	X	25.00D	1.00	1.000
	X	50.00D	1.00	1.000
		100.00D	0.00	.000

NOEC	LOEC	TU	Alpha	Tail	Based on
50	100	2	.05	One-sided	Fisher Exact

9/13/95 TOXIS ANALYSIS SUMMARY

Ceriodaphnia			Reproduction			
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
WAPTL	CD	8/22/95	EFF2 (%)	N. CREEK	EPAF 89	571

EPA Flowchart	Auto growth select	1 control

	Conc	Mean	SD	N	T
Data transformation:	No transformation				
X	0.00D	16.00	1.155	4	
X	6.25D	13.75	2.986	4	1.133
X	12.50D	16.67	2.082	3	-.311
X	25.00D	19.25	2.217	4	-1.636
X	50.00D	14.50	6.364	2	.617
	100.00D	0.00	0.000	10	

NOEC	LOEC	TU	Alpha	Tail	Based on	Critical T
>50	>50	<2	.05	One-sided	Bonferroni T	2.561

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T
	7.8888	31.7894	2.561

Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.970593	.851	Yes

Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	9.1395	.05770	Yes

Appendix B

SCOEPA00028366

APPENDIX B

DUAL ENDPOINT *Pimephales promelas* TOXICITY TEST DATA

Parametrix, Inc.
5808 Lake Washington Blvd
Kirkland, WA 98033

CHRONIC FATHEAD DAILY MONITORING

Sample: Effluent
Source: ~~AOA~~ NCA Beaverton

Collection Dates: 1 8/21, 2 8/23, 3 8/25
Test Dates: 8/22/95 – 8/29/95

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Temp (°C)	25	25	25	25	25	25	25	25	

Conc.	Rep.	pH Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control		8.1	8.1	8.0	7.9	7.9	7.9	7.9	7.9	7.7	8.0	7.9	7.8	7.7		7.9						
6.25%		8.0	8.1	8.0	7.9	7.8	7.9	7.9	7.9	7.7	8.0	7.8	7.8	7.7		7.9						
12.5%		8.0	8.0	8.0	7.8	7.8	7.8	7.8	7.8	7.7	7.9	7.8	7.7	7.6		7.8						
25%		7.9	7.9	8.0	7.8	7.8	7.7	7.7	7.7	7.5	7.9	7.7	7.7	7.6		7.8						
50%		7.7	7.8	7.9	7.7	7.7	7.6	7.6	7.6	7.4	7.8	7.6	7.6	7.4		7.4						
100%		7.0	7.2	7.2	7.2	7.3	7.1	7.2	7.1	7.0	7.4	7.1	7.2	7.1		7.3						

Conc.	Rep.	Dissolved Oxygen (mg/L) Initial	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Control		7.8	7.8	7.4	7.5	7.2	7.6	7.3	7.4	6.7	7.6	7.3	7.6	7.0		7.0						
6.25%		7.8	7.7	7.4	7.4	7.1	7.6	7.2	7.4	6.7	7.6	7.2	7.8	7.1		7.0						
12.5%		7.8	7.6	7.4	7.5	7.1	7.6	7.2	7.4	6.7	7.7	7.0	7.6	7.0		6.8						
25%		7.8	7.7	7.4	7.4	7.1	7.6	7.2	7.4	6.7	7.6	7.0	7.6	7.0		6.8						
50%		7.4	7.6	7.4	7.5	7.2	7.6	7.2	7.4	6.4	7.5	6.9	7.4	6.9		6.6						
100%		8.0	7.6	7.4	7.9	7.3	7.6	7.1	7.4	6.4	7.4	6.9	7.6	6.9		6.6						

		Specific Conductivity (µS) Initial															Final		Final	
Control		295															310			
100%		950															1,000			
Initials		SB	BL	BL	[illegible]	[illegible]	SB	SB	DH	DH	[illegible]	[illegible]	[illegible]	[illegible]	BL	BL	BL			
Date		8/22	8/23	8/23	8/24	8/24	8/25	8/25	8/26	8/26	8/27	8/27	8/28	8/28	8/29	8/29	8/29			

	Control	100% Effluent 1st Delivery	2nd Delivery	3rd Delivery
Hardness	90	311	294	292
Alkalinity	55	11	12	14
Chlorine (total residual)	/	0.03 / <0.01	0.03 / <0.01	0.03 / <0.01
Ammonia (mg/L)	/	2	1	1

NT = Not Taken
Shading respresents areas for which data collection is not required.

SB 9/16

				1	2	3
Sample	Effluent	Collection Dates		8/21	8/23	8/25
Source	NIA Beaufort	Test Dates		~~8/22~~ 8/22/95 – 9/29/95		

Conc.	Rep.	No. of Org.	No. of Survivors 24	48	72	96	120	144	168
Control	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	8-2	8	7-1
	D	10	10	10	10	8-2	5-3	5	5
6.25%	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	4-6	3-7	3	2-1
12.5%	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
25%	A	10	10	10	10	10	10	10	10
	B	10	10	10	10	10	10	10	10
	C	10	9-1	8-1	8	8	8	8	8
	D	10	10	10	10	10	10	10	10
50%	A	10	10	10	10	10	10	10	10
	B	10	9-1	9	9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10	10
100%	A	10	10	10	10	10	10	10	10
	B	10	10	9-1	9	9	9	9	9
	C	10	10	10	10	10	10	10	10
	D	10	10	10	10	10	10	10 ~~9~~-1	9
Initials		LA	[illegible]	[illegible]	SB	DH	[illegible]	[illegible]	BL
Date		8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29

Comments

SB 9/6

Aquatec, Inc.
303 Lake Washington Blvd. NE
Renton, WA 98033

BIOMASS DATA

Sample: Effluent

Client: NCA Beaverton

Study Director: Sallyanne Bartlett

Test Organism: Pimephales promelas

Test Dates: 8/22/95 - 8/29/95.

Concentration	Replicate		Number of org.	Weight of Foil (mg)	Dry Weight of Foil and organism (mg)	Dry Weight of organism (mg)	Avg. Dry Wt. of organism (mg)
Control	A	1	10	8.50	12.30	3.8	0.38
	B	2	10	7.97	11.61	3.64	0.36
	C	3	7	9.48	12.06	2.58	SB ~~0.26~~ 0.37
	D	4	5	9.10	11.32	2.22	SB ~~0.22~~ 0.44
6.25	A	5	10	8.23	12.27	4.04	0.44
	B	6	10	8.63	12.60	3.97	0.3
	C	7	10	9.87	13.34	3.47	0.35
	D	8	2	8.94	10.43	1.52	0.74
12.5	A	9	10	8.32	12.92	4.6	0.46
	B	10	10	8.40	12.20	3.8	0.38
	C	11	10	8.52	12.53	4.01	0.40
	D	12	10	8.30	12.40	4.1	0.41
25	A	13	10	7.54	12.05	4.51	0.45
	B	14	10	9.13	12.75	3.62	0.36
	C	15	8	8.84	12.34	3.5	0.44
	D	16	10	8.51	12.67	4.16	0.42
50	A	17	~~8~~ ~~9~~ 10	8.14	12.19	4.05	0.40
	B	18	9	8.43	12.00	3.57	SB ~~0.3~~ 0.4
	C	19	10	8.93	12.83	3.9	0.4
	D	20	10	9.46	13.49	4.03	0.4
100	A	21	~~8~~ ~~9~~ 10	8.73	13.20	4.47	0.45
	B	22	9	8.76	12.77	4.01	0.44
	C	23	10	8.89	12.82	3.93	0.39
	D	24	9	8.64	12.57	3.93	0.44

SB
9/1

Parametrix Toxicology Laboratory

FISH TEST DATA

Test Number: 572 (x) Chronic ( ) Acute hours
Test Date: 22-Aug-95
Source: N. CREEK Test Material: EFF2 (%)

Conc		Rep	Cont. No.	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Weight /Fish
0.00	D	1		10	10						10	1.00	.38000
0.00	D	2		10	10						10	1.00	.36000
0.00	D	3		10	10						7	.70	.37000
0.00	D	4		10	10						5	.50	.44000
6.25	D	1		10	10						10	1.00	.44000
6.25	D	2		10	10						10	1.00	.30000
6.25	D	3		10	10						10	1.00	.35000
6.25	D	4		10	10						2	.20	.74000
12.50	D	1		10	10						10	1.00	.46000
12.50	D	2		10	10						10	1.00	.38000
12.50	D	3		10	10						10	1.00	.40000
12.50	D	4		10	10						10	1.00	.41000
25.00	D	1		10	10						10	1.00	.45000
25.00	D	2		10	10						10	1.00	.36000
25.00	D	3		10	9						8	.80	.44000
25.00	D	4		10	10						10	1.00	.42000
50.00	D	1		10	10						10	1.00	.40000
50.00	D	2		10	9						9	.90	.40000
50.00	D	3		10	10						10	1.00	.40000
50.00	D	4		10	10						10	1.00	.40000
100.00	D	1		10	10						10	1.00	.45000
100.00	D	2		10	10						9	.90	.44000
100.00	D	3		10	10						10	1.00	.39000
100.00	D	4		10	10						9	.90	.44000

Parametrix Toxicology Laboratory

Test Date: 8/22/95
Sample Date: 8/21/95
Species: Pimephales promelas
Test Type: Chronic

Test Number: 572
Test Material: Effluent - Industry %
Source: N. CREEK
North Creek Analytical

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	Arc sine sqrt w/ adj.							
			X	0.000	D	4	1.41	0.000	
			X	6.250	D	4	1.41	0.000	
			X	12.500	D	4	1.41	0.000	
			X	25.000	D	4	1.37	.081	
			X	50.000	D	4	1.37	.081	
			X	100.000	D	4	1.41	0.000	
Proportion Alive	2	No transformation							
				0.000	D	4	1.00	0.000	
				6.250	D	4	1.00	0.000	
				12.500	D	4	1.00	0.000	
				25.000	D	4	.98	.050	
				50.000	D	4	.98	.050	
				100.000	D	4	1.00	0.000	
Proportion Alive	7	Arc sine sqrt w/ adj.							
			X	0.000	D	4	1.15	.314	
			X	6.250	D	4	1.17	.474	
			X	12.500	D	4	1.41	0.000	
			X	25.000	D	4	1.34	.152	
			X	50.000	D	4	1.37	.081	
			X	100.000	D	4	1.33	.094	
Proportion Alive	7	No transformation							
				0.000	D	4	.80	.245	
				6.250	D	4	.80	.400	
				12.500	D	4	1.00	0.000	
				25.000	D	4	.95	.100	
				50.000	D	4	.98	.050	
				100.000	D	4	.95	.058	
Weight		No transformation							
			X	0.000	D	4	.39	.036	
			X	6.250	D	4	.46	.197	
			X	12.500	D	4	.41	.034	
			X	25.000	D	4	.42	.040	
			X	50.000	D	4	.40	0.000	
			X	100.000	D	4	.43	.027	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	Arc sine sqrt w/ adj.					
		Steel many-one rank test	>100.000	>100.000	< 1.00	.002	
Proportion Alive	7	Arc sine sqrt w/ adj.					
		Steel many-one rank test	>100.000	>100.000	< 1.00	.060	
Weight		No transformation					
		Steel many-one rank test	>100.000	>100.000	< 1.00	.007	

- PROPORTION POINT ESTIMATE -

End Point	Day	Method	P	Conc	95% CI	TU
Proportion Alive	2	Probit				
			EC 25	> 100.000	-	< 1.00

9/06/95- 3:46 pm TOXIS ANALYSIS SUMMARY

Fish Larvae

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
WAPTL	PP	8/22/95	EFF2 (%)	N. CREEK	EPAF 89	572

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	Arc sine square root w/ Bartlett adj.		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	-1.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: P (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point:	GW Weight		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	68	Proportion of responses at all doses <= proportion of responses for the control
IC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

9/06/95 TOXIS ANALYSIS SUMMARY

Fish Larvae	Proportion Alive	Day 7

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
WAPTL	PP	8/22/95	EFF2 (%)	N. CREEK	EPAF 89	572

EPA Flowchart	Auto growth select	1 control

	Conc	Mean	SD	N	T	Sum of Ranks
Data transformation:		Arc sine sqrt w/ adj.				
X	0.00D	1.15	.314	4		
X	6.25D	1.17	.474	4	-.143	19.000
X	12.50D	1.41	0.000	4	-1.508	22.000
X	25.00D	1.34	.152	4	-1.069	21.000
X	50.00D	1.37	.081	4	-1.273	21.000
X	100.00D	1.33	.094	4	-1.038	20.000
Data transformation:		No transformation				
	0.00D	.80	.245	4		
	6.25D	.80	.400	4	-.143	19.000
	12.50D	1.00	0.000	4	-1.508	22.000
	25.00D	.95	.100	4	-1.069	21.000
	50.00D	.98	.050	4	-1.273	21.000
	100.00D	.95	.058	4	-1.038	20.000

NOEC	LOEC	TU	Alpha	Tail	Based on	Critical Sum of Ran
>100	>100	<1	.05	One-sided	Steel	10

Dunnett Test:	MSE	MSD % Reduction from Control	Critical T
	.06034	46.4475	2.41

Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.855494	.884	No

Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	9999	0	No

9/06/95 TOXIS ANALYSIS SUMMARY

Fish Larvae			Weight			
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
WAPTL	PP	8/22/95	EFF2 (%)	N. CREEK	EPAF 89	572

EPA Flowchart	Auto growth select	1 control

	Conc	Mean	SD	N	T	Sum of Ranks
Data transformation:		No transformation				
X	0.00D	.39	.036	4		
X	6.25D	.46	.197	4	-1.161	17.500
X	12.50D	.41	.034	4	-.415	22.500
X	25.00D	.42	.040	4	-.497	21.000
X	50.00D	.40	0.000	4	-.207	22.000
X	100.00D	.43	.027	4	-.705	24.000

NOEC	LOEC	TU	Alpha	Tail	Based on	Critical Sum of Ran
>100	>100	<1	.05	One-sided	Steel	10

Dunnett Test:	MSE	MSD % Reduction from Control	Critical T
	.00727	37.5034	2.41

Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.755818	.884	No

Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	9999	0	No

Appendix C

SCOEPA00028376

APPENDIX C

REFERENCE TOXICANT DATA

STATIC ACUTE CERIODAPHNIA TOXICITY TEST

Sample: Ref tox CuSO4
Source: N/A
Date Collected: N/A

Test Dates: 8/2/95
Time: 1000

Temp (°C) Day 0 25 Day 1 25 Day 2 25

Conc.	Rep.	Num. Org. Conc	Number of Survivors 0	24	48	pH 0	24	48	Specific Conductivity (µS) 0	24	48	Dissolved Oxygen (mg/L) 0	24	48
Control	A	5	5	5	4-1	7.9	7.81	7.8	260	—	250	7.6	7.4	7.7
	B	5	5	5	5									
	C	5												
	D	5												
2.5ppb	A	5	5	5	3-2	7.9	7.49	7.9	270	—	260	7.8	7.4	7.7
	B	5	5	5	3-2									
	C	5												
	D	5												
5ppb	A	5	5	5	1-4	7.9	7.49	8.0	270	—	260	7.8	7.4	7.7
	B	5	5	5	3-2									
	C	5												
	D	5												
10ppb	A	5	5	5	1-4	7.9	7.49	8.1	270	—	260	7.8	7.4	7.7
	B	5	5	4-1	0-4									
	C	5												
	D	5												
20ppb	A	5	5	1-4	0-1	7.9	7.49	8.1	270	—	250	7.8	7.4	7.7
	B	5	5	1-4	0-1									
	C	5												
	D	5												
40ppb	A	5	5	0-5	0	7.9	7.49	—	270	270		7.8	7.4	7.7
	B	5	5	0-5	0									
	C	5												
	D	5												
	Initials		SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB	SB
	Date		8/2	8/3	8/4	8/2	8/3	8/4	8/2	8/3	8/4	8/2	8/3	8/4

Shading represents areas for which data collection is not required.

NT = Not Taken

Chemistry (To)	Control	100 % Effluent	Comments
Hardness (mg/L CaCO3)			
Alkalinity (mg/L CaCO3)			
Total Residual Chlorine (mg/L)			
Ammonia (mg/L)			

Parametrix Toxicology Laboratory

WATER FLEA TEST DATA

Test Number: REFTOX185 ( ) Chronic (x) Acute 48 hours
Test Date: 2-Aug-95
Source: REF Test Material: CUSO (ug/l)

Conc	Rep	Cont. No.	Sex	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Total Young	Max Young
0.00 D	1		F	5		4						.80		
0.00 D	2		F	5		5						1.00		
2.50 D	1		F	5		3						.60		
2.50 D	2		F	5		3						.60		
5.00 D	1		F	5		1						.20		
5.00 D	2		F	5		3						.60		
10.00 D	1		F	5		1						.20		
10.00 D	2		F	5		0						0.00		
20.00 D	1		F	5		0						0.00		
20.00 D	2		F	5		0						0.00		
40.00 D	1		F	5		0						0.00		
40.00 D	2		F	5		0						0.00		

Parametrix Toxicology Laboratory

Test Date: 8/02/95
Sample Date:
Species: Ceriodaphnia dubia
Test Type: Acute - 48 hours

Test Number: REFTOX185
Test Material: Copper sulfate ug/l
Source: REF
Reference Toxicant

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	Arc sine sqrt w/ adj.							
			X	0.000	D	2	1.23	.168	
			X	2.500	D	2	.89	0.000	
			X	5.000	D	2	.67	.299	
			X	10.000	D	2	.34	.168	
				20.000	D	2	.23	0.000	
				40.000	D	2	.23	0.000	
Proportion Alive	2	No transformation							
				0.000	D	2	.90	.141	
				2.500	D	2	.60	0.000	
				5.000	D	2	.40	.283	
				10.000	D	2	.10	.141	
				20.000	D	2	0.00	0.000	
				40.000	D	2	0.00	0.000	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	Arc sine sqrt w/ adj.					
		Dunnett + t-test				.024	

- PROPORTION POINT ESTIMATE -

End Point	Day	Method	P	Conc	95% CI	TU
Proportion Alive	2	Probit				
			EC 50	3.955	1.46 - 6.19	

8/21/95-12:10 pm TOXIS ANALYSIS SUMMARY

Water Flea

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
WAPTL	CD	8/02/95	CUSO (ug/l)	REF	EPAA 91	REFTOX185

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	EPA Flowchart (Chronic and Acute)		1 control
Transform:	Arc sine square root w/ Bartlett adj.		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	-1.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point:	GR Reproduction		
Analysis:	No Analysis		
Transform:			
Tail:			
Constant:	.01	Variance:	.01
Root:		Alpha Normality:	.01
		NOEC:	.05

Calculate IC? N (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	0	Analysis completed with no errors
PROP	44	Not enough replication for Steel test

Probit Analysis For EC/LC

Parametrix Toxicology Laboratory

Species: Ceriodaphnia dubia
Test Material: Copper sulfate (ug/l)
Endpoint: Prop

Test Number: REFTOX185
Test Date: 8/02/95

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Proportion Responding Adjusted for Controls	Predicted Proportion Responding
Control	10	1	0.1000	0.0000	0.1069
2.5000	10	4	0.4000	0.3282	0.2694
5.0000	10	6	0.6000	0.5521	0.6234
10.0000	10	9	0.9000	0.8880	0.8931
20.0000	10	10	1.0000	1.0000	0.9851
40.0000	10	10	1.0000	1.0000	0.9990

Chi-square for heterogeneity (calculated) = 0.449
Probability(Chi-square > 0.449) = 0.92995

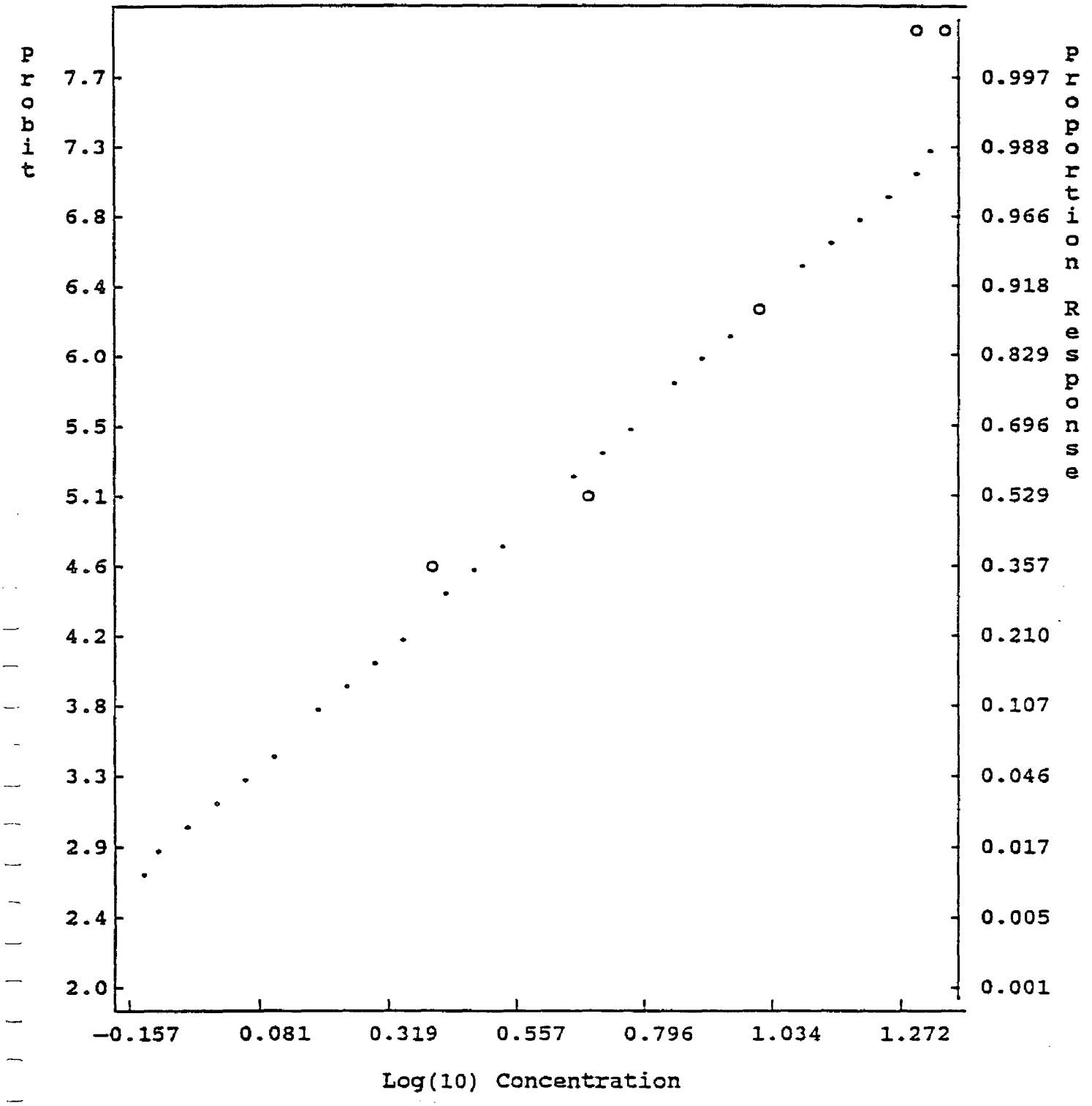
Parameter	Estimate	Std. Err.	95% Confidence Limits Lower	Upper
Intercept	3.157347	0.806295	1.577008	4.737685
Slope	3.085953	1.022938	1.080994	5.090912
Spontaneous Response Rate	0.106898	0.097139	-0.083495	0.297291

Regression equation is:
probit(adjusted prop. resp.) = intercept + slope*log(10) Concentration

Estimated LC/EC values

Point	Exposure Conc.	95% Confidence Limits Lower	Upper
50.00	3.955	1.463	6.189

Plot of adjusted probits and predicted regression line



[illegible] Washington Blvd. NE
Everett, Washington 98033

STATIC ACUTE FATHEAD MINNOW DEFINITIVE TEST

Sample: $CuSO_4$ | Date Collected: n/a | Time: 1700
Source: In House | Test Dates: 8/24/95 – 8/26/95
Source of Organisms: ABS | Age of Organisms: 48 hours

Temp (°C): Day 0 25 | Day 1 25 | Day 2 25 | Day 3 / | Day 4 /

Conc.	Rep.	Num. Org. Cont	No. of Survivors 24	48	72	96	pH 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	Specific Conductivity (µS) 0	~~96~~
Control	A	5	5	5	1		7.9	8.0	7.9			7.6	7.7	7.2			330	320
	B	5	5	5	-													
	C																	
	D		-															
25	A	5	5	5			7.9	8.0	7.9			7.6	7.7	7.2			330	370
	B	5	5	4-1														
	C																	
	D																	
50	A	5	5	5			7.9	8.0	7.9			7.6	7.7	7.2			330	350
	B	5	4-1	4														
	C																	
	D																	
100	A	5	4-1	4			7.9	8.0	7.9			7.6	7.7	7.2			330	330
	B	5	5	2-3														
	C																	
	D																	
200	A	5	5	2-3			7.9	8.0	7.9			7.6	7.7	7.2			320	330
	B	5	4-1	3-1														
	C																	
	D																	
400	A	5	2-3	0-2			7.9	8.0	7.9			7.6	7.7	7.2			320	330
	B	5	1-4	0-1														
	C																	
	D																	
	Initials		DH	DH			DH	DH	DH			DH	DH	DH			DH	DH
	Date		8/25	8/26			8/24	8/25	8/26			8/24	8/25	8/26			8/24	8/26

Chemistry (To)	Control	100% Effluent	Comments
Hardness (mg/L as CaCO3)			
Alkalinity (mg/L as CaCO3)			
Residual Chlorine (ppm)			

SB.

Parametrix Toxicology Laboratory

FISH TEST DATA

Test Number: REFTOX197 ( ) Chronic (x) Acute 48 hours
Test Date: 24-Aug-95
Source: REF Test Material: CUSO (ug/l)

Conc		Rep	Cont. No.	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Weight /Fish
0.00	D	1		5		5						1.00	
0.00	D	2		5		5						1.00	
25.00	D	1		5		5						1.00	
25.00	D	2		5		4						.80	
50.00	D	1		5		5						1.00	
50.00	D	2		5		4						.80	
100.00	D	1		5		4						.80	
100.00	D	2		5		2						.40	
200.00	D	1		5		2						.40	
200.00	D	2		5		3						.60	
400.00	D	1		5		0						0.00	
400.00	D	2		5		0						0.00	

Parametrix Toxicology Laboratory

Test Date: 8/24/95
Sample Date: 8/24/95
Species: Pimephales promelas
Test Type: Acute - 48 hours

Test Number: REFTOX197
Test Material: Copper sulfate ug/l
Source: REF
Reference Toxicant

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	Arc sine sqrt w/ adj.							
			X	0.000	D	2	1.35	0.000	
			X	25.000	D	2	1.23	.168	
			X	50.000	D	2	1.23	.168	
			X	100.000	D	2	.90	.299	
			X	200.000	D	2	.79	.142	
				400.000	D	2	.23	0.000	
Proportion Alive	2	No transformation							
				0.000	D	2	1.00	0.000	
				25.000	D	2	.90	.141	
				50.000	D	2	.90	.141	
				100.000	D	2	.60	.283	
				200.000	D	2	.50	.141	
				400.000	D	2	0.00	0.000	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	Arc sine sqrt w/ adj.					
		Dunnett + t-test				.028	

- PROPORTION POINT ESTIMATE -

End Point	Day	Method	P	Conc	95% CI	TU
Proportion Alive	2	Probit				
			EC 50	131.104	85.97 - 212.57	

9/06/95- 3:23 pm TOXIS ANALYSIS SUMMARY

Fish Larvae

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
WAPTL	PP	8/24/95	CUSO (ug/l)	REF	EPAA 91	REFTOX197

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	EPA Flowchart (Chronic and Acute)		1 control
Transform:	Arc sine square root w/ Bartlett adj.		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	-1.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

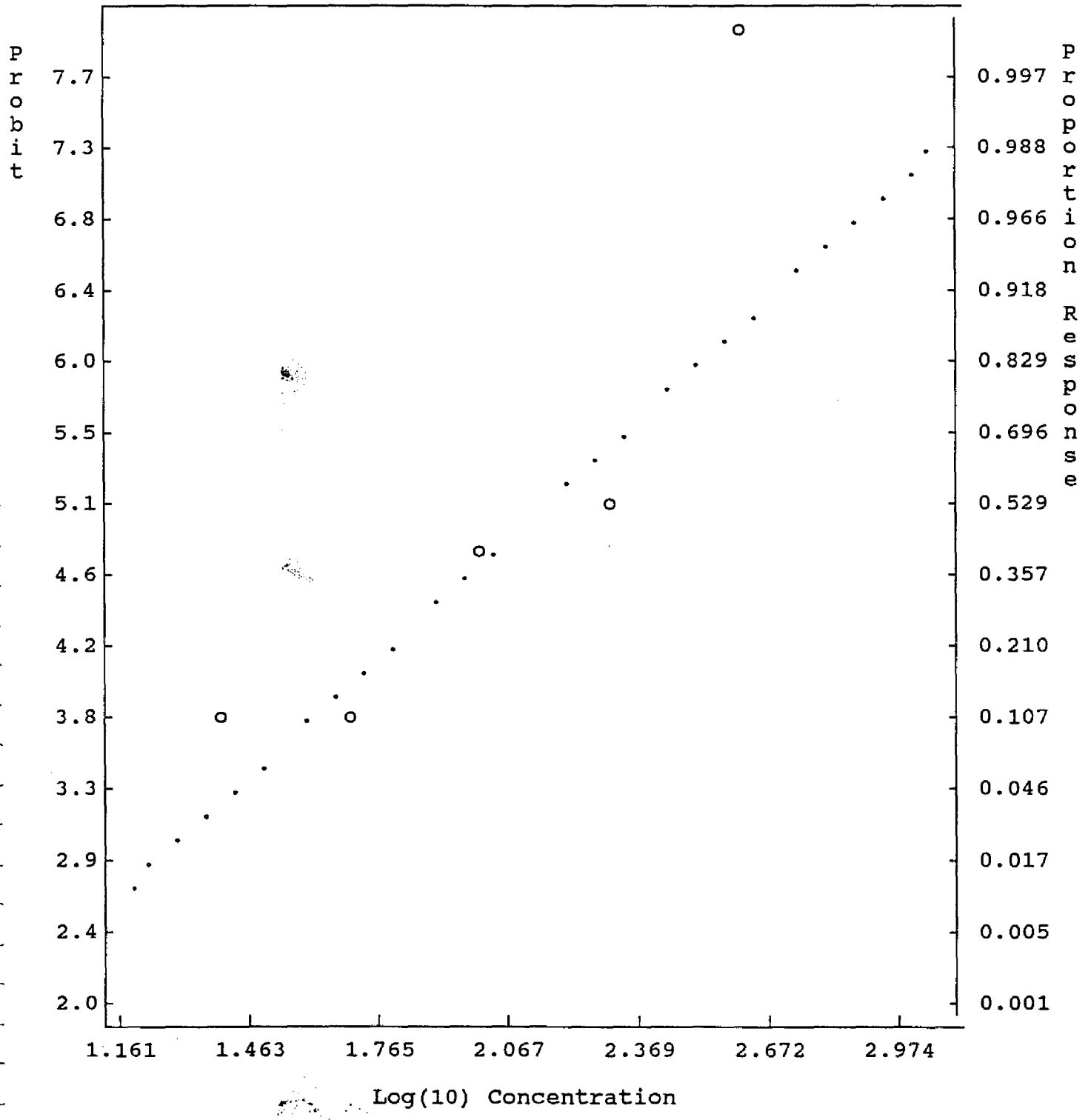
End Point:	GW Weight		
Analysis:	No Analysis		
Transform:			
Tail:			
Constant:	.01	Variance:	.01
Root:		Alpha Normality:	.01
		NOEC:	.05

Calculate IC? N (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	0	Analysis completed with no errors
PROP	44	Not enough replication for Steel test

Plot of adjusted probits and predicted regression line



Appendix D

SCOEPA00028389

APPENDIX D

CHAIN OF CUSTODY FORMS AND INITIAL WATER QUALITY PARAMETERS

INITIAL WATER QUALITY PARAMETERS

SOURCE: P508259-1

CLIENT: NCA Beaverton

JOB NO.:

Parametrix, Inc.
5808 Lake Washington Blvd. NE
Kirkland, WA 98033

	SAMPLE #1	SAMPLE #2	SAMPLE #3
DATE SAMPLE COLLECTED:	8/21/95	8/23/95	8/25/95
DATE SAMPLE RECEIVED:	8/22/95	8/24/95	8/26/95
TEMPERATURE:	12	11	5
SALINITY:	0	1	0
DISSOLVED OXYGEN (mg/L):	9.2	10.0	9.8
pH	6.9	7.1	7.2
CONDUCTIVITY (uS):	800	850	700
HARDNESS (mg/L CaCO3):	311 MP	294 MP	292 MP
ALKALINITY (mg/L CaCO3):	11 MP	12 MP	14 MP
RESIDUAL CHLORINE (ppm):	I 0.03 ~~F 0.01~~ F <0.01	I 0.03 F <0.01	I 0.03 F <0.01
AMMONIA (ppm):	2	1	1
INITIALS:	DH	SB/DH	DH

NT=Not taken

NORTH CREEK ANALYTICAL

SAMPLES ORIGINATING FROM:
18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508 (206) 481-9200 FAX 483-9927
East 5 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

SUBCONTRACTING CHAIN OF CUSTODY REPORT

SUBCONTRACTOR: Parametrix, Inc.

ADDRESS: 5808 Lake Washington Blvd. NE
Kirkland, WA 98033

PHONE: FAX:

NCA PROJECT NUMBER: P508259

REPORT RESULTS ATTN. TO: Howard Holmes

INVOICE IN DUPLICATE WITH CHAIN TO:
NCA BOTHELL, ATTN: ACCOUNTS PAYABLE

P.O. NUMBER:

DATE RESULTS DUE NORTH CREEK: 8-28-95

- NEXT BUSINESS DAY RUSH
- 2 BUSINESS DAY RUSH
- 3 BUSINESS DAY RUSH
- 5 BUSINESS DAY RUSH
- 10 BUSINESS DAY STANDARD (circled)

Analysis Request: Biossay

NORTH CREEK SAMPLE NUMBER	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Biossay	COMMENTS & PRESERVATIVES USED	SUBCONTRACTOR SAMPLE NUMBER
1. P508259-1	8-21-95	W	1	X		
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

NO PAYMENT WILL BE MADE UNLESS NCA C.O.C. IS ATTACHED TO INVOICE

RELINQUISHED BY: Sara McClurg	DATE: 8-21-95	RECEIVED BY: Doug Herlan	DATE: 8/22/95
FIRM: NORTH CREEK ANALYTICAL Inc.	TIME: 1350	FIRM: Parametrix, Inc.	TIME: 1100
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
FIRM:	TIME:	FIRM:	TIME:

ADDITIONAL REMARKS: Dual endpoint - acute and chronic: IAW EPA/600/4-89/001 and Ceriodaphnia dubia & Fat Head Minnow EPA/600/4-90/027

PAGE 1 OF 1

SCOEPA00028392

NORTH CREEK ANALYTICAL

SAMPLES ORIGINATING FROM:
18939 120th Ave N.E., Suite 101, Bothell, WA 98011 (206) 481-9200 FAX 481-9292
East 12415 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
5405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 643-9202 ☒

SUBCONTRACTING CHAIN OF CUSTODY REPORT

SUBCONTRACTOR: Parametrix

ADDRESS:

PHONE: FAX:

NCA PROJECT NUMBER: P508288

REPORT RESULTS ATTN. TO: Cindy Hetrick

INVOICE IN DUPLICATE WITH CHAIN TO:
NCA BOTHELL, ATTN: ACCOUNTS PAYABLE

P.O. NUMBER:

DATE RESULTS DUE NORTH CREEK: 8-30-95

NEXT BUSINESS DAY RUSH	
2 BUSINESS DAY RUSH	
3 BUSINESS DAY RUSH	
5 BUSINESS DAY RUSH	
10 BUSINESS DAY STANDARD	

Analysis Request: Biossay

NORTH CREEK SAMPLE NUMBER	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Biossay	COMMENTS & PRESERVATIVES USED	SUBCONTRACTOR SAMPLE NUMBER
1. P508288-1	8/23/95 0730	W	1	X		
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

NO PAYMENT WILL BE MADE UNLESS NCA C.O.C. IS ATTACHED TO INVOICE

RELINQUISHED BY: Sara McCleary	DATE: 8/23/95	RECEIVED BY: Sallyanne Bartlett	DATE: 8/24/95
FIRM: NORTH CREEK ANALYTICAL Inc.	TIME: 1420	FIRM: Parametrix	TIME: 1100
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
FIRM:	TIME:	FIRM:	TIME:

ADDITIONAL REMARKS: Dual End point - acute and chronic; IAW EPA/600/4-89/001 and EPA/600/4-90/027
Re: Wacker Siltronics - 2nd of 3.

PAGE OF

SCOEPA00028393

CREEK ANALYTICAL

ORIGINATING FROM:
East ...15 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

SUBCONTRACTING CHAIN OF CUSTODY REPORT

SUBCONTRACTOR: Parametrix

ADDRESS:

PHONE: FAX:

NCA PROJECT NUMBER: P508333

REPORT RESULTS ATTN. TO: Cindy Hetrick

INVOICE IN DUPLICATE WITH CHAIN TO:

NCA BOTHELL, ATTN: ACCOUNTS PAYABLE

P.O. NUMBER:

DATE RESULTS DUE NORTH CREEK: 9-1-95

NEXT BUSINESS DAY RUSH	
2 BUSINESS DAY RUSH	
3 BUSINESS DAY RUSH	
5 BUSINESS DAY RUSH	
10 BUSINESS DAY STANDARD	

Analysis Request: Bioassay

NORTH CREEK SAMPLE NUMBER	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONT.	Bioassay	COMMENTS & PRESERVATIVES USED	SUBCONTRACTOR SAMPLE NUMBER
1. P508333-1	8/25/95 0815	W	1	X		
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

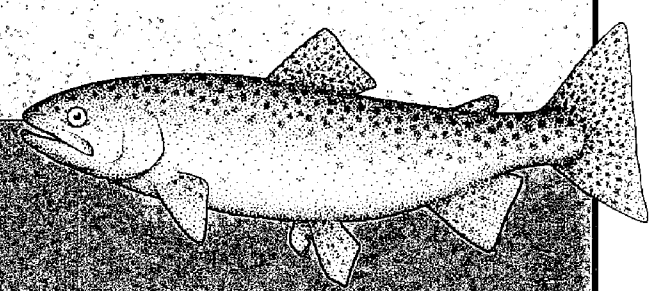
NO PAYMENT WILL BE MADE UNLESS NCA C.O.C. IS ATTACHED TO INVOICE

RELINQUISHED BY: Sara McClurg	DATE: 8-25-95	RECEIVED BY: Doug Helsen	DATE: 8/26/95
FIRM: NORTH CREEK ANALYTICAL Inc.	TIME: 1420	FIRM: Parametrix, Inc	TIME: 1130
RELINQUISHED BY:	DATE:	RECEIVED BY:	DATE:
FIRM:	TIME:	FIRM:	TIME:

ADDITIONAL REMARKS:

Biomonitoring Services

BIOASSAY REPORT
48-HOUR DEFINITIVE BIOASSAYS
Conducted March 21 through 23, 1995
and April 4 through 6, 1995



CH2M HILL

BIOASSAY REPORT
48-HOUR DEFINITIVE BIOASSAYS
Conducted March 21 through 23, 1995
and April 4 through 6, 1995

Prepared for

WACKER SILTRONICS
PORTLAND, OREGON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

April 25, 1995
Lab ID Nos. C01364, C01376

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TEST CONCENTRATIONS	1
SAMPLE COLLECTION	1
SAMPLE PREPARATION	2
MONITORING OF BIOASSAYS	2
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INTRODUCTION

CH2M HILL conducted abbreviated acute definitive tests using the water flea (*Ceriodaphnia dubia*) on samples provided by Wacker Siltronics, Portland, Oregon. The tests were conducted from March 21 through 23, 1995 and April 4 through 6, 1995. The acute testing was performed as part of a Toxicity Identification Evaluation Study.

METHODS AND MATERIALS

TEST METHODS

The acute tests were performed according to: *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*, Weber C., et. al. (1991); EPA/600/4-90/027F, and Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures, (1991); EPA 600/6-91/003.

TEST ORGANISMS

The *Ceriodaphnia dubia* used in the acute tests were obtained from CH2M HILL's in-house cultures and were less than 24 hours old at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (1991). All test organisms appeared vigorous and in good condition prior to testing.

DILUTION WATER

The dilution water used in the *Ceriodaphnia* tests was moderately hard well water (EPA, 1991), with a total hardness and alkalinity of 88, 86 and 72, 68 mg/l as $CaCO_3$, respectively, and a pH of 6.8, 7.8.

TEST CONCENTRATIONS

The concentrations tested in the March 21, 1995 acute test were 3, 10, 33, 66, and 100 percent effluent with dilution water for the control. The concentrations were run in duplicate with 5 organisms per replicate. The concentrations tested in the April 4, 1995 acute test were 3, 10, 17, 33, 66, and 100 percent effluent with dilution water for the control. An extra 50 and 100 percent effluent concentrations were performed at 25°C. The concentrations were run in quadruplicate with 5 organisms per replicate.

SAMPLE COLLECTION

The samples were collected by Wacker personnel on March 20, and April 3, 1995 and delivered to CH2M HILL's Corvallis Aquatic Toxicology Laboratory by UPS. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

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SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 µm net and temperature adjusted prior to test initiation.

MONITORING OF BIOASSAYS

The acute tests were monitored at test initiation for pH, hardness, alkalinity, conductivity, ammonia and dissolved oxygen in the 100 percent concentration, and every 24 hours thereafter for mortality. Temperature was monitored continuously throughout the 48-hour test periods.

DATA ANALYSIS

The effects measured during the *Ceriodaphnia dubia* acute test included survival over the 48-hour exposure period. The statistical analyses performed were those outlined in *Short-Term Methods for Estimating the Acute Toxicity of Effluent and Receiving Waters to Freshwater Organisms and Marine Organisms*, EPA/600/4-90/027F, using Toxcalc version 5.

RESULTS AND DISCUSSION

ACUTE BIOASSAYS

The raw data sheets are presented in Appendix A and the results are summarized in Tables 1 and 2. The March 21, 1995 test resulted in 50 percent survival in the 100 percent effluent. The acute NOEC was 66 percent effluent.

Table 1
Summary of Results March 21, 1995
Ceriodaphnia dubia

Percent Survival			
Concentration	0 hr	24 hr	48 hr
Control	100	100	100
3	100	100	100
10	100	100	100
33	100	100	80
66	100	100	100
100	100	90	50

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The results of the April 4, 1995 test showed 20 percent survival in the 100 percent effluent at 20° C. The LC50 was 56.6 percent effluent. The acute NOEC was 33 percent effluent. The sample tested at 25°C resulted in 5 percent survival in the 100 percent effluent.

Table 2 **Summary of Results April 4, 1994** ***Ceriodaphnia dubia***			
Percent Survival			
Concentration	0 hr	24 hr	48 hr
Control	100	100	100
3	100	100	100
10	100	100	100
17	100	100	100
33	100	100	80
66	100	100	35
100	100	90	20
50 (25°C)	100	100	25
100 (25°C)	100	70	5

Test temperatures remained in the range of 20±1°C. The tests proceeded without interruption or incidence that could have affected test results.

REFERENCE TOXICANT TESTS

The results of monthly reference toxicant tests with sodium chloride conducted in March indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1991). The LC_{50} value and Control Chart limits are listed in the table below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 3 **Reference Toxicant Tests**		
Species	**LC_{50} (g/L)**	**Control chart limits**
Ceriodaphnia dubia	1.8	1.6 to 3.1g/L

SCOEPA00028400

APPENDIX A
RAW DATA SHEETS

CH2M HILL TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Wacker Siltronics
Address: 7200 Front St, Portland, OR
Contact: Ms Sandra Archer

Test Initiation: Date 3-21-95 Time 1330 Test Termination: Date 3-24-95 Time 0815
Technician: Schut
Test Species/ID: Ceriodaphnia dubia 1 Cd 459 / 1
Ceriodaphnia dubia 1 Cd 464 / 1

Sample Information

Sample ID Number	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Tested	Dechlorinated (Yes or No)	Salinity (ppt)	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
C01364	3-20-95	0815	0.06 mg/l	No		244	20
			/				
C01376	4-3-95	0820	0.06 /	No		164	12
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				

Dilution Water Source	ID #	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
[illegible]	902	88	72
[illegible]	910	96	68

Test Species Information

	ID # Cd 459	ID # Cd 464	ID #	ID #
Age or Size	<24 h	<24 h		
Loading Rate	–	–		
Test Container Size	25 ml	25 ml		
Test Volume	15 ml	15 ml		
Feeding: Type	None	None		
Amount	–	–		
Aeration: Began	None	None		
Amount	–	–		
Dilution Water ID #	902	910		
Acclimation Period	–	–		
Test Location	#3	#3		
Condition of Survivors				

Comments

Water Quality Meters Used/ID #

Dissolved Oxygen 1 pH 1 Temperature

Conductivity 1 Refractometer Other

SCOEPA00028402

CH2M HILL FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Wacker Siltronics

Sample Description: Day 1 - Initial Toxicity Test 24 hr.

Test Species: Ceriodaphnia dubia ID#: Cd 459

Beginning, Date: 3-21-95 Time: 13:30

Ending, Date: 3-23-95 Time: 08:

Technician: 0 hr JS 24 hr JS 48 hr JS 72 hr ____ 96 hr ____

Time: 0 hr 13:30 24 hr 13:30 48 hr 08:15 72 hr ____ 96 hr ____

Conc or Percent	Test Container Number	Number of Live Organisms					Disolved Oxygen (mg/l)					pH					Temperature(°C)					Conductivity (µmohs/cm)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
control	A	5	5	5													20	20	20							
	B	5	5	5																						
3%	A	5	5	5																						
	B	5	5	5																						
10%	A	5	5	5																						
	B	5	5	5																						
33%	A	5	5	5																						
	B	5	5	3																						
66%	A	5	5	5																						
	B	5	5	5																						
100%	A	5	4	3													20	20	20							
	B	5	5	2																						

CH2M HILL **FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA**

Client: Wacker
Sample Description: Initial Toxicity Test
C01376-01
Test Species: Ceriodaphnia dubia ID#: Cd 464

Beginning, Date: 4-4-95 Time: 14:00
Ending, Date: 4-6-95 Time: 1100
Technician: 0 hr JS 24 hr JS 48 hr JS 72 hr ____ 96 hr ____
Time: 0 hr 14:00 24 hr 14:30 48 hr 1110 72 hr ____ 96 hr ____

Conc or Percent	Test Container Number	Number of Live Organisms					Disolved Oxygen (mg/l)					pH					Temperature(°C)					Conductivity (µmohs/cm)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
control	A	5	5	5													20	20	20							
	B	5	5	5																						
	C	5	5	5																						
	D	5	5	5																						
10%	A	5	5	5													20	20	20							
	B	5	5	5																						
	C	5	5	5																						
	D	5	5	5																						
JS 17	A	5	5	5													20	20	20							
	B	5	5	5																						
	C	5	5	5																						
	D	5	5	5																						
33	A	5	5	5													20	20	20							
	B	5	5	2																						
	C	5	5	5																						
	D																									

CH2M HILL **FRESHWATER TOXICITY TEST SURVIVAL AND WATER QUALITY DATA**

Client: Wacker Ess
Sample Description: Initial Test
Test Species: Ceriodaphnia dubia ID#: Cd 464

Beginning, Date: 4-4-95 Time: 14:00
Ending, Date: 4-6-95 Time: 11:00
Technician: 0 hr JS 24 hr JS 48 hr JS 72 hr ____ 96 hr ____
Time: 0 hr 14:00 24 hr 14:30 48 hr 11:10 72 hr ____ 96 hr ____

Conc or Percent	Test Container Number	Number of Live Organisms					Disolved Oxygen (mg/l)					pH					Temperature(°C)					Conductivity (µmohs/cm)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
66%	A	5	5	2													20	20	20							
	B	5	5	1																						
	C	5	5	2																						
	D	5	5	2																						
100%	A	5	4	1			9.4	~~9.4~~ JS									20	20	20			710				
	B	5	5	1																						
	C	5	3	1																						
	D	5	4	1																						
50%	A	5	5	1													25	25	25							
	B	5	5	2																						
	C	5	5	1																						
	D	5	5	1																						
100%	A	5	4	1			9.2										25	25	25			710				
	B	5	4	0																						
	C	5	3	1																						
	D	5	3	0																						

Acute Test-48 Hr Survival

Start Date:	04 Apr-95 00:00	Test ID:	137601cdai	Sample ID:	WACKER-SILTRONICS
End Date:	06 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:	03 Apr-95 00:00	Protocol:	EPAA 91-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:	Initial Toxicity Test				

Conc-%	1	2	3	4
D-Control	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000
33	1.0000	0.4000	1.0000	0.8000
66	0.4000	0.2000	0.4000	0.4000
100	0.2000	0.2000	0.2000	0.2000

			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4			0	20
10	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
17	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	4	18.00	10.00	0	20
33	0.8000	0.8000	1.1206	0.6847	1.3453	27.799	4	14.00	10.00	4	20
*66	0.3500	0.3500	0.6295	0.4636	0.6847	17.561	4	10.00	10.00	13	20
*100	0.2000	0.2000	0.4636	0.4636	0.4636	0.000	4	10.00	10.00	16	20

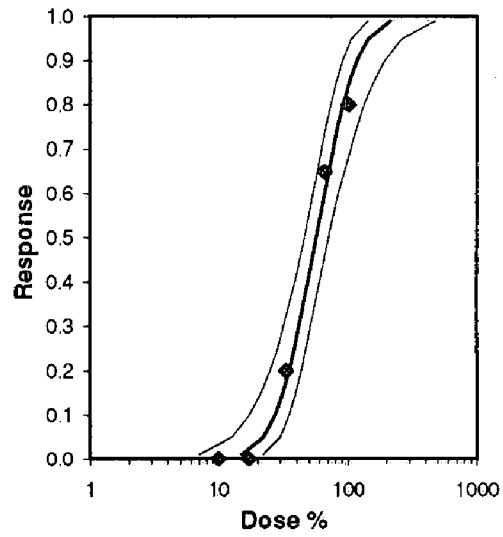
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.63757	0.884	-1.7895	8.23516
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	33	66	46.669	3.0303

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	4.04419	0.74136	2.59114	5.49725	0	0.90346	11.3449	0.82	1.753	0.24727	4
Intercept	-2.0895	1.3009	-4.6392	0.4603							
TSCR											

Point	Probits	%	95% Fiducial Limits	
EC01	2.674	15.058	7.01384	22.0417
EC05	3.355	22.1962	12.6596	29.7688
EC10	3.718	27.2968	17.2515	35.1278
EC15	3.964	31.385	21.1759	39.4298
EC20	4.158	35.0665	24.8381	43.3682
EC25	4.326	38.5673	28.3856	47.2166
EC40	4.747	49.0178	38.9212	59.724
EC50	5.000	56.6238	46.143	70.1601
EC60	5.253	65.4099	53.8089	83.792
EC75	5.674	83.134	67.4606	115.917
EC80	5.842	91.4334	73.2827	132.77
EC85	6.036	102.159	80.4471	156.032
EC90	6.282	117.459	90.1467	191.85
EC95	6.645	144.45	106.208	261.849
EC99	7.326	212.927	143.231	473.318



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APPENDIX B
REFERENCE TOXICANT DATA SHEETS

REFERENCE TOXICANT DATA SHEET

Client: QA/QC
Reference Toxicant: NaCl
Test Begin Date: 3-7-95 Time: 1540
Test Organism: Ceriodaphnia dubia
CID#: 91 Stock Solution: 20 g/L
Test End Date: 3-9-95 Time: 1600
Source: In house
Solvent: distilled
ID#: Cd 454 Age: <24hrs
*Dilution Water: MH well H_2O ID#: 899
Size: —
Total Hardness as CaCO3: 102 Total Alkalinity as CaCO3: 72
Conductivity (umhos/cm)/ Salinity (ppt): 228 Temperature: 20±1°C
Technician 0h: BM 24h: BM 48h: BM 72h: 96h:

Toxicant Concentration g/L	Test Chamber Number	Number Surviving					Dissolved Oxygen mg/l					pH					Temperature °C				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
control	A	5	5	5			8.8	-	8.5			7.7	-	8.2			20	20	20		
	B	5	5	5			8.8	-	8.6												
1	A	5	5	5			8.8	-	8.5			7.8	-	8.1			20	20	20		
	B	5	5	4			8.8	-	8.6												
2	A	5	5	3			8.9	-	8.6			7.8	-	8.1			20	20	20		
	B	5	5	2			8.9	-	8.6												
2.5	A	5	5	1			8.9	-	8.6			7.8	-	8.0			20	20	20		
	B	5	5	1			8.9	-	8.5												
3	A	5	5	0			8.8	-	8.5			7.8	-	8.0			20	20	20		
	B	5	4	0			8.8	-	8.6												
4	A	5	0	-			8.8	8.5	-			7.8	8.0	-			20	20	-		
	B	5	0	-			8.8	8.5	-												

*Dilution Water Code
Recon. - reconstituted water
VS - very soft
S - soft
MH - moderately hard
H - hard
VH - very hard

48 h LC50: 1.8
95% conf. int.: 1.3 to 2.1
Statistical Method: Prob.t

We verify this data is true and correct.
Task Manager: [signature]
Project Manager: Doug Winn
QA Officer: [signature]
Signature

SCOEPA00028408

Acute Test-48 Hr Survival

Start Date:	07 Mar-95 00:00	Test ID:	rcda454	Sample ID:	REF-Ref Toxicant
End Date:	09 Mar-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-gm/L	1	2
D-Control	1.0000	1.0000
1	1.0000	0.8000
2	0.6000	0.4000
2.5	0.2000	0.2000
3	0.0000	0.0000
4	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
D-Control	1.0000	1.0000	1.3453	1.3453	1.3453	0.000	2	0	10
1	0.9000	0.9000	1.2262	1.1071	1.3453	13.732	2	1	10
2	0.5000	0.5000	0.7854	0.6847	0.8861	18.129	2	5	10
2.5	0.2000	0.2000	0.4636	0.4636	0.4636	0.000	2	8	10
3	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	2	10	10
4	0.0000	0.0000	0.2255	0.2255	0.2255	0.000	2	10	10

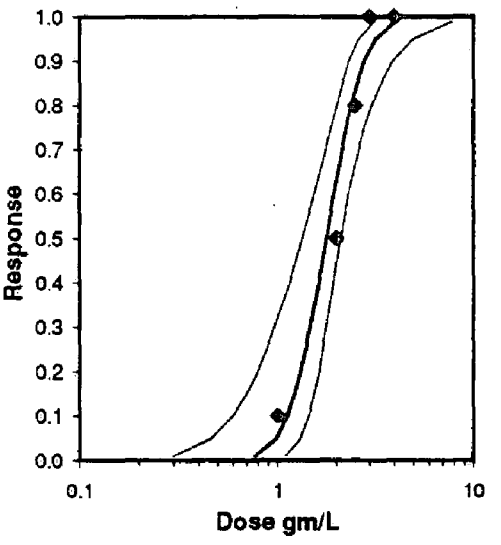
Auxillary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	6.43771	1.57378	3.3531	9.52232	0	2.09442	11.3449	0.55	0.24848	0.15533	4
Intercept	3.40039	0.572	2.27927	4.5215							

TSCR

Point	Probits	gm/L	95% Fiducial Limits	
EC01	2.674	0.7711	0.29403	1.10391
EC05	3.355	0.98395	0.46539	1.31314
EC10	3.718	1.12049	0.59307	1.44387
EC15	3.964	1.22316	0.69737	1.54175
EC20	4.158	1.31142	0.79217	1.62635
EC25	4.326	1.39221	0.88263	1.70471
EC40	4.747	1.61853	1.15007	1.93433
EC50	5.000	1.77205	1.33696	2.10522
EC60	5.253	1.94012	1.538	2.31536
EC75	5.674	2.25552	1.87971	2.80099
EC80	5.842	2.39447	2.01136	3.05709
EC85	6.036	2.56726	2.16084	3.40983
EC90	6.282	2.8025	2.34485	3.94533
EC95	6.645	3.19138	2.61676	4.95376
EC99	7.326	4.07229	3.15495	7.73603



APPENDIX C
CHAIN OF CUSTODY

CH2M HILL

APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project #	ASE 14431
Purchase Order #	31302
Project Name	
Company Name/CH2M HILL Office	Wacker Siltronic Corporation
Project Manager & Phone #	Mr. [X] Ms. [ ] Dr. [ ] Thomas J. Rothschild
Report Copy to:	Sandie Archer
Requested Completion Date:	
Sampling Requirements	SDWA [ ] NPDES [X] RCRA [ ] OTHER ____
Sample Disposal:	Dispose [X] Return [ ]

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	LAB TEST CODES: Toxicity Identification Evaluation	ANALYSES REQUESTED	REMARKS	LAB 1 ID	LAB 2 ID
20 Mar 95	0845	X		X			95-19	1	X			601364-01	

SHADED AREA – FOR LAB USE ONLY

Lab 1 #	Lab 2 #
Quote #	Kit Request #
Project #	
No. of Samples	Page of
Login	LIMS Ver.

Sampled By & Title	(Please sign and print name) Thomas J. Rothschild / Facilities Chem.	Date/Time 20 Mar 95 / 0845	Relinquished By	(Please sign and print name) Thomas J. Rothschild	Date/Time 20 Mar 95 / 1020
Received By	(Please sign and print name)	Date/Time 21 Mar 95 / 0930	Relinquished By	(Please sign and print name)	Date/Time
Received By	(Please sign and print name)	Date/Time	Relinquished By	(Please sign and print name)	Date/Time
Received By	(Please sign and print name)	Date/Time	Shipped Via: UPS BUS Fed-Ex Hand Other ____		Shipping #
Work Authorized By	(Please sign and print name)	Remarks			

QC Level: 1 2 3 Other: ____

COC Rec	ICE
Ana Req	TEMP 7°C
Cust Seal	Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

REV 3/94 FORM 340

SCOEPA00028411

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Wacker Siltronic Corporation NPDES# _____

Address 7200 NW Front Avenue
Portland, Oregon 97210

Composite Sample Information _____

Samples/Hour 0.5 Volume/Sample 3.5 gallons
Total Hours 24 Total Volume 42 gallons
Initiated: Date 2 Apr 95 Time 0800
Ended: Date 3 Apr 95 Time 0800
Chilled During Collection Yes ☐ No ☒

Contact Person: Sandra Archer
Phone: 503-243-2020
CH2M HILL Project # ASE 14431

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P. O.#

Check Chlorine (Y/N) _____
Temp. Upon Arrival (°C) 3°C
Check Ammonia (Y/N) _____ Dechlorinate (Y/N) _____

Analysis Required/Comments

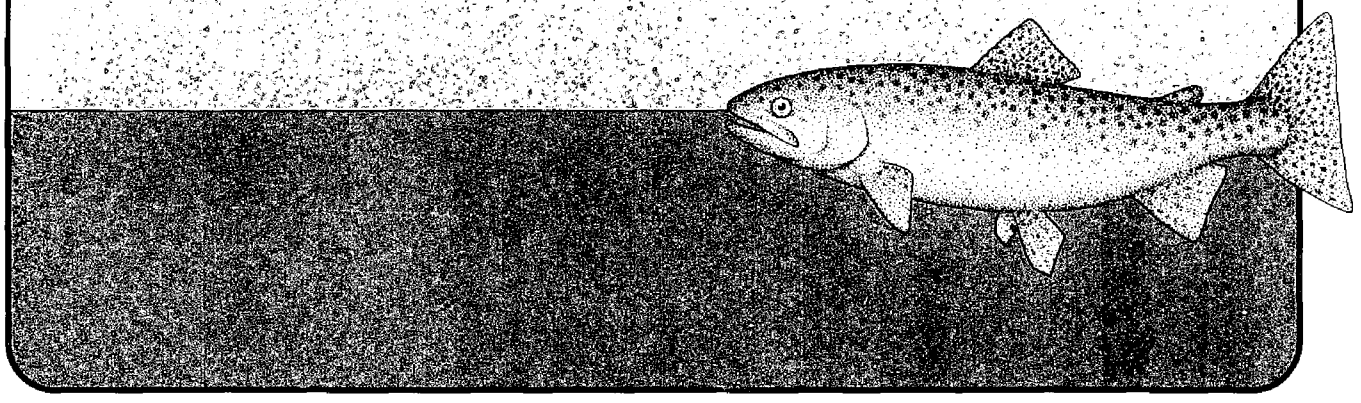
Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste				Concentrations and/or Comments
95-20	3 Apr 95	0820	X		1	C01376-01																		Continuing Toxicology Identification Evaluation

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Thomas J. Rothschild, Facilities Chemist	3 Apr 95 0820	Thomas J. Rothschild	3 Apr 95 / 0820
Received By (Please sign and print name)	Date/Time 4/4/95	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ✓ Bus ___ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

SCOEPA00028412

Biomonitoring Services

BIOASSAY REPORT
CHRONIC
DEFINITIVE BIOASSAY
Conducted April 21 through 28, 1995



CH2M HILL

BIOASSAY REPORT
CHRONIC
DEFINITIVE BIOASSAY
Conducted April 21 through 28, 1995

Prepared for

WACKER SILTRONICS
PORTLAND, OREGON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

May 9, 1995
Lab ID No. C01387

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INTRODUCTION

CH2M HILL conducted one chronic definitive test using the water flea (*Ceriodaphnia dubia*) on samples provided by Wacker Siltronics, Portland, Oregon. The test was conducted from April 21 through 28, 1995. The test was conducted as part of a Toxicity Investigation Evaluation (TIE). An extra test was set up on the second sample (April 24th, 1995) with only the 50 and 17 percent concentrations to assess whether or not the 2nd sample was acutely or chronically toxic.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Weber, C. et al. (1989); EPA/600/4-89/001.

TEST ORGANISMS

The *Ceriodaphnia dubia* used in the chronic test were obtained from CH2M HILL's in-house cultures and were less than 24 hours old and within an eight hour age at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (1989). All test organisms appeared vigorous and in good condition prior to testing.

DILUTION WATER

The dilution water used in the *Ceriodaphnia* tests was moderately hard well water (EPA, 1989), with a total hardness and alkalinity of 98 and 82 mg/l as $CaCO_3$, respectively, and a pH of 8.0.

TEST CONCENTRATIONS

The concentrations tested in the chronic test were 3, 10, 17, 50, and 100 percent effluent with dilution water for the control. For the *Ceriodaphnia* chronic test, 1 organism per chamber with ten chambers per concentration for a total of 10 organisms per concentration were used.

SAMPLE COLLECTION

The samples were collected by Wacker personnel on April 21, 24, and 26, 1995 and delivered to CH2M HILL's Corvallis Aquatic Toxicology Laboratory by CH2M HILL personnel and bus. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C. The samples ID's were 95-24, 95-25, and 95-26.

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SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 μm net and temperature adjusted prior to each daily renewal.

MONITORING OF BIOASSAY

For the chronic test, pre- and post-renewal solutions were monitored for dissolved oxygen and pH daily in the control, low, middle, and high concentrations. Conductivity, ammonia, alkalinity, and hardness were measured in each new sample (100 percent effluent) and in the control. *Ceriodaphnia dubia* survival and neonate production was measured daily in the chronic tests. According to EPA (1989), *Ceriodaphnia* tests should be terminated when 60 percent or more of the surviving female *Ceriodaphnia* in the controls have produced their third brood and at least 15 neonates per adult are produced. Temperature was monitored continuously throughout the testing periods.

DATA ANALYSIS

The effects measured during the *Ceriodaphnia dubia* chronic test included survival and reproduction over the 7-day exposure period. The statistical analyses performed were those outlined in *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms*, EPA/600/4-89/001, using Toxcalc version 5. Dunnett's Procedure, Bonferroni's T-Test or Fisher's Exact Test was used to compare the survival data and Dunnett's Procedure or Bonferroni's T-Test was used to compare the reproduction or growth data between the control and each effluent treatment. When the assumptions of normality or homogeneity of variance necessary for Dunnett's Procedure or T-test with Bonferroni Adjustment could not be met, Steel's Many-One Rank Test or Wilcoxon Rank Sum with Bonferroni Adjustment was used to analyze the data.

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RESULTS AND DISCUSSION

CHRONIC BIOASSAYS

Table 1 summarizes the survival and reproduction data for the *Ceriodaphnia dubia* test conducted.

Table 1
***Ceriodaphnia Dubia* Results**

Concentration (%)	Percent Survival	No. Young Per Adult
Control	100	27.9
3	100	28.9
10	100	28.3
17	100	28.0
50	100	20.6[a]
100	0	0.0

[a] Indicates a statistically significant reduction from control at p less than 0.05 using Steel's Many-One Rank Test.

The *Ceriodaphnia dubia* showed a statistically significant reduction in reproduction at the 50 percent effluent concentration when compared to the control. The no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC) for survival and reproduction were 17 and 50 percent effluent, respectively. Control survival was 100 percent.

The IC_{25} values calculated for *Ceriodaphnia dubia* survival and reproduction were 62.5 and 46.9 percent effluent, respectively.

ACUTE DUAL-END POINT

The results of the 48-hour *Ceriodaphnia dubia* dual end-point tests resutled in no statistically significant reduction in survival at the 50 percent effluent concentration, in either the 1st or 2nd samples. The allowable acute Zone of Initial Dilution (ZID) for Wacker Siltronic is 50 percent effluent. The results indicate the effluent discharge is in compliance with the Oregon DEQ water quality criteria for toxic substances.

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REFERENCE TOXICANT TESTS

The results of monthly reference toxicant tests with sodium chloride conducted in April indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1989). The LC_{50} values, IC_{25} values, and Control Chart limits are listed in the tables below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 2
Acute Reference Toxicant Test (g/L)

Species	LC_{50}	Control chart limits
Ceriodaphnia dubia	1.5	1.3 to 2.1

Table 3
Chronic Reference Toxicant Tests with Sodium Chloride (g/L)

Species (test)	IC_{25}	Control chart limits
Ceriodaphnia dubia (survival)	2.1	1.0 to 2.6
Ceriodaphnia dubia (reproduction)	1.2	0.2 to 1.7

SCOEPA00028419

APPENDIX A
RAW DATA SHEETS

CH2M HILL TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Wacker Siltronics
Address: 7200 N.W. Front, Portland, OR 97210
Contact: Gary Hickman / CVO

Test Initiation: Date 4-21-95 Time 1600 Test Termination: Date 4-28-95 Time 0930
Technician: Janssen, Schut, Mucky
Test Species/ID: Ceriodaphnia dubia / cd 471 / / / /

Sample Information

Sample ID Number	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Tested	Dechlorinated (Yes or No)	Salinity (ppt)	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
C01387-01	4-21-95	0800	0.041	No		248	10
-02	4-24-95	0810	NA /	No		252	14
-03	4-26-95	0800	NA /	No		220	16
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				

Dilution Water Source	ID #	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
MH Well H_2O	924	98	52

Test Species Information

	ID # cd 471	ID # cd 472	ID #	ID #
Age or Size	<24 hrs within	<24 hr		
Loading Rate	8 hr span	8 hr span		
Test Container Size	30 ml	30 ml		
Test Volume	15 ml	15 ml		
Feeding: Type	0.1 ml Algae	0.1 ml Algae		
Feeding: Amount	1 YCT daily	1 YCT Daily		
Aeration: Began				
Aeration: Amount				
Dilution Water ID #	924	924		
Acclimation Period	<24 hrs	<24 hr		
Test Location	#6	#6		
Condition of Survivors	Good	Good		

Comments

Water Quality Meters Used/ID #

Dissolved Oxygen #1 pH #1 Temperature

Conductivity #1 Refractometer Other

CH2M HILL

Ceriodaphnia dubia Survival and Reproduction Test Data Summary

Client: Wacker Silicones Test Start Date: 4-21-95

Sample Description: (95-24) w/ renewals Sample ID #: C01387-01

Ceriodaphnia Lot #: 471 Statistician: Zm

Percent or Concentration	Total Young Per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
Control	30	33	31	12	28	30	27	29	33	26	10	279
3%	30	25	30	29	33	28	27	33	29	25	10	289
10%	32	24	28	29	27	30	30	28	29	26	10	283
17%	27	13	29	31	38	26	29	30	28	29	10	280
50%	24	19	20	23	21	23	18	16	26	16	10	206
100%	0	0	0	0	0	0	0	0	0	0	0	0

CH2M HILL CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client Wacker Siltronics Test Beginning: Date 4-21-95 Time 1600

Sample Description samples w/ renewals (95-24) 601367-01 Test Ending: Date 4-28-95 Time 0930

Ceriodaphnia Lot# Cd 471 Dilution Water MH Well Water ID# 924

Technician Day 1 KJ Day 2 KJ Day 3 JS Day 4 JS Day 5 Bm Day 6 Bm Day 7 Bm

Time Day 1 1212 Day 2 0900 Day 3 1600 Day 4 1115 Day 5 1520 Day 6 1345 Day 7 0930

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
CONTROL	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	6	7	6	0	4	5	4	6	6	5	10	49
	4	0	0	0	0	0	0	0	0	2	0	10	2
	5	10	12	11	3	11	11	9	10	13	9	10	99
	6	0	0	0	9	13	0	14	13	12	12	10	73
	7	14	14	14	0	0	14	0	0	0	0	10	56
3%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	3	5	5	4	5	6	6	5	4	10	47
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5	9	9	11	11	14	9	13	12	11	10	10	109
	6	17	13	14	13	15	14	8	15	13	11	10	133
	7	0	0	0	0	0	0	0	0	0	0	10	0
10%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	6	4	4	3	0	5	5	5	4	10	40
	4	0	0	0	0	0	4	0	0	0	0	10	4
	5	12	8	11	12	12	12	11	10	10	10	10	108
	6	16	10	13	13	12	0	14	13	14	12	10	117
	7	0	0	0	0	0	14	0	0	0	0	10	14
17%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	5	6	5	4	4	4	6	5	6	10	49
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5	7	8	13	10	10	9	11	10	11	8	10	97
	6	16	0	10	16	12	13	14	14	12	15	10	122
	7	0	0	0	0	12	0	0	0	0	0	10	12
50%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	4	3	5	3	3	0	0	6	0	10	28
	4	0	0	0	0	0	0	3	3	0	4	10	10
	5	10	10	9	9	8	8	6	4	10	4	10	78
	6	10	5	8	9	10	12	0	0	10	0	10	64
	7	0	0	0	0	0	0	9	9	0	8	10	26
100%	1	0	0	0	0	0	—	—	0	0	0	8	0
	2	0	—	—	—	0	—	—	0	—	0	4	0
	3	—				—			—		—	0	0
	4												
	5												
	6												
	7												

CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client Walker Stitzenberg Test Beginning: Date 4-21-95 Time 1600

Sample Description 95-24 Test Ending: Date 4-28-95 Time 0930

Ceriodaphnia Lot# Cd 471 Dilution Water MH Well Water ID# 924

Technician Day 1 KJ Day 2 KJ Day 3 JS Day 4 JS Day 5 Bm Day 6 Bm Day 7 Bm

Time Day 1 1215 Day 2 0900 Day 3 1615 Day 4 1100 Day 5 1520 Day 6 1350 Day 7 0930

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
17% utilizing 1st sample only	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	5	4	5	4	3	4	5	6	4	5	10	45
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5	9	12	10	10	8	9	12	13	12	12	10	107
	6	0	0	14	10	10	0	0	0	0	12	10	46
	7	10	13	0	0	0	11	11	11	9	0	10	65
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
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	3												
	4												
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												

CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client Wacker 2nd Sample Test Beginning: Date 4-24-95 Time 15:40

Sample Description 17% on C01387-02 - 95-25 Test Ending: Date _____ Time _____

Ceriodaphnia Lot# 472 Dilution Water _____ ID# _____

Technician Day 1 JS Day 2 DM Day 3 DM Day 4 DM Day 5 _____ Day 6 _____ Day 7 _____

Time Day 1 1100 Day 2 1535 Day 3 1400 Day 4 0935 Day 5 _____ Day 6 _____ Day 7 _____

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	3	5	4	6	6	4	5	6	4	0	10	43
	4	0	0	0	0	0	0	0	0	0	4	10	4
	5												
	6												
	7												
17%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	5	6	6	6	4	5	4	5	5	3	10	49
	4	0	0	0	0	0	0	0	0	0	0	10	0
	5												
	6												
	7												
50%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	3	6	0	3	5	6	0	5	0	10	32
	4	0	0	0	4	0	0	0	4	0	4	10	12
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Walker Stitzer

Initiated: Date 4-21-95 Time 1600 Adults Isolated Date 4-20-95 Time 08:45

Sample Description: 95-24

Terminated: Date _____ Time _____ Neonates Collected Date 4-20-95 Time 14:10

Technician: Day 0 BM, Day 1 KJ, Day 2 KJ, Day 3 JS, Day 4 JS, Day 5 BM, Day 6 BM, Day 7 BM

Time: Day 0 1405, Day 1 1220, Day 2 0920, Day 3 1630, Day 4 1120, Day 5 1600, Day 6 1445, Day 7 1620

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
CONTROL	7.9	7.8 / 8.2	8.1 / 8.3	8.0 / 8.2	8.0 / 8.1	8.6 / 8.2	8.2 / 7.8	8.9	7.7	7.8 / 8.0	7.7 / 7.9	8.0 / 8.0	7.9 / 8.0	8.2 / 7.9	8.1 / 7.9	7.2	216			244		253		
3%	8.0	8.0 / 8.2	8.1 / 8.3	8.0 / 8.4	8.0 / 8.5	8.5 / 8.5	8.1 / 7.9	9.0	7.9	8.1 / 7.9	8.0 / 7.9	8.0 / 8.0	8.1 / 8.0	8.0 / 7.8	8.0 / 7.8	7.9								
10%																								
17%	8.0	8.0 / 8.2	8.1 / 8.4	8.0 / 8.2	8.0 / 8.5	8.3 / 8.6	8.1 / 7.9	8.5	7.7	8.0 / 7.9	7.9 / 7.8	8.0 / 8.0	8.1 / 7.9	8.0 / 7.7	8.0 / 7.7	7.9								
50%				– / 8.2	8.0 / 8.5	8.3 / 8.6	8.2 / 8.0	8.6				– / 7.5	7.9 / 7.5	8.0 / 7.4	7.8 / 7.4	7.8				585		609		
100%	8.1	8.1 / 8.4	8.2 / 8.8	8.0					6.4	7.3 / 6.7	7.2 / 6.5	7.3					1013							

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client Wacker 95-25 Initiated: Date 4-24-95 Time 15:40 Adults Isolated Date 4-23-95 Time [illegible]

Sample Description 17% on Day 3 sample C01387-02 Terminated: Date _____ Time _____ Neonates Collected Date 4-24-95 Time 09:00

Technician Day 0 JS Day 1 JS Day 2 BM Day 3 BM Day 4 BM Day 5 _____ Day 6 _____ Day 7 _____

Time Day 0 16:40 Day 1 1120 Day 2 1605 Day 3 1400 Day 4 1620 Day 5 _____ Day 6 _____ Day 7 _____

Percent or Concentration	Dissolved Oxygen (mg/l)								pH Day								Conductivity (µmhos/cm) Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
control	8.2	8.0 / 8.1	7.9 / 8.2	7.8 / 7.8	8.5				8.0	8.0 / 7.9	8.2 / 7.9	8.2 / 7.9	8.0				244		259					
17%	8.3	8.0 / 8.4	8.0 / 8.3	7.9 / 8.0	8.5				7.9	8.0 / 7.9	8.1 / 7.7	8.1 / 7.7	8.0											
50%	8.3	8.0 / 8.4	8.0 / 8.5	7.9 / 8.1	8.6				7.8	7.9 / 7.5	7.8 / 7.3	7.9 / 7.4	7.8				567							

Percent or Concentration	Total Hardness (mg/l $CaCO_3$) Day								Alkalinity (mg/l $CaCO_3$) Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

SCOEPA00028427

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Wacker Siltronics — Initiated: Date 4-21-95 Time 1600 — Adults Isolated Date 4-20-95 Time 08:45

Sample Description: 95-24 — Terminated: Date _____ Time _____ — Neonates Collected Date 4-20-95 Time 14:10

Technician: Day 0 BM, Day 1 KJ, Day 2 KJ, Day 3 JS, Day 4 JS, Day 5 BM, Day 6 BM, Day 7 BM

Time: Day 0 1405, Day 1 1220, Day 2 0920, Day 3 1640, Day 4 1120, Day 5 1600, Day 6 1450, Day 7 1620

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1 KJ	2	3	4	5	6	7	0	1 KJ	2	3	4	5	6	7	0	1	2	3	4	5	6	7
17% (1st sample only)	7.9	7.8 / 8.0 / 8.2	8.2 / 8.4	8.0 / 8.4	8.0 / 8.4	8.4 / 8.4	8.1 / 7.9	8.4	7.7	7.8 / 8.0 / 7.9 / 8.0	7.9 / 7.8	8.1 / 7.9	8.1 / 8.0	8.0 / 7.7	8.0 / 7.6	8.0	410			369		259		

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

SCOEPA00028428

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	21 Apr-95 00:00	Test ID:	138701cdc	Sample ID:	WACKER-SILTRONICS
End Date:	28 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

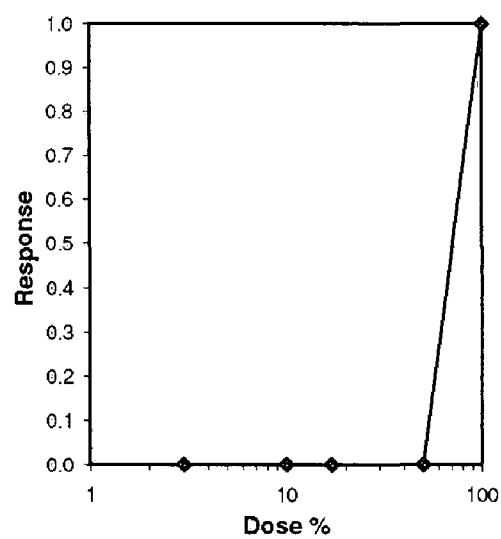
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
D-Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
3	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
10	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
17	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
50	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
100	0.0000	0.0000	10	0	10	10			0.0000	0.0000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	50	100	70.7107	2

Linear Interpolation (80 Resamples)

Point	%	SE	95% CL		Skew
IC05	52.500	0.000	52.500	52.500	#DIV/0!
IC10	55.000	0.000	55.000	55.000	#DIV/0!
IC15	57.500	0.000	57.500	57.500	#DIV/0!
IC20	60.000	0.000	60.000	60.000	#DIV/0!
IC25	62.500	0.000	62.500	62.500	#DIV/0!
IC40	70.000	0.000	70.000	70.000	#DIV/0!
IC50	75.000	0.000	75.000	75.000	#DIV/0!



 ToxCalc v5.0 Reviewed by: MS

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	21 Apr-95 00:00	Test ID:	138701cdc	Sample ID:	WACKER-SILTRONICS
End Date:	28 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	30.000	33.000	31.000	12.000	28.000	30.000	27.000	29.000	33.000	26.000
3	30.000	25.000	30.000	29.000	33.000	28.000	27.000	33.000	29.000	25.000
10	32.000	24.000	28.000	29.000	27.000	30.000	30.000	28.000	29.000	26.000
17	27.000	13.000	29.000	31.000	38.000	26.000	29.000	30.000	28.000	29.000
50	24.000	19.000	20.000	23.000	21.000	23.000	18.000	16.000	26.000	16.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

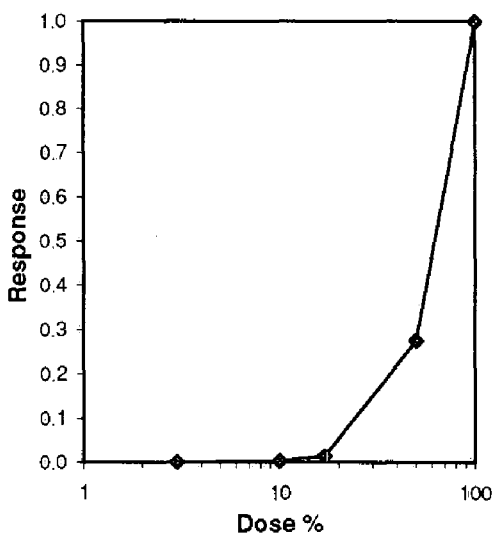
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	27.900	1.0000	27.900	12.000	33.000	21.667	10			28.400	1.0000
3	28.900	1.0358	28.900	25.000	33.000	9.712	10	102.00	76.00	28.400	1.0000
10	28.300	1.0143	28.300	24.000	32.000	7.997	10	96.00	76.00	28.300	0.9965
17	28.000	1.0036	28.000	13.000	38.000	22.144	10	100.50	76.00	28.000	0.9859
*50	20.600	0.7384	20.600	16.000	26.000	16.533	10	65.50	76.00	20.600	0.7254
100	0.000	0.0000	0.000	0.000	0.000	0.000	10			0.000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.86163	0.93	-1.6491	5.75422
Bartlett's Test indicates unequal variances (p = 9.25E-03)	13.457	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	17	50	29.1548	5.88235

Linear Interpolation (80 Resamples)

Point	%	SE	95% CL		Skew
IC05	21.549	6.429	2.171	24.438	-0.8177
IC10	27.881	5.612	13.489	31.876	-0.5042
IC15	34.214	6.209	15.699	39.490	-0.6894
IC20	40.546	6.183	21.519	47.243	-0.7192
IC25	46.878	5.407	31.941	52.033	-0.3778
IC40	58.641	2.481	53.598	61.626	0.2109
IC50	65.534	2.068	61.331	68.022	0.2109



 ToxCalc v5.0 Reviewed by: MS

APPENDIX B
REFERENCE TOXICANT DATA SHEETS

REFERENCE TOXICANT DATA SHEET

Client: QA/QC - April Ref Tox
Reference Toxicant: NaCl
Test Begin: Date 4-12-95 Time 1100
Test Organism: Ceriodaphnia dubia
CID#: 91 Stock Solution: 20 g/L
Test End: Date 4-14-95 Time 1130
Source: In House Cultures
Solvent: distilled water
ID#: Cd 468 Age: <24 hrs
*Dilution Water: MH Well H_2O ID#: 918
Size: —
Total Hardness as CaCO3: 106 Total Alkalinity as CaCO3: 80
Conductivity (umhos/cm)/ Salinity (ppt): 220 Temperature: 20 ± 1 °C
Technician: 0h DW 24h DW 48h JS 72h 96h

Toxicant Concentration g/L	Test Chamber Number	Number Surviving					Dissolved Oxygen mg/l					pH					Temperature °C				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
CONTROL	A	5	5	5			8.4	~~8.5~~	8.2			8.0	–	8.0			20	20	20		
	B	5	5	5			8.4	~~8.5~~	8.2												
1	A	5	5	5			8.4	~~8.5~~	8.2			8.1	–	8.0			20	20	20		
	B	5	5	5			8.4	–	8.3												
2	A	5	5	1			8.4	–	8.3			8.1	–	8.0			20	20	20		
	B	5	5	1			8.4	–	8.3												
2.5	A	5	4	0			8.4	–	8.3			8.0	–	8.0			20	20	20		
	B	5	4	0			8.4	–	8.3												
3	A	5	3	0			8.4	–	8.3			8.0	–	8.0			20	20	20		
	B	5	2	0			8.4	–	8.3												
4	A	5	0	–			8.4	8.5	–			8.0	7.8	–			20	20	–		
	B	5	0	–			8.4	8.5	–												

*Dilution Water Code
Recon. - reconstituted water
VS - very soft
S - soft
MH - moderately hard
H - hard
VH - very hard

48 h LC50: 1.5
95% conf. int.: 1.4 to 1.7
Statistical Method: Spearman Karber

We verify this data is true and correct.
Task Manager: Doug Winn
Project Manager: Jeffrey Short
QA Officer: [signature]
Signature

SCOEPA00028432

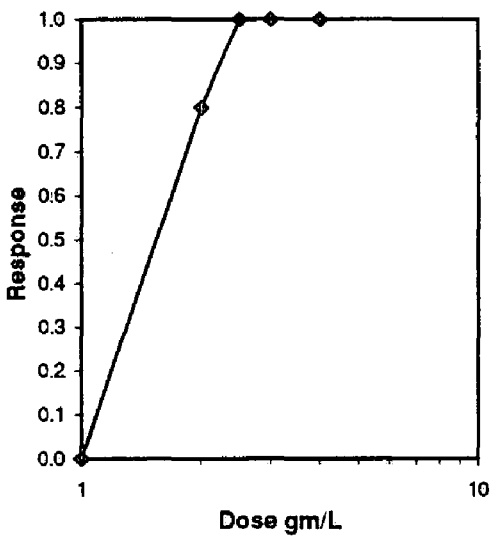
Acute Test-48 Hr Survival

Start Date:	12 Apr-95 00:00	Test ID:	Rcda468	Sample ID:	REF-Ref Toxicant
End Date:	14 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-gm/L	1	2
D-Control	1.0000	1.0000
1	1.0000	1.0000
2	0.2000	0.2000
2.5	0.0000	0.0000
3	0.0000	0.0000
4	0.0000	0.0000

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	1.5499	1.3803	1.7404
5.0%	1.5470	1.3622	1.7569
10.0%	1.5446	1.3458	1.7728
20.0%	1.5422	1.3448	1.7686
Auto-0.0%	1.5499	1.3803	1.7404



CH2M HILL

Ceriodaphnia dubia Survival and Reproduction Test Data Summary

Client: QA/QC Total Retbox Test Start Date: 3-31-05

Sample Description: NaCl Sample ID #: —

Ceriodaphnia Lot #: 462 Statistician: Dn

Percent or Concentration	Total Young Rer Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
CONTROL	27	26	28	19	13	24	24	29	26	8	10	224
0.5 %	24	20	25	25	22	27	*	26	25	21	9/9	215
1.0 %	13	18	23	23	12	19	19	20	25	21	10	193
1.5 %	19	20	13	18	11	0 m5	18	10	11	21	9	141
2.0 %	1	0 m5	0 m5	5	2	4	10	1	3	2	8	28
4.0 %	0	0	0	0	0	0	0	0	0	0	0	0

* 0.5% G adult lost. do not include in statistics 3m

CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client QA/QC (Apr 1 9 5 Test) Test Beginning: Date 3-31-95 Time 1350

Sample Description Nacl Test Ending: Date 4-6-95 Time 1345

Ceriodaphnia Lot# 962 Dilution Water MH Well ID# 910

Technician Day 1 BM Day 2 BM Day 3 JS Day 4 BM Day 5 JS Day 6 JS Day 7 [illegible]

Time Day 1 1215 Day 2 1400 Day 3 1445 Day 4 1350 Day 5 1330 Day 6 1345 Day 7 _____

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	3	4	0	0	4	5	4	5	2	10	25
	4	4	0	0	0	3	0	0	0	0	1	10	8
	5	10	8	10	7	0	9	8	10	9	7	10	78
	6	13	15	14	12	10	11	11	15	12	0	10	113
	7												
0.5 (SS)	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	4	4	4	4	5	4	3	4	4	4	10	40
	4	0	0	0	0	0	0	0	0	0	0	9	0
	5	0	8	9	10	8	9	NA	9	8	7	9	77
	6	11	8	12	11	9	14	NA	13	13	10	9	101
	7							NA					
1.0	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	1	4	4	0	3	4	2	4	4	10	26
	4	4	6	0	0	4	0	0	0	0	0	10	14
	5	9	0	7	8	8	8	6	8	9	7	10	70
	6	0	11	12	11	0	8	9	10	12	10	10	83
	7												
1.5	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	9	0
	3	4	4	3	4	1	–	0	0	0	3	9	19
	4	0	0	0	0	0	–	4	4	3	0	9	11
	5	8	8	4	7	3	–	7	6	8	7	9	53
	6	7	8	6	7	7	–	7	0	0	11	9	53
	7						–						
2.0	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	AB	0	0	0	0	0	0	0	9	0
	4	0	0 AB	–	0	0	0	0	0	0	0	8	0
	5	1	–	–	2	0	1	4	1	0	2	8	1
	6	0	–	–	3	2	3	6	0	3	0	8	17
	7		–	–									
4.0	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3												
	4												
	5												
	6												
	7												

* 0.5% @ cero dilt lost day 3 BM

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: QA/QC (April Ref. Tox) Initiated: Date 3-31-95 Time 1050 Adults Isolated Date 3-30-95 Time 0930

Sample Description: NaCl Terminated: Date 4-6-95 Time 13:45 Neonates Collected Date 3-30-95 Time 1440

Technician: Day 0 Bn Day 1 Bn Day 2 Bn Day 3 JS Day 4 Bn Day 5 JS Day 6 JS Day 7

Time: Day 0 1100 Day 1 1215 Day 2 1445 Day 3 1500 Day 4 1350 Day 5 1545 Day 6 1400 Day 7

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Control	8.1	7.8 / 7.7	7.9 / 7.7	8.0 / 7.3	7.9 / 7.9	7.9 / 8.1	8.1 / –		8.1	8.0 / 8.0	8.1 / 8.0	8.0 / 7.9	8.3 / 8.2	8.2 / 8.2	8.1 / –		241						–	
0.5	8.3	7.8 / 7.9	7.9 / 7.8	8.0 / 7.1	7.7 / 8.0	8.0 / 8.0	7.9 / –		8.0	8.1 / 8.0	8.1 / 8.0	8.0 / 7.7	8.2 / 8.0	8.1 / 8.0	8.2 / –									
1.0																								
1.5	8.3	7.8 / 7.9	7.9 / 7.9	8.0 / 7.0	7.9 / 8.0	8.1 / 7.9	8.1 / –		8.0	8.1 / 8.0	8.1 / 8.0	8.0 / 8.0	8.2 / 7.9	8.1 / 8.1	8.2 / –									
2.0		– / 7.9	7.9 / 7.9	8.0 / 7.0	7.9 / 8.0	8.1 / 7.9	8.0 / –			– / 8.0	8.0 / 8.0	8.1 / 8.0	8.2 / 7.9	8.1 / 8.1	8.2 / –									
4.0	8.3	7.9 / –							7.9	8.0 / –							6720							

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments:

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	31 Mar-95 00:00	Test ID:	rcdc462	Sample ID:	REF-Ref Toxicant
End Date:	06 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

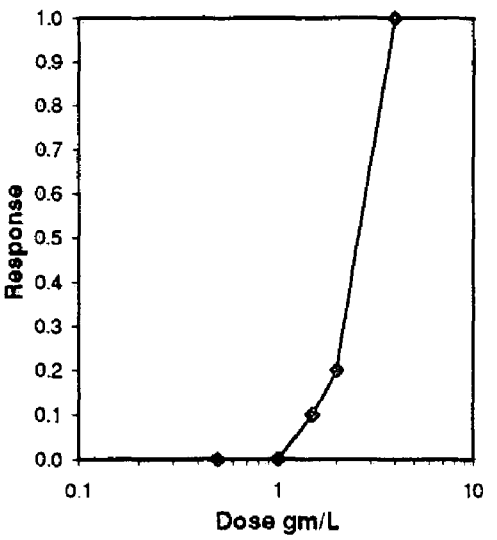
Conc-gm/L	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.5	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000
2	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-gm/L	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
D-Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
0.5	1.0000	1.0000	0	9	9	9	1.0000	0.0500	1.0000	1.0000
1	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
1.5	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9000	0.9000
2	0.8000	0.8000	2	8	10	10	0.2368	0.0500	0.8000	0.8000
4	0.0000	0.0000	10	0	10	10			0.0000	0.0000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	2	4	2.82843	

Linear Interpolation (80 Resamples)

Point	gm/L	SE	95% CL		Skew
IC05	1.2500	0.2490	1.1250	2.0025	0.8182
IC10	1.5000	0.2666	1.2500	2.1076	0.3437
IC15	1.7500	0.2556	1.3750	2.2128	0.0686
IC20	2.0000	0.2099	1.5000	2.3179	-0.2313
IC25	2.1250	0.2025	1.7500	2.4230	-0.0605
IC40	2.5000	0.2187	1.9000	2.7384	-0.8220
IC50	2.7500	0.2096	2.0000	2.9487	-1.4466



Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	31 Mar-95 00:00	Test ID:	rcdc462	Sample ID:	REF-Ref Toxicant
End Date:	06 Apr-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-gm/L	1	2	3	4	5	6	7	8	9	10
D-Control	27.000	26.000	28.000	19.000	13.000	24.000	24.000	29.000	26.000	8.000
0.5	24.000	20.000	25.000	25.000	22.000	27.000	26.000	25.000	21.000	
1	13.000	18.000	23.000	23.000	12.000	19.000	19.000	20.000	25.000	21.000
1.5	19.000	20.000	13.000	18.000	11.000	0.000	18.000	10.000	11.000	21.000
2	1.000	0.000	0.000	5.000	2.000	4.000	10.000	1.000	3.000	2.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

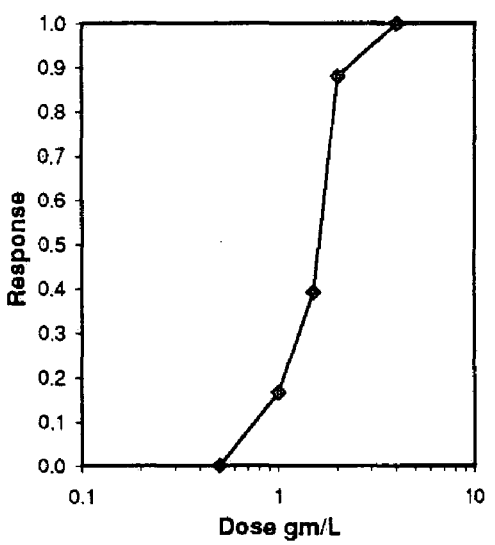
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	22.400	1.0000	22.400	8.000	29.000	31.015	10			23.144	1.0000
0.5	23.889	1.0665	23.889	20.000	27.000	9.916	9	86.50	62.00	23.144	1.0000
1	19.300	0.8616	19.300	12.000	25.000	21.716	10	81.50	75.00	19.300	0.8339
*1.5	14.100	0.6295	14.100	0.000	21.000	45.652	10	72.00	75.00	14.100	0.6092
*2	2.800	0.1250	2.800	0.000	10.000	107.539	10	56.00	75.00	2.800	0.1210
4	0.000	0.0000	0.000	0.000	0.000	0.000	10			0.000	0.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.92192	0.929	-1.0857	1.74281
Bartlett's Test indicates equal variances (p = 0.01)	12.8773	13.2767		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	1	1.5	1.22474	

Linear Interpolation (80 Resamples)

Point	gm/L	SE	95% CL		Skew
IC05	0.6505	0.1464	0.3598	1.0144	0.0848
IC10	0.8010	0.1466	0.5981	1.0839	-0.0249
IC15	0.9515	0.1374	0.7532	1.2203	-0.2554
IC20	1.0754	0.1380	0.8556	1.3989	0.1151
IC25	1.1867	0.1389	0.9792	1.5141	0.2258
IC40	1.5094	0.0899	1.2817	1.6363	-0.6343
IC50	1.6118	0.0686	1.4236	1.7107	-0.8669



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APPENDIX C
CHAIN OF CUSTODY

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Wacker Siltronic Corp.
Address: 7200 N.W. Front Avenue

Contact Person: Sandra Archer
Phone: 243-2020
CH2M HILL Project #: ASE 14431

NPDES#:
Composite Sample Information:

Samples/Hour: 0.5 Volume/Sample: 3.5 gallons
Total Hours: 24 Total Volume: 42 gallons
Initiated: Date: ~~0800~~ 20 Apr 95 Time: 0800
Ended: Date: 21 Apr 95 Time: 0800
Chilled During Collection: Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P. O.#:

Check Chlorine (Y/N):
Temp. Upon Arrival (°C): 10
Check Ammonia (Y/N): Dechlorinate (Y/N):

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste				Concentrations and/or Comments
95-24	21 Apr 95	0800	X		3	C01387-01																		Bioassay

Sampled By (Please sign and print name): Thomas J. Rothschild, Facilities Chem	Date/Time: 21 Apr 95 0800 0830	Relinquished By (Please sign and print name): Thomas J. Rothschild	Date/Time: 21 Apr 95 0835
Received By (Please sign and print name): Michael J. Sinnaway	Date/Time: 4-21-95 0835	Relinquished By (Please sign and print name):	Date/Time:
Received By (Please sign and print name): Doug Nunn (Lab)	Date/Time: 4-21-95 1300	Relinquished By (Please sign and print name):	Date/Time:
Received By (Please sign and print name):	Date/Time:	Shipped Via: UPS ___ Bus ___ Fed-Ex ___ Hand X Other ___	Shipping #:
Work Authorized By (Please sign and print name):	Remarks:		

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Wacker Siltronic
Address: 7200 N.W. Front
Portland, OR

Contact Person: Sandra Archer
Phone: 243-2020 x 4684
CH2M HILL Project #: ASE 14431

NPDES#:
Composite Sample Information:

Samples/Hour: 0.5 Volume/Sample: 3.5 gallons
Total Hours: 24 Total Volume: 42 gallons
Initiated: Date 4-23-95 Time 0800
Ended: Date 4-24-95 Time 0800
Chilled During Collection: Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P.O.#

Check Chlorine (Y/N):
Temp. Upon Arrival (°C): 7°C
Check Ammonia (Y/N): Dechlorinate (Y/N):

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste				Concentrations and/or Comments
95-25	4-24-95	~~0815~~ 0810	X		3	C01387-02				✓														Bioassay

Sampled By & Title (Please sign and print name) Dianne Mullan Dianne Mullan	Date/Time 4-24-95/0810	Relinquished By (Please sign and print name) Dianne Mullan Dianne Mullan	Date/Time 4-24-95 0820
Received By (Please sign and print name) Sandra Archer Sandra Archer	Date/Time 4/24/95 0820	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time 4/24/95 1900	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus X Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

Rev. 3/94

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Wacker Siltronic

Address 7200 N.W. Front Ave
Portland, OR

Contact Person: Sandra Archer

Phone: 243-2020 x 4684

CH2M HILL Project # ASE 14431

NPDES# _____

Composite Sample Information _____

Samples/Hour 0.5 Volume/Sample 3.5 gal

Total Hours 24 Total Volume 42 gal

Initiated: Date 4-25-95 Time 0800

Ended: Date 4-26-95 Time 0800

Chilled During Collection Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P. O.# _____

Check Chlorine (Y/N) _____

Temp. Upon Arrival (°C) 10°C

Check Ammonia (Y/N) _____ Dechlorinate (Y/N) _____

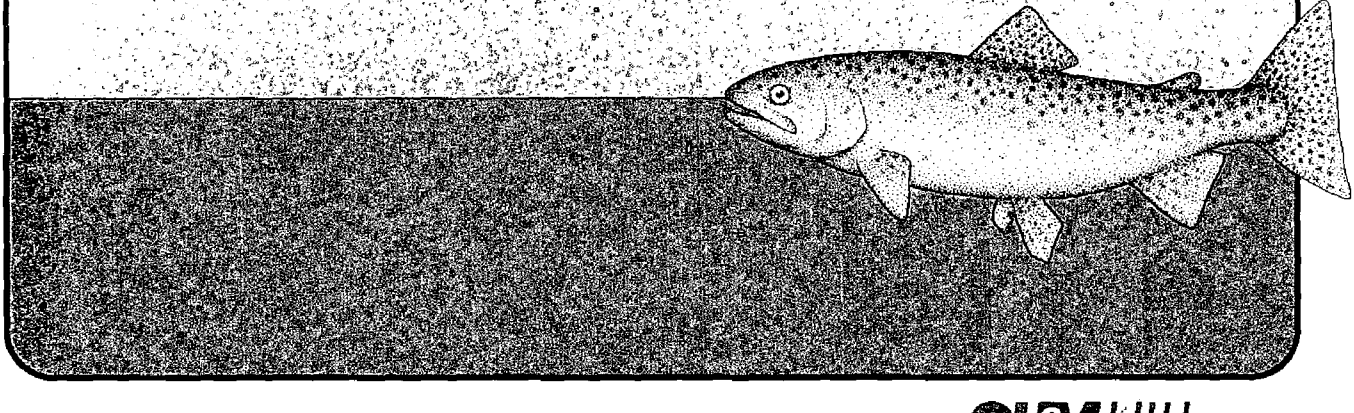
Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	Bioassay			Concentrations and/or Comments
95-26	4-26-95	0800	X		3	101387-03															X			Bioassay -

Sampled By & Title (Please sign and print name) Lab Tech Dianne Mullen Dianne Mullen	Date/Time 4-26-95/0800	Relinquished By (Please sign and print name) Lab Tech Dianne Mullen Dianne Mullen	Date/Time 4/26 95 / 0900
Received By (Please sign and print name) Sandra Archer Sandra Archer	Date/Time 4/26/95/0900	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name) Brett Mickey	Date/Time 4/26/95 1420	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus X Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks		

Biomonitoring Services

BIOASSAY REPORT
CHRONIC
DEFINITIVE BIOASSAY
Conducted May 12 through 19, 1995



CH2M HILL

BIOASSAY REPORT
CHRONIC
DEFINITIVE BIOASSAY
Conducted May 12 through 19, 1995

Prepared for

WACKER SILTRONICS
PORTLAND, OREGON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

May 23, 1995
Lab ID No. C01401

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INTRODUCTION

CH2M HILL conducted one chronic definitive test using the water flea (*Ceriodaphnia dubia*) on samples provided by Wacker Siltronics, Portland, Oregon. The test was conducted from May 12 through 19, 1995. The test was conducted as part of a Toxicity Investigation Evaluation (TIE). An extra test was set up on the initial and second samples only with a 17 percent concentration to assess whether or not the initial sample was acutely or chronically toxic.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Weber, C. et al. (1989); EPA/600/4-89/001.

TEST ORGANISMS

The *Ceriodaphnia dubia* used in the chronic test were obtained from CH2M HILL's in-house cultures and were less than 24 hours old and within an eight hour age at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (1989). All test organisms appeared vigorous and in good condition prior to testing.

DILUTION WATER

The dilution water used in the *Ceriodaphnia* tests was moderately hard well water (EPA, 1989), with a total hardness and alkalinity of 104 and 82 mg/l as $CaCO_3$, respectively, and a pH of 8.0.

TEST CONCENTRATIONS

The concentrations tested in the chronic test were 3, 10, 17, 50, and 100 percent effluent with dilution water for the control. For the *Ceriodaphnia* chronic test, 1 organism per chamber with ten chambers per concentration for a total of 10 organisms per concentration were used.

SAMPLE COLLECTION

The samples were collected by Wacker personnel on May 12, 15, and 17, 1995 and delivered to CH2M HILL's Corvallis Aquatic Toxicology Laboratory by bus. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C. The samples ID's were 95-29, 95-30, and 95-34.

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SAMPLE PREPARATION

Samples used during these tests were filtered through a 60 µm net and temperature adjusted prior to each daily renewal.

MONITORING OF BIOASSAY

For the chronic test, pre- and post-renewal solutions were monitored for dissolved oxygen and pH daily in the control, low, middle, and high concentrations. Conductivity, ammonia, alkalinity, and hardness were measured in each new sample (100 percent effluent) and in the control. *Ceriodaphnia dubia* survival and neonate production was measured daily in the chronic tests. According to EPA (1989), *Ceriodaphnia* tests should be terminated when 60 percent or more of the surviving female *Ceriodaphnia* in the controls have produced their third brood and at least 15 neonates per adult are produced. Temperature was monitored continuously throughout the testing periods.

DATA ANALYSIS

The effects measured during the *Ceriodaphnia dubia* chronic test included survival and reproduction over the 7-day exposure period. The statistical analyses performed were those outlined in *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms*, EPA/600/4-89/001, using Toxcalc version 5. Dunnett's Procedure, Bonferroni's T-Test or Fisher's Exact Test was used to compare the survival data and Dunnett's Procedure or Bonferroni's T-Test was used to compare the reproduction or growth data between the control and each effluent treatment. When the assumptions of normality or homogeneity of variance necessary for Dunnett's Procedure or T-test with Bonferroni Adjustment could not be met, Steel's Many-One Rank Test or Wilcoxon Rank Sum with Bonferroni Adjustment was used to analyze the data.

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RESULTS AND DISCUSSION

CHRONIC BIOASSAYS

Table 1 summarizes the survival and reproduction data for the *Ceriodaphnia dubia* test conducted.

Table 1
***Ceriodaphnia Dubia* Results**

Concentration (%)	Percent Survival	No. Young Per Adult
Control	100	19.0
3	100	21.0
10	90	19.1
17	100	18.8
50	100	14.0[b]
100	20[a]	0.2[b]

[a] Indicates a statistically significant reduction from control at p less than 0.05 using Fisher's Exact Test.
[b] Indicates a statistically significant reduction from control at p less than 0.05 using Steel's Many-One Rank Test.

The *Ceriodaphnia dubia* showed a statistically significant reduction in reproduction at the 50 and 100 percent effluent concentrations when compared to the control and a statistically significant reduction in survival at the 100 percent effluent concentration when compared to the control. The no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC) for survival and reproduction were 17 and 50 percent effluent, respectively. Control survival was 100 percent.

The IC_{25} values (the concentration of effluent causing a 25 percent reduction in biological measurement, e.g. growth) calculated for *Ceriodaphnia dubia* survival and reproduction were 64.1 and 43.1 percent effluent, respectively.

ACUTE DUAL-END POINT

The results of the 48-hour *Ceriodaphnia dubia* dual end-point tests resulted in no statistically significant reduction in survival at the 50 percent effluent concentration, in either the 1st or 2nd samples. The allowable acute Zone of Initial Dilution (ZID) for Wacker Siltronic is 50 percent effluent. The results indicate the effluent discharge is in compliance with the Oregon DEQ water quality criteria for toxic substances.

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REFERENCE TOXICANT TESTS

The results of monthly reference toxicant tests with sodium chloride conducted in May indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1989). The LC_{50} values, IC_{25} values, and Control Chart limits are listed in the tables below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 2
Acute Reference Toxicant Test (g/L)

Species	LC_{50}	Control chart limits
Ceriodaphnia dubia	1.9	1.4 to 2.1

Table 3
Chronic Reference Toxicant Tests with Sodium Chloride (g/L)

Species (test)	IC_{25}	Control chart limits
Ceriodaphnia dubia (survival)	1.5	1.0 to 2.6
Ceriodaphnia dubia (reproduction)	1.3	0.2 to 1.7

SCOEPA00028449

APPENDIX A
RAW DATA SHEETS

CH2M HILL TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Client: Wacker Siltronic Corp.
Address: 7200 NW Front Ave
Portland, OR 97210
Contact: Sandra Archer

Test Initiation: Date 5-12-95 Time [illegible] Test Termination: Date 5-19-95 Time 1100
Technician: Schut, Winn
Test Species/ID: Ceriodaphnia dubia / Cd 479 / / /

Sample Information

Sample ID Number	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Tested	Dechlorinated (Yes or No)	Sample ~~Salinity~~ (ppt)	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
CC1401-01	5-12-95	0800	0.02/0.02	NO	95-29	218	<10 mg
-02	5-15-95	0815	0.06/0.06	no	95-30	236	<10 mg
-03	5-17-95	0800	0.05/0.05	No	95-34	204	<10 mg
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				
			/				

Dilution Water Source	ID #	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
MH Well H_2O	935	104	82

Test Species Information

Test Species Information	ID # Cd 479	ID #	ID #	ID #
Age or Size	<24 hr. within			
Loading Rate	8 hr. of each other			
Test Container Size	30 ml			
Test Volume	15 ml.			
Feeding: Type	0.1 ml algae			
Amount	+ YCT daily			
Aeration: Began	none			
Amount	—			
Dilution Water ID #	935			
Acclimation Period	< 24 hr.			
Test Location	# 6			
Condition of Survivors				

Comments

Water Quality Meters Used/ID #

Dissolved Oxygen #1 pH #1 Temperature

Conductivity #1 Refractometer Other

SCOEPA00028451

CH2M HILL

Ceriodaphnia dubia Survival and Reproduction Test Data Summary

Client: Wacker Siltronic Test Start Date: 5-12-95

Sample Description: 95-29 Sample ID #: C01401-01

Ceriodaphnia Lot #: 479 Statistician: Schut

Percent or Concentration	Total Young Per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
Control	19	20	20	19	19	19	20	18	20	16	10	190
3	21	20	21	22	27	24	21	24	22	8	10	210
10	8	21	20	24	19	23	10	19	22	25	9	191
17	22	17	23	20	20	23	8	23	8	24	10	188
50	18	15	17	13	10	9	18	15	15	10	10	140
100	0	0	0	0	0	0	0	0	2	0	2	2

CH2M HILL CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client Wacker Siltronic Test Beginning: Date 5-12-95 Time 1500
Sample Description 95-29 Test Ending: Date 5-19-95 Time 1100
Ceriodaphnia Lot# rd 479 Dilution Water MH well ID# 935
Technician Day 1 DW Day 2 DW Day 3 DW Day 4 DW Day 5 DW Day 6 DW Day 7 JS
Time Day 1 0915 Day 2 0900 Day 3 1630 Day 4 1145 Day 5 1700 Day 6 1345 Day 7 1100

~~Percent~~ or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	4	4	4	4	4	4	4	4	5	10	41
	5	5	0	5	4	5	5	5	4	4	4	10	41
	6	0	4	0	0	0	0	0	0	0	0	10	4
	7	10	12	11	11	10	10	11	10	12	7	10	104
3	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	4	4	4	6	4	5	4	4	4	10	43
	5	7	4	3	7	0	7	0	7	8	0	10	43
	6	0	0	0	0	8	0	0	0	0	4	10	18
	7	10	12	14	11	13	13	10	13	10	0	10	106
10	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	4	4	4	4	4	5	4	4	4	10	41
	5	4 AD	4	5	7	6	4	0	4	7	0	9	41
	6	—	0	0	0	0	0	5	0	0	5	9	10
	7	—	13	11	13	9	15	0	11	11	16	9	99
17	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0 ~~2~~ DW	0	0	0	0	0	10	0
	4	4	3	4	4	4	4	4	4	4	4	10	39
	5	6	5	6	5	7	5	0	6	0	5	10	45
	6	0	0	0	0	0	0	4	0	4	0	10	8
	7	12	9	13	11	9	14	0	13	0	15	10	96
50	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	4	4	0	4	4	4	4	3	3	10	34
	5	5	5	4	4	2	0	4	~~0~~ 4	3	3	10	~~30~~ 34
	6	0	0	0	9	0	5	0	0	0	0	10	14
	7	9	6	9	0	4	0	10	7	9	4	10	58
100	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	AD	0	0	9	0
	3	0	0	0	AD	0	AD	AD	—	0	0	6	0
	4	AD	0	0	—	0	—	—	—	0	0	5	0
	5	—	AD	0	—	AD	—	—	—	0	AD	2	0
	6	—	—	0	—	—	—	—	—	0	—	2	0
	7	—	—	0	—	—	—	—	—	2	—	2	2

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	12 May-95 00:00	Test ID:	140101cdc	Sample ID:	WACKER-SILTRONICS
End Date:	19 May-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:	12 May-95 00:00	Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia

Comments:

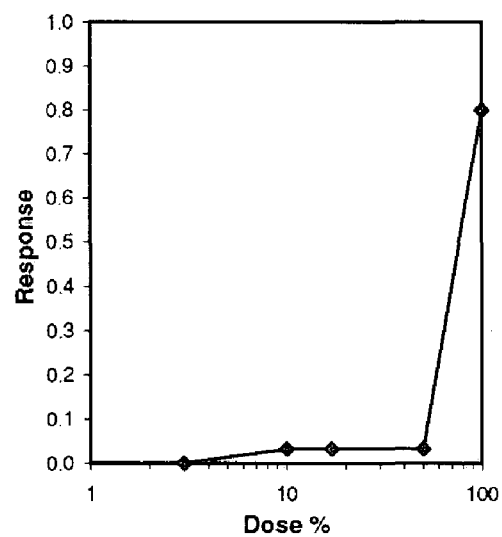
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
10	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
D-Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
3	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
10	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9667	0.9667
17	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9667	0.9667
50	1.0000	1.0000	0	10	10	10	1.0000	0.0500	0.9667	0.9667
*100	0.2000	0.2000	8	2	10	10	0.0004	0.0500	0.2000	0.2000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	50	100	70.7107	2

Linear Interpolation (80 Resamples)

Point	%	SE	95% CL		Skew
IC05	51.087	18.402	6.478	54.167	-1.4221
IC10	54.348	7.698	48.956	58.333	-5.5075
IC15	57.609	6.030	52.732	62.500	-6.6009
IC20	60.870	3.143	55.513	67.857	0.7068
IC25	64.130	3.628	58.293	73.214	1.1236
IC40	73.913				
IC50	80.435				



 ToxCalc v5.0 Reviewed by: MS

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	12 May-95 00:00	Test ID:	140101cdc	Sample ID:	WACKER-SILTRONICS
End Date:	19 May-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	EFF2-Industrial
Sample Date:	12 May-95 00:00	Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	19.000	20.000	20.000	19.000	19.000	19.000	20.000	18.000	20.000	16.000
3	21.000	20.000	21.000	22.000	27.000	24.000	21.000	24.000	22.000	8.000
10	8.000	21.000	20.000	24.000	19.000	23.000	10.000	19.000	22.000	25.000
17	22.000	17.000	23.000	20.000	20.000	23.000	8.000	23.000	8.000	24.000
50	18.000	15.000	17.000	13.000	10.000	9.000	18.000	15.000	15.000	10.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.000	0.000

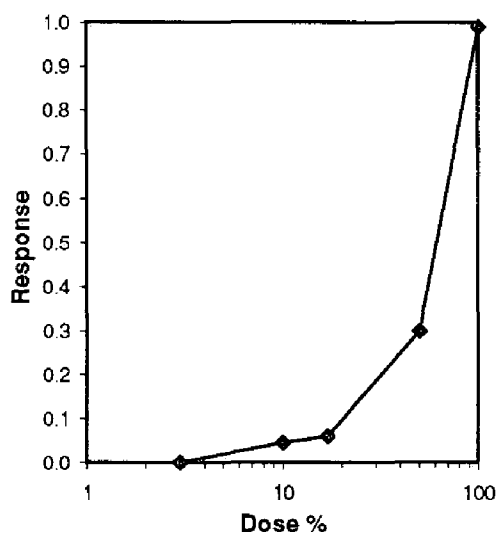
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	19.000	1.0000	19.000	16.000	20.000	6.564	10			20.000	1.0000
3	21.000	1.1053	21.000	8.000	27.000	23.862	10	143.00	75.00	20.000	1.0000
10	19.100	1.0053	19.100	8.000	25.000	29.868	10	121.00	75.00	19.100	0.9550
17	18.800	0.9895	18.800	8.000	24.000	32.190	10	122.00	75.00	18.800	0.9400
*50	14.000	0.7368	14.000	9.000	18.000	24.046	10	59.00	75.00	14.000	0.7000
*100	0.200	0.0105	0.200	0.000	2.000	316.228	10	55.00	75.00	0.200	0.0100

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	2.06847	1.035	-1.5494	2.76432
Bartlett's Test indicates unequal variances (p = 2.74E-08)	43.6386	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	17	50	29.1548	5.88235

Linear Interpolation (80 Resamples)

Point	%	SE	95% CL		Skew
IC05	12.333	6.299	4.873	24.195	0.0488
IC10	22.500	7.258	7.231	31.497	-0.1525
IC15	29.375	8.108	9.534	39.538	-0.3046
IC20	36.250	8.858	15.022	50.340	-0.3097
IC25	43.125	8.501	16.379	53.525	-0.8877
IC40	57.246	4.126	47.449	63.078	-0.6276
IC50	64.493	3.335	57.021	69.446	-0.4567



 ToxCalc v5.0 Reviewed by: MS

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Wacker Siltronic — Initiated: Date 5-12-95 Time 1640 — Adults Isolated Date 5-11-95 Time 0730

Sample Description: 95-29 — Terminated: Date 5-19-95 Time 1100 — Neonates Collected Date 5-11-95 Time 1430

Technician: Day 0 JS, Day 1 DW, Day 2 DW, Day 3 DW, Day 4 DW, Day 5 DW, Day 6 DW, Day 7 DW/JS

Time: Day 0 1600, Day 1 0930, Day 2 0920, Day 3 1645, Day 4 1330, Day 5 1700, Day 6 1430, Day 7 1530

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
									Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
control	7.8	8.1/8.0	8.0/8.0	8.1/8.0	8.1/8.4	8.0/8.4	8.2/8.4	8.6	8.0	8.2/8.0	8.1/8.0	8.1/7.9	8.2/8.0	8.1/8.2	8.2/8.0	8.0	240			260		270		
3	7.8	8.1/8.2	8.0/8.0	8.2/8.4	8.1/8.4	8.4/8.1	8.1/8.4	8.6	8.0	8.2/7.9	8.1/8.0	8.3/8.0	8.1/8.0	8.3/8.2	8.2/8.0	8.0								
10																								
17	7.8	8.0/8.2	8.0/8.2	8.2/8.2	8.2/8.4	8.3/8.3	8.0/8.4	8.8	8.0	8.1/7.8	8.0/7.8	8.2/7.8	8.1/7.8	8.2/8.0	8.1/7.9	8.0								
50																								
100	8.2	8.4/8.4	8.0/8.5	8.4/8.4	7.8/8.3	8.2/8.5	8.1/8.1	8.7	6.6	7.5/6.6	7.2/6.6	7.3/6.6	7.0/6.7	7.4/7.0	7.7/7.0	7.5	885			830		955		

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments:

CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client Wacker Siltronic Test Beginning: Date 5-12-95 Time 1500
Sample Description Initial Sample only Test Ending: Date 5-19-95 Time 1500
Ceriodaphnia Lot# Cd 479 Dilution Water MH well ID# 935
Technician Day 1 DW Day 2 DW Day 3 DW Day 4 DW Day 5 DW Day 6 DW Day 7 JS
Time Day 1 0915 Day 2 0900 Day 3 1630 Day 4 1145 Day 5 1700 Day 6 1345 Day 7 [illegible]

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
17%	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	2	0	0	0	0	0	10	2
	4	4	4	4	4	0	4	4	4	4	5	10	33
	5	6	0	0	7	6	5	6	0	6	6	10	42
	6	0	5	5	0	10	0	0	8	0	0	10	28
	7	14	16	AD	11	0	[illegible]	12	0	14	11	10	91
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	1												
	2												
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	7												

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Wacker Siltronic

Initiated: Date 5-12-95 Time 1640 Adults Isolated Date 5-11-95 Time 0730

Sample Description: Initial Sample only

Terminated: Date _____ Time _____ Neonates Collected Date 5-11-95 Time 1430

Technician: Day 0 JS, Day 1 DW, Day 2 DW, Day 3 DW, Day 4 DW, Day 5 DW, Day 6 DW, Day 7 DW/JS

Time: Day 0 ~~1430~~ 1640, Day 1 0930, Day 2 0920, Day 3 1645, Day 4 1330, Day 5 1700, Day 6 1430, Day 7 1530

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
									Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
17%	7.8	8.0/8.2	8.0/8.2	8.2/8.2	8.2/8.4	8.3/8.5	8.1/8.4	8.7	8.0	8.1/7.8	8.0/7.8	8.2/7.8	8.1/7.9	8.3/8.0	8.1/7.8	8.0								

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

CH2M HILL **CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA**

Client Wacker Siltronic Test Beginning: Date 5-15-95 Time 1600

Sample Description Second Sample Only Test Ending: Date _____ Time _____

Ceriodaphnia Lot# Cd 481 Dilution Water MH Well H_2O ID# 935

Technician Day 1 DW Day 2 DW Day 3 DW Day 4 JS Day 5 ____ Day 6 ____ Day 7 ____

Time Day 1 1130 Day 2 1500 Day 3 1345 Day 4 1100 Day 5 ____ Day 6 ____ Day 7 ____

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	5	0	4	0	0	4	3	3	3	0	10	22
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
	6												
	7												
17	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	0	4	0	0	4	4	6	0	3	0	10	21
	5												
	6												
	7												
	1												
	2												
	3												
	4												
	5												
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	1												
	2												
	3												
	4												
	5												
	6												
	7												

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Wacker Siltronic

Initiated: Date 5-15-95 Time 1600 Adults Isolated Date 5-15-95 Time 0900

Sample Description: Second Sample only

Terminated: Date _____ Time _____ Neonates Collected Date 5-15-95 Time 1530

Technician: Day 0 DW Day 1 DW Day 2 DW Day 3 DW Day 4 _____ Day 5 _____ Day 6 _____ Day 7 _____

Time: Day 0 1600 Day 1 1330 Day 2 1530 Day 3 1430 Day 4 _____ Day 5 _____ Day 6 _____ Day 7 _____

Percent or Concentration	Dissolved Oxygen (mg/l)								pH								Conductivity (µmhos/cm)							
	Day								Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Control	8.4	8.2 / 8.4	8.3 / 8.4	8.2 / 8.4					8.1	8.2 / 8.0	8.3 / 8.2	8.2 / 8.0												
17	8.4	8.2 / 8.4	8.1 / 8.4	8.1 / 8.4					7.9	8.1 / 7.8	8.2 / 8.0	8.1 / 7.8												

Percent or Concentration	Total Hardness (mg/l $CaCO_3$)								Alkalinity (mg/l $CaCO_3$)							
	Day								Day							
	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

Comments: _____

APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2M HILL

Ceriodaphnia dubia Survival and Reproduction Test Data Summary

Client May Ref. Tox Test Start Date 5-5-95

Sample Description NaCl Sample ID #

Ceriodaphnia Lot # 476 Statistician SCHJT

Percent or Concentration	Total Young Per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
control	22	21	4	20	26	25	21	21	11	17	10	188
0.5	14	22	21	22	22	20	23	3	23	27	10	197
1.0	18	19	18	15	4	24	14	19	24	19	9	174
1.5	10	16	15	22	13	0	12	12	16	9	8	125
2.0	8	0	0	0	0	0	0	8	0	0	2	16
4.0	0	0	0	0	0	0	0	0	0	0	0	0

CH2M HILL

CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client: Ref Tox - May '95 Test Beginning: Date 5-5-95 Time 1610

Sample Description: NaCl Test Ending: Date 5-12-95 Time 1415

Ceriodaphnia Lot#: 476 Dilution Water: MH well ID# 931

Technician: Day 1 JS Day 2 JS Day 3 JS Day 4 JS Day 5 JS Day 6 DW Day 7 JS

Time: Day 1 1100 Day 2 1015 Day 3 1430 Day 4 1515 Day 5 1300 Day 6 1325 Day 7 1415

Percent or Concentration	Day	Replicate A	B	C	D	E	F	G	H	I	J	No. Live Adults	Total Live Young
Control	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	3	0	4	6	6	3	3	4	4	10	37
	5	7	0	0	3 ~~37~~	0 ~~7~~	0	6	8	4	0	10	32
	6	0	6	4	0	7	7	8	0	0	5	10	29
	7	11	12	8	9	13	12	12	10	3	8	10	90
0.5 s/c	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	4	4	4	4	3	5	0	4	6	10	38
	5	3	5	0	0	7	6	6	1	1	0	10	29
	6	7	0	6	7	0	0	0	0	7	10	10	37
	7	0	13	11	11	11	11	12	2	11	11	10	93
1.0	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	3	3	4	2	4	4	2	4	4	3	10	33
	5	7	0	6	5	AD	0	4	5	0	6	35 ~~10~~ 9	33
	6	0	8	0	0	–	9	0	0	9	0	9	26
	7	8	8	8	8	–	11	8	10	11	10	9	82
1.5	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	AD	0	0	0	0	9	0
	3	0	0	0	0	0	–	0	0	0	0	9	0
	4	0	2	3	4	1	–	0	2	3	1	9	16
	5	4	5	0	0	4	–	6	0	6	0	9	25
	6	6	0	5	7	0	–	6	6	0	5	9	35
	7	AD 0	9	7	11	8	–	0	4	7	3	8	49
2.0	1	0	0	AD	AD	0	0	0	0	0	AD	7	0
	2	0	0	–	–	AD	AD	AD	0	AD	–	3	0
	3	0	AD	–	–	–	–	–	0	–	–	2	0
	4	0	–	–	–	–	–	–	0	–	–	2	0
	5	1	–	–	–	–	–	–	3	–	–	2	4
	6	0	–	–	–	–	–	–	0	–	–	2	0
	7	7	–	–	–	–	–	–	5	–	–	2	12
4.0	1	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD	0	0
	2												
	3												
	4												
	5												
	6												
	7												

AD = Adult Dead

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: Ref Tox - May 95 | Initiated Date: 5-5-95 Time: 1610 | Adults Isolated Date: 5-9-95 Time: 1615

Sample Description: | Terminated Date: 5-12-95 Time: 1415 | Neonates Collected Date: 5-9-95 Time: 2100

Technician: Day 0 BM, Day 1 JS, Day 2 JS, Day 3 JS, Day 4 JS, Day 5 DW, Day 6 DW, Day 7 JS

Time: Day 0 1615, Day 1 1130, Day 2 ~~1050~~ 0950, Day 3 1538, Day 4 1630, Day 5 1600, Day 6 1400, Day 7 1440

Percent or Concentration	Dissolved Oxygen (mg/l) 0	1	2	3	4	5	6	7	pH Day 0	1	2	3	4	5	6	7	Conductivity (µmhos/cm) Day 0	1	2	3	4	5	6	7
Control	8.0	8.0 / 8.2	8.0 / 8.0	8.1 / 8.1	8.0 / 8.5	7.8 / 7.8	7.7 / 7.7	7.6	7.8	8.2 / 8.1	8.0 / 8.0	8.2 / 8.1	8.1 / 8.1	8.3 / 8.1	8.3 / 8.0	8.1	263					280		
0.5	7.3	8.0 / 8.2	8.0 / 8.0	8.1 / 8.1	8.0 / 8.5	7.8 / 7.7	7.6 / 7.8	7.6	7.9	8.2 / 8.1	8.0 / 8.2	8.2 / 8.0	8.0 / 8.1	8.2 / 8.0	8.2 / 8.4	8.1								
1.0																								
1.5	8.0	8.0 / 8.2	8.0 / 8.0	8.1 / 8.1	8.0 / 8.4	7.8 / 7.7	7.6 / 7.6	7.7	7.9	8.1 / 8.0	8.1 / 8.0	8.2 / 7.9	8.0 / 8.1	8.1 / 7.9	8.2 / 8.0	8.1								
2.0	-	- / 8.2	8.0 / 8.0	8.1 / 8.1	8.0 / 8.4	8.0 / 7.5	7.6 / 7.5	7.7	-	- / 7.9	8.1 / 8.0	8.2 / 7.9	8.1 / 7.9	8.1 / 7.8	8.2 / 8.0	8.0						3760		
4.0	8.0	8.0 / -	8.0						7.9	7.9 / -							7050							

COMMENTS:

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	05 May-95 00:00	Test ID:	rcdc476	Sample ID:	REF-Ref Toxicant
End Date:	12 May-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:	05 May-95 00:00	Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia

Comments:

Conc-gm/L	1	2	3	4	5	6	7	8	9	10
D-Control	22.000	21.000	4.000	20.000	26.000	25.000	21.000	21.000	11.000	17.000
0.5	14.000	22.000	21.000	22.000	22.000	20.000	23.000	3.000	23.000	27.000
1	18.000	19.000	18.000	15.000	4.000	24.000	14.000	19.000	24.000	19.000
1.5	10.000	16.000	15.000	22.000	13.000	0.000	12.000	12.000	16.000	9.000
2	8.000	0.000	0.000	0.000	0.000	0.000	0.000	8.000	0.000	0.000
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

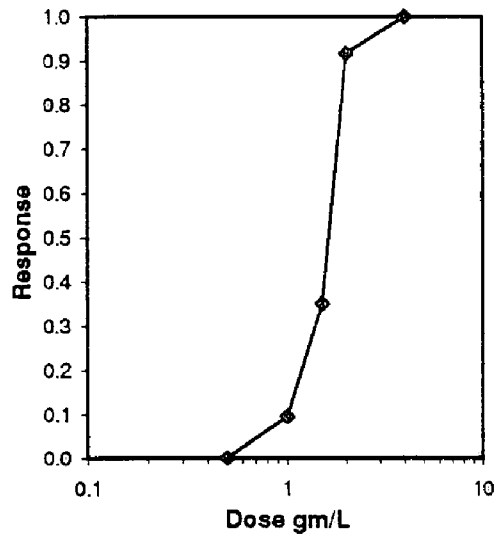
			Transform: Untransformed					Rank	1-Tailed	Isotonic	
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
D-Control	18.800	1.0000	18.8000	4.0000	26.0000	35.443	10			19.250	1.0000
0.5	19.700	1.0479	19.7000	3.0000	27.0000	34.014	10	114.50	75.00	19.250	1.0000
1	17.400	0.9255	17.4000	4.0000	24.0000	32.758	10	90.50	75.00	17.400	0.9039
1.5	12.500	0.6649	12.5000	0.0000	22.0000	45.918	10	76.50	75.00	12.500	0.6494
*2	1.600	0.0851	1.6000	0.0000	8.0000	210.819	10	57.00	75.00	1.600	0.0831
*4	0.000	0.0000	0.0000	0.0000	0.0000	0.000	10	55.00	75.00	0.000	0.0000

Auxillary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.5194	1.035	-1.3499	3.00029
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	1.5	2	1.73205	

Linear Interpolation (80 Resamples)

Point	gm/L	SE	95% CL		Skew
IC05	0.7601	0.2893	0.1921	1.1245	-0.0717
IC10	1.0077	0.2606	0.3842	1.2508	-0.3112
IC15	1.1059	0.2250	0.5963	1.5006	-0.1756
IC20	1.2041	0.1914	0.8197	1.5322	0.0062
IC25	1.3023	0.1818	0.8996	1.5637	-0.2521
IC40	1.5436	0.0950	1.2645	1.6581	-1.3585
IC50	1.6319	0.0701	1.4592	1.7210	-1.1247



Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	05 May-95 00:00	Test ID:	rcdc476	Sample ID:	REF-Ref Toxicant
End Date:	12 May-95 00:00	Lab ID:	ORCHM-Corvallis Lab	Sample Type:	NACL-Sodium chloride
Sample Date:	05 May-95 00:00	Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia

Comments:

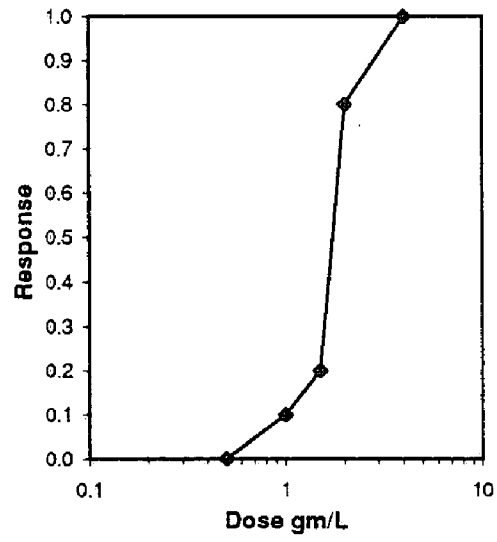
Conc-gm/L	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0.5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1.5	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000
2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	0.0000
4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Conc-gm/L	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Isotonic Mean	Isotonic N-Mean
D-Control	1.0000	1.0000	0	10	10	10			1.0000	1.0000
0.5	1.0000	1.0000	0	10	10	10	1.0000	0.0500	1.0000	1.0000
1	0.9000	0.9000	1	9	10	10	0.5000	0.0500	0.9000	0.9000
1.5	0.8000	0.8000	2	8	10	10	0.2368	0.0500	0.8000	0.8000
*2	0.2000	0.2000	8	2	10	10	0.0004	0.0500	0.2000	0.2000
*4	0.0000	0.0000	10	0	10	10	0.0000	0.0500	0.0000	0.0000

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	1.5	2	1.73205	

Linear Interpolation (80 Resamples)

Point	gm/L	SE	95% CL		Skew
IC05	0.7500	0.2845	0.6244	1.5314	1.3285
IC10	1.0000	0.3076	0.7488	1.5627	0.2521
IC15	1.2500	0.2612	0.8731	1.5941	-0.5460
IC20	1.5000	0.1879	0.9975	1.6365	-1.6334
IC25	1.5417	0.1217	1.2500	1.6786	-1.3258
IC40	1.6667	0.0777	1.5000	1.8005	-0.8314
IC50	1.7500	0.0782	1.6250	1.9114	0.5300



SCOEPA00028466

APPENDIX C
CHAIN OF CUSTODY

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Wacker Siltronic Corp.
Address: 7200 N.W. Front Avenue, Portland, Oregon 97210
Contact Person: Sandra Archer
Phone: 503-243-2020
CH2M HILL Project #: ASE-1443

NPDES#:
Composite Sample Information:
Samples/Hour: 0.5 Volume/Sample: 3.5 gal.
Total Hours: 24 Total Volume: 42 gallons
Initiated: Date 05-11-95 Time 0800
Ended: Date 5-12-95 Time 0800
Chilled During Collection: Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160
P.O.#:
Check Chlorine (Y/N): ~~N~~ Y
Temp. Upon Arrival (°C): 10
Check Ammonia (Y/N): Dechlorinate (Y/N): N

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	Bioassay			Concentrations and/or Comments
95-29	12 May 1995	0800	X		3	5043-01															X			
						5014 01-01																		

Sampled By & Title (Please sign and print name): Thomas J. Rothschild	Date/Time: 12 May 95/0800	Relinquished By (Please sign and print name): Thomas J. Rothschild	Date/Time: 12 May 95/0900
Received By (Please sign and print name): Dianne Mullan	Date/Time: 5/12/95 0900	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name): Doug Winn (LAB)	Date/Time: 5-12-95 1500	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via: UPS ___ Bus ✓ Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks: Initial pH = 6.9; Initial D.O. = 9.2 mg/L; Initial Conductivity = 870		

Rev. 2/94

SCOEPA00028468

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Wacker Siltronic Corp.
Address: 7200 N.W. Front Ave., Portland, Oregon 97210

Contact Person: Sandra Archer
Phone: 503-243-2020
CH2M HILL Project #: ASE 14431

NPDES#:
Composite Sample Information:

Samples/Hour: 0.5 Volume/Sample: 3.5 gal.
Total Hours: 24 Total Volume: 42 gallons
Initiated: Date 5-14-95 Time 0800
Ended: Date 5-15-95 Time 0815
Chilled During Collection: Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P.O.#

Check Chlorine (Y/N): Y
Temp. Upon Arrival (°C): 4°C
Check Ammonia (Y/N): Dechlorinate (Y/N): N

Analysis Required/Comments

Sample ID	Date	Time	Sample Type: Comp.	Sample Type: Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	Bioassay			Concentrations and/or Comments
95-3C	15 May 1995	0815	X		3	C01481-02															X			

Sampled By & Title (Please sign and print name) Thomas J. Rothschild, Facilities Chem.	Date/Time 15 May 95/0815	Relinquished By (Please sign and print name) Thomas J. Rothschild	Date/Time 15 May 95/0850
Received By (Please sign and print name) Dianne E Mullen	Date/Time 15 May 95/0850	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time 15 May 95/1400	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via UPS ___ Bus X Fed-Ex ___ Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks Initial Cl = 0.06, pH = 6.8, DO = 9.0, cond. = 735, see back sheet for Alkalinity and Hardness		

CH2M HILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: Wacker Silicones Corp
Address: 7200 N.W. Front Ave.
Portland, Oregon 97210

Contact Person: Sandra Archer
Phone: (503) 243 2020 x4684
CH2M HILL Project #: ASE-14431

NPDES#: _____
Composite Sample Information: _____

Samples/Hour: 0.5 Volume/Sample: 3.5 gal
Total Hours: 24 Total Volume: 42 gallons
Initiated: Date 5-16-95 Time 0800
Ended: Date 5-17-95 Time 0800
Chilled During Collection: Yes ☐ No ☒

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (503) 752-4271 Ext. 3160
Message: (503) 758-0235 Ext. 3160

P.O.# 31302

Check Chlorine (Y/N): Y
Temp. Upon Arrival (°C): 9°C
Check Ammonia (Y/N): _____ Dechlorinate (Y/N): N

Analysis Required/Comments

Sample ID	Date	Time	Sample Type Comp.	Sample Type Grab	# of Containers	Lab ID#	Fathead Acute	Fathead Chronic	Cerio Acute	Cerio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	Bioassay			Concentrations and/or Comments
95-34	5-17-95	0800	X			C01401-03															X			

Sampled By & Title (Please sign and print name)	Date/Time	Relinquished By (Please sign and print name)	Date/Time
Dianne E Mullan — Dianne E Mullan	5-17-95 0800		
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Doug Wilson (LAB)	5-17-95 1630		
Received By (Please sign and print name)	**Date/Time**	**Relinquished By (Please sign and print name)**	**Date/Time**
Received By (Please sign and print name)	**Date/Time**	**Shipped Via** UPS ___ Bus ___ Fed-Ex ___ Hand ___ Other ___	**Shipping #**
Work Authorized By (Please sign and print name)	**Remarks** Initial pH = 7.5 Initial D.O. = 8.7		

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

RECEIVED DEC 1 3 1994
SJR

December 12, 1994

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is test report No. 357-19 for a Ceriodaphnia dubia dual endpoint test. As in the previous Ceriodaphnia chronic test (No. 357-18), this test failed to meet DEQ guidelines for acute toxicity. The chronic test also yielded similar results as previously; the NOEC was <6.25% effluent, the IC25 was 1.89% effluent, and the 7-day LC50 was 15.1% effluent.

If you have any questions about these test results, please call me at (503) 265-7225.

Sincerely,

Gary A. Buhler
Project Manager

Encl.

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-19

Title: Cladoceran (*Ceriodaphnia dubia*) dual endpoint (acute/chronic) test using static exposure to Wacker Siltronic Corp. outfall effluent.

Protocol No.: NAS-XXX-CD2, August 2, 1990. Revision 1 (1-18-92). Based on U.S. EPA. 1989. Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test, pp. 105-146. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR, 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Man./Study Dir.; L.K. Garrison-Nemeth, B.A., QA Officer; G.J. Irissarri, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 10-13-94, 1:30 p.m.

Test Ending: 10-20-94, 2:00 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronics Corp. effluent; samples are 24HC. Details are as follows:

NAS Sample No.	2615E	2639E	2640E
Wacker ID	94-61	94-63	94-65
Collection Date	10-12-94	10-14-94	10-17-94
Receipt Date	10-13-94	10-15-94	10-18-94
Conductivity (µmhos/cm)	700	720	600
pH	6.8	7.3	7.4
Hardness (mg/L)	220	240	150
Alkalinity (mg/L)	40	60	40

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container in the dark until tested.

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DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 10-7-94
Water Quality: Conductivity, 260 µmhos/cm; pH, 7.6; Hardness, 110 mg/L as $CaCO_3$; Alkalinity, 70 mg/L as $CaCO_3$.
Pretreatment: Aerated ≥24 hr

TEST ORGANISMS

Species: *Ceriodaphnia dubia*, cladoceran
Age: <24-hr
Source: NAS cultures
Culture Conditions: Temperature, 24.9 ± 0.1°C; dissolved oxygen, 8.1 ± 0.1 mg/L; conductivity, 264 ± 5 µmhos/cm; pH, 7.8 ± 0.2; hardness, 103 ± 6 mg/L as $CaCO_3$; alkalinity, 77 ± 6 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 1 oz. polystyrene cups containing 15 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 10
Organisms/Treatment: 10 (1/repl)
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: 0.1 ml each of YTC and *Selenastrum* suspension daily/beaker.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) inhibition of reproduction. Mortality was defined as lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.
Water Quality and Other Test Conditions: Temperature, 25.0 ± 0.1°C; dissolved oxygen, 7.7 ± 0.5 mg/L; conductivity, 673 ± 64 µmhos/cm (100% effluent), 260 µmhos/cm (control); pH, 7.6 ± 0.2; hardness, 203 ± 47 mg/L as $CaCO_3$ (100% effluent), 110 mg/L as $CaCO_3$ (control); alkalinity, 47 ± 12 mg/L as $CaCO_3$ (100% effluent), 70 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The LC50 (survival) was calculated, where data permitted, either by the probit or the Trimmed Spearman-Karber methods (EPA 600/4-90-027). The IC25 (reproduction) was calculated using the Linear Interpolation Method with bootstrapping (EPA 600/4-89/001a). NOEC and LOEC values for survival and reproduction were computed using Fisher's Exact Test and either Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni Adjustment, respectively. The appropriate test for the latter endpoint was selected after evaluating the data for normality and homogeneity of variance. Reproduction data at certain treatment levels were excluded from the hypothesis test calculation if there was a survival effect. The statistical software employed for these calculations was ToxCalc, v. 4.0, Tidepool Scientific Software.

SCOEPA00028473

PROTOCOL DEVIATIONS

There were no protocol deviations for the main test. However, the reference toxicant test results exceeded the laboratory's control chart control limits for the reproduction endpoint. The significance of this result for the present test is considered in the next section (Reference Toxicant Test) of this report.

REFERENCE TOXICANT TEST

Test No.: 999-422
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 10-13-94
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 9.07 µg/L Cd; 7-day IC25, 4.85 µg/L Cd; NOEC, 3.0 µg/L Cd. The IC25 result exceeds the laboratory's control chart warning and control limits.

The reference toxicant test (Appendix III) run concurrent with this study yielded a reproduction IC25 value (4.85 µg/L Cd) that exceeded the laboratory's control chart upper control limit (4.29 µg/L Cd) based on all tests as of this report date. The survival LC50 for the test (9.07 µg/L Cd) was within the control chart limits. NAS's control charts and reference toxicant database for this test are shown in Appendix IV. The growth control chart clearly shows that the 7-day IC25 is grossly different than the normal response in this test and might be interpreted to mean that the organisms were much less sensitive to toxicants than normal. The survival chart, however, suggests that the organisms were normal to more sensitive than average. From general observation of the organisms in the reference test (No. 999-422) and the concurrent effluent test (No. 357-19) we do not have any reason to believe that the animals were abnormal. We have not been able to identify any specific cause of the abnormal growth response, but feel that it could represent a laboratory error. We conclude, therefore, that this spurious growth response should not disqualify the study and that the animals be provisionally accepted as normal.

TEST RESULTS

Acute Endpoint: A detailed tabulation of the acute test results is given in Table 1. There was 100% mortality of daphnids exposed to 100% effluent after 48 hours. Therefore, the effluent failed the acute test according to Oregon DEQ guidelines (DEQ Whole Effluent Toxicity Testing Guidance Manual, January 1993).

Chronic Endpoint: A detailed tabulation of the chronic test results is given in Table 2 and Table 3. The biological effects, given as the NOEC and LOEC for survival and reproduction, the LC50 for survival, and the IC25 for reproduction are shown below.

	Survival	Reproduction
NOEC (%)	6.25	<6.25
LOEC (%)	12.5	6.25
7-Day LC50/IC25 (%)	15.1	1.89
(95% conf. int.)	(10.0 - 21.7)	(1.81 - 2.00)
Method	Probit	Linear Interpolation

SCOEPA00028474

STUDY APPROVAL

Study Director	Date	Quality Assurance Unit	Date
Director, Toxicology	Date		

Table 1. Ceriodaphnia 2-day (acute) survival data.

		Effluent concentration (%)				
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	0	0	0	3	10

Table 2. Ceriodaphnia 7-day (chronic) survival data.

		Effluent concentration (%)				
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	1	5*	6*	10*	10*

*Significantly different from the control (P=0.05).

Table 3. Ceriodaphnia 7-day reproduction data (Number of young produced).

		Effluent concentration (%)				
Replicate	Control	6.25	12.5	25	50	100
1	33	9	3	1	0	0
2	30	9	6	4	0	0
3	33	7	3	0	0	0
4	29	3	1	1	0	0
5	26	3	1	2	0	0
6	28	6	2	3	0	0
7	35	3	5	4	0	0
8	35	2	4	2	0	0
9	33	9	2	2	0	0
10	27	2	7	0	0	0
Mean	30.9	5.3*	3.4*	1.9*	0.0*	0.0*

*Significantly less than the control (P=0.05).

SCOEPA00028476

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

CLADOCERAN (*CERIODAPHNIA DUBIA*) SURVIVAL AND REPRODUCTION TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the cladoceran, *Ceriodaphnia dubia* (EPA Method 1002.0).

1.2 Summary of Method: Neonate (<24-hr-old) *Ceriodaphnia dubia*, are exposed for seven days (or until 60% of surviving control organisms have three broods of young) to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 30 ml borosilicate glass or plastic beakers, each containing 15 ml of test solution. Ten replicate beakers, each with one neonate, are employed at each test concentration. Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Qual. Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

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2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 30 ml borosilicate glass or plastic beakers holding 15 ml of test solution. Temperature and photoperiod control of test chambers is provided by incubation in an environmental chamber or water bath.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS

6.1 Species: Cladoceran, *Ceriodaphnia dubia*

6.2 Source: *Ceriodaphnia* neonates are supplied from the NAS laboratory culture. The original culture was obtained from the EPA Environmental Research Laboratory, Corvallis, OR.

6.3 Age at Study Initiation: <24-hr-old neonates; and all released within an 8-hr period.

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6.4 Pretest Culture and Handling: Individual cultures are used as the immediate source of neonates for toxicity testing. Source cultures are handled in a similar manner as test organisms for at least seven days and the neonates are then used to initiate tests. Source cultures are transferred to new medium and fed at least three times a week (e.g. Mon, Wed, Fri). Records of the source cultures are kept and if mortality exceeds 20% or if less than 15 young are produced per week, the cultures are not used as a source of neonates for testing.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of neonates to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days or until 60% of the surviving control animals produce three broods. Each treatment consists of ten replicate test containers each containing one cladoceran. A stratified random design is used for beaker placement.

7.2 Effect Criteria: The effect criteria are: 1) mortality, and 2) inhibition of reproduction. Mortality is defined as the lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.

7.3 Test Conditions: The test temperature employed is 25 ± 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. The test solution is replaced once daily.

7.4 Beginning of Test: The test solutions are added to the test beakers and food is added. The test is then begun by adding one neonate to each test container.

7.5 Feeding: The organisms are fed when the test is initiated, and daily thereafter. Food is added to the fresh medium immediately before or immediatedly after the adults are transferred. Each feeding consists of 0.1 ml YTC per 15 ml test solution and 0.1 ml *Selanastrum* concentrate per 15 ml test solution.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days (or until 60% of surviving control organisms have three broods of young). The type and frequency of observations to be made during the test are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival (of adult)	Daily before transfer
Reproduction (young produced)	Daily after adult transfer
Physical and Chemical Data	
Temperature (two locations in environmental control system)	Daily

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Dissolved oxygen, pH (High, medium, & low concentrations & control)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control & each new effluent sample)	e.g. Days 1, 3, & 5

During the test, dead adult organisms are removed every 24 hours and the young are discarded daily after counting. Dissolved oxygen is measured in each stock test solution using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured in each stock test solution using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using test kits.

7.7 Criteria of Test Acceptance: The test results are acceptable if: 1) survival in the controls is at least 80% and reproduction in the controls averages 15 or more young per surviving female. At least 60% of surviving females in controls should have produced their third brood.

8. DATA ANALYSIS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests (e.g. Dunnett's Test, Fisher's Exact Test, or Steel's Many-one Rank Test).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

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11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. Environmental Protection Agency. 1989. Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test. Method 1002.0. *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

U.S. Environmental Protection Agency. 1989. Supplement to "Short-term methods for estimating the chronic toxicity of effluents and surface waters to freshwater organisms". Revision 1. EPA/600/4-89/001a.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028482

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 357-19 Investigator Revised pp 1-15 GAB 12-12-94

STUDY MANAGEMENT

Client: WACKER Siltronics Corp, 7200 NW Front Ave, Portland, OR 97210

Client's Study Monitor: Mr. Thomas Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.A. Buhler

QA Officer L.K. Garrison-Nemeth

1. G.J. IRISSARRI 2.

3. 4.

Study Schedule:

Test Beginning: 10-13-94 1:30 P Test Ending: 10-20-94 2:00 P

TEST MATERIAL

Description: Outfall- 24-hr Comp (WACKER # 94-61) 94-63, 94-65

NAS Sample No.:	2615E	2639E	2640E	
Date of Collection:	10-12-94	10-14-94	10-17-94	
Date of Receipt:	10-13-94	10-15-94	10-18-94	
Conductivity (µmhos/cm):	700	720	600	673 ± 67
pH:	6.8	7.3	7.4	
Hardness (mg/L):	220	240	150	203 ± 47
Alkalinity (mg/L):	40	60	40	47 ± 12
:				

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)

Date of Preparation: 10-7-94

Water Quality: Conductivity (µmhos/cm) 260 pH 7.6

Hardness (mg/L) 110 Alkalinity (mg/L) 70

Treatments: Aerated 24-hr., AERATED > 24 HRS.

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran

Age: (<24-hr; all released within 8 hr) < 24 HR.

Source: (NAS cultures) NAS CULTURES

Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (100%, 50%, 25%, 12.5%, 6.25%, 0%) 100, 50, 25, 12.5, 6.25, 0%

Test chambers: (30 ml beakers) 30mL Plastic cups

Test volume: (15 ml) 15mL

Replicates/treatment: (10) 10

Organisms/treatment: (10) 10 (1/repl)

Test water changes: Daily

Aeration during test: None

Feeding: 0.1 ml each of YTC and algal suspension daily

Beaker placement: Stratified randomization

8/1/90

SCOEPA00028484

COVER DATA SHEET (CONTINUED)

Test No. 357-79 Investigator

RANDOMIZATION CHART

12.5	6.25	25	∅	12.5	100	12.5	6.25	50	12.5
6.25	25	50	100	∅	6.25	25	50	100	∅
∅	∅	12.5	6.25	50	12.5	100	12.5	25	6.25
50	12.5	100	50	100	∅	6.25	25	∅	25
100	50	6.25	12.5	25	25	50	∅	6.25	50
25	100	∅	25	6.25	50	∅	100	12.5	100

MISCELLANEOUS NOTES

50% DILUTION

TEST CONCENTRATION (%)	VOLUME OF EFFLUENT (mL)	VOL DILUTION WATER (mL)
100	150	0
50	75	75
25	37.5	112.5
12.5	18.75	131.25
6.25	9.4	140.6
∅	∅	150

8/1/90

SCOEPA00028485

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 35779 Investigator

DAY 0 (10/13/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		7.2		6.8
Med. (25)		7.3		6.9
Low (6.25)		7.9		7.2
Control		8.0		7.3

Temp #1 (°C): 24.8
Temp #2 (°C): 25.0

Notes:

DAY 1 (10/14/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	7.4	7.4	7.3
Med. (25)	7.1	7.9	7.7	7.5
Low (6.25)	7.0	8.0	7.8	7.5
Control	7.2	8.0	7.8	7.6

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 2 (10/15/94) GJS

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	8.6	7.5	7.3
Med. (25)	7.3	8.5	7.7	7.4
Low (6.25)	8.0	8.4	7.8	7.6
Control	8.0	8.4	7.7	7.6

Temp #1 (°C): 24.7
Temp #2 (°C): 24.9

Notes:

DAY 3 (10/16/94) GJS

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.5	8.4	7.8	7.6
Low (6.25)	7.6	8.4	7.7	7.7
Control	7.6	8.4	7.7	7.7

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

8/1/90

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-19 Investigator

DAY 4 (10/17/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.4	8.0	7.7	7.8
Low (6.25)	7.4	8.1	7.8	7.8
Control	7.3	8.1	7.8	7.7

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 5 (10/18/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.3	8.0	7.6	7.7
Low (6.25)	7.3	8.0	7.8	7.7
Control	7.2	8.0	7.7	7.6

Temp #1 (°C): 24.9
Temp #2 (°C): 25.2

Notes:

DAY 6 (10/19/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.2	7.9	7.8	7.7
Low (6.25)	7.3	8.0	7.8	7.8
Control	7.1	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 7 (10/20/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.2		7.6	
Low (6.25)	7.2		7.8	
Control	7.1		7.6	

Temp #1 (°C): 25.0
Temp #2 (°C): 25.2

Notes:

WQ $\bar{X}$	7.7	7.6	25.0
SD	0.5	0.2	0.1
(N)	(47)	(47)	(16)

8/1/90

SCOEPA00028487

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-19 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	6	6	7	6	5	6	7	7	6	6			
Ø	5	11	8	12	7	8	8	12	11	12	6			
	6	16	16	14	4	13	0	0	0	1	0			
	7	0	0	0	12	0	14	16	14	14	15			
	8													
%	Total	33	30	33	29	26	28	35	33	33	27		10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	1	3	1	0	2	0	1	2	2	0			
6.25	5	6	4	4	2	1	4	1	0	4	0			
	6	0	0	0	0	X0	0	0	0	0	2			
	7	2	2	2	1	↓	2	1	0	3	0			
	8					↓								
%	Total	9	9	7	3	x3	6	3	2	9	2		9	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	1	0	0	1	3	2	0	1			
12.5	5	3	3	0	X1	1	1	2	0	X2	0			
	6	0	0	2	↓	0	0	X0	X2	↓	3			
	7	X0	3	0	↓	0	0	↓	↓	↓	3			
	8	↓			↓			↓	↓	↓				
%	Total	x3	6	3	x1	1	2	x5	x4	x2	7		5	

8/1/90

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CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-19 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
25 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	1	0	0	2	0	2	2	0	0			
	5	0	3	0	0	0	3	X 2	X 0	2	0			
	6	0	0	0	0	0	X 0			X 0	0			
	7	1	0	0	1	X 0					X 0			
	8													
	Total	1	4	0	1	x2	x3	x4	x2	x2	0		4	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
50 %	1	0	0	0	0	0	0	0	0	0	0			
	2	X 0	0	0	X 0	X 0	0	0	0	0	0			
	3		X 0	0			0	0	0	0	0			
	4			0			X 0	X 0	X 0	X 0	X 0			
	5			X 0										
	6													
	7													
	8													
	Total	0	0	0	0	0	0	0	0	0	0		0	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
100 %	1	X 0	X 0	X 0	X 0	0	0	X 0	X 0	X 0	0			
	2					X 0	X 0				X 0			
	3													
	4													
	5													
	6													
	7													
	8													
	Total	0	0	0	0	0	0	0	0	0	0		0	

8/1/90

DAY 0 10-7-94 GJI

Basso Board

pH 8.0	DO 8.1 mg/L
COND 270 umhos	HARD 100 ~~88~~ GJI mg/L
TEMP 24.9 °C	ALK 80 mg/L

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Temp 24.9 ± 0.1
DO 8.1 ± 0.1
pH 7.8 ± 0.2
Cond 264 ± 5
Hard 103 ± 6
Alk 77 ± 6

DAY 1 10-8-94

pH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD 110 mg/L
TEMP 24.9 °C	ALK 70 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 1 10-8-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 2 10-9-94

pH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 24.8 °C	ALK — mg/L

DAY 2 10-9-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0		0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 3 10-10-94

pH 7.7	DO 8.1 mg/L
COND 265 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 3 10-10-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	2	0	0	1	1	2	3	1	2			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	2	0	0	2	2	2	2	0	0			
	4	0	0	2	2	1	0	2	1	0	0			
	5	0	1	2	0	1	0	0	3	2	2			
	6	2	2	0	1	0	1	0	3	2	1			
	7	0	0	0	2	2	3	2	3	0	2			
	8	2	0	2	0	3	2	0	3	2	2			
	Total													

SCOEPA00028490

DAY 4 10-11-94 6JZ Brood Board

pH 8.0	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

DAY 4 10-11-94 6JZ

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	2	0	X	0	0	0	0			
	2	2	2	2	4	0	0	1	4	1	1			
	3	2	0	0	0	X	0	0	0	0	2			
	4	0	0	0	0	0	2	0	0	0	1			
	5	4	0	0	4	0	X	0	0	0	0			
	6	0	0	2	0	0	3	4	0	0	1			
	7	1	0	0	0	0	0	0	0	4	0			
	8	1	2	0	0	0	0	1	0	0	0			
	Total													

DAY 5 10-12-94 6JZ

pH 7.8	DO 8.2 mg/L
COND 270 umhos	HARD 100 mg/L
TEMP 25.0 °C	ALK 80 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3													
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY 5 10-12-94

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	3	1	1	0	4	X	2	3	2	2			
	2	5	6	2	5	3	2	4	8	4	0			
	3	0	2	0	1	X	4	0	6	2	5			
	4	3	2	2	1	2	0	3	5	7	2			
	5	6	1	7	1	6	X	4	2	0	1			
	6	5	3	1	5	3	0	7	2	1	3			
	7	1	0	4	5	0	3	6	2	7	6			
	8	6	2	1	2	4	2	9	2	3	1			
	Total						8							

DAY 6

pH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3					X								
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY

pH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

SCOEPA00028491

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	357-19	Sample ID:	NAS # 2615E,2639E,2640E
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 89	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	RSC	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Survival

Conc-%	Alive	Dead	Total	Fisher P
N Control	10	0	10	
6.25	9	1	10	0.5000
12.5	5	5	10	0.0163
25	4	6	10	0.0054
50	0	10	10	0.0000
100	0	10	10	0.0000

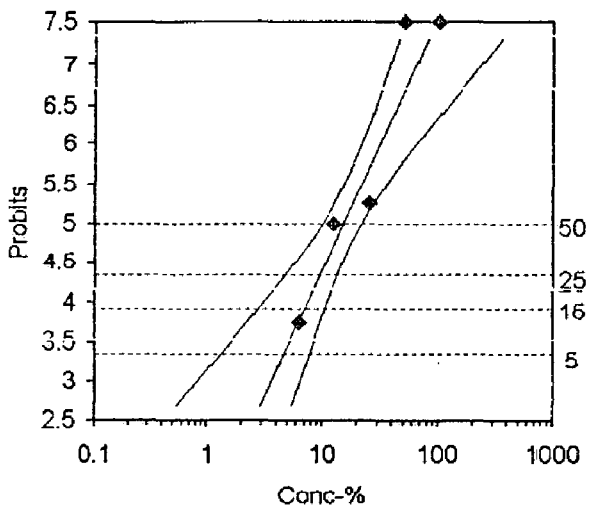
Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	6.25	12.5	8.8388	16

Maximum Likelihood-Probit Transform

Parameter	Estimate	SE	95% Fiducial Limits	
Slope	3.1993	0.7797	1.6712	4.7275
Intercept	1.2257	0.9804	-0.696	3.1471
TSCR	0	0.3018	-0.591	0.5915

Point	Probits	%	95% Fiducial Limits	
EC1	2.674	2.84	0.53	5.35
EC5	3.355	4.63	1.32	7.63
EC10	3.718	6.01	2.14	9.29
EC15	3.964	7.17	2.94	10.66
EC25	4.326	9.31	4.65	13.24
EC40	4.747	12.61	7.65	17.65
EC50	5.000	15.13	10.01	21.65
EC60	5.253	18.15	12.68	27.41
EC75	5.674	24.68	17.56	43.40
EC85	6.036	31.89	22.19	67.45
EC90	6.282	38.05	25.64	92.19
EC95	6.645	49.42	31.41	148.19
EC99	7.326	80.70	45.05	368.29

Control Resp	Chi-Sq	Critical	Mu	Sigma	Iter
0.000	2.365	11.345	1.180	0.3126	5



SCOEPA00028492

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	357-19	Sample ID:	NAS # 2615E,2639E,2640E
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 91	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	RSC	Test Species:	CD-Ceriodaphnia dubia
Comments:				Response:	Reproduction

Conc-%	1	2	3	4	5	6	7	8	9	10
N Control	33.00	30.00	33.00	29.00	26.00	28.00	35.00	35.00	33.00	27.00
6.25	9.00	9.00	7.00	3.00	3.00	6.00	3.00	2.00	9.00	2.00
12.5	3.00	6.00	3.00	1.00	1.00	2.00	5.00	4.00	2.00	7.00
25	1.00	4.00	0.00	1.00	2.00	3.00	4.00	2.00	2.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

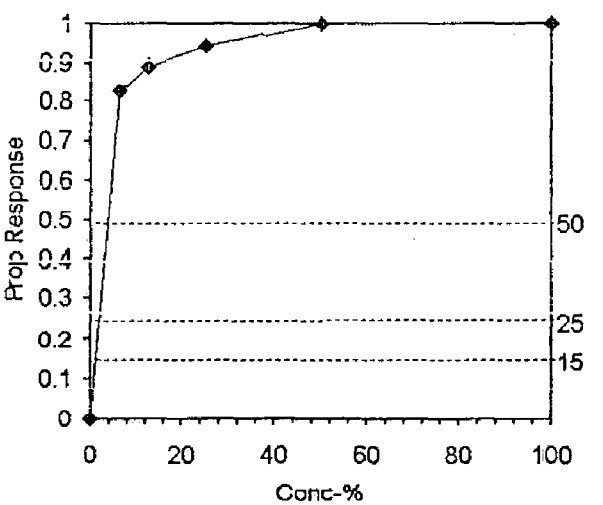
			Untransformed Data					t				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Stat	Critical	MSD	NRESP	NDOSE
N Control	30.90	1.000	30.90	26.00	35.00	10.73	10					
6.25	5.30	0.172	5.30	2.00	9.00	56.99	10	*22.249	2.137	2.458		
12.5	3.40	0.110	3.40	1.00	7.00	60.75	10	*23.900	2.137	2.458		
25	1.90	0.061	1.90	0.00	4.00	76.27	10	*25.204	2.137	2.458		
50	0.00	0.000										
100	0.00	0.000										

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.949	0.919	0.0813	-1.026
Bartlett's Test indicates equality of variance (p = 0.0883)	6.535	11.345		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	F	Critical	df
Dunnett's Multiple Comparison	<6.25	6.25			2.5588	1891.7	6.6194	285.78	2.8663	3, 36

		Prop Response	
Conc-%	Iso	N-Mean	N-Iso
N Control	30.90		
6.25	5.30	0.8285	0.8285
12.5	3.40	0.8900	0.8900
25	1.90	0.9385	0.9385
50	0.00	1.0000	1.0000
100	0.00	1.0000	1.0000

Linear Interpolation(ICp) with 80 bootstrap resamples



Point	Estimate	SD	95% CL		Skew
IC1*	0.0754	0.0022	0.0725	0.0801	0.252
IC5*	0.3772	0.0109	0.3626	0.4006	0.252
IC10*	0.7544	0.0218	0.7253	0.8013	0.252
IC15*	1.1316	0.0327	1.0879	1.2019	0.252
IC25*	1.8860	0.0545	1.8132	2.0032	0.252
IC40*	3.0176	0.0872	2.9011	3.2051	0.252
IC50*	3.7720	0.1090	3.6264	4.0064	0.252

SCOEPA00028493

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 357-19 RTest ID: 999-422 Analyst(s): RSC

Sample ID: NAS # 2615E,2639E,2640E Sample Type: EFF2 Industrial

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number Survived	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	1	1	N Control	1.000	33								1	
	2	2	N Control	1.000	30								1	
	3	3	N Control	1.000	33								1	
	4	4	N Control	1.000	29								1	
	5	5	N Control	1.000	26								1	
	6	6	N Control	1.000	28								1	
	7	7	N Control	1.000	35								1	
	8	8	N Control	1.000	35								1	
	9	9	N Control	1.000	33								1	
	10	10	N Control	1.000	27								1	
	11	1	6.250	1.000	9								1	
	12	2	6.250	1.000	9								1	
	13	3	6.250	1.000	7								1	
	14	4	6.250	1.000	3								1	
	15	5	6.250	0.000	3								0	
	16	6	6.250	1.000	5								1	
	17	7	6.250	1.000	3								1	
	18	8	6.250	1.000	2								1	
	19	9	6.250	1.000	9								1	
	20	10	6.250	1.000	2								1	
	21	1	12.500	0.000	3								0	
	22	2	12.500	1.000	6								1	
	23	3	12.500	1.000	3								1	
	24	4	12.500	0.000	1								0	
	25	5	12.500	1.000	1								1	
	26	6	12.500	1.000	2								1	
	27	7	12.500	0.000	5								0	
	28	8	12.500	0.000	4								0	
	29	9	12.500	0.000	2								0	
	30	10	12.500	1.000	7								1	
	31	1	25.000	1.000	1								1	
	32	2	25.000	1.000	4								1	
	33	3	25.000	1.000	0								1	
	34	4	25.000	1.000	1								1	
	35	5	25.000	0.000	2								0	
	36	6	25.000	0.000	3								0	
	37	7	25.000	0.000	4								0	
	38	8	25.000	0.000	2								0	
	39	9	25.000	0.000	2								0	
	40	10	25.000	0.000	0								0	
	41	1	50.000	0.000	0								0	
	42	2	50.000	0.000	0								0	
	43	3	50.000	0.000	0								0	
	44	4	50.000	0.000	0								0	
	45	5	50.000	0.000	0								0	
	46	6	50.000	0.000	0								0	
	47	7	50.000	0.000	0								0	
	48	8	50.000	0.000	0								0	
	49	9	50.000	0.000	0								0	
	50	10	50.000	0.000	0								0	
	51	1	100.000	0.000	0								0	

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 357-19 RTest ID: 999-422 Analyst(s): RSC

Sample ID: NAS # 2615E,2639E,2640E Sample Type: EFF2 Industrial

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number Survived	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	52	2	100.000	0.000	0								0	
	53	3	100.000	0.000	0								0	
	54	4	100.000	0.000	0								0	
	55	5	100.000	0.000	0								0	
	56	6	100.000	0.000	0								0	
	57	7	100.000	0.000	0								0	
	58	8	100.000	0.000	0								0	
	59	9	100.000	0.000	0								0	
	60	10	100.000	0.000	0								0	

CHAIN OF CUSTODY RECORD

Log Number _____

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Avenue	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Ceriodaphnia							Hazardous sample Special handling required	Remarks
	12 Oct 94	0800	AQ	Outfall 24-hour Composite (Wacker #94-61)	1	X								NASH 2615E
														TEMPERED: 12-0°C

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	12Oct94	0900
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	[illegible]	Gary A. Bubik	NAS	10/13/94	0103C

NORTHWESTERN AQUATIC SCIENCES

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

-13-

SCOEPA00028496

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Avenue	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required ✓

Lab Sample number	Date sampled ✓	Time sampled ✓	Type* See key below ✓	Sampled by ✓ Thomas J. Rothschild / Sample description ✓	Number of containers ✓	Ceriodaphnia							Hazardous sample Special handling required	Remarks ✓
94-63	14 Oct 94	0800	AQ	Outfall, 24-hour composite	1	X								NAS 2639E
														TEMP ON Rec'd 9.3°C

	Signature ✓	Print Name ✓	Company ✓	Date ✓	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	14 Oct 94	0830
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	[illegible]	Gary A. [illegible]	NAS	10/15/94	9:58 A

NORTHWESTERN AQUATIC SCIENCES

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.

SCOEPA00028497

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO# P357
Address: 7200 N.W. Front Avenue	Phone # 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required ✓

Lab Sample number	Date sampled ✓	Time sampled ✓	Type* See key below ✓	Sampled by ✓ / Sample description ✓	Number of containers ✓	Ceriodaphnia							Hazardous sample Special handling required	Remarks ✓
94-65	17 Oct 94	0830	AQ	Outfall, 24-hour composite	1	X								Cool, 4°C
														NAS 2640E
														TEMP UPON RECEIPT: 8.1

	Signature ✓	Print Name ✓	Company ✓	Date ✓	Time ✓
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation		
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Buhler	Gary A Buhler	NAS	10-18-94	1030 AM

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1427, N... (503) ...

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

SCOEPA00028498

APPENDIX III

REFERENCE TOXICANT TEST

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 999-422 Investigator Reviewed AP1-12 GAB 12-12-94

STUDY MANAGEMENT

Client: QC TEST
Client's Study Monitor: NA
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. G.A. Buhler
QA Officer L.K. Garrison-Nemeth
1. G.J. IRISSARRI, GJI 2.
3. 4.
Study Schedule:
Test Beginning: 10-13-94 130P Test Ending: 10-20-94 200P

TEST MATERIAL

Description: Cadmium - $CdCl_2 \cdot 2\frac{1}{2} H_2O$ Mallinkrodt, Lot # TVZ 1mg/ml stock prepd 5-25-94
NAS Sample No.:
Date of Collection:
Date of Receipt:
Conductivity (µmhos/cm):
pH:
Hardness (mg/L):
Alkalinity (mg/L):
:

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)
Date of Preparation: 10-7-94
Water Quality: Conductivity (µmhos/cm) 260 pH 7.6
Hardness (mg/L) 110 Alkalinity (mg/L) 70
Treatments: Aerated 24-hr., AERATED > 24 HRS

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran
Age: (<24-hr; all released within 8 hr) < 24 HRS
Source: (NAS cultures) NAS CULTURES
Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (~~100%, 50%, 25%, 12.5%, 6.25%, 0%~~) 100, 30, 10, 3, 1 µg/L
Test chambers: (30 ml beakers) 30 mL Plastic cups
Test volume: (15 ml) 15 mL
Replicates/treatment: (10) 10
Organisms/treatment: (10) 10 (1/rep)
Test water changes: Daily
Aeration during test: None
Feeding: 0.1 ml each of YTC and algal suspension daily
Beaker placement: Stratified randomization

SCOEPA00028500

COVER DATA SHEET (CONTINUED)

Test No. 999-422 Investigator

RANDOMIZATION CHART

Ø	10	1	3	100	3	1	30	Ø	100
30	Ø	10	100	3	30	100	3	1	Ø
3	3	Ø	30	1	100	10	100	10	1
1	100	30	1	Ø	10	3	1	100	3
10	30	100	Ø	30	1	Ø	10	3	30
100	1	3	10	10	Ø	30	Ø	30	10

MISCELLANEOUS NOTES

CADMIUM AS $CdCl_2$

WORKING STOCK (W.S) MADE BY:

1.) 1:99 (1mL & 100mL) DILUTION OF CONCENTRATED 1mg/mL STOCK (FINAL CONCENTRATION 10mg/mL)

2.) 10:90 (10mL & 100mL) DILUTION OF #1 (10mg/mL); FINAL CONCENTRATION 1mg/mL

TEST CONCENTRATION mg/L	VOL W.S. (1mg/mL) (mL)	VOL DILUTION WATER (mL)
100	15	135
30	4.5	145.5
10	1.5	148.5
3	0.45	149.6
1	0.15	149.85
Ø	Ø	Ø

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 999-422 Investigator

DAY 0 (10/13/94) GJI

Conc. ug/L (~~mg/L~~)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		8.2		7.7
Med. (10)		8.2		7.7
Low (1)		8.3		7.6
Control		8.2		7.5

Temp #1 (°C): 24.8
Temp #2 (°C): 25.0

Notes:

DAY 1 (10/14/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	8.0	7.9	7.5
Med. (10)	7.2	8.0	7.9	7.5
Low (1)	7.2	8.1	7.9	7.6
Control	7.2	8.0	7.9	7.6

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 2 (10/15/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	8.2	8.4	7.7	7.6
Med. (10)	8.0	8.4	7.7	7.6
Low (1)	8.0	8.4	7.7	7.6
Control	8.1	8.4	7.8	7.6

Temp #1 (°C): 24.7
Temp #2 (°C): 24.9

Notes:

DAY 3 (10/16/94)

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.8	8.4	7.8	7.7
Med. (10)	7.6	8.4	7.8	7.7
Low (1)	7.6	8.4	7.8	7.7
Control	7.6	8.4	7.8	7.7

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

SCOEPA00028502

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 999-422 Investigator

DAY 4 (10/17/94) GJI

Conc. ug/L (%) GJI	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.3	8.1	7.9	7.9
Low (1)	7.3	8.1	7.9	7.9
Control	7.4	8.1	7.9	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 5 (10/18/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.3	8.0	7.8	7.9
Low (1)	7.3	7.9	7.8	7.9
Control	7.2	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.1

Notes:

DAY 6 (10/19/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.1	8.0	7.9	7.9
Low (1)	7.2	8.0	7.8	7.8
Control	7.1	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 7 (10/20/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.2		7.9	
Low (1)	7.3		7.9	
Control	7.2		7.9	

Temp #1 (°C): 25.0
Temp #2 (°C): 25.2

Notes:

WQ			
$\bar{X}$	7.8	7.8	25.0
SD	0.5	0.1	0.1
(N)	(49)	(49)	(16)

8/1/90

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 999-422 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	6	5	7	7	5	6	4	2	4	6			
Ø	5	6	7	8	12	11	8	3	8	15	12			
	6	0	0	0	0	0	0	0	0	0	0			
	7	14	10	14	16	16	0	13	10	15	15			
	8													
mg/L	Total	26	22	31	35	32	14	20	20	34	33		10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	2	7	5	5	5	5	4	3	4	6			
1.0	5	11	12	12	11	11	10	9	6	12	12			
	6	0	X0	0	0	1	0	0	0	0	8			
	7	14	↓	13	10	10	16	9	14	6	0			
	8													
mg/L	Total	27	X9	~~19~~ 30	26	27	31	22	23	22	26		9	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	5	6	6	7	6	4	4	3	6	5			
3.0	5	11	12	9	10	10	5	7	9	10	12			
	6	0	0	1	0	0	0	0	0	0	0			
	7	10	11	12	15	15	12	10	8	0	0			
	8													
mg/L	Total	26	29	28	32	31	21	21	20	16	17		10	

8/1/90

SCOEPA00028504

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 999-422 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	5	4	6	X4	5	3	4	2	4	4			
10	5	6	X0	8		6	X0	7	X0	8	8			
	6	0		0		0		0		0	0			
	7	3		0		0		0		0	0			
	8													
ug/L	Total	14	4	14	4	11	3	11	2	12	12		6	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	X0	X0	0	0	0	0	X0	X0	0	0			
	4			X0	0	2	2			2	X0			
30	5				0	X0	0			X0				
	6				X0		4							
	7						X0							
ug/L	8													
	Total	0	0	0	0	2	6	0	0	2	0		0	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	X0	0	X0	X0	0	0	X0	0	0	X0			
	3		X0			X0	X0		X0	X0				
	4													
100	5													
	6													
	7													
	8													
ug/L	Total	0	0	0	0	0	0	0	0	0	0		0	

DAY 0 10-7-94 GJI

Baood Board

PH 8.0	DO 8.1 mg/L
COND 270 umhos	HARD 100 ~~88~~ GJI mg/L
TEMP 24.9 °C	ALK 80 mg/L

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Temp 24.9 ± 0.
DO 8.1 ± 0.1
pH 7.8 ± 0.2
Cond 264 ± ~~49~~ 5
Hard 103 ± 6
Alk 77 ± 6

DAY 1 10-8-94

PH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD 110 mg/L
TEMP 24.9 °C	ALK 70 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 1 10-8-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 2 10-9-94

PH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 24.8 °C	ALK — mg/L

DAY 2 10-9-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0		0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 3 10-10-94

PH 7.7	DO 8.1 mg/L
COND 265 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 3 10-10-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	2	0	0	1	1	2	3	1	2			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	2	0	0	2	2	2	2	0	0			
	4	0	0	2	2	1	0	2	1	0	0			
	5	0	1	2	0	1	0	0	3	2	2			
	6	2	2	0	1	0	1	0	3	2	1			
	7	0	0	0	2	2	3	2	3	0	2			
	8	2	0	2	0	3	2	0	3	2	2			
	Total													

DAY 4 10-11-94 6:57 Basso Board

PH 8.0	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

DAY 4 10-11-94 6:57

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	2	0	X	0	0	0	0			
	2	2	2	2	4	0	0	1	4	1	1			
	3	2	0	0	0	X	0	0	0	0	2			
	4	0	0	0	0	0	2	0	0	0	1			
	5	4	0	0	4	0	X	0	0	0	0			
	6	0	0	2	0	0	3	4	0	0	1			
	7	1	0	0	0	0	0	0	0	4	0			
	8	1	2	0	0	0	0	1	0	0	0			
	Total													

DAY 5 10-12-94 6:13

PH 7.8	DO 8.2 mg/L
COND 270 umhos	HARD 100 mg/L
TEMP 25.0 °C	ALK 80 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3													
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY 5 10-12-94

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	3	1	1	0	4	X	2	3	2	2			
	2	5	6	2	5	3	2	4	8	4	0			
	3	0	2	0	1	X	4	0	6	2	5			
	4	3	2	2	1	2	0	3	5	3	2			
	5	4	1	7	1	6	X	4	2	0	1			
	6	5	3	1	5	3	0	7	2	1	3			
	7	1	0	4	5	0	3	6	2	7	6			
	8	6	2	1	2	4	2	9	2	3	1			
	Total						8							

DAY 6

PH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3					X								
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY

PH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

SCOEPA00028507

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	999-422	Sample ID:	
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 89	Sample Type:	CDCL Cadmium chloride
Sample Date:		Analyst Name:	RSC	Test Species:	~~CD Ceriodaphnia~~ dubia
Comments:				Response:	Survival

Conc-µg/L	Alive	Dead	Total	Fisher P
N Control	10	0	10	
1	9	1	10	0.5000
3	10	0	10	1.0000
10	6	4	10	0.0433
30	0	10	10	0.0000
100	0	10	10	0.0000

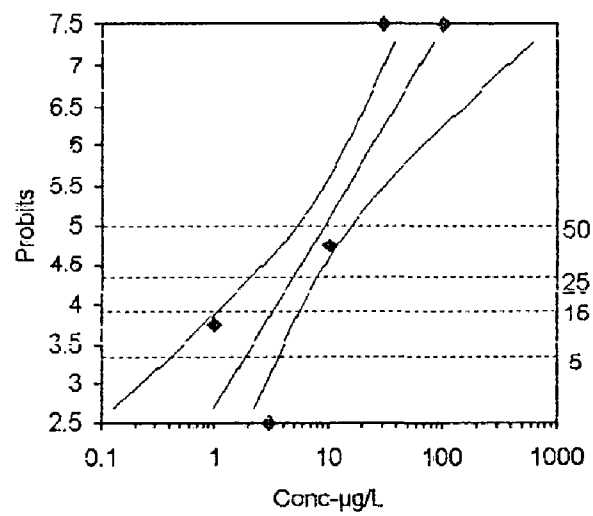
Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	3	10	5.4772	

Maximum Likelihood-Probit Transform

Parameter	Estimate	SE	95% Fiducial Limits	
Slope	2.3981	0.563	1.2945	3.5016
Intercept	2.7035	0.6015	1.5245	3.8825
TSCR	0	0.0455	-0.089	0.0892

Point	Probits	µg/L	95% Fiducial Limits	
EC1	2.674	0.97	0.13	2.20
EC5	3.355	1.87	0.41	3.59
EC10	3.718	2.65	0.76	4.71
EC15	3.964	3.35	1.14	5.71
EC25	4.326	4.75	2.03	7.75
EC40	4.747	7.11	3.76	11.68
EC50	5.000	9.07	5.23	15.57
EC60	5.253	11.57	7.01	21.53
EC75	5.674	17.33	10.64	39.61
EC85	6.036	24.54	14.49	70.21
EC90	6.282	31.05	17.60	105.04
EC95	6.645	44.01	23.15	193.55
EC99	7.326	84.67	37.73	624.70

Control Resp	Chi-Sq	Critical	Mu	Sigma	Iter
0.000	10.829	11.345	0.958	0.417	5



ToxCalc v4.0/047

SCOEPA00028508

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	999-422	Sample ID:	
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 91	Sample Type:	CDCL Cadmium chloride
Sample Date:		Analyst Name:	RSC	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Reproduction

Conc-µg/L	1	2	3	4	5	6	7	8	9	10
N Control	26.00	22.00	31.00	35.00	32.00	14.00	20.00	20.00	34.00	33.00
1	27.00	19.00	30.00	26.00	27.00	31.00	22.00	23.00	22.00	26.00
3	26.00	29.00	28.00	32.00	31.00	21.00	21.00	20.00	16.00	17.00
10	14.00	4.00	14.00	4.00	11.00	3.00	11.00	2.00	12.00	12.00
30	0.00	0.00	0.00	0.00	2.00	6.00	0.00	0.00	2.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

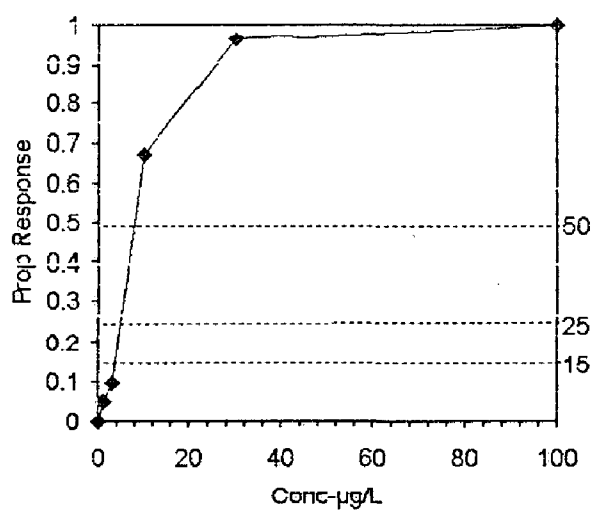
			Untransformed Data					Rank				
Conc-µg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	MSD	NRESP	NDOSE
N Control	26.70	1.000	26.70	14.00	35.00	27.41	10					
1	25.30	0.948	25.30	19.00	31.00	14.91	10	96.5	76.0			
3	24.10	0.903	24.10	16.00	32.00	24.15	10	91.5	76.0			
10	8.70	0.326	8.70	2.00	14.00	55.54	10	*56.0	76.0			
30	1.00	0.037	1.00	0.00	6.00	194.37	10	*55.0	76.0			
100	0.00	0.000										

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.968	0.930	-0.285	-0.511
Bartlett's test indicates unequal variances (p = 0.0078)	13.833	13.277		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	3	10	5.4772	

		Prop Response	
Conc-µg/L	Iso	N-Mean	N-Iso
N Control	26.70		
1	25.30	0.0524	0.0524
3	24.10	0.0974	0.0974
10	8.70	0.6742	0.6742
30	1.00	0.9625	0.9625
100	0.00	1.0000	1.0000

Linear Interpolation(ICp) with 80 bootstrap resamples



Point	Estimate	SD	95% CL		Skew
IC1*	0.1907	1.0754	0.0650	3.1196	1.316
IC5*	0.9536	1.1893	0.3250	3.5981	0.422
IC10	3.0318	1.2293	0.6500	4.1961	-0.153
IC15	3.6366	1.0897	0.9750	4.7942	-0.726
IC25	4.8523	0.8234	2.9919	5.9903	-0.470
IC40	6.6727	0.6734	5.3734	7.8733	-0.349
IC50	7.8864	0.6329	6.7892	9.0916	-0.037

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 999-422 RTest ID: Analyst(s): RSC

Sample ID: Sample Type: CDCL Cadmium chloride

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number of Young	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	1	1	N Control	26.000	26								1	
	2	2	N Control	22.000	22								1	
	3	3	N Control	31.000	31								1	
	4	4	N Control	35.000	35								1	
	5	5	N Control	32.000	32								1	
	6	6	N Control	14.000	14								1	
	7	7	N Control	20.000	20								1	
	8	8	N Control	20.000	20								1	
	9	9	N Control	34.000	34								1	
	10	10	N Control	33.000	33								1	
	11	1	1.000	27.000	27								1	
	12	2	1.000	19.000	19								0	
	13	3	1.000	30.000	30								1	
	14	4	1.000	26.000	26								1	
	15	5	1.000	27.000	27								1	
	16	6	1.000	31.000	31								1	
	17	7	1.000	22.000	22								1	
	18	8	1.000	23.000	23								1	
	19	9	1.000	22.000	22								1	
	20	10	1.000	26.000	26								1	
	21	1	3.000	26.000	26								1	
	22	2	3.000	29.000	29								1	
	23	3	3.000	28.000	28								1	
	24	4	3.000	32.000	32								1	
	25	5	3.000	31.000	31								1	
	26	6	3.000	21.000	21								1	
	27	7	3.000	21.000	21								1	
	28	8	3.000	20.000	20								1	
	29	9	3.000	16.000	16								1	
	30	10	3.000	17.000	17								1	
	31	1	10.000	14.000	14								1	
	32	2	10.000	4.000	4								0	
	33	3	10.000	14.000	14								1	
	34	4	10.000	4.000	4								0	
	35	5	10.000	11.000	11								1	
	36	6	10.000	3.000	3								0	
	37	7	10.000	11.000	11								1	
	38	8	10.000	2.000	2								0	
	39	9	10.000	12.000	12								1	
	40	10	10.000	12.000	12								1	
	41	1	30.000	0.000	0								0	
	42	2	30.000	0.000	0								0	
	43	3	30.000	0.000	0								0	
	44	4	30.000	0.000	0								0	
	45	5	30.000	2.000	2								0	
	46	6	30.000	6.000	6								0	
	47	7	30.000	0.000	0								0	
	48	8	30.000	0.000	0								0	
	49	9	30.000	2.000	2								0	
	50	10	30.000	0.000	0								0	
	51	1	100.000	0.000	0								0	

ToxCalc v4.0

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 999-422 RTest ID: Analyst(s): RSC

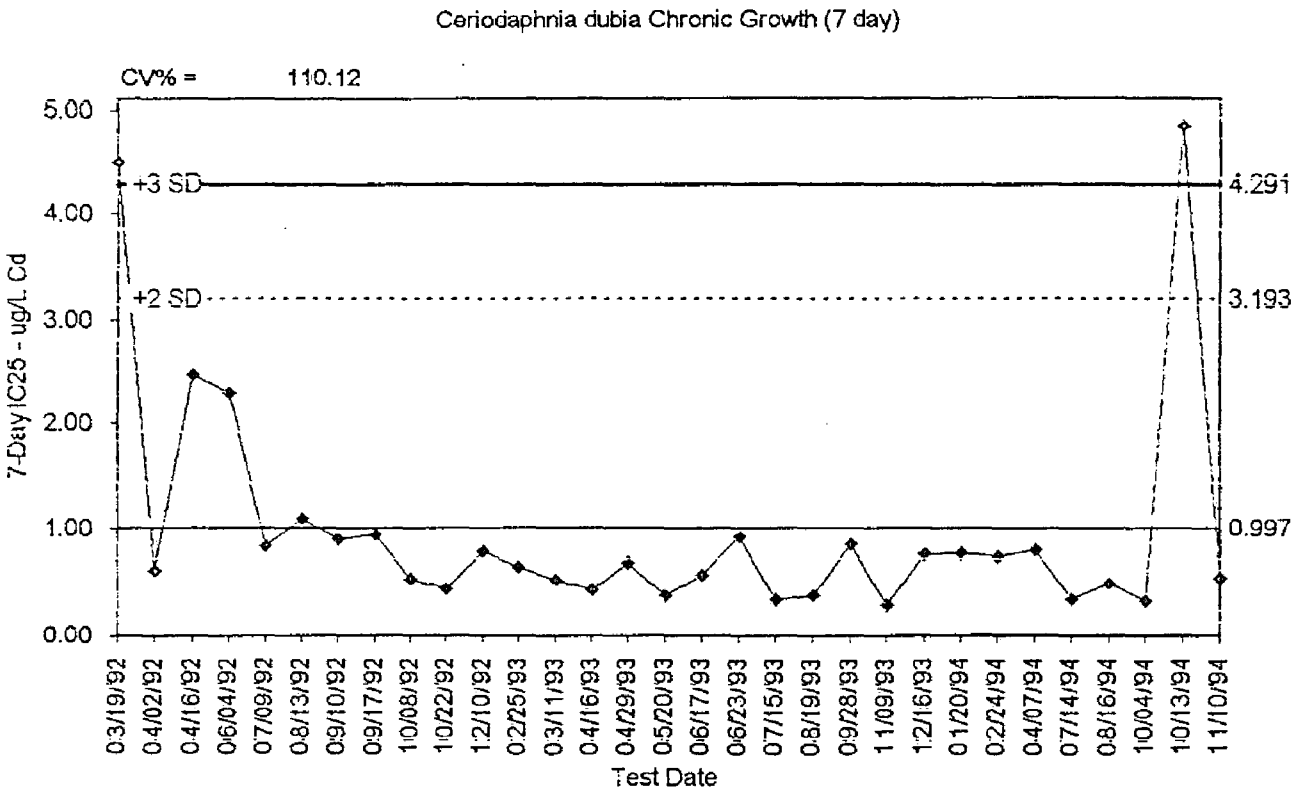
Sample ID: Sample Type: CDCL Cadmium chloride

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number of Young	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	52	2	100.000	0.000	0								0	
	53	3	100.000	0.000	0								0	
	54	4	100.000	0.000	0								0	
	55	5	100.000	0.000	0								0	
	56	6	100.000	0.000	0								0	
	57	7	100.000	0.000	0								0	
	58	8	100.000	0.000	0								0	
	59	9	100.000	0.000	0								0	
	60	10	100.000	0.000	0								0	

APPENDIX IV

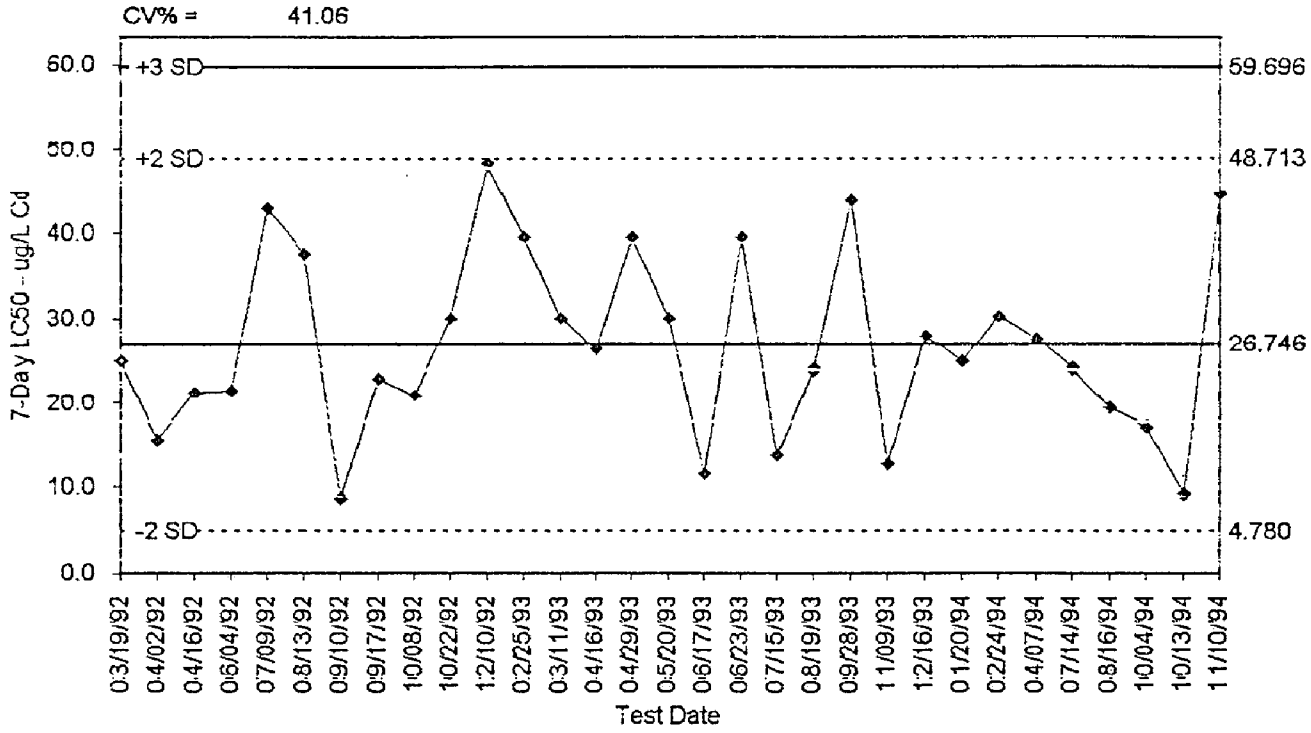
REFERENCE TOXICANT CONTROL CHARTS



12/10/94
RS

ToxCalc v4.0

Ceriodaphnia dubia Chronic Survival (7 day)



12/1/94
BS

ToxCalc v4.0

Ceriodaphnia dubia - 7 day chronic			
Date	LC50	IC25	Test No.
3/19/92	24.7	4.49	999-111
4/2/92	15.7	0.61	999-116
4/16/92	21.2	2.5	999-123
6/4/92	21.5	2.3	999-131
7/9/92	43	0.83	999-144
8/13/92	37.6	1.09	999-153
9/10/92	8.67	0.9	999-166
9/17/92	22.8	0.94	999-168
10/8/92	20.9	0.53	999-175
10/22/92	30	0.43	999-181
12/10/92	48.2	0.78	999-204
2/25/93	39.5	0.64	999-224
3/11/93	30	0.52	999-236
4/16/93	26.1	0.42	999-243
4/29/93	39.5	0.68	999-248
5/20/93	30	0.36	999-258
6/17/93	11.5	0.57	999-265
6/23/93	39.5	0.92	999-271
7/15/93	13.8	0.32	999-274
8/19/93	23.8	0.37	999-286
9/28/93	43.8	0.85	999-295
11/9/93	12.8	0.27	999-304
12/16/93	27.9	0.78	999-310
1/20/94	24.7	0.77	999-323
2/24/94	30.2	0.74	999-340
4/7/94	27.5	0.8	999-351
7/14/94	24	0.33	999-385
8/16/94	19.3	0.49	999-393
10/4/94	17.3	0.31	999-417
10/13/94	9.07	4.85	999-422
11/10/94	44.6	0.54	999-428

12/10/94

Engineers
Planners
Economists
Scientists

Gary T. Hickman, Ph.D.
Hazardous Waste and
Industrial Process Engineering

CH2M HILL
P.O. Box 428, Corvallis, 97339-0428
2300 N.W. Walnut Boulevard
Corvallis, Oregon 97330-3538

503.752.4271
For Direct Access:
503.758.0235 Extension: 3521
503.752.0276 (FAX)

Engineers Planners Economists Scientists

November 8, 1994

Mr. Chip Bloomer
Wacker Siltronics
P.O. Box 83180
Portland, OR 97283-0180

Dear Mr. Bloomer:

Subject: Toxicity Identification Evaluation

Attached is a scope of work and cost estimate to conduct a Toxicity Identification Evaluation (TIE) for Wacker Siltronics. In general, we developed a project scope which is based on the EPA's Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures, EPA-600/6-91/003, February 1991.

We recommend that before undertaking the TIE, a thorough process review be performed. In doing so, the TIE can be targeted towards the most likely cause of toxicity, thereby saving time and cost.

Our proposed scope of work includes three tasks with an option for a fourth.

- Task 1: Review Existing Chemical and Bioassay Information
  Review results of previous bioassay test
  Review results of any chemical analysis (ie. pH, metals, NH_3, biocides, antifoams, etc.)
- Task 2: Initial Wastewater Characterization
- Task 3: Phase I Toxicity Identification
- Task 4: Phase II Toxicity Identification (optional)

We propose an incremental approach to this TIE. As information is gained, we use it to focus the scope of the TIE discovery process. Along the way, we will keep you informed on our progress and costs. The prices for Tasks 1, 2, and 3 have been broken out. The costs associated with Task 3 could likely be less than indicated, depending on the outcome of the wastewater characterization performed under Task 2. Some of these alternatives may not be required.

If you have any questions please feel free to call me at 503-752-4271. I would be pleased to meet with you to discuss the proposal at your convenience.

Sincerely,

CH2M HILL
Michael J. Stanaway
Bioassay Laboratory Manager

gba\proposal\wlk-ltr.tie

SCOPE OF WORK

TOXICITY IDENTIFICATION EVALUATION FOR WACKER SILTRONICS PORTLAND, OREGON

BACKGROUND

Toxicity testing of the Wacker Siltronics wastewater performed according to EPA/DEQ protocol, indicated acute and chronic toxicity to fathead minnow (*Pimephales promelas* and *Ceriodaphnia dubia*). The chemical agent causing toxicity is unknown at this time. To date, a few chemical tests (e.g., pH, ammonia, metals) have been performed on the effluent. However, this chemical testing has proven insufficient to judge the nature of this toxicity. A brief review of chemicals used at the Wacker Siltronics plant needs to be performed before a TIE is started to see if an obvious agent is causing toxicity. At this time, in-plant process stream toxicity measurements have not been performed.

Effluent toxicity can result from accumulation of persistent chemical agents such as defoamers, biocides, polymers, or metals. Toxicity can also be a function of the native concentration of a chemical or combination of chemicals (pH, NH_3, chlorides, sulfides, etc.) in the effluent. To conclusively establish the nature and character of toxicity, a more extensive chemical characterization and, if necessary, a toxicity identification evaluation is recommended. Figure 1 schematically presents our proposed approach to identify the cause of toxicity in Wacker's waste water.

A mixing zone analysis was performed by CH2M HILL and the Zone of Initial Dilution at 5 feet for acute toxicity is 2:1 (33% effluent) and the edge of the mixing zone for chronic toxicity at 50 feet is 5:1 (17% effluent).

TASK 1. REVIEW EXISTING CHEMICAL AND BIOASSAY INFORMATION

Acquisition of available bioassay and chemical data and facility-specific information. This defines the regulatory objective, defines the target for successful completion, and can provide insights regarding the sources and/or causes of the toxicity, which can be used to better design the TIE testing strategy.

Bioassay test results, chemical inventory, and chemical data over the last year will be evaluated and reviewed. An in-house audit of the chemicals, etc. used during the time of the last toxicity test may prove helpful in finding the culprit of the toxicity. The toxicity may be intermittent or cyclic to a specific process. This is the first step towards identifying potential

toxic agent in the effluent. We assume a process engineer form Wacker would be available to provide chemical data and usage for the plant process.

TASK 2. INITIAL WASTEWATER CHARACTERIZATION

If the outcome of the Task 1 chemical information review warrants further testing, then we propose to perform a more complete chemical characterization to augment the historical data. The following list of chemical parameters, in the order shown, and for the reasons indicated, will guide the formal toxicity identification evaluation process. These analyses should be performed on a composite effluent sample.

Parameter	Rationale
pH	pH levels above 9.0 and below 6.0 can cause acute/chronic toxicity. pH may also accentuate the toxicity of ammonia, sulfides, and metals.
Ammonia	Ammonia at low levels can be toxic to aquatic life.
Salinity	A cause of toxicity to freshwater organisms is toxicity from chloride, sodium, and osmotic effects.
Nitrites	Low levels of nitrites may be toxic to freshwater organisms
Metals	Toxicity associated with the accumulation of cationic metal effluent is common. The use of Alum and other technical grade chemicals in water treatment may add trace metals which contribute to toxicity.

Data obtained from the above chemical analyses will be compared with literature values for acute/chronic toxicity in aquatic organisms. In doing so, we will be narrowing down the candidate list of common toxic agents in the effluent. This chemical characterization also provides a basis for developing a streamlined approach for the TIE process described in the following tasks.

TASK 3. PHASE I---TOXICITY IDENTIFICATION EVALUATION

Initial Toxicity Evaluations

If the initial chemical characterization of the effluent does not readily identify a toxicant and the baseline toxicity tests continue to indicate acute/chronic toxicity, then a Phase I TIE is recommended. This Phase I TIE will include a series of fractionation tests that are designed to identify the type(s) or class of toxicants present. EPA's *"Method for Aquatic Toxicity Identification Evaluation Phase I Toxicity Characterization Procedure"* will be followed.

The types of toxicants that are causing toxicity would be identified by treating the sample with a variety of techniques that selectively remove certain classes of toxicants. The types of treatment that would be employed and the general classes of toxicants they would remove include:

Sample Treatment	Class of Toxicant
Xeolite	NH_3
Granular activated carbon (GAC)	non-polar organic chemicals (e.g., hydrocarbons oil and grease biocides)
Silica gel	polar organic chemicals (e.g., acids, alcohols ketones, surfactants)
Cation exchange	cationic metals
Aeration	volatile or oxidizable constituents
Filtration	the effects of solids or oil and grease

Figure 1 represents the Phase I fractionation scheme that will be followed. The results of the fractionation testing provide a generic measure of the class of toxicant(s). This data will be used to determine what steps, if any, should be taken next in the TIE process. The results and conclusions from the Phase I TIE will be presented in a technical memorandum to Wacker Siltronics and recommendations for follow on work, if required, will be provided.

TASK 4. PHASE II--TOXICITY IDENTIFICATION EVALUATION

Based on the results of the first phase of toxicity testing, there are several courses of action that might be appropriate. If the results are inconclusive, such as, if the class of toxicant(s) cannot be conclusively identified, other treatments, with subsequent testing, may be warranted. At this time, we are not able to describe with certainty the scope of work required to complete a definitive TIE. However, information gained during Phase I will provide the valuable insights to developing a focused effort for a Phase II TIE process.

If the results of Phase I provide a "weight of evidence" indication as to the class of toxicant, a Phase II TIE is undertaken to more conclusively identify specific toxic agents. Again, at this juncture, it is difficult to prescribe a scope of testing for this outcome.

Depending on the results of the chemical characterization and Phase I TIE, it may be more desirable to move towards evaluating toxicity reduction as opposed to further study towards identification of a specific toxicant. The best course of action will be driven by the information gained and the alternatives that meet your needs. At the completion of each task, we will provide recommendations, a revised scope of work, and cost information for Wacker Siltronics to review and approve or modify.

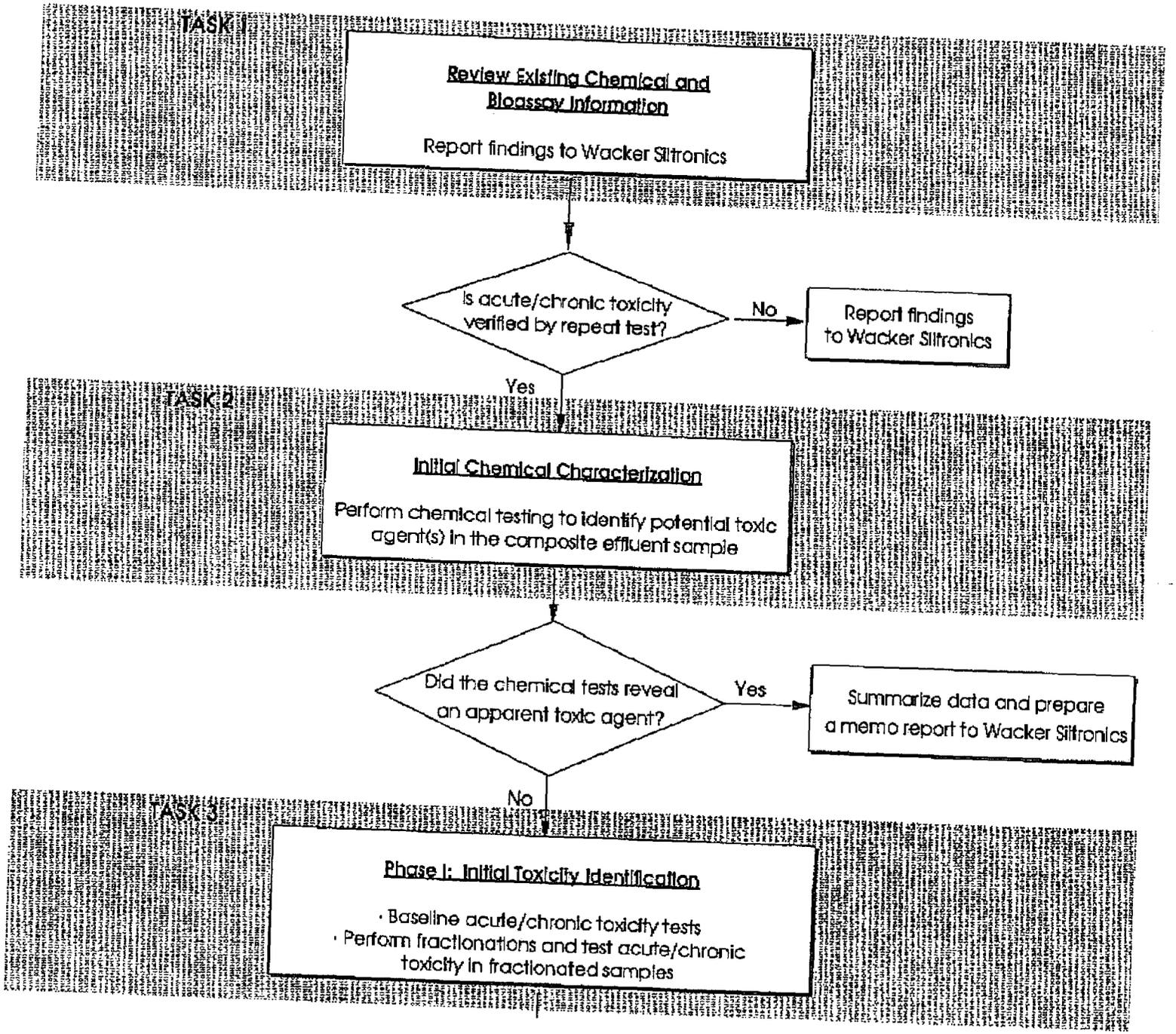
SCOEPA00028519

COSTS

Task 1: Review Existing Chemical and Bioassay Information	**$2000**
Task 2: Initial Chemical Characterization	**$350**
Task 3: Phase I Toxicity Identification	**allocation is $10,000**

SCHEDULE

After authorization, we will begin Task 1 the week of November 28, 1994.



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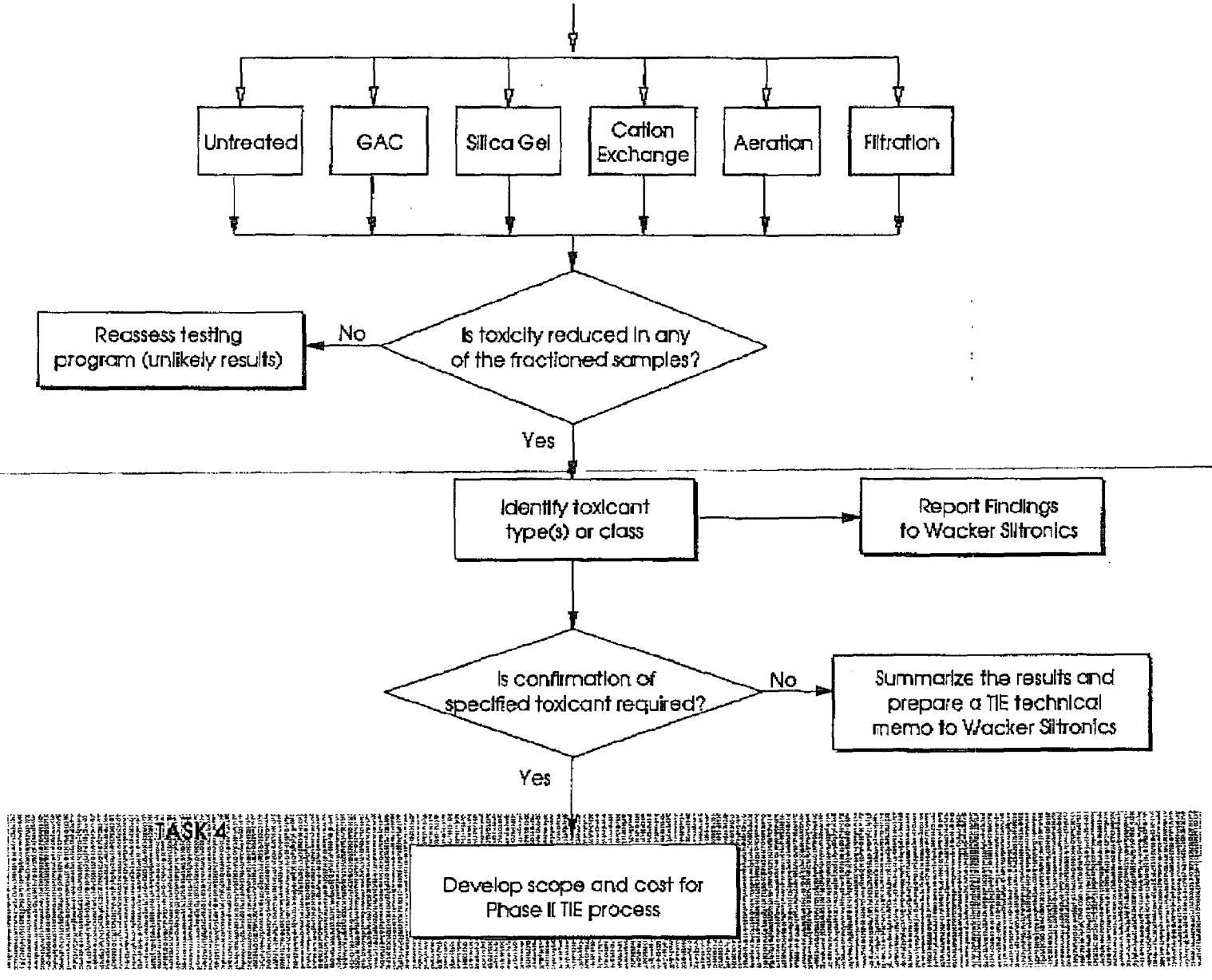

Figure 1
Toxicity Identification Scheme
Wacker Siltronics Wastewater: OPExxxxx.xx

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RECEIVED NOV 1 5 1994

Columbia Aquatic Sciences

November 7, 1994

JgR

Thomas Rothschild
Wacker Siltronic Corporation
7200 N W Front Avenue
Portland, OR 97201

RE: Toxicity Testing - Test Substance: 94-62 (with renewals 94-64 and 94-66)

Dear Mr. Rothschild:

Attached is the single report for the bioassay required by your NPDES permit. The test was conducted between October 13th and October 21, 1994 and was performed on *Ceriodaphnia dubia* with test substance: 94-62 (with renewals 94-64 and 94-66). The LC_{50} after 192 hours was 15.15 percent of the test substance. The IC_{50} after the same length of exposure, was 9.25 percent of the test substance. The No-Observed-Effect-Concentration (NOEC) was 6.25 percent concentration of the test substance using Bonferroni's Adjusted T Test but was 50 percent when calculated with the Wilcoxon Rank Sum Test. The Lowest-Observed-Effect-Concentration (LOEC) was 100 percent of the test substance using the Wilcoxon method..

For your future reference, CAqS has given test substance 94-62 (with renewals 94-64 and 94-66) the test reference number C94-2184.01.

All testing was performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the sample tested.

If you have any questions regarding the attached reports, or require additional testing, please call me at (619) 931-9225. Thank you for using the aquatic testing services of Columbia Aquatic Sciences.

Regards,

William A. Schmitz
Laboratory Manager

6060 Corte del Cedro ▪ Carlsbad, CA 92009-1514 ▪ Telephone (619) 931-9225 ▪ Fax (619) 931-9251

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

Chronic 7-Day Survival/Reproduction Bioassay
CAS Testing Protocol No. P004.0

Test Organism: *Ceriodaphnia dubia*

Test Solution	Number of Adult Organisms at Start of Test	Number of Dead Adult Organisms at End of Test	Percent Mortality	Mean Number of Young Produced per Adult
Control	10	2	20	15.2
6.25%	10	0	0	11.6
12.5%	10	7	70	3.3
25%	10	7	70	0.4
50%	10	9	90	0.3
100% Effluent	10	10	100	0.0

Acute Toxicity

Exposure (Hours)	LC_{50} (Percent Effluent)	Statistical Method
192	15.15	Trimmed Spearman Karber

Acute Toxicity Statement: Test substance, Secondary 94-62 (renewals 94-64, 94-66) produced an LC_{50} of 15.15 percent concentration of effluent at the end of 8 days.

Approved by Wil Cl. Sch Date 7NOV94

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

Chronic 7-Day Survival/Reproduction Bioassay
CAS Testing Protocol No. P004.0

Test Organism: *Ceriodaphnia dubia*

Chronic Toxicity

Reproduction data do not meet the assumptions of normality (D'Agostino's Test, $p \leq 0.01$), or equality of variance (Bartlett's Test, $p = 4.04E-19$). Bonferroni's Adjusted T Test processing provided an NOEC (No-Observed-Effect-Concentration) of 6.25 percent, and an LOEC (Lowest-Observed-Effect-Concentration) of 12.5 percent. The Wilcoxon Rank Sum Test provided an NOEC of 50 percent and an LOEC of 100 percent.

The Linear Interpolation Method was used to calculate point estimates for effluent concentrations causing 10, 15, 40 and 50 percent reductions in reproduction.

IC_p Point	Concentration Estimate	Standard Deviation	Lower 95% Fiducial Limit	Upper 95% Fiducial Limit
IC_{10}	<6.25	N/A	N/A	N/A
IC_{15}	<6.25	N/A	N/A	N/A
IC_{25}	6.39	N/A	N/A	N/A
IC_{40}	8.11	N/A	N/A	N/A
IC_{50}	9.25	N/A	N/A	N/A

Note: According to EPA 600/4-89/001 Section 12.9, "Tests should be terminated when 60% or more of the surviving females in the controls have produced their third brood." The test was ended on day 8 for this reason.

Chronic Toxicity Statement: Test substance, 94-62 (renewals 94-64, 94-66) produced an IC_{25} of 6.39 percent concentration at the end of 8 days.

Approved by _____ Date 7NOV94 Page 2

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

Chronic 7-Day Survival/Reproduction Bioassay
CAS Testing Protocol No. P004.0

Test Organism: *Ceriodaphnia dubia*

Test Solution Physical and Chemical Data

Conc.	Statistic	D.O. Initial (mg/L)	D.O. Final (mg/L)	pH Initial	pH Final	Cond. (mS/cm)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)
Control	Mean	8.7	7.6	8.1	8.2	0.17	93	85
	Minimum	8.1	7.0	8.0	7.9	0.17	84	76
	Maximum	9.5	7.9	8.1	8.3	0.17	104	92
6.25%	Mean	8.7	7.5	8.0	8.0	0.20	.	.
	Minimum	8.0	7.2	8.1	7.8	0.19	.	.
	Maximum	9.7	8.2	8.1	8.3	0.21	.	.
25%	Mean	8.8	7.5	8.1	8.1	0.30	.	.
	Minimum	8.1	6.9	8.0	8.0	0.27	.	.
	Maximum	10.0	8.2	8.1	8.3	0.32	.	.
100%	Mean	8.7	7.5	7.4	8.0	0.73	43	176
	Minimum	8.0	7.0	7.3	7.9	0.72	36	176
	Maximum	9.0	7.8	7.4	8.0	0.74	52	176

Approved by Wil Q. Schf Date 7NOV94

SCOEPA00028526

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

APPENDIX

Pertinent Test Data

TEST: Chronic 7-Day Survival/Reproduction Bioassay with *Ceriodaphnia dubia*, CAS Testing Protocol No. P004.0

LAB CONTROL WATER: Synthetic moderately hard water (zero time).

Hardness	84 mg/L as $CaCO_3$
Alkalinity	104 mg/L
pH	8.1
Dissolved Oxygen	8.2 mg/L
Temperature	24.9° C

TEST ORGANISM: *Ceriodaphnia dubia*, obtained from in-house cultures.

TEST CHAMBER: Ten replicates, one animal per replicate, concentrations of 0, 6.25, 12.5, 25, 50 and 100 percent. 25 mL plastic cups, brought to a final volume of 20 mL.

EXPERIMENTAL DESIGN:

1. Effluent was collected by Wacker Siltronic Corporation on October 12, 14, and 17, 1994.
2. The temperature of the substance was adjusted to 25 ± 1°C, and the initial dissolved oxygen adjusted to greater than 3.3 mg/L.
3. 1 test organism was placed into each chamber.
4. Test chambers were held at 25°C for 8 days with a photo period of 16 hours light, 8 hours darkness.
5. Test substance was renewed daily.
6. Organisms were fed daily.

REFERENCE TOXICITY:

Toxicant:	$CuSO_4$
Species	*Ceriodaphnia dubia*
Date of Test	10/14/94
48 hour LC_{50}	>48 ppb

MORTALITY CRITERIA: Lack of respiratory movement and lack of reaction to gentle prodding.

STUDY DIRECTOR: D. Griffin

INVESTIGATORS: K. Evans, M.S. Burke

Approved by Willa Cl. Schaf Date 7NOV 94

SCOEPA00028527

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94	Permit ID:	0714-001a	Sample ID:	effluent
End Date:	21 Oct-94	Analyst Name:	ke KE 10/23/94	Protocol ID:	EPA/600/4-89/001
Sample Date:		Response:	Reproduction	Test Species:	Ceriodaphnia dubia
Comments:	MEC Animals				

Conc-%	1	2	3	4	5	6	7	8	9	10
N Control	32.00		28.00	14.00	29.00	22.00	0.00	0.00	12.00	0.00
6.25	9.00	12.00	14.00	14.00	10.00	11.00	13.00	9.00	11.00	13.00
12.5	0.00	13.00	0.00	0.00	0.00	0.00	5.00	15.00	0.00	0.00
25	0.00	2.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
50	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

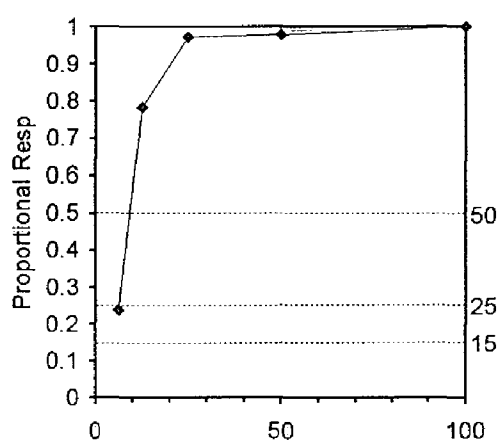
			Transformed (None) Data					T	Rank		Probit Data	
Conc-%	Mean	N-Mean	Mean	Min	Max	Var	SD	Statistic	Sum	Critical	NRESP	NDOSE
N Control	15.22	1.000	15.22	0.00	32.00	173.44	13.17					
6.25	11.60	0.762	11.60	9.00	14.00	3.60	1.90	1.255	90.50	72		
12.5	3.30	0.217	3.30	0.00	15.00	34.46	5.87	*4.130	77.50	72		
25	0.40	0.026	0.40	0.00	2.00	0.49	0.70	*5.135	74.50	72		
50	0.30	0.020	0.30	0.00	1.00	0.23	0.48	*5.170	74.50	72		
100	0.00	0.000										

ANOVA Assumptions	Calculated Statistic	Critical Statistic
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.010)	0.824	0.929
Bartlett's test indicates unequal variances (p = 4.04E-19)	92.416	13.277

Hypothesis Tests (alpha = 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	Critical	df
Bonferroni Adjusted t Test	6.25	12.5	8.8388	16	6.7256	447.61	39.467	2.321	4, 44
Wilcoxon Rank Sum Test	50	100		2					

		Prop Response	
Conc-%	Isotonic	N-Mean	Isotonic
N Control	15.22		
6.25	11.60	0.238	0.238
12.5	3.30	0.783	0.783
25	0.40	0.974	0.974
50	0.30	0.980	0.980
100	0.00	1.000	1.000

Linear Interpolation(ICp) with 80 bootstrap resamples



Point	Estimate	SD	95% Fiducial Limits		Skew
IC10	<6.25	#N/A	#N/A	#N/A	#N/A
IC15	<6.25	#N/A	#N/A	#N/A	#N/A
IC25	6.39	#N/A	#N/A	#N/A	#N/A
IC40	8.11	#N/A	#N/A	#N/A	#N/A
IC50	9.25	#N/A	#N/A	#N/A	#N/A

ToxCalc v3.50/046

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	13 Oct-94 00:00	Test ID:	2184.01	Sample ID:	Wacker Siltronic
End Date:	21 Oct-94 00:00	Lab ID:	CACAS-Columbia Aquatic S	Sample Type:	EFF1-POTW
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

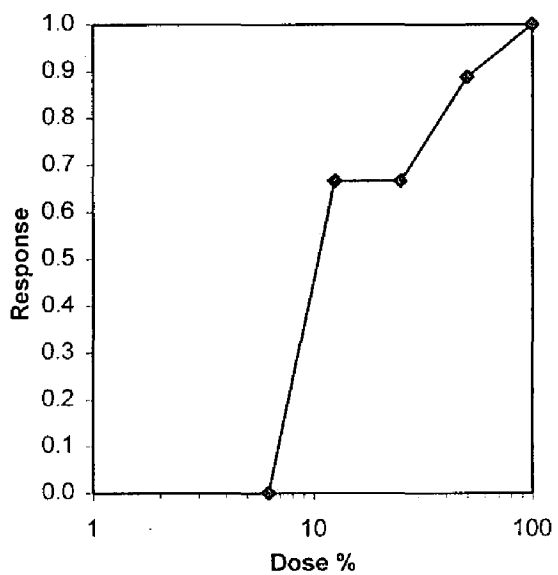
Conc-%	1
Control	0.8000
6.25	1.0000
12.5	0.3000
25	0.3000
50	0.1000
100	0.0000

Conc-%	Mean	N-Mean	Affected	Not Affected	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	0.800	1.000	2	8	10	1			2	10
6.25	1.000	1.250	0	10	10	1	0.237	0.050	0	10
*12.5	0.300	0.375	7	3	10	1	0.035	0.050	7	10
*25	0.300	0.375	7	3	10	1	0.035	0.050	7	10
*50	0.100	0.125	9	1	10	1	0.003	0.050	9	10
*100	0.000	0.000	10	0	10	1	0.000	0.050	10	10

Hypothesis Test (1-tail, p = 0.05	NOEC	LOEC	ChV	TU
Fisher's Exact Test	6.25	12.5	8.83883	16

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	15.154	10.970	20.934
5.0%	14.438	10.151	20.535
10.0%	13.813	9.470	20.147
20.0%	12.645	7.994	20.003
Auto-0.0%	15.154	10.970	20.934



MEC Analytical Systems, Inc.
Bioassay Division

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Mailing Address:	
98 Main Street, Suite 428	
Tiburon, CA 94920	
Shipping Address:	
3150 Paradise Drive, Building 36	
Tiburon, CA 94920	
Phone: (415) 435-1847	
Fax: (415) 435-0479	

CLIENT INFORMATION

Project ID	94-62
Project Manager	Thomas J. Rothschild
Company	Wacker Siltronic Corporation
Address	7200 N.W. Front Avenue
	Portland, Oregon 97210
Phone	(503) 243-2020 Ext. 374
Fax	(503) 241-7599

Shipped via			
	UPS	X	Fed Ex
	Bus		
Sample Disposal			
X	Dispose of		
	Return		

SAMPLE COLLECTION			SAMPLE INFORMATION					ANALYSES REQUIRED						SAMPLE INTEGRITY		
Sample ID	Date	Time	Matrix S=Sediment W=Water	Type G=Grab C=Composite O=Other (Describe)	Preservation	Number of Containers	Volume per Container		Cerielophnic					Sample Condition	Temperature upon laboratory receipt	Comments
94-62	12 oct94	0800	W	C	4°C	1	10L		X							

Thomas J. Rothschild	Wacker Siltronic	12 oct94/0900	
Samplers' Name/Signature	Company Affiliation	Date/Time of Relinquishment	
Karine Evans	MEC	10/13/94 0000	
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	

MEC Analytical Systems, Inc.
Bioassay Division

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Mailing Address:	CLIENT INFORMATION	
98 Main Street, Suite 428	Project ID	94-64
Tiburon, CA 94920	Project Manager	Thomas J. Rothschild
Shipping Address:	Company	Wacker Siltronic Corporation
3150 Paradise Drive, Building 36	Address	7200 NW Front Avenue
Tiburon, CA 94920		Portland, Oregon 97210
Phone: (415) 435-1847	Phone	503-243-2020
Fax: (415) 435-0479	Fax	503-226-0052

Shipped via			
	UPS	X	Fed Ex
	Bus		
Sample Disposal			
X	Dispose of		
	Return		

SAMPLE COLLECTION			SAMPLE INFORMATION					ANALYSES REQUIRED						SAMPLE INTEGRITY		
Sample ID	Date	Time	Matrix S=Sediment W=Water	Type G=Grab C=Composite O=Other (Describe)	Preservation	Number of Containers	Volume per Container	Ceriodaphnia						Sample Condition	Temperature upon laboratory receipt	Comments
94-64	14 Oct 94	0800	W	C	4°C	1	2.5L	X								Rec at 7.1°C

Thomas J. Rothschild	Wacker Siltronic	14 Oct 94/0830	
Samplers' Name/Signature	Company Affiliation	Date/Time of Relinquishment	
MARK J. BURKE	MEC Analytical - Tib	10/15/94/1325	
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	

MEC Analytical Systems, Inc.
Bioassay Division

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Mailing Address:	CLIENT INFORMATION	
98 Main Street, Suite 428	Project ID	94-66
Tiburon, CA 94920	Project Manager	Thomas J. Rothschild
Shipping Address:	Company	Wacker Siltronic Corporation
3150 Paradise Drive, Building 36	Address	7200 N.W. Front Avenue
Tiburon, CA 94920		Portland, Oregon 97210
Phone: (415) 435-1847	Phone	503-243-2020
Fax: (415) 435-0479	Fax	

Shipped via		
UPS	X	Fed Ex
Bus		
Sample Disposal		
X	Dispose of	
	Return	

SAMPLE COLLECTION			SAMPLE INFORMATION					ANALYSES REQUIRED						SAMPLE INTEGRITY		
Sample ID	Date	Time	Matrix S=Sediment W=Water	Type G=Grab C=Composite O=Other (Describe)	Preservation	Number of Containers	Volume per Container	Cerio-phnig						Sample Condition	Temperature upon laboratory receipt	Comments
94-66	17Oct94	0830	W	C	4°C	1	2.5L	X								24-hour composite

Thomas J. Rothschild	Wacker Siltronic	17Oct94/0900	
Samplers' Name/Signature	Company Affiliation	Date/Time of Relinquishment	
Kathie Evans	MEC	10-18-94/1040	
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt	

Wacker Siltronic Corporation

WACKER

P.O. BOX 83180 • PORTLAND, OREGON 97283-0180 • (503) 243-2020

PURCHASE ORDER

DATE	NUMBER	
10/10/94	30482	
CHANGE NOTICE	BLANKET RELEASE	PAGE
		1

VENDOR:

COLUMBIA AQUATIC SCIENCES
6060 CORTE DEL CEDRO

CARLSBAD, CA 92009

ATTN: F. CHARLES NEWTON

SHIP TO: Wacker Siltronic Corp. 7200 N.W. Front Ave., Portland, Oregon 97210-3676
SHIP VIA: ~~UPS MOTOR FRT~~ Federal Express overnight
F.O.B.: SHIPPING POINT
FREIGHT TERMS: PREPAID & ADDED
PAYMENT TERMS: NET 30 DAYS

LINE	QUANTITY	UNIT	DELIVER BY	DESCRIPTION	UNIT PRICE	EXTENDED
001	1	JB	10/30/94	BIOASSAY TEST, CERIEDEPHNIA DUBIA	1200.0000	1200.
				THREE SEPARATE SAMPLES TO BE SHIPPED:		
				1. 12 OCTOBER 1994		
				2. 14 OCTOBER 1994		
				3. 17 OCTOBER 1994		
				BY UPS OVERNIGHT		

LINE	REQUESTOR	DELIVER TO	ACCOUNT NO
01	ROTHSCHILD, TOM	(1)THOMAS ROTHS	1410

INSTRUCTIONS ON FACE AND REVERSE SIDE ARE MADE PART OF THIS ORDER TO WHICH SELLER AGREES BY ACCEPTANCE OF SAME.

KIMBERLEY EVE

PURCHASING AGENT

Kimberley A Eve

ADDITIONAL COST

ORDER TOTAL 1200.

PURCHASING COPY

SCOEPA00028533

RECEIVED SEP 2 9 1994
JJR

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-17

Title: Fathead Minnow dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall effluent.

Protocol No.: NAS-XXX-PP2, September 15, 1990, Revision 1 (10-30-91). Based on U.S. EPA. 1989. Method 1000.0, Fathead minnow, *Pimephales promelas*, larval survival and growth test, pp. 33-74, In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR, 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Man./Study Dir.; L.K. Garrison-Nemeth, B.A., QA Officer; G.J. Irissarri, B.S., Sr. Tech.; C.J. Bullock, B.S., Tech.

Study Schedule:

Test Beginning: 8-16-94, 1:00 p.m.

Test Ending: 8-23-94, 11:30 a.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	2203E	2219E	2220E
Collection Date	8-15-94	8-17-94	8-19-94
Receipt Date	8-16-94	8-18-94	8-22-94
Conductivity (µmhos/cm)	500	520	650
pH	7.9	7.5	7.3
Hardness (mg/L)	220	200	280
Alkalinity (mg/L)	60	50	40

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

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DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 8-11-94 & 8-16-94
Pretreatment: Aerated ≥24 hours.

TEST ORGANISMS

Species: *Pimephales promelas*, fathead minnow.
Size/Weight: 24-hr-old.
Source: Aquatox, Hot Springs, Arkansas.
Acclimation: Water quality condition upon receipt were: Temperature, 23.1°C; dissolved oxygen, saturated; pH, 7.9; conductivity, 350 µmhos/cm; hardness, 170 mg/L as $CaCO_3$; and alkalinity, 160 mg/L as $CaCO_3$.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 600 ml glass beakers containing 250 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25 and 0% (control).
Replicates/Treatment: 4
Organisms/Treatment: 40
Loading (based on final weight of control organisms): 0.017 g/L
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: Approx. 700 *Artemia* nauplii per beaker three times daily except on day 7.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) growth inhibition. Mortality was defined as lack of visible movement during a 30 second observation period. Growth inhibition was measured as the difference in weight gain of fish between a treatment level and the control.
Water Quality and Other Test Conditions: Temperature, 24.8 ± 0.1°C; dissolved oxygen, 7.5 ± 1.1 mg/L; conductivity, 668 ± 72 µmhos/cm (100% effluent), 316 ± 11 µmhos/cm (control); pH, 7.7 ± 0.2; hardness, 240 ± 22 mg/L as $CaCO_3$ (100% effluent), 110 ± 11 mg/L as $CaCO_3$ (control); alkalinity, 56 ± 8 mg/L as $CaCO_3$ (100% effluent), 80 ± 13 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival and the average weight per larva are calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 (survival) was calculated using the Trimmed Spearman-Karber method (EPA 600/4-85/027). The IC25 (growth) was calculated using the Linear Interpolation Method with bootstrapping (EPA 600/4-89/001a). NOEC and LOEC values for survival and growth are computed using ANOVA and an appropriate *post hoc* test (Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni Adjustment). The appropriate test was selected after evaluating the data for normality and homogeneity of variance. Weight data were excluded from the ANOVA calculation if there was a survival effect. An arcsine transformation was performed on the survival data prior to statistical analysis. The statistical software employed for these calculations was ToxCalc, v. 4.0, Tidepool Scientific Software.

PROTOCOL DEVIATIONS

None.

SCOEPA00028535

REFERENCE TOXICANT TEST

Test No.: 999-392
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 8-16-94
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 27.7 µg/L; 7-day IC25, 23.9 µg/L; NOEC, 20 µg/L Cd. These test results are within the laboratory's control chart warning limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was 2.5% mortality of fathead minnows exposed to 100% Wacker Siltronics outfall composite after 48 hours. Therefore, the effluent passed the acute test according to Oregon DEQ guidelines (DEQ Whole Effluent Toxicity Testing Guidance Manual, January 1993).

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2. The biological effects, given as the NOEC and LOEC for survival and growth, and the LC50/IC25 for survival/growth, are shown below.

	Survival	Growth
NOEC (%)	50	50
LOEC (%)	100	100
7-Day LC50/IC25 (%)	70.7	55.5
(95% conf. int.)	--	--
Method	Tr. Spearman-Karber	Linear Interpolation

STUDY APPROVAL

Gary A Gahler 9/28/94 — Study Director, Date

Julie R. Fiore 9/28/94 — Quality Assurance Unit, Date

Richard D. Caldwell 9/28/94 — Director, Aquatic Toxicology, Date

SCOEPA00028536

Table 1. Survival of fathead minnow larvae exposed for 48-hours to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae Exposed	Dead	Surviving	Percent survival	Mean* percent survival
100	1	10	0	10	100.0	
	2	10	1	9	90.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	97.5
Control	1	10	0	10	100.0	
	2	10	0	10	100.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	100.0

*An asterick next to a treatment mean indicates that it is significantly (P,0.05) less than the control mean.

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Table 2. Survival and growth of fathead minnow larvae exposed for seven days to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae Exposed	Dead	Surviving	Percent survival	Mean* percent survival	Ave. wt. per larva (mg)	Mean* weight (mg)
100	1	10	9	1	10.0		--	
	2	10	9	1	10.0		--	
	3	10	10	0	0.0		--	
	4	10	8	2	20.0	10.0*	--	--
50	1	10	0	10	100.0		0.301	
	2	10	1	9	90.0		0.393	
	3	10	3	7	70.0		0.484	
	4	10	1	9	90.0	87.5	0.456	0.409
25	1	10	0	10	100.0		0.471	
	2	10	1	9	90.0		0.517	
	3	10	0	10	100.0		0.597	
	4	10	0	10	100.0	97.5	0.543	0.532
12.5	1	10	0	10	100.0		0.531	
	2	9a	0	9	100.0		0.530	
	3	10	6	4	40.0		0.530	
	4	10	2	8	80.0	80.0	0.460	0.513
6.25	1	10	1	9	90.0		0.392	
	2	10	2	8	80.0		0.585	
	3	10	0	10	100.0		0.548	
	4	10	1	9	90.0	90.0	0.518	0.511
Control	1	10	1	9	90.0		0.493	
	2	10	0	10	100.0		0.395	
	3	10	0	10	100.0		0.465	
	4	10	0	10	100.0	97.5	0.429	0.446

* An asterisk next to a treatment mean indicates that it is significantly ($P<0.05$) less than the control mean.

[a] The intial number of organisms reduced by one to compensate for an organism lost or damaged during the test.

SCOEPA00028538

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

RECEIVED SEP 29 1994
JJR

September 28, 1994

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed are test reports No. 357-17 and 357-18 for fathead minnow and Ceriodaphnia dubia dual endpoint tests, respectively. As we have previously discussed, the Ceriodaphnia test failed to meet DEQ guidelines for acute toxicity, i.e. mortality in effluent exposed animals was 100% after 48 hours. Also, the chronic NOEC for this organism was <6.25% effluent and the 7-day LC50 was 2.64% effluent.

Results were better for the fathead minnow test in which the overall test NOEC was 50% effluent and the IC25 for growth was 55.5% effluent.

If you have any questions about these test results, please call me at (503) 265-7225. Also, let me know if you wish to schedule additional tests. Thanks for your patience regarding the delay in getting these reports out.

Sincerely,

Gary A. Buhler
Project Manager

Encl.

RECEIVED SEP 2 9 1994
SJR

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-17

Title: Fathead Minnow dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall effluent.

Protocol No.: NAS-XXX-PP2, September 15, 1990, Revision 1 (10-30-91). Based on U.S. EPA. 1989. Method 1000.0, Fathead minnow, *Pimephales promelas*, larval survival and growth test, pp. 33-74, In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR, 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Man./Study Dir.; L.K. Garrison-Nemeth, B.A., QA Officer; G.J. Irissarri, B.S., Sr. Tech.; C.J. Bullock, B.S., Tech.

Study Schedule:

Test Beginning: 8-16-94, 1:00 p.m.

Test Ending: 8-23-94, 11:30 a.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	2203E	2219E	2220E
Collection Date	8-15-94	8-17-94	8-19-94
Receipt Date	8-16-94	8-18-94	8-22-94
Conductivity (µmhos/cm)	500	520	650
pH	7.9	7.5	7.3
Hardness (mg/L)	220	200	280
Alkalinity (mg/L)	60	50	40

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

SCOEPA00028540

DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 8-11-94 & 8-16-94
Pretreatment: Aerated ≥24 hours.

TEST ORGANISMS

Species: *Pimephales promelas*, fathead minnow.
Size/Weight: 24-hr-old.
Source: Aquatox, Hot Springs, Arkansas.
Acclimation: Water quality condition upon receipt were: Temperature, 23.1°C; dissolved oxygen, saturated; pH, 7.9; conductivity, 350 µmhos/cm; hardness, 170 mg/L as $CaCO_3$; and alkalinity, 160 mg/L as $CaCO_3$.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 600 ml glass beakers containing 250 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25 and 0% (control).
Replicates/Treatment: 4
Organisms/Treatment: 40
Loading (based on final weight of control organisms): 0.017 g/L
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: Approx. 700 *Artemia* nauplii per beaker three times daily except on day 7.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) growth inhibition. Mortality was defined as lack of visible movement during a 30 second observation period. Growth inhibition was measured as the difference in weight gain of fish between a treatment level and the control.
Water Quality and Other Test Conditions: Temperature, 24.8 ± 0.1°C; dissolved oxygen, 7.5 ± 1.1 mg/L; conductivity, 668 ± 72 µmhos/cm (100% effluent), 316 ± 11 µmhos/cm (control); pH, 7.7 ± 0.2; hardness, 240 ± 22 mg/L as $CaCO_3$ (100% effluent), 110 ± 11 mg/L as $CaCO_3$ (control); alkalinity, 56 ± 8 mg/L as $CaCO_3$ (100% effluent), 80 ± 13 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival and the average weight per larva are calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 (survival) was calculated using the Trimmed Spearman-Karber method (EPA 600/4-85/027). The IC25 (growth) was calculated using the Linear Interpolation Method with bootstrapping (EPA 600/4-89/001a). NOEC and LOEC values for survival and growth are computed using ANOVA and an appropriate *post hoc* test (Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni Adjustment). The appropriate test was selected after evaluating the data for normality and homogeneity of variance. Weight data were excluded from the ANOVA calculation if there was a survival effect. An arcsine transformation was performed on the survival data prior to statistical analysis. The statistical software employed for these calculations was ToxCalc, v. 4.0, Tidepool Scientific Software.

PROTOCOL DEVIATIONS

None.

SCOEPA00028541

REFERENCE TOXICANT TEST

Test No.: 999-392
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 8-16-94
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 27.7 µg/L; 7-day IC25, 23.9 µg/L; NOEC, 20 µg/L Cd. These test results are within the laboratory's control chart warning limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was 2.5% mortality of fathead minnows exposed to 100% Wacker Siltronics outfall composite after 48 hours. Therefore, the effluent passed the acute test according to Oregon DEQ guidelines (DEQ Whole Effluent Toxicity Testing Guidance Manual, January 1993).

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2. The biological effects, given as the NOEC and LOEC for survival and growth, and the LC50/IC25 for survival/growth, are shown below.

	Survival	Growth
NOEC (%)	50	50
LOEC (%)	100	100
7-Day LC50/IC25 (%)	70.7	55.5
(95% conf. int.)	--	--
Method	Tr. Spearman-Karber	Linear Interpolation

STUDY APPROVAL

Study Director — Date: 9/23/94
Quality Assurance Unit — Date: 9/20/94
Director, Aquatic Toxicology — Date: 9/23/94

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Table 1. Survival of fathead minnow larvae exposed for 48-hours to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae Exposed	Dead	Surviving	Percent survival	Mean* percent survival
100	1	10	0	10	100.0	
	2	10	1	9	90.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	97.5
Control	1	10	0	10	100.0	
	2	10	0	10	100.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	100.0

*An asterick next to a treatment mean indicates that it is significantly (P,0.05) less than the control mean.

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Table 2. Survival and growth of fathead minnow larvae exposed for seven days to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae Exposed	Dead	Surviving	Percent survival	Mean* percent survival	Ave. wt. per larva (mg)	Mean* weight (mg)
100	1	10	9	1	10.0		--	
	2	10	9	1	10.0		--	
	3	10	10	0	0.0		--	
	4	10	8	2	20.0	10.0*	--	--
50	1	10	0	10	100.0		0.301	
	2	10	1	9	90.0		0.393	
	3	10	3	7	70.0		0.484	
	4	10	1	9	90.0	87.5	0.456	0.409
25	1	10	0	10	100.0		0.471	
	2	10	1	9	90.0		0.517	
	3	10	0	10	100.0		0.597	
	4	10	0	10	100.0	97.5	0.543	0.532
12.5	1	10	0	10	100.0		0.531	
	2	9a	0	9	100.0		0.530	
	3	10	6	4	40.0		0.530	
	4	10	2	8	80.0	80.0	0.460	0.513
6.25	1	10	1	9	90.0		0.392	
	2	10	2	8	80.0		0.585	
	3	10	0	10	100.0		0.548	
	4	10	1	9	90.0	90.0	0.518	0.511
Control	1	10	1	9	90.0		0.493	
	2	10	0	10	100.0		0.395	
	3	10	0	10	100.0		0.465	
	4	10	0	10	100.0	97.5	0.429	0.446

* An asterisk next to a treatment mean indicates that it is significantly ($P<0.05$) less than the control mean.

[a] The intial number of organisms reduced by one to compensate for an organism lost or damaged during the test.

SCOEPA00028544

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

FATHEAD MINNOW (PIMEPHALES PROMELAS) LARVAL SURVIVAL AND GROWTH TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the fathead minnow (Pimephales promelas).

1.2 Summary of Method: Fathead minnow (Pimephales promelas) larvae (<24-hr old) are exposed for seven days to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 600 ml borosilicate glass beakers, each containing 250 ml of test solution. Four replicate beakers, each with 10 larvae, are employed at each test concentration. Test results are based on the survival and growth of the larvae. The data analysis includes calculation of the 7-day LC50 and the determination of a NOEC and LOEC for both growth and survival using ANOVA and an appropriate post-hoc test.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: Tests will be performed at the firm's laboratory at Newport, OR.

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: Richard S. Caldwell, Ph.D.
Qual. Assurance Officer: Donald R. Buhler, Ph.D.
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29,

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1983 (40 CFR Part 792).

3. TEST MATERIAL:

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM:

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 600 ml Pyrex beakers holding 250 ml of test solution. Temperature control of test chambers is provided by partial immersion of the beakers in a temperature controlled water bath. Aeration is employed only if necessary to maintain the dissolved oxygen concentration within acceptable limits, and, if used, is provided to all test containers by bubbling oil free air through 1 ml disposable glass pipets. The required photoperiod is achieved by timer control of the room lights.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E-729-80, paragraph 6.6. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 5% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER:

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS:

6.1 Species: Fathead minnow, *Pimephales promelas*

6.2 Source: Fathead minnow larvae are supplied from laboratory culture or from a reputable supplier. A recommended supplier is Aquatox, Inc., Hot Springs, Arkansas.

6.3 Age at Study Initiation: <24-hr-old if cultured; <48-hr-old (and all within 24-hr of the same age) if shipped.

SCOEPA00028547

6.4 Acclimation and Pretest Observation: Since the larvae are used within 24 hours of receipt (or hatching), pretest observation is limited to the determination that water quality conditions upon receipt are within acceptable limits and that mortalities during shipping were minimal and that the fish appear to be healthy.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES:

7.1 Experimental Design: The test involves exposure of fathead minnow larvae to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days. Each treatment consists of four replicate test containers each containing ten larvae. Test containers are placed, using a stratified random design, in a water bath for temperature control. Test organisms are impartially distributed to the test chambers by adding two to three test organisms to each and repeating the process until each chamber contains 10 organisms.

7.2 Effect Criterion: The effect criteria are: 1) mortality, and 2) growth inhibition. Mortality is defined as the lack of visible movement during a 30 second observation period. Growth inhibition is measured as the difference in weight gain of fish between a treatment level and the control.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 40% saturation at all times. If necessary to achieve this, test containers should be gently aerated by slow bubbling through 1.0 ml disposable pipets. The test temperature employed is 25 $\pm$ 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. Loading of organisms should not exceed 0.8 g/L wet wt. (0.2 g/L dry wt.) in the test chambers. The test solution is replaced once daily.

7.4 Beginning of Test: The test is begun by adding the test organisms to the equilibrated test solutions as previously described.

7.5 Feeding: Test organisms are fed newly hatched *Artemia salina* nauplii three times daily. The feeding level is approximately 700 *Artemia* per beaker. The feeding level can be adjusted as necessary to minimize overfeeding which can lead to water fouling, but should be sufficient to support rapid growth of the larvae. Care must be taken that all treatments receive equal quantities of food daily. Uneaten food is removed once daily from test containers as part of the water changing routine to minimize water quality degradation. Larvae are not fed on day 7 of the test.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days. The type and frequency of observations to be made during the test are summarized as follows:

SCOEPA00028548

Type of Observation	Times of Observation
Biological Data	
Survival	Daily
Growth	at end of test
Physical and Chemical Data	
Temperature (one replicate at all test levels)	Daily before solution renewal
Dissolved oxygen, pH (one replicate at all test levels)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control and high test concentration of one replicate)	Daily before solution renewal

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is directly measured in test beakers using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured directly in the test beakers by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alklinity are measured using test kits.

7.7 Growth Measurement Growth is measured as average dry weight of animals in a test replicate at the end of the test on day 7. Pooled animals from each test replicate are rinsed with deionized water, gently blotted and placed into tared aluminum weigh pans. The pans are dried at 100°C for a minimum of 2 hours. The dried larvae are dessicated and weighed as soon as possible to the nearest 0.00001 g. The total weight of the dried fish in each pan is divided by the number of fish weighed to obtain an average dry weight per fish.

7.8 Criteria of Test Acceptance: The test results are acceptable if: 1) the average survival of control larvae is $\geq$ 80%; and 2) the mean dry weight of control larvae preserved in 4% formalin solution is $\geq$ 0.25 mg for tests begun with <24-hr-old larvae.

8. DATA ANALYSIS:

The end points of the fathead minnow toxicity test are survival and growth. Survival is tabulated daily from direct count of live organisms. Average fish weight, measured at the end of the test, is used to compare growth between individual effluent treatments and the control. Point estimates, e.g. LC50, are calculated using the moving average or probit analysis. LOEC and NOEC values, for survival and growth, are obtained using appropriate hypothesis test statistics including ANOVA with Dunnett's or Bonferroni t-test post-hoc treatment comparisons. An arcsine transformation of survival data is employed prior to the ANOVA test.

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9. REPORTING:

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION:

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED GUIDELINES

U.S. Environmental Protection Agency. 1989. Fathead minnow, *Pimephales promelas*, larval survival and growth test, Method 1000.0. pp. 33-74 *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

12. APPROVALS:

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028550

APPENDIX II

RAW DATA

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

COVER DATA SHEET

Test No. 357-17 Client WACKER SILTRONICS Investigator GAB 9/28/94

STUDY MANAGEMENT

Client: WACKER SILTRONICS
Client's Study Monitor: Mr. Tom Rothschild
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. G.A. Buhler
QA Officer L.K. Garrison - Nemeth LKN
1. CJ Bullock - CJB 2. G.J. IRISSARRI GJI
3. 4.
Study Schedule:
Test Beginning: 8/16/94 1:00pm Test Ending: 8/23/94 11:30A

TEST MATERIAL

Description: OUTFALL COMPOSITE

NAS Sample No.:	2203E	2219E	2220E	
Date of Collection:	8-15-94	8-17-94	8-19-94	
Date of Receipt:	8-16-94	8-18-94	8-22-94	
Conductivity (µmhos/cm):	500	520	650	
pH:	7.9	7.5	7.3	
Hardness (mg/L):	220	200	280	
Alkalinity (mg/L):	60	50	40	
:				

DILUTION WATER

Description: Moderatly Hard synthetic water
Date of Preparation: 8-11-94 / 8-16-94
Water Quality: Conductivity (µmhos/cm) 280/265 pH 8.0/8.2
Hardness (mg/L as $CaCO_3$) 100/120 Alkalinity (mg/L as $CaCO_3$ 70/20 60
Treatments: Aerated ≥24hr

TEST ORGANISMS

Species: Pimephales promelas, Fathead minnow
Age: (<24-hr old; 24-48 hr old if purchased) 24 hr
Source: Aquatox, Inc; Hot Springs, ARKANSAS
Acclimation Data:

Date	Temp (°C	DO (mg/L)	pH	Cond µmh/cm	Hard (mg/L)	Alk (mg/L)	Comments
8/16/94	23-1	SAT	7-9	350	170	160	RCC' H_2O
Mean							
S.D.							
(N)							

SCOEPA00028552

COVER DATA SHEET (CONTINUED)

Test No. 35717 Client WACKER SILTRONICS Investigator GAS 9/28/94

TEST PROCEDURES AND CONDITIONS

Test concentrations: (50% series recommended) 100, 50, 25, 12.5, 6.25 & Ø%

Test chambers: (600 ml beakers) 600 mL Beakers
Test volume: (250 ml) 250 mL
Replicates/treatment: (4) 4
Organisms/treatment: (~~15~~) 40 (10/repl)
Test water changes: Daily
Aeration during test: None
Feeding: 700-1000 three times daily
Beaker placement: Stratified randomization

Randomization chart:

A	25	6.25	100	50	Ø	12.5
B	Ø	25	50	12.5	100	6.25
C	50	12.5	25	100	6.25	Ø
D	100	12.5	Ø	6.25	25	50

PREPARATION OF TEST SOLUTIONS

Concentration of working stock solution ( )

Test Conc (%)	~~Toxicant~~ Effluent (ml/L)	WACKER (OUTFALL) Comp (ml/L)	Dilution Water (ml/L)
100		1000	Ø
50		500	500
25		250	750
12.5		125	875
6.25		62.5	937.5
Ø		Ø	1000

LOADING

$$\text{Loading} = \frac{\text{Sum of total wts in controls (mg)}}{\text{Total vol. in controls (ml)}} = \frac{(4.44)+(3.95)+(4.65)+(4.29)}{(1000)} = 0.017 \text{ g/L}$$

MISCELLANEOUS NOTES

SCOEPA00028553

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

WATER QUALITY DATA SHEET

Test No. 3577 Client WACKER Investigator LAB 9/28/94

DAY 0 (8/16/94) LAB

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100			8.3		7.8	
2. 50			8.3		7.8	
3. 25			8.3		7.9	
4. 12.5			8.4		7.9	
5. 6.25			8.4		7.9	
6. Ø			8.4		7.9	
7.						

Notes:

DAY 1 (8/17/94) CJB/GJI

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.7	6.6	8.2	7.6	7.9	625/220/60
2. 50	24.7	6.7	8.6	7.7	7.9	—
3. 25	24.7	6.6	8.7	7.8	7.9	—
4. 12.5	24.7	6.6	8.7	7.8	7.9	—
5. 6.25	24.7	6.6	8.7	7.8	7.9	—
6. Ø	24.6	6.2	8.7	7.9	7.9	330/130/100
7.						

Notes:

DAY 2 (8/18/94) CJB

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.8	6.9	8.8	7.6	7.7	700/250/60
2. 50	24.8	6.6	8.8	7.6	7.8	—
3. 25	24.8	6.8	8.8	7.7	7.9	—
4. 12.5	24.7	6.4	8.8	7.6	7.9	—
5. 6.25	24.9	6.6	8.8	7.7	7.9	—
6. Ø	24.7	7.0	8.8	7.7	7.9	305/110/80
7.						

Notes:

DAY 3 (8/19/94) LAB/CJB/GJI

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.8	6.6	8.6	7.4	7.8	~~335~~/240/60
2. 50	24.8	6.2	8.6	7.5	7.9 CJB	600 —
3. 25	24.8	6.3	8.6	7.6	8.0	—
4. 12.5	24.8	6.3	8.4	7.7	8.0	—
5. 6.25	24.9	6.1	8.5	7.7	8.0	—
6. Ø	24.7	6.6	8.5	7.8	8.1	310/100/80
7.						

Notes:

Remarks:

SCOEPA00028554

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

WATER QUALITY DATA SHEET

Test No. 35717 Client WACKER Investigator GAS 9/28/94

DAY 4 (8/20/94) GAS

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.6	6.4	8.7	7.5	7.8	650/240/60
2.	50	24.8	6.3	8.5	7.4	7.8	—
3.	25	24.8	6.5	8.4	7.6	7.8	—
4.	12.5	24.7	6.2	8.4	7.7	7.8	—
5.	6.25	24.6	6.2	8.4	7.8	7.8	—
6.	Ø	24.7	6.1	8.4	7.8	7.8	330/100/80
7.							

Notes:

DAY 5 (8/21/94) GAS

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.9	6.2	8.5	7.4	7.7	700/240/60
2.	50	24.9	6.2	8.4	7.5	7.8	—
3.	25	24.9	6.3	8.4	7.7	7.8	—
4.	12.5	24.8	5.8	8.3	7.8	7.9	—
5.	6.25	24.9	6.2	8.4	7.8	7.9	—
6.	Ø	24.7	6.0	8.4	7.8	7.9	320/100/90
7.							

Notes:

DAY 6 (8/22/94) CJB/GJI

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	25.0	6.9	8.0	7.5	7.7	1090/210/40 GJS
2.	50	25.0	6.2	8.4	7.5	7.8	—
3.	25	25.1	6.7	8.4	7.7	7.9	—
4.	12.5	25.0	5.9	8.4	7.6	7.8	—
5.	6.25	25.0	6.2	8.5	7.7	7.8	—
6.	Ø	25.0	6.6	8.6	7.8	7.9	315/120/60
7.							

Notes:

DAY 7 (8/23/94) CJB

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	25.0	7.4		7.4		800/280/50
2.	50	24.9	7.0		7.4		—
3.	25	24.9	6.6		7.4		—
4.	12.5	24.8	6.3		7.3		—
5.	6.25	24.8	6.6		7.3		—
6.	Ø	24.8	7.0		7.3		305/110/70
7.							

Notes:

Remarks:

SCOEPA00028555

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

SURVIVAL DATA SHEET

Test No. 35717 Client WACKER Investigator KAB 9/20/94

Conc. (%)	Repl	Survival on day (D=dead; M=missing) 0	1	2	3	4	5	6	7	proportion
1. 100	A	10	10	10	10	3(7D)	1(2D)	1	1	0.1
	B	10	10	9(1D)	8(1D)	5(3D)	2(3D)	1(1D)	1	0.1
	C	10	10	10	10	4(6D)	4	~~3(1D)~~ 0(1D)	0	0
	D	10	10	10	10	4(6D)	4	~~2(1D)~~ 3(1D)	2(1D)	0.2
2. 50	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	9(1D)	9	9	9	9	.9
	C	10	10	9(1D)	9	7(2D)	7	7	7	.7
	D	10	10	10	10	10	10	10	9(1D)	.9
3. 25	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	9(1D) ~~8(2D)~~	9	9	9	.9
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
4. 12.5	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	9(1M)	9	9	9	1.0 9
	C	10	10	10	7(3D)	7	7	5(2D)	4(1D)	.4
	D	10	10	10	10	9(1D)	9	9	8(1D)	.8
5. 6.25	A	10	10	10	9(1D)	9	9	9	9	.9
	B	10	10	10	10	9(1D)	9	8(1D)	8	.8
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	9(1D)	9	.9
6. Ø	A	10	10	10	9(1D)	9	9	9	9	.9
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
7.	A									
	B									
	C									
	D									
Initial		GAB	CJB	CJB	CJB	GAB	GAB	CJB	CJB	
Remarks:		8/16/94	8-17-94	8-18-94	8-19-94	8-20-94	8-21-94	8-22-94	8-23-94	

SCOEPA00028556

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

WEIGHING DATA SHEET

KAZ 9/28/94

Test No. 3577 Client WACKER SILTRONICS Investigator

Tare: Date 8-8-94 Oven temp(°C) 103.9 Drying time(hr) 2hrs Init. JRF

Final: Date 8-31-94 Oven temp(°C) 102.9 Drying time(hr) 2hrs Init. JRF

Equip. Used: Oven Blue-M Balance Sartorius

Conc. (%)	Repl	Pan #	A Tare wt (mg)	B Total wt (mg)	B-A Fish wt (mg)	C # of Fish	B-A/C Ave. wt (mg)	Comments
1. 100	A	1	39.84	40.02		1		
	B	2	35.65	35.74		1		
	C	3	37.88	—		0		
	D	4	40.32	40.62		2		
2. 50	A	5	35.90	38.91		10		
	B	6	37.07	40.61		9		
	C	7	37.44	40.83		7		
	D	8	35.45	39.55		9		
3. 25	A	9	34.26	38.97		10		
	B	10	35.38	40.03		9		Tare = 35.38
	C	11	32.93	38.90		10		
	D	12	37.76	43.19		10		
4. 12.5	A	13	32.06	37.37		10		
	B	14	37.03	41.80		9		
	C	15	35.36	37.48		4		
	D	16	38.11	41.79		8		
5. 6.25	A	17	35.20	38.73		9		
	B	18	37.45	42.13		8		
	C	19	34.04	39.52		10		
	D	20	35.20	39.68		9		
6. Ø	A	21	36.77	41.21	4.44	9	0.493	
	B	22	35.99	39.94	3.95	10	0.395	
	C	23	40.91	45.56	4.65	10	0.465	
	D	24	37.03	41.32	4.29	10	0.429	
7.	A							
	B							
	C							
	D							

Remarks:

CJB 8-23-94

JRF 8-8-94 100 mg std wt = 100.01 mg

JRF 8-31-94 100mg std wt = 100.02 mg

SCOEPA00028557

GAB 9/28/94

AQUATOX, INC.

100 Springwood Drive #15
Hot Springs, Arkansas 71913
(501) 767-9120

TEST ORGANISM HISTORY

DATE SHIPPED 8-15-94 NW Aquatic Sciences

SPECIES Pimephales promelas

QUANTITY SHIPPED 500+

AGE/LIFE STAGE Eggs to hatchling Transit

BROODSTOCK SOURCE Anderson Farms, AR

CULTURE WATER Groundwater

ALKALINITY (Mg/l as $CaCO_3$) ≈180

HARDNESS (Mg/l as $CaCO_3$)/Salinity (ppt) ≈160

FEEDING N/A

COMMENTS

FOR FATHEAD TEST

PACKAGED BY UCC

HALL 5245

KAP 9/28/94

Data listing File: p357wq17 Date: 09-15-1994

FILTER: None

Obs.	DAY	CONC	OLDNEW	TEMP	DO	PH	COND	HARD	ALK
1	0	100.00	1	-1.0	-1.0	-1.0	-1	-1	-1
2	0	50.00	1	-1.0	-1.0	-1.0	-1	-1	-1
3	0	25.00	1	-1.0	-1.0	-1.0	-1	-1	-1
4	0	12.50	1	-1.0	-1.0	-1.0	-1	-1	-1
5	0	6.25	1	-1.0	-1.0	-1.0	-1	-1	-1
6	0	0.00	1	-1.0	-1.0	-1.0	-1	-1	-1
7	0	100.00	2	-1.0	8.3	7.8	-1	-1	-1
8	0	50.00	2	-1.0	8.3	7.8	-1	-1	-1
9	0	25.00	2	-1.0	8.3	7.9	-1	-1	-1
10	0	12.50	2	-1.0	8.4	7.9	-1	-1	-1
11	0	6.25	2	-1.0	8.4	7.9	-1	-1	-1
12	0	0.00	2	-1.0	8.4	7.9	-1	-1	-1
13	1	100.00	1	24.7	6.6	7.6	625	220	60
14	1	50.00	1	24.7	6.7	7.7	-1	-1	-1
15	1	25.00	1	24.7	6.6	7.8	-1	-1	-1
16	1	12.50	1	24.7	6.6	7.8	-1	-1	-1
17	1	6.25	1	24.7	6.6	7.8	-1	-1	-1
18	1	0.00	1	24.6	6.2	7.9	330	130	100
19	1	100.00	2	-1.0	8.2	7.9	-1	-1	-1
20	1	50.00	2	-1.0	8.6	7.9	-1	-1	-1
21	1	25.00	2	-1.0	8.7	7.9	-1	-1	-1
22	1	12.50	2	-1.0	8.7	7.9	-1	-1	-1
23	1	6.25	2	-1.0	8.7	7.9	-1	-1	-1
24	1	0.00	2	-1.0	8.7	7.9	-1	-1	-1
25	2	100.00	1	24.8	6.9	7.6	700	250	60
26	2	50.00	1	24.8	6.6	7.6	-1	-1	-1
27	2	25.00	1	24.8	6.8	7.7	-1	-1	-1
28	2	12.50	1	24.7	6.4	7.6	-1	-1	-1
29	2	6.25	1	24.9	6.6	7.7	-1	-1	-1
30	2	0.00	1	24.7	7.0	7.7	305	110	80
31	2	100.00	2	-1.0	8.8	7.7	-1	-1	-1
32	2	50.00	2	-1.0	8.8	7.8	-1	-1	-1
33	2	25.00	2	-1.0	8.8	7.9	-1	-1	-1
34	2	12.50	2	-1.0	8.8	7.9	-1	-1	-1
35	2	6.25	2	-1.0	8.8	7.9	-1	-1	-1
36	2	0.00	2	-1.0	8.8	7.9	-1	-1	-1
37	3	100.00	1	24.8	6.6	7.4	600	240	60
38	3	50.00	1	24.8	6.2	7.5	-1	-1	-1
39	3	25.00	1	24.8	6.3	7.6	-1	-1	-1
40	3	12.50	1	24.8	6.3	7.7	-1	-1	-1
41	3	6.25	1	24.9	6.1	7.7	-1	-1	-1
42	3	0.00	1	24.7	6.6	7.8	310	100	80
43	3	100.00	2	-1.0	8.6	7.8	-1	-1	-1
44	3	50.00	2	-1.0	8.6	7.9	-1	-1	-1
45	3	25.00	2	-1.0	8.6	8.0	-1	-1	-1
46	3	12.50	2	-1.0	8.4	8.0	-1	-1	-1
47	3	6.25	2	-1.0	8.5	8.0	-1	-1	-1
48	3	0.00	2	-1.0	8.5	8.1	-1	-1	-1
49	4	100.00	1	24.6	6.4	7.5	650	240	60
50	4	50.00	1	24.8	6.3	7.4	-1	-1	-1
51	4	25.00	1	24.8	6.5	7.6	-1	-1	-1
52	4	12.50	1	24.7	6.2	7.7	-1	-1	-1
53	4	6.25	1	24.6	6.2	7.8	-1	-1	-1
54	4	0.00	1	24.7	6.1	7.8	330	100	80
55	4	100.00	2	-1.0	8.7	7.8	-1	-1	-1

GAS 9/28/94

Data listing File: p357wq17 Date: 09-15-1994

FILTER: None

Obs.	DAY	CONC	OLDNEW	TEMP	DO	PH	COND	HARD	ALK
56	4	50.00	2	-1.0	8.5	7.8	-1	-1	-1
57	4	25.00	2	-1.0	8.4	7.8	-1	-1	-1
58	4	12.50	2	-1.0	8.4	7.8	-1	-1	-1
59	4	6.25	2	-1.0	8.4	7.8	-1	-1	-1
60	4	0.00	2	-1.0	8.4	7.8	-1	-1	-1
61	5	100.00	1	24.9	6.2	7.4	700	240	60
62	5	50.00	1	24.9	6.2	7.5	-1	-1	-1
63	5	25.00	1	24.9	6.3	7.7	-1	-1	-1
64	5	12.50	1	24.8	5.8	7.8	-1	-1	-1
65	5	6.25	1	24.9	6.2	7.8	-1	-1	-1
66	5	0.00	1	24.7	6.0	7.8	320	100	90
67	5	100.00	2	-1.0	8.5	7.7	-1	-1	-1
68	5	50.00	2	-1.0	8.4	7.8	-1	-1	-1
69	5	25.00	2	-1.0	8.4	7.8	-1	-1	-1
70	5	12.50	2	-1.0	8.3	7.9	-1	-1	-1
71	5	6.25	2	-1.0	8.4	7.9	-1	-1	-1
72	5	0.00	2	-1.0	8.4	7.9	-1	-1	-1
73	6	100.00	1	25.0	6.9	7.5	600	210	40
74	6	50.00	1	25.0	6.2	7.5	-1	-1	-1
75	6	25.00	1	25.1	6.7	7.7	-1	-1	-1
76	6	12.50	1	25.0	5.9	7.6	-1	-1	-1
77	6	6.25	1	25.0	6.2	7.7	-1	-1	-1
78	6	0.00	1	25.0	6.6	7.8	315	120	60
79	6	100.00	2	-1.0	8.0	7.7	-1	-1	-1
80	6	50.00	2	-1.0	8.4	7.8	-1	-1	-1
81	6	25.00	2	-1.0	8.4	7.9	-1	-1	-1
82	6	12.50	2	-1.0	8.4	7.8	-1	-1	-1
83	6	6.25	2	-1.0	8.5	7.8	-1	-1	-1
84	6	0.00	2	-1.0	8.6	7.9	-1	-1	-1
85	7	100.00	1	25.0	7.4	7.4	800	280	50
86	7	50.00	1	24.9	7.0	7.4	-1	-1	-1
87	7	25.00	1	24.9	6.6	7.4	-1	-1	-1
88	7	12.50	1	24.8	6.3	7.3	-1	-1	-1
89	7	6.25	1	24.8	6.6	7.3	-1	-1	-1
90	7	0.00	1	24.8	7.0	7.3	305	110	70
91	7	100.00	2	-1.0	-1.0	-1.0	-1	-1	-1
92	7	50.00	2	-1.0	-1.0	-1.0	-1	-1	-1
93	7	25.00	2	-1.0	-1.0	-1.0	-1	-1	-1
94	7	12.50	2	-1.0	-1.0	-1.0	-1	-1	-1
95	7	6.25	2	-1.0	-1.0	-1.0	-1	-1	-1
96	7	0.00	2	-1.0	-1.0	-1.0	-1	-1	-1

escriptive statistics File: p357wq17 Date: 09-15-1994

(LAT) 9/28/94

FILTER: None

Observations meeting filter conditions: 96

Variable	N	Mean	Standard Deviation	Variance	Minimum	Maximum	Coeff. of Variation
TEMP	42	24.814	0.124	0.015	24.600	25.100	0.500
D	84	7.485	1.061	1.126	5.800	8.800	14.176
PH	84	7.739	0.180	0.032	7.300	8.100	2.322
COND	14	492.143	188.891	35679.672	305.000	800.000	38.381
ARD	14	175.000	69.587	4842.308	100.000	280.000	39.764
ALK	14	67.857	16.257	264.286	40.000	100.000	23.957

SCOEPA00028561

GAD 9/28/94

Descriptive statistics File: p357wq17 Date: 09-15-1994

FILTER: Keep if CONC = 100

Observations meeting filter conditions: 16

Variable	N	Mean	Standard Deviation	Variance	Minimum	Maximum	Coeff. of Variation
COND	7	667.857	71.755	5148.810	600.000	800.000	10.744
HARD	7	240.000	22.361	500.000	210.000	280.000	9.317
ALK	7	55.714	7.868	61.905	40.000	60.000	14.122

SCOEPA00028562

escriptive statistics File: p357wq17 Date: 09-15-1994

GAB 9/28/94

ILTER: Keep if CONC = 0

bservations meeting filter conditions: 16

Variable	N	Mean	Standard Deviation	Variance	Minimum	Maximum	Coeff. of Variation
OND	7	316.429	10.690	114.286	305.000	330.000	3.378
ARD	7	110.000	11.547	133.333	100.000	130.000	10.497
LK	7	80.000	12.910	166.667	60.000	100.000	16.137

GAB 9/28/94

Larval Fish Survival and Growth Test

Start Date:	16 Aug-94 13:00	Test ID:	357-17	Sample ID:	
End Date:	23 Aug-94 11:30	Protocol ID:	EPAF 89	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	GAB	Test Species:	PP Pimephales promelas
Comments:				Response:	Survival

Conc-%	1	2	3	4
N Control	0.900	1.000	1.000	1.000
6.25	0.900	0.800	1.000	0.900
12.5	1.000	1.000	0.400	0.800
25	1.000	0.900	1.000	1.000
50	1.000	0.900	0.700	0.900
100	0.100	0.100	0.000	0.200

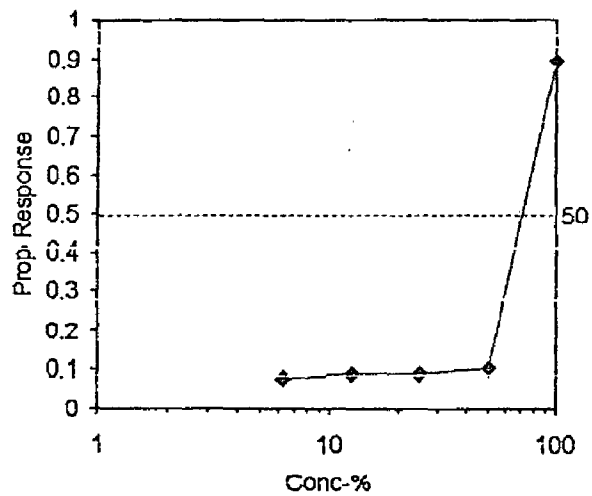
			Arcsin Squareroot Transformed Data					t				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Stat	Critical	MSD	NRESP	NDOSE
N Control	0.975	1.000	1.371	1.249	1.412	5.94	4					
6.25	0.900	0.923	1.254	1.107	1.412	9.93	4	0.925	2.410	0.305		
12.5	0.800	0.821	1.152	0.685	1.412	29.70	4	1.737	2.410	0.305		
25	0.975	1.000	1.371	1.249	1.412	5.94	4	0.000	2.410	0.305		
50	0.875	0.897	1.225	0.991	1.412	14.20	4	1.155	2.410	0.305		
100	0.100	0.103	0.316	0.159	0.464	39.37	4	*8.346	2.410	0.305		

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.918	0.884	-0.936	2.2619
Bartlett's Test indicates equality of variance (p = 0.1144)	8.868	15.086		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	F	Critical	df
Dunnett's Multiple Comparison	50	100	70.711	2	0.2046	0.6415	0.0319	20.084	2.7729	5, 18

	Proportional Response		
Conc-%	Mean	Iso	N-Iso
N Control	0.0250	0.0250	
6.25	0.1000	0.1000	0.0769
12.5	0.2000	0.1125	0.0897
25	0.0250	0.1125	0.0897
50	0.1250	0.1250	0.1026
100	0.9000	0.9000	0.8974

Trimmed Spearman-Karber



Alpha Trim-%	LC50	95% CL	
0	-	-	-
5	-	-	-
10	-	-	-
20	70.711	66.649	75.020
Auto-10.3	70.711	61.949	80.711

LAB 9/28/94

Larval Fish Survival and Growth Test

Start Date:	16 Aug-94 13:00	Test ID:	357-17	Sample ID:	
End Date:	23 Aug-94 11:30	Protocol ID:	EPAF 89	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	GAB	Test Species:	PP Pimephales promelas
Comments:				Response:	Growth-Weight

Conc-%	1	2	3	4
N Control	0.493	0.395	0.465	0.429
6.25	0.392	0.585	0.548	0.518
12.5	0.531	0.530	0.530	0.460
25	0.471	0.517	0.597	0.543
50	0.301	0.393	0.484	0.456
100	0.180	0.090	0.000	0.150

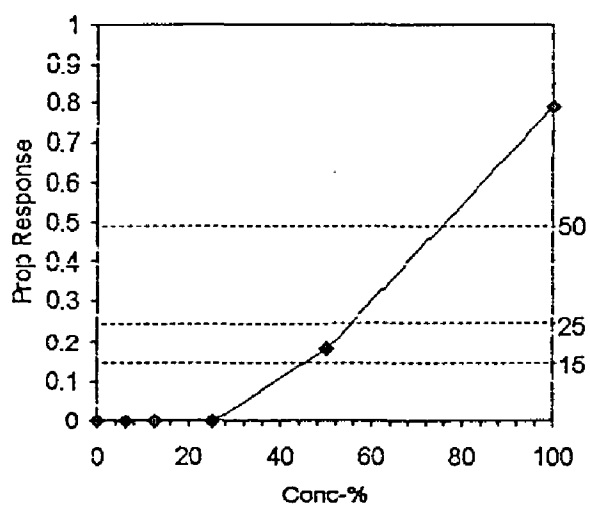
			Untransformed Data					t				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Stat	Critical	MSD	NRESP	NDOSE
N Control	0.446	1.000	0.446	0.395	0.493	9.60	4					
6.25	0.511	1.146	0.511	0.392	0.585	16.38	4	-1.479	2.360	0.104		
12.5	0.513	1.151	0.513	0.460	0.531	6.86	4	-1.524	2.360	0.104		
25	0.532	1.194	0.532	0.471	0.597	9.89	4	-1.959	2.360	0.104		
50	0.409	0.917	0.409	0.301	0.484	19.86	4	0.841	2.360	0.104		
100	0.105	0.236										

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.937	0.868	-0.694	-0.056
Bartlett's Test indicates equality of variance (p = 0.5645)	2.960	13.277		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	F	Critical	df
Dunnett's Multiple Comparison	50	100		2	0.1082	0.011	0.0039	2.8291	3.0556	4, 15

		Prop Response	
Conc-%	Iso	N-Mean	N-Iso
N Control	0.5003		
6.25	0.5003	-0.1463	0.0000
12.5	0.5003	-0.1507	0.0000
25	0.5003	-0.1938	0.0000
50	0.4085	0.0831	0.1833
100	0.1050	0.7644	0.7901

Linear Interpolation(ICp) with
80 bootstrap resamples



Point	Estimate	SD	95% CL (Exp)		Skew
IC1	26.364	2.476	25.329	31.072	-5.342
IC5	31.819	4.245	27.294	55.361	2.522
IC10	38.637	5.627	29.588	61.480	1.036
IC15	45.456	5.570	31.882	62.945	0.248
IC25	55.494	4.925	38.630	67.412	-0.463
IC40	67.855	3.956	54.790	76.790	-0.506
IC50	76.095	3.604	65.271	85.191	-0.263

Test: Larval Fish Survival and Growth Test

Species: PP Pimephales promelas

Test ID: 357-17 RTest ID: 9919-392 Analyst(s): GAB

Sample ID: Sample Type: EFF2 Industrial

Start Date/Time: 16 Aug-94 End Date/Time: 23 Aug-94

Pos	ID	Rep	Test Groups	Mean Weight	Start Count	Number Survived at Day 1	2	3	4	5	6	End	Total Weight	Tare Weight	Weight Count	Notes
	1	1	N Control	0.493	10							9	41.21	36.77	9	
	2	2	N Control	0.395	10							10	39.94	35.99	10	
	3	3	N Control	0.465	10							10	45.56	40.91	10	
	4	4	N Control	0.429	10							10	41.32	37.03	10	
	5	1	6.250	0.392	10							9	38.73	35.2	9	
	6	2	6.250	0.585	10							8	42.13	37.45	8	
	7	3	6.250	0.548	10							10	39.52	34.04	10	
	8	4	6.250	0.518	10							9	39.68	35.02	9	
	9	1	12.500	0.531	10							10	37.37	32.06	10	
	10	2	12.500	0.530	9							9	41.8	37.03	9	
	11	3	12.500	0.530	10							4	37.48	35.36	4	
	12	4	12.500	0.460	10							8	41.79	38.11	8	
	13	1	25.000	0.471	10							10	38.97	34.26	10	
	14	2	25.000	0.517	10							9	40.03	35.38	9	
	15	3	25.000	0.597	10							10	38.9	32.93	10	
	16	4	25.000	0.543	10							10	43.19	37.76	10	
	17	1	50.000	0.301	10							10	38.91	35.9	10	
	18	2	50.000	0.393	10							9	40.61	37.07	9	
	19	3	50.000	0.484	10							7	40.83	37.44	7	
	20	4	50.000	0.456	10							9	39.55	35.45	9	
	21	1	100.000	0.180	10							1	40.02	39.84	1	
	22	2	100.000	0.090	10							1	35.74	35.65	1	
	23	3	100.000	0.000	10							0	0	37.88	0	
	24	4	100.000	0.150	10							2	40.62	40.32	2	

-15-

ToxCalc v4.0

GAB 9/24/

CHAIN OF CUSTODY RECORD

Log number _____

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Ave.	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Dianne Mullan

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test							Hazardous sample Special handling required	Remarks
94-50	8-15-94	0800	AQ	Outfall Composite	1	X								sample held on ice. NAS # 2203E

Analyses required

Signature	Print Name	Company	Date	Time
Relinquished by: Dianne E Mullan	Dianne E. Mullan	Wacker Siltronic Corp.	8/15/94	0815
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by Laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	8-16-94	1055 A

NORTHWESTERN AQUATIC SCIENCES

A Division of NAS Associates, Inc.

PO Box 1437 Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

SCOEPA00028567

CHAIN OF CUSTODY RECORD

Log Number _____

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Ave.	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by / Sample description	Number of containers	Bioassay Test							Hazardous sample Special handling required	Remarks
94-51	8-17-94	0800	AQ	Outfall Composite	1	X								sample held on ice. NAS# 2219E TEMP ADJ RCV 170°C

Signature	Print Name	Company	Date	Time
Relinquished by: Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corp.	8-17-94	0830
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by Laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	8-18-94	1023 A

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ - Aqueous, WW - Wastewater, SL - Sludge, GW - Groundwater, SO - Soil, OT - Other, RE - Retest

SCOEPA00028568

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Ave.	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by / Sample description	Number of containers	Bioassay Test							Hazardous sample Special handling required	Remarks
94-52	8-19-94	0820	AQ	Outfall Composite	1	X								Sample held on ice.
														NAS# 2220E
														RECEIVING TEMP: 16.2°C

Signature	Print Name	Company	Date	Time
Relinquished by: Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic	8-19-94	0845
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by Laboratory: Carri J. Bullock	Carri J. Bullock	NAS	8-22-94	10:25A

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

SCOEPA00028569

TOXICITY TEST REPORT

RECEIVED SEP 2 9 1994
JJR

TEST IDENTIFICATION

Test No.: 357-18

Title: Cladoceran (*Ceriodaphnia dubia*) survival and reproduction test using static exposure to Wacker Siltronic Corp. outfall effluent.

Protocol No.: NAS-XXX-CD2, August 2, 1990. Revision 1 (1-18-92). Based on U.S. EPA. 1989. Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test, pp. 105-146. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR, 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Man./Study Dir.; L.K. Garrison-Nemeth, B.A., QA Officer; G.J. Irissarri, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 8-16-94, 1:00 p.m.

Test Ending: 8-24-94, 2:00 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	2203E	2219E	2220E
Collection Date	8-15-94	8-17-94	8-19-94
Receipt Date	8-16-94	8-18-94	8-22-94
Conductivity (µmhos/cm)	500	520	650
pH	7.9	7.5	7.3
Hardness (mg/L)	220	200	280
Alkalinity (mg/L)	60	50	40

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

SCOEPA00028570

DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 8-11-94 & 8-16-94
Pretreatment: Aerated ≥24 hours.

TEST ORGANISMS

Species: *Ceriodaphnia dubia*, cladoceran
Age: <24-hr
Source: NAS cultures
Culture Conditions: Temperature, 25.1 ± 0.1°C; dissolved oxygen, 7.8 ± 0.1 mg/L; conductivity, 273 ± 6 µmhos/cm; pH, 8.0 ± 0.1; hardness, 100 ± 0 mg/L as $CaCO_3$; alkalinity, 70 ± 0 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 1 oz. polystyrene medicine cups containing 15 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 10
Organisms/Treatment: 10
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: 0.1 ml each of YTC and *Selenastrum* suspension daily/beaker.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) inhibition of reproduction. Mortality was defined as lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.
Water Quality and Other Test Conditions: Temperature, 25.1 ± 0.1°C; dissolved oxygen, 7.8 ± 0.4 mg/L; conductivity, 557 ± 81 µmhos/cm (100% effluent), 272 ± 11 µmhos/cm (control); pH, 7.8 ± 0.1; hardness, 233 ± 42 mg/L as $CaCO_3$ (100% effluent), 110 ± 14 mg/L as $CaCO_3$ (control); alkalinity, 50 ± 10 mg/L as $CaCO_3$ (100% effluent), 65 ± 7 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The LC50 (survival) was calculated by the Trimmed Spearman-Karber Method (EPA 600/4-90-027). The IC25 (reproduction) was calculated using the Linear Interpolation Method with bootstrapping (EPA/600/4-89/001a). NOEC and LOEC values for survival and reproduction were computed using Fisher's Exact Test and either Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni adjustment, respectively. The statistical software employed for these calculations was ToxCalc, v. 4.0, Tidepool Scientific Software.

PROTOCOL DEVIATIONS

None.

REFERENCE TOXICANT TEST

Test No.: 999-393
Reference Toxicant and Source: $CdCl_2$-$2.5H_2O$, Mallinckrodt, Lot No. TNZ.
Test Date: 8-16-94
Dilution Water Used: Moderately hard synthetic water.

SCOEPA00028571

Result: 7-day LC50, 19.3 µg/L; 7-day IC25, 0.49 µg/L; NOEC, <1.0 µg/L. These test results are within the laboratory's control chart limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was 100% mortality of *C. dubia* exposed to 100% Wacker Siltronics outfall after 48 hours. Therefore, the effluent failed the acute test according to Oregon DEQ guidelines.

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2 and Table 3. The biological effects, given as the NOEC and LOEC for survival and reproduction, the 7-day LC50 for survival, and the 7-day IC25 for reporduction are shown below.

	Survival	Reproduction
NOEC (%)	25	<6.25
LOEC (%)	50	6.25
7-Day LC50/IC25 (%)	28.6	2.64
(95% conf. int.)	(22.0 - 37.2)	(2.30 - 3.73)
Method	Tr. Spearman-Karber	Linear Interpolation

STUDY APPROVAL

Gary A. Burkhart 9/28/94
Study Director Date

Julie R. Dione 9/28/94
Quality Assurance Unit Date

Richard D. Caldwell 9/28/94
Director, Aquatic Toxicology Date

SCOEPA00028572

Table 1. Ceriodaphnia survival data, 48-hour.

	Effluent concentration (%)	
	Control	100
Number exposed	10	10
Number dead	0	10

Table 2. Ceriodaphnia survival data, 7-day.

		Effluent concentration (%)				
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	2	0	1	10*	10*

*Significantly different from the control (P=0.05).

Table 3. Ceriodaphnia reproduction data (Number of young produced).

		Effluent concentration (%)				
Replicate	Control	6.25	12.5	25	50	100
1	23	26	10	10	0	0
2	25	17	12	8	0	0
3	29	3	13	11	0	0
4	24	3	10	11	0	0
5	31	8	13	14	0	0
6	30	3	0	15	0	0
7	22	18	19	0	0	0
8	14	17	14	11	0	0
9	34	9	14	12	0	0
10	34	2	6	9	0	0
Mean	26.6	10.6*	11.1*	10.1*	0.0*	0.0*

*Significantly less than the control (P=0.05).

SCOEPA00028573

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

CLADOCERAN (CERIODAPHNIA DUBIA) SURVIVAL AND REPRODUCTION TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the cladoceran, Ceriodaphnia dubia (EPA Method 1002.0).

1.2 Summary of Method: Neonate (<24-hr-old) Ceriodaphnia dubia, are exposed for seven days (or until 60% of surviving control organisms have three broods of young) to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 30 ml borosilicate glass or plastic beakers, each containing 15 ml of test solution. Ten replicate beakers, each with one neonate, are employed at each test concentration. Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Qual. Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

SCOEPA00028575

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 30 ml borosilicate glass or plastic beakers holding 15 ml of test solution. Temperature and photoperiod control of test chambers is provided by incubation in an environmental chamber or water bath.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS

6.1 Species: Cladoceran, *Ceriodaphnia dubia*

6.2 Source: *Ceriodaphnia* neonates are supplied from the NAS laboratory culture. The original culture was obtained from the EPA Environmental Research Laboratory, Corvallis, OR.

6.3 Age at Study Initiation: <24-hr-old neonates; and all released within an 8-hr period.

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6.4 Pretest Culture and Handling: Individual cultures are used as the immediate source of neonates for toxicity testing. Source cultures are handled in a similar manner as test organisms for at least seven days and the neonates are then used to initiate tests. Source cultures are transferred to new medium and fed at least three times a week (e.g. Mon, Wed, Fri). Records of the source cultures are kept and if mortality exceeds 20% or if less than 15 young are produced per week, the cultures are not used as a source of neonates for testing.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of neonates to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days or until 60% of the surviving control animals produce three broods. Each treatment consists of ten replicate test containers each containing one cladoceran. A stratified random design is used for beaker placement.

7.2 Effect Criteria: The effect criteria are: 1) mortality, and 2) inhibition of reproduction. Mortality is defined as the lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.

7.3 Test Conditions: The test temperature employed is 25 $\pm$ 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. The test solution is replaced once daily.

7.4 Beginning of Test: The test solutions are added to the test beakers and food is added. The test is then begun by adding one neonate to each test container.

7.5 Feeding: The organisms are fed when the test is initiated, and daily thereafter. Food is added to the fresh medium immediately before or immediatedly after the adults are transferred. Each feeding consists of 0.1 ml YTC per 15 ml test solution and 0.1 ml *Selanastrum* concentrate per 15 ml test solution.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days (or until 60% of surviving control organisms have three broods of young). The type and frequency of observations to be made during the test are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival (of adult)	Daily before transfer
Reproduction (young produced)	Daily after adult transfer
Physical and Chemical Data	
Temperature (two locations in environmental control system)	Daily

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Dissolved oxygen, pH (High, medium, & low concentrations & control)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control & each new effluent sample)	e.g. Days 1, 3, & 5

During the test, dead adult organisms are removed every 24 hours and the young are discarded daily after counting. Dissolved oxygen is measured in each stock test solution using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured in each stock test solution using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using test kits.

7.7 Criteria of Test Acceptance: The test results are acceptable if: 1) survival in the controls is at least 80% and reproduction in the controls averages 15 or more young per surviving female. At least 60% of surviving females in controls should have produced their third brood.

8. DATA ANALYSIS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests (e.g. Dunnett's Test, Fisher's Exact Test, or Steel's Many-one Rank Test).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

SCOEPA00028578

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. Environmental Protection Agency. 1989. Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test. Method 1002.0. *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

U.S. Environmental Protection Agency. 1989. Supplement to "Short-term methods for estimating the chronic toxicity of effluents and surface waters to freshwater organisms". Revision 1. EPA/600/4-89/001a.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028579

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 357-18 Investigator GAB 9/23/94

STUDY MANAGEMENT

Client: WACKER SILTRONICS

Client's Study Monitor: Mr Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: NEWPORT LABORATORY

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.A. Buhler GAB

QA Officer C.K. Garrison - Never for JAM

1. G.J. IRISSARRI, GJI 2.

3. 4.

Study Schedule:

Test Beginning: 8-16-94 1000 Test Ending: 8-24-94 2000

TEST MATERIAL

Description: OUTFALL COMPOSITE

NAS Sample No.:	2203E	2219E	2220E		
Date of Collection:	8-15-94	8-17-94	8-19-94		
Date of Receipt:	8-16-94	8-18-94	8-22-94		
Conductivity (µmhos/cm):	500	520	650		557±81
pH:	7.9	7.5	7.3		7.6±0.3
Hardness (mg/L):	220	200	280		233±42
Alkalinity (mg/L):	60	50	40		50±10
:					

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)

Date of Preparation: 8-11-94, 8-16-94, 272±11, 8.1±0.1

Water Quality: Conductivity (µmhos/cm) 280, 265 pH 8.0, 8.2

Hardness (mg/L) 100, 120 Alkalinity (mg/L) 70, 60

Treatments: Aerated 24-hr., 110±14 65±7

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran

Age: (<24-hr; all released within 8 hr) < 24 HRS OLD

Source: (NAS cultures) NAS CULTURES

Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (100%, 50%, 25%, 12.5%, 6.25%, 0%) 100%, 50%, 25%, 12.5%, 6.25%, Ø

Test chambers: (30 ml beakers) 30 ML PLASTIC CUPS

Test volume: (15 ml) 15 ML

Replicates/treatment: (10) 10

Organisms/treatment: (10) 10

Test water changes: Daily

Aeration during test: None

Feeding: 0.1 ml each of YTC and algal suspension daily

Beaker placement: Stratified randomization

8/1/90

SCOEPA00028581

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET (CONTINUED)

Test No. 357-18 Investigator GAB 9/28/94

Randomization chart:

Ø	50	50	6.25	100	6.25	25	12.5	50	12.5
12.5	100	Ø	50	Ø	12.5	6.25	25	100	50
100	25	6.25	12.5	25	25	100	50	Ø	100
6.25	12.5	25	Ø	50	100	12.5	Ø	25	6.25
25	Ø	12.5	100	6.25	Ø	50	100	12.5	25
50	6.25	100	25	12.5	50	Ø	6.25	6.25	Ø

PREPARATION OF TEST SOLUTIONS

Concentration of working stock solution ( )

(A 1.0 µg/L working stock is prep'd from the conc. stock by serial dilution; e.g. 1 to 10, then 1 to 100.)

Test Conc (%)	EFFLUENT ~~Toxicant~~ (WACKER OUTFALL) (ml/150 ml) COMP.	Dilution Water (ml/150 ml)
100	150	0
50	75	75
25	37.5	112.5
12.5	18.75	131.25
6.25	9.4	140.6
Ø	Ø	150

MISCELLANEOUS NOTES

8/1/90

SCOEPA00028582

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

GAB 9/28/94

Test No. 357-18 Investigator

DAY 0 (8/16/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		7.8		7.8
Med. (25)		8.0		8.0
Low (6.25)		8.1		8.0
Control		8.0		7.9

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

DAY 1 (8/17/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.4	7.6	7.7	7.9
Med. (25)	7.5	7.9	7.8	7.9
Low (6.25)	7.4	8.0	7.9	7.9
Control	7.4	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 2 (8/18/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.4	8.2	7.8	7.9
Low (6.25)	7.4	8.1	7.8	7.9
Control	7.3	8.0	7.9	7.9

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

DAY 3 (8/19/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.4	8.0	7.8	7.9
Low (6.25)	7.3	8.1	7.9	7.9
Control	~~7.8~~ 7.4 GJI	8.1	7.8	7.9

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

WQ				
	$\bar{X}$	7.8	7.8	25.1
	SD	0.4	0.1	0.1
	(N)	(51)	(51)	(18)

8/1/90

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-18 Investigator GAB 9/28/94

DAY 4 (8/20/94) GAB

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.9	8.2	7.8	7.8
Low (6.25)	7.8	8.2	7.8	7.8
Control	7.8	8.2	7.8	7.8

Temp #1 (°C): 25.0
Temp #2 (°C): 25.1

Notes:

DAY 5 (8/21/94) GAB

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.7	8.4	7.8	7.8
Low (6.25)	7.8	8.3	7.8	7.8
Control	7.8	8.3	7.9	7.8

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

DAY 6 (8/22/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.5	8.1	7.9	7.8
Low (6.25)	7.4	8.1	7.9	7.9
Control	7.4	8.0	7.8	7.8

Temp #1 (°C): 25.0
Temp #2 (°C): 25.1

Notes:

DAY 7 (8/23/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.4	8.1	7.9	7.8
Low (6.25)	7.4	8.0	7.9	7.9
Control	7.4	8.0	7.8	7.8

Temp #1 (°C): 25.0
Temp #2 (°C): 25.1

Notes:

DAY 8 8-24-94 GJI

CONC %	D.O mg/L	PH
HIGH 100	—	—
MED 25	7.1	7.7
LOW 6.25	7.2	7.8
CONTROL	7.3	7.8

TEMP#1 (°C): 25.1 ~~25.2~~ GJI
TEMP#2 (°C): 25.2

8/1/90

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

GAD 9/28/94

Test No. 357-18 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0	0		
	2	0	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	4	2	2	3	4	2	6	3	0	1	27		
ϕ	5	6	3	4	0	7	6	0	3	4	3	36		
	6	5	0	6	11	2	0	3	4	5	11	47		
	7	0	10	9	10	8	8	0	0	9	0	54		
	8	8	10	8	0	10	14	13	4	16	19	102		
	Total	23	25	29	24	31	30	22	14	34	34	266		

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0	0		
	2	0	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	4	0	2	0	0	0	0	4	0	1	11		
6.25	5	0	4	0	2	6	3	4	0	3	0	22		
%	6	5	0	0	X1	0	0	6	5	0	0	17		
	7	9	6	X1	↓	0	0	0	2	0	1	19		
	8	8	7	↓	↓	2	0	8	6	6	0	37		
	Total	26	17	3	3	8	3	18	17	9	2	106		

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0	0		
	2	0	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	0	0	0	0	0		
	4	2	0	0	0	0	0	2	3	1	0	8		
12.5	5	2	2	3	0	3	0	0	0	0	0	10		
%	6	3	5	4	6	4	0	4	4	6	3	39		
	7	3	0	5	4	6	0	7	5	4	3	37		
	8	0	5	1	0	0	0	6	2	3	0	17		
	Total	10	12	13	10	13	0	19	14	14	6	111		

8/1/90

SCOEPA00028585

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

GAD 9/28/94

Test No. 357-18 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
25 %	1	0	0	0	0	0	0	0	0	0	0	0		
	2	0	0	0	0	0	0	0	0	0	0	0		
	3	0	0	0	0	0	0	X°	0	0	0	0		
	4	2	0	1 Dd	0	1	0	↓	1	0	3	8		
	5	0	2	0	3	0	0	↓	0	0	0	5		
	6	0	2	3	3	6	4	↓	7	3	1	29		
	7	4	4	5	0	3	7	↓	0	4	5	32		
	8	4	0	2	X5	4	4	↓	X3	5	0	27		
	Total	10	8	11	11	14	15	0	11	12	9	101		

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
50 %	1	X°	X°	X°	X°	X°	X°	X°	X°	X°	X°	0		
	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	4	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	6	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	7	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	Total											0	0	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
100 %	1	X°	X°	X°	X°	X°	X°	X°	X°	X°	X°			
	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	4	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	6	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	7	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	Total											0	0	

KAB 9/28/94

Brood Board

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

DAY 0 8-9-94 GJI

pH 8.3	DO 8.1 mg/L
COND 270 umhos	HARD 100 mg/L
TEMP 25.2 °C	ALK 60 mg/L

DAY 0 8-9-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7													
	8													
	Total													

DAY 1 8-10-94 GJI

pH 8.1	DO 8.2 mg/L
COND 270 umhos	HARD — mg/L
TEMP 25.1 °C	ALK — mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

GJI

DAY 1 8-10-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7													
	8													
	Total													

DAY 2 8-11-94 GJI

pH 8.1	DO 8.2 mg/L
COND 260 umhos	HARD — mg/L
TEMP 25.1 °C	ALK — mg/L

DAY 2 8-11-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7													
	8													
	Total													

DAY 3 8-12-94 GJI

pH 7.7	DO 7.8 mg/L
COND ~~370~~ 340 GJI umhos	HARD — mg/L
TEMP 25.2 °C	ALK — mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

GJI

DAY 3 8-12-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7													
	8													
	Total													

SCOEPA00028587

9/28/94

Brood Board

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

DAY 0

pH 8.1	DO 7.7 mg/L
COND 270 umhos	HARD 100 mg/L
TEMP 25.2 °C	ALK 70 mg/L

DAY 4 8-13-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	2	0	4	0	0	0			
	2	0	0	0	2	0	0	3	0	0	0			
	3	0	0	0	0	0	0	2	0	2	0			
	4	0	0	0	0	2	0	3	4	0	0			
	5	0	0	0	0	0	0	0	0	4	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7													
	8													
	Total													

$\bar{X} \pm SD$ (N=3)

Temp 25.1±0.1
DO 7.8±0.1
pH 8.0±0.1
cond 273±6
hard 100±0(2)
alk 70±0(2)

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

GJI

DAY 5 8-14-94 GJI

pH 8.0	DO 8.0 mg/L
COND 280 umhos	HARD 100 mg/L
TEMP 25.1 °C	ALK 70 mg/L

DAY 5 8-14-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	4	1	3	0	6	2	0	0	0	0			
	2	4	4	0	0	0	2	0	3	3	0			
	3	3	0	4	4	4	0	0	4	4	4			
	4	4	5	0	1	0	2	0	0	0	3			
	5	3	5	4	2	5	4	2	2	0	2			
	6	2	0	0	4	2	0	6	2	0	5			
	7													
	8													
	Total													

DAY 6 8-15-94 GJI

pH 8.0	DO 7.8 mg/L
COND 270 umhos	HARD — mg/L
TEMP 25.1 °C	ALK — mg/L

DAY 6 8-15-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	6	6	7	6	0	8	9	10	10	6			
	2	8	0	1	10	6	4	4	12	3	7			
	3	5	0	0	0	2	5	2	2	0	7			
	4	3	1	2	8	8	0	7	8	0	11			
	5	0	6	5	1	10	0	7	7	10	10			
	6	10	4	0	1	2	0	0	8	0	4			
	7													
	8													
	Total													

DAY

pH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

SCOEPA00028588

KAB 9/28/94

Ceriodaphnia Survival and Reproduction Test

Start Date:	16 Aug-94 13:00	Test ID:	357-18	Sample ID:	
End Date:	24 Aug-94 14:00	Protocol ID:	EPAF 89	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	GAB	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Survival

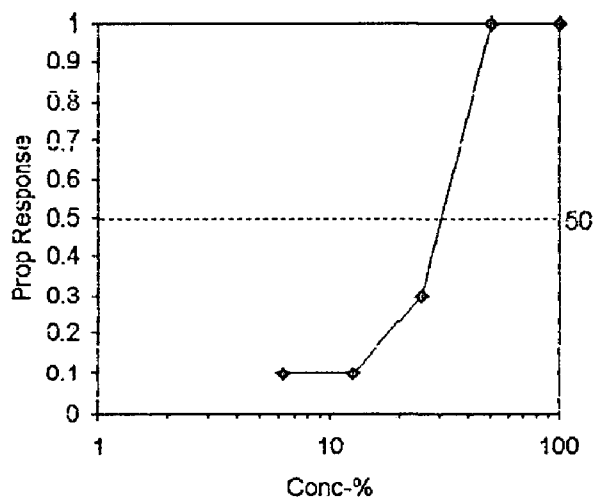
Conc-%	Alive	Dead	Total	Fisher P
N Control	10	0	10	
6.25	8	2	10	0.2368
12.5	10	0	10	1.0000
25	7	3	10	0.1053
50	0	10	10	0.0000
100	0	10	10	0.0000

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	25	50	35.355	4

	Proportional Response		
Conc-%	Mean	Iso	N-Iso
N Control	0.0000	0.0000	
6.25	0.2000	0.1000	0.1000
12.5	0.0000	0.1000	0.1000
25	0.3000	0.3000	0.3000
50	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000

Alpha Trim-%	LC50	95% CL	
0	-	-	-
5	-	-	-
10	28.646	22.048	37.219
20	29.853	20.744	42.963
Auto-10	28.646	22.048	37.219

Trimmed Spearman-Karber



SCOEPA00028589

GAS 9/28/94

Ceriodaphnia Survival and Reproduction Test

Start Date:	16 Aug-94 13:00	Test ID:	357-18	Sample ID:	
End Date:	24 Aug-94 14:00	Protocol ID:	EPAF 91	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	GAB	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Reproduction

Conc-%	1	2	3	4	5	6	7	8	9	10
N Control	23.00	25.00	29.00	24.00	31.00	30.00	22.00	14.00	34.00	34.00
6.25	26.00	17.00	3.00	3.00	8.00	3.00	18.00	17.00	9.00	2.00
12.5	10.00	12.00	13.00	10.00	13.00	0.00	19.00	14.00	14.00	6.00
25	10.00	8.00	11.00	11.00	14.00	15.00	0.00	11.00	12.00	9.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

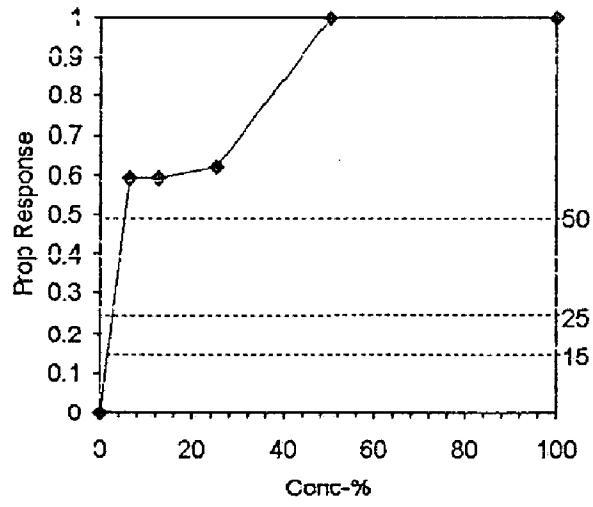
			Untransformed Data					t				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Stat	Critical	MSD	NRESP	NDOSE
N Control	26.60	1.000	26.60	14.00	34.00	23.39	10					
6.25	10.60	0.398	10.60	2.00	26.00	78.96	10	*5.798	2.137	5.896		
12.5	11.10	0.417	11.10	0.00	19.00	46.42	10	*5.617	2.137	5.896		
25	10.10	0.380	10.10	0.00	15.00	40.81	10	*5.979	2.137	5.896		
50	0.00	0.000										
100	0.00	0.000										

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.979	0.919	-0.053	0.1864
Bartlett's Test indicates equality of variance (p = 0.1988)	4.656	11.345		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	F	Critical	df
Dunnett's Multiple Comparison	<6.25	6.25			6.1367	641.67	38.072	16.854	2.8663	3, 36

		Prop Response	
Conc-%	Iso	N-Mean	N-Iso
N Control	26.60		
6.25	10.85	0.6015	0.5921
12.5	10.85	0.5827	0.5921
25	10.10	0.6203	0.6203
50	0.00	1.0000	1.0000
100	0.00	1.0000	1.0000

Linear Interpolation(ICp) with 80 bootstrap resamples



Point	Estimate	SD	95% CL		Skew
IC1*	0.106	0.015	0.092	0.149	2.025
IC5*	0.528	0.077	0.461	0.745	2.025
IC10*	1.056	0.154	0.922	1.491	2.025
IC15*	1.583	0.231	1.382	2.236	2.025
IC25*	2.639	0.386	2.304	3.727	2.025
IC40*	4.222	0.719	3.686	5.964	3.139
IC50*	5.278	2.947	4.608	10.457	5.329

ToxCalc v4.0/047

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 357-18 RTest ID: 999-393 Analyst(s): GAB

Sample ID: Sample Type: EFF2 Industrial

Start Date/Time: 16 Aug-94 End Date/Time: 24 Aug-94

Pos	ID	Rep	Test Groups	Number of Young	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	1	1	N Control	23.000	23								1	
	2	2	N Control	25.000	25								1	
	3	3	N Control	29.000	29								1	
	4	4	N Control	24.000	24								1	
	5	5	N Control	31.000	31								1	
	6	6	N Control	30.000	30								1	
	7	7	N Control	22.000	22								1	
	8	8	N Control	14.000	14								1	
	9	9	N Control	34.000	34								1	
	10	10	N Control	34.000	34								1	
	11	1	6.250	26.000	26								1	
	12	2	6.250	17.000	17								1	
	13	3	6.250	3.000	3								0	
	14	4	6.250	3.000	3								0	
	15	5	6.250	8.000	8								1	
	16	6	6.250	3.000	3								1	
	17	7	6.250	18.000	18								1	
	18	8	6.250	17.000	17								1	
	19	9	6.250	9.000	9								1	
	20	10	6.250	2.000	2								1	
	21	1	12.500	10.000	10								1	
	22	2	12.500	12.000	12								1	
	23	3	12.500	13.000	13								1	
	24	4	12.500	10.000	10								1	
	25	5	12.500	13.000	13								1	
	26	6	12.500	0.000	0								1	
	27	7	12.500	19.000	19								1	
	28	8	12.500	14.000	14								1	
	29	9	12.500	14.000	14								1	
	30	10	12.500	6.000	6								1	

ToxCalc v4.0

GAB 9/28/94

SCOEPA00028591

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 357-18 RTest ID: 999-393 Analyst(s): GAB

Sample ID: Sample Type: EFF2 Industrial

Start Date/Time: 16 Aug-94 End Date/Time: 24 Aug-94

Pos	ID	Rep	Test Groups	Number of Young	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	31	1	25.000	10.000	10								1	
	32	2	25.000	8.000	8								1	
	33	3	25.000	11.000	11								1	
	34	4	25.000	11.000	11								0	
	35	5	25.000	14.000	14								1	
	36	6	25.000	15.000	15								1	
	37	7	25.000	0.000	0								0	
	38	8	25.000	11.000	11								0	
	39	9	25.000	12.000	12								1	
	40	10	25.000	9.000	9								1	
	41	1	50.000	0.000	0								0	
	42	2	50.000	0.000	0								0	
	43	3	50.000	0.000	0								0	
	44	4	50.000	0.000	0								0	
	45	5	50.000	0.000	0								0	
	46	6	50.000	0.000	0								0	
	47	7	50.000	0.000	0								0	
	48	8	50.000	0.000	0								0	
	49	9	50.000	0.000	0								0	
	50	10	50.000	0.000	0								0	
	51	1	100.000	0.000	0								0	
	52	2	100.000	0.000	0								0	
	53	3	100.000	0.000	0								0	
	54	4	100.000	0.000	0								0	
	55	5	100.000	0.000	0								0	
	56	6	100.000	0.000	0								0	
	57	7	100.000	0.000	0								0	
	58	8	100.000	0.000	0								0	
	59	9	100.000	0.000	0								0	
	60	10	100.000	0.000	0								0	

ToxCalc v4.0

GAB 9/28/94

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Ave.	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Dianne Mullan

Analyses required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay TEST							Hazardous sample Special handling required	Remarks
94-50	8-15-94	0800	AQ	Outfall Composite	1	X								sample held on ice. NAS# 2203E

	Signature	Print Name	Company	Date	Time
Relinquished by	Dianne E Mullan	Dianne E. Mullan	Wacker Siltronic Corp.	8/15/94	0815
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	8-16-94	1055 A

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

SCOEPA00028593

CHAIN OF CUSTODY RECORD

Log Number _____

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Ave.	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required ✓

Lab Sample number	Date sampled ✓	Time sampled ✓	Type* See key below ✓	Sampled by ✓ / Sample description ✓	Number of containers ✓	Biossay Test							Hazardous sample Special handling required	Remarks ✓
94-51	8-17-94	0800	AQ	Outfall Composite	1	X								sample held on ice.
														NAS# 2219E
														TEMP ADJ Rec 17.0°C

Signature ✓	Print Name ✓	Company ✓	Date ✓	Time ✓
Relinquished by: Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corp.	8-17-94	0830
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by Laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	8-18-94	1023 A

NORTHWESTERN AQUATIC SCIENCES
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P.O. Box 1437, Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

GAB 9/28/94

CHAIN OF CUSTODY RECORD

Log Number _____

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Ave.	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by / Sample description	Number of containers	Bioassay Test							Hazardous sample Special handling required	Remarks
94-52	8-19-94	0820	AQ	Outfall Composite	1	X								Sample held on ice.
														NAS# 2220E
														RECEIVING TEMP: 16.2°C

Signature	Print Name	Company	Date	Time
Relinquished by: Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic	8-19-94	0845
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by Laboratory: Carri J. Bullock	Carri J. Bullock	NAS	8-22-94	10:25A

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petrole

SCOEPA00028595

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

RECEIVED DEC 1 3 1994
SJR

December 12, 1994

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is test report No. 357-19 for a Ceriodaphnia dubia dual endpoint test. As in the previous Ceriodaphnia chronic test (No. 357-18), this test failed to meet DEQ guidelines for acute toxicity. The chronic test also yielded similar results as previously; the NOEC was <6.25% effluent, the IC25 was 1.89% effluent, and the 7-day LC50 was 15.1% effluent.

If you have any questions about these test results, please call me at (503) 265-7225.

Sincerely,

Gary A. Buhler
Project Manager

Encl.

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-19

Title: Cladoceran (*Ceriodaphnia dubia*) dual endpoint (acute/chronic) test using static exposure to Wacker Siltronic Corp. outfall effluent.

Protocol No.: NAS-XXX-CD2, August 2, 1990. Revision 1 (1-18-92). Based on U.S. EPA. 1989. Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test, pp. 105-146. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR, 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Man./Study Dir.; L.K. Garrison-Nemeth, B.A., QA Officer; G.J. Irissarri, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 10-13-94, 1:30 p.m.

Test Ending: 10-20-94, 2:00 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronics Corp. effluent; samples are 24HC. Details are as follows:

NAS Sample No.	2615E	2639E	2640E
Wacker ID	94-61	94-63	94-65
Collection Date	10-12-94	10-14-94	10-17-94
Receipt Date	10-13-94	10-15-94	10-18-94
Conductivity (µmhos/cm)	700	720	600
pH	6.8	7.3	7.4
Hardness (mg/L)	220	240	150
Alkalinity (mg/L)	40	60	40

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container in the dark until tested.

SCOEPA00028597

DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 10-7-94
Water Quality: Conductivity, 260 µmhos/cm; pH, 7.6; Hardness, 110 mg/L as $CaCO_3$; Alkalinity, 70 mg/L as $CaCO_3$.
Pretreatment: Aerated ≥24 hr

TEST ORGANISMS

Species: *Ceriodaphnia dubia*, cladoceran
Age: <24-hr
Source: NAS cultures
Culture Conditions: Temperature, 24.9 ± 0.1°C; dissolved oxygen, 8.1 ± 0.1 mg/L; conductivity, 264 ± 5 µmhos/cm; pH, 7.8 ± 0.2; hardness, 103 ± 6 mg/L as $CaCO_3$; alkalinity, 77 ± 6 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 1 oz. polystyrene cups containing 15 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 10
Organisms/Treatment: 10 (1/repl)
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: 0.1 ml each of YTC and *Selenastrum* suspension daily/beaker.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) inhibition of reproduction. Mortality was defined as lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.
Water Quality and Other Test Conditions: Temperature, 25.0 ± 0.1°C; dissolved oxygen, 7.7 ± 0.5 mg/L; conductivity, 673 ± 64 µmhos/cm (100% effluent), 260 µmhos/cm (control); pH, 7.6 ± 0.2; hardness, 203 ± 47 mg/L as $CaCO_3$ (100% effluent), 110 mg/L as $CaCO_3$ (control); alkalinity, 47 ± 12 mg/L as $CaCO_3$ (100% effluent), 70 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The LC50 (survival) was calculated, where data permitted, either by the probit or the Trimmed Spearman-Karber methods (EPA 600/4-90-027). The IC25 (reproduction) was calculated using the Linear Interpolation Method with bootstrapping (EPA 600/4-89/001a). NOEC and LOEC values for survival and reproduction were computed using Fisher's Exact Test and either Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni Adjustment, respectively. The appropriate test for the latter endpoint was selected after evaluating the data for normality and homogeneity of variance. Reproduction data at certain treatment levels were excluded from the hypothesis test calculation if there was a survival effect. The statistical software employed for these calculations was ToxCalc, v. 4.0, Tidepool Scientific Software.

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PROTOCOL DEVIATIONS

There were no protocol deviations for the main test. However, the reference toxicant test results exceeded the laboratory's control chart control limits for the reproduction endpoint. The significance of this result for the present test is considered in the next section (Reference Toxicant Test) of this report.

REFERENCE TOXICANT TEST

Test No.: 999-422
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 10-13-94
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 9.07 µg/L Cd; 7-day IC25, 4.85 µg/L Cd; NOEC, 3.0 µg/L Cd. The IC25 result exceeds the laboratory's control chart warning and control limits.

The reference toxicant test (Appendix III) run concurrent with this study yielded a reproduction IC25 value (4.85 µg/L Cd) that exceeded the laboratory's control chart upper control limit (4.29 µg/L Cd) based on all tests as of this report date. The survival LC50 for the test (9.07 µg/L Cd) was within the control chart limits. NAS's control charts and reference toxicant database for this test are shown in Appendix IV. The growth control chart clearly shows that the 7-day IC25 is grossly different than the normal response in this test and might be interpreted to mean that the organisms were much less sensitive to toxicants than normal. The survival chart, however, suggests that the organisms were normal to more sensitive than average. From general observation of the organisms in the reference test (No. 999-422) and the concurrent effluent test (No. 357-19) we do not have any reason to believe that the animals were abnormal. We have not been able to identify any specific cause of the abnormal growth response, but feel that it could represent a laboratory error. We conclude, therefore, that this spurious growth response should not disqualify the study and that the animals be provisionally accepted as normal.

TEST RESULTS

Acute Endpoint: A detailed tabulation of the acute test results is given in Table 1. There was 100% mortality of daphnids exposed to 100% effluent after 48 hours. Therefore, the effluent failed the acute test according to Oregon DEQ guidelines (DEQ Whole Effluent Toxicity Testing Guidance Manual, January 1993).

Chronic Endpoint: A detailed tabulation of the chronic test results is given in Table 2 and Table 3. The biological effects, given as the NOEC and LOEC for survival and reproduction, the LC50 for survival, and the IC25 for reproduction are shown below.

	Survival	Reproduction
NOEC (%)	6.25	<6.25
LOEC (%)	12.5	6.25
7-Day LC50/IC25 (%)	15.1	1.89
(95% conf. int.)	(10.0 - 21.7)	(1.81 - 2.00)
Method	Probit	Linear Interpolation

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STUDY APPROVAL

[signature]	12/12/94	[signature]	12/12/94
Study Director	Date	Quality Assurance Unit	Date

[signature]	12/12/94
Director, Toxicology	Date

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Table 1. Ceriodaphnia 2-day (acute) survival data.

		Effluent concentration (%)				
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	0	0	0	3	10

Table 2. Ceriodaphnia 7-day (chronic) survival data.

		Effluent concentration (%)				
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	1	5*	6*	10*	10*

*Significantly different from the control (P=0.05).

Table 3. Ceriodaphnia 7-day reproduction data (Number of young produced).

		Effluent concentration (%)				
Replicate	Control	6.25	12.5	25	50	100
1	33	9	3	1	0	0
2	30	9	6	4	0	0
3	33	7	3	0	0	0
4	29	3	1	1	0	0
5	26	3	1	2	0	0
6	28	6	2	3	0	0
7	35	3	5	4	0	0
8	35	2	4	2	0	0
9	33	9	2	2	0	0
10	27	2	7	0	0	0
Mean	30.9	5.3*	3.4*	1.9*	0.0*	0.0*

*Significantly less than the control (P=0.05).

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APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

CLADOCERAN (CERIODAPHNIA DUBIA) SURVIVAL AND REPRODUCTION TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the cladoceran, Ceriodaphnia dubia (EPA Method 1002.0).

1.2 Summary of Method: Neonate (<24-hr-old) Ceriodaphnia dubia, are exposed for seven days (or until 60% of surviving control organisms have three broods of young) to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 30 ml borosilicate glass or plastic beakers, each containing 15 ml of test solution. Ten replicate beakers, each with one neonate, are employed at each test concentration. Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Qual. Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

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2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 30 ml borosilicate glass or plastic beakers holding 15 ml of test solution. Temperature and photoperiod control of test chambers is provided by incubation in an environmental chamber or water bath.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS

6.1 Species: Cladoceran, *Ceriodaphnia dubia*

6.2 Source: *Ceriodaphnia* neonates are supplied from the NAS laboratory culture. The original culture was obtained from the EPA Environmental Research Laboratory, Corvallis, OR.

6.3 Age at Study Initiation: <24-hr-old neonates; and all released within an 8-hr period.

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6.4 Pretest Culture and Handling: Individual cultures are used as the immediate source of neonates for toxicity testing. Source cultures are handled in a similar manner as test organisms for at least seven days and the neonates are then used to initiate tests. Source cultures are transferred to new medium and fed at least three times a week (e.g. Mon, Wed, Fri). Records of the source cultures are kept and if mortality exceeds 20% or if less than 15 young are produced per week, the cultures are not used as a source of neonates for testing.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of neonates to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days or until 60% of the surviving control animals produce three broods. Each treatment consists of ten replicate test containers each containing one cladoceran. A stratified random design is used for beaker placement.

7.2 Effect Criteria: The effect criteria are: 1) mortality, and 2) inhibition of reproduction. Mortality is defined as the lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.

7.3 Test Conditions: The test temperature employed is 25 ± 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. The test solution is replaced once daily.

7.4 Beginning of Test: The test solutions are added to the test beakers and food is added. The test is then begun by adding one neonate to each test container.

7.5 Feeding: The organisms are fed when the test is initiated, and daily thereafter. Food is added to the fresh medium immediately before or immediatedly after the adults are transferred. Each feeding consists of 0.1 ml YTC per 15 ml test solution and 0.1 ml *Selanastrum* concentrate per 15 ml test solution.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days (or until 60% of surviving control organisms have three broods of young). The type and frequency of observations to be made during the test are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival (of adult)	Daily before transfer
Reproduction (young produced)	Daily after adult transfer
Physical and Chemical Data	
Temperature (two locations in environmental control system)	Daily

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Dissolved oxygen, pH (High, medium, & low concentrations & control)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control & each new effluent sample)	e.g. Days 1, 3, & 5

During the test, dead adult organisms are removed every 24 hours and the young are discarded daily after counting. Dissolved oxygen is measured in each stock test solution using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured in each stock test solution using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using test kits.

7.7 Criteria of Test Acceptance: The test results are acceptable if: 1) survival in the controls is at least 80% and reproduction in the controls averages 15 or more young per surviving female. At least 60% of surviving females in controls should have produced their third brood.

8. DATA ANALYSIS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests (e.g. Dunnett's Test, Fisher's Exact Test, or Steel's Many-one Rank Test).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

SCOEPA00028606

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. Environmental Protection Agency. 1989. Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test. Method 1002.0. *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

U.S. Environmental Protection Agency. 1989. Supplement to "Short-term methods for estimating the chronic toxicity of effluents and surface waters to freshwater organisms". Revision 1. EPA/600/4-89/001a.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028607

APPENDIX II

RAW DATA

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 357-19 Investigator Revised pp 1-15 GAB 12-12-94

STUDY MANAGEMENT

Client: WACKER Siltronic Corp, 7200 NW Front Ave., Portland, OR 97210

Client's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.A. Buhler

QA Officer L.K. Gravsen-Nemeth

1. G.J. IRISSARRI 2.

3. 4.

Study Schedule:

Test Beginning: 10-13-94 1:30 P Test Ending: 10-20-94 2:00 P

TEST MATERIAL

Description: Outfall - 24-hr Comp (WACKER # 94-61) 94-63, 94-65

NAS Sample No.:	2615E	2639E	2640E	
Date of Collection:	10-12-94	10-14-94	10-17-94	
Date of Receipt:	10-13-94	10-15-94	10-18-94	
Conductivity (µmhos/cm):	700	720	600	673 ± 67
pH:	6.8	7.3	7.4	
Hardness (mg/L):	220	240	150	203 ± 47
Alkalinity (mg/L):	40	60	40	47 ± 12
:				

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)

Date of Preparation: 10-7-94

Water Quality: Conductivity (µmhos/cm) 260 pH 7.6

Hardness (mg/L) 110 Alkalinity (mg/L) 70

Treatments: Aerated 24-hr., AERATED > 24 HRS.

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran

Age: (<24-hr: all released within 8 hr) < 24 HR.

Source: (NAS cultures) NAS CULTURES

Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (100%, 50%, 25%, 12.5%, 6.25%, 0%) 100, 50, 25, 12.5, 6.25 & 0%

Test chambers: (30 ml beakers) 30mL Plastic cups

Test volume: (15 ml) 15mL

Replicates/treatment: (10) 10

Organisms/treatment: (10) 10 (1/repl)

Test water changes: Daily

Aeration during test: None

Feeding: 0.1 ml each of YTC and algal suspension daily

Beaker placement: Stratified randomization

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COVER DATA SHEET (CONTINUED)

Test No. 357-79 Investigator

RANDOMIZATION CHART

12.5	6.25	25	∅	12.5	100	12.5	6.25	50	12.5
6.25	25	50	100	∅	6.25	25	50	100	∅
∅	∅	12.5	6.25	50	12.5	100	12.5	25	6.25
50	12.5	100	50	100	∅	6.25	25	∅	25
100	50	6.25	12.5	25	25	50	∅	6.25	50
25	100	∅	25	6.25	50	∅	100	12.5	100

MISCELLANEOUS NOTES

50% DILUTION

TEST CONCENTRATION (%)	VOLUME OF EFFLUENT (ml)	VOL DILUTION WATER (ml)
100	150	0
50	75	75
25	37.5	112.5
12.5	18.75	131.25
6.25	9.4	140.6
∅	∅	150

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CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 35779 Investigator

DAY 0 (10/13/94) GJL

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		7.2		6.8
Med. (25)		7.3		6.9
Low (6.25)		7.9		7.2
Control		8.0		7.3

Temp #1 (°C): 24.8
Temp #2 (°C): 25.0

Notes:

DAY 1 (10/14/94) GJL

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	7.4	7.4	7.3
Med. (25)	7.1	7.9	7.7	7.5
Low (6.25)	7.0	8.0	7.8	7.5
Control	7.2	8.0	7.8	7.6

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 2 (10/15/94) GJL

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	8.6	7.5	7.3
Med. (25)	7.3	8.5	7.7	7.4
Low (6.25)	8.0	8.4	7.8	7.6
Control	8.0	8.4	7.7	7.6

Temp #1 (°C): 24.7
Temp #2 (°C): 24.9

Notes:

DAY 3 (10/16/94) GJL

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.5	8.4	7.8	7.6
Low (6.25)	7.6	8.4	7.7	7.7
Control	7.6	8.4	7.7	7.7

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

8/1/90

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-19 Investigator

DAY 4 (10/17/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.4	8.0	7.7	7.8
Low (6.25)	7.4	8.1	7.8	7.8
Control	7.3	8.1	7.8	7.7

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 5 (10/18/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.3	8.0	7.6	7.7
Low (6.25)	7.3	8.0	7.8	7.7
Control	7.2	8.0	7.7	7.6

Temp #1 (°C): 24.9
Temp #2 (°C): 25.2

Notes:

DAY 6 (10/19/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.2	7.9	7.8	7.7
Low (6.25)	7.3	8.0	7.8	7.8
Control	7.1	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 7 (10/20/94) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.2		7.6	
Low (6.25)	7.2		7.8	
Control	7.1		7.6	

Temp #1 (°C): 25.0
Temp #2 (°C): 25.2

Notes:

WQ $\bar{X}$	7.7	7.6	25.0
SD	0.5	0.2	0.1
(N)	(47)	(47)	(16)

8/1/90

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-19 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	6	6	7	6	5	6	7	7	6	6			
Ø	5	11	8	12	7	8	8	12	11	12	6			
	6	16	16	14	4	13	0	0	0	1	0			
	7	0	0	0	12	0	14	16	14	14	15			
	8													
%	Total	33	30	33	29	26	28	35	35	33	27		10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	1	3	1	0	2	0	1	2	2	0			
6.25	5	6	4	4	2	1	4	1	0	4	0			
	6	0	0	0	0	X0	0	0	0	0	2			
	7	2	2	2	1	↓	2	1	0	3	0			
	8					↓								
%	Total	9	9	7	3	x3	6	3	2	9	2		9	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	1	0	0	1	3	2	0	1			
12.5	5	3	3	0	X1	1	1	2	0	X2	0			
	6	0	0	2	↓	0	0	X0	X2	↓	3			
	7	X0	3	0	↓	0	0	↓	↓	↓	3			
	8	↓			↓			↓	↓	↓				
%	Total	x3	6	3	x1	1	2	x5	x4	x2	7		5	

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CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-19 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
25 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	1	0	0	2	0	2	2	0	0			
	5	0	3	0	0	0	3	X 2	X 0	2	0			
	6	0	0	0	0	0	X 0	↓	↓	X 0	0			
	7	1	0	0	1	X 0	↓	↓	↓	↓	X 0			
	8					↓	↓	↓	↓	↓	↓			
	Total	1	4	0	1	12	13	14	12	12	0		4	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
50 %	1	0	0	0	0	0	0	0	0	0	0			
	2	X 0	0	0	X 0	X 0	0	0	0	0	0			
	3	↓	X 0	0	↓	↓	0	0	0	0	0			
	4	↓	↓	0	↓	↓	X 0	X 0	X 0	X 0	X 0			
	5	↓	↓	X 0	↓	↓	↓	↓	↓	↓	↓			
	6	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	7	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	Total	0	0	0	0	0	0	0	0	0	0		0	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
100 %	1	X 0	X 0	X 0	X 0	0	0	X 0	X 0	X 0	0			
	2	↓	↓	↓	↓	X 0	X 0	↓	↓	↓	X 0			
	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	4	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	6	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	7	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	Total	0	0	0	0	0	0	0	0	0	0		0	

8/1/90

SCOEPA00028614

DAY 0 10-7-94 GJI

Bacco Board

PH 8.0	DO 8.1 mg/L
COND 270 umhos	HARD 100 ~~88~~ GJI mg/L
TEMP 24.9 °C	ALK 80 mg/L

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Temp 24.9 ± 0.1
DO 8.1 ± 0.1
pH 7.8 ± 0.2
Cond 264 ± 5
Hard 103 ± 6
Alk 77 ± 6

DAY 1 10-8-94

PH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD 110 mg/L
TEMP 24.9 °C	ALK 70 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 1 10-8-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 2 10-9-94

PH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 24.8 °C	ALK — mg/L

DAY 2 10-9-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0		0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 3 10-10-94

PH 7.7	DO 8.1 mg/L
COND 265 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 3 10-10-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	2	0	0	1	1	2	3	1	2			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	2	0	0	2	2	2	2	0	0			
	4	0	0	2	2	1	0	2	1	0	0			
	5	0	1	2	0	1	0	0	3	2	2			
	6	2	2	0	1	0	1	0	3	2	1			
	7	0	0	0	2	2	3	2	3	0	2			
	8	2	0	2	0	3	2	0	3	2	2			
	Total													

SCOEPA00028615

DAY 4 10-11-94 65F Brood Board

PH 8.0	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Discharger:
Location:
Date Sample Collected:
Analyst:
Test Start-Date/Time:
Test Stop -Date/Time:

DAY 4 10-11-94 65F

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	2	0	X	0	0	0	0			
	2	2	2	2	4	0	0	1	4	1	1			
	3	2	0	0	0	X	0	0	0	0	2			
	4	0	0	0	0	0	2	0	0	0	1			
	5	4	0	0	4	0	X	0	0	0	0			
	6	0	0	2	0	0	3	4	0	0	1			
	7	1	0	0	0	0	0	0	0	4	0			
	8	1	2	0	0	0	0	1	0	0	0			
	Total													

DAY 5 10-12-94 65F

PH 7.8	DO 8.2 mg/L
COND 270 umhos	HARD 100 mg/L
TEMP 25.0 °C	ALK 80 mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3													
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY 5 10-12-94

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	3	1	1	0	4	X	2	3	2	2			
	2	5	6	2	5	3	2	4	8	4	0			
	3	0	2	0	1	X	4	0	6	2	5			
	4	3	2	2	1	2	0	3	5	7	2			
	5	2	1	7	1	6	X	4	2	0	1			
	6	5	3	1	5	3	0	7	2	1	3			
	7	1	0	4	5	0	3	6	2	7	6			
	8	0	2	1	2	4	2	9	2	5	1			
	Total						5							

DAY 6

PH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3					X								
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY

PH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

SCOEPA00028616

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	357-19	Sample ID:	NAS # 2615E,2639E,2640E
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 89	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	RSC	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Survival

Conc-%	Alive	Dead	Total	Fisher P
N Control	10	0	10	
6.25	9	1	10	0.5000
12.5	5	5	10	0.0163
25	4	6	10	0.0054
50	0	10	10	0.0000
100	0	10	10	0.0000

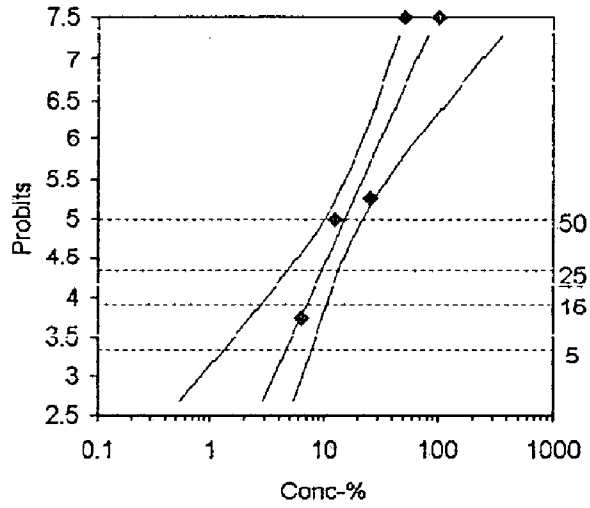
Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	6.25	12.5	8.8388	16

Maximum Likelihood-Probit Transform

Parameter	Estimate	SE	95% Fiducial Limits	
Slope	3.1993	0.7797	1.6712	4.7275
Intercept	1.2257	0.9804	-0.696	3.1471
TSCR	0	0.3018	-0.591	0.5915

Point	Probits	%	95% Fiducial Limits	
EC1	2.674	2.84	0.53	5.35
EC5	3.355	4.63	1.32	7.63
EC10	3.718	6.01	2.14	9.29
EC15	3.964	7.17	2.94	10.66
EC25	4.326	9.31	4.65	13.24
EC40	4.747	12.61	7.65	17.65
EC50	5.000	15.13	10.01	21.65
EC60	5.253	18.15	12.68	27.41
EC75	5.674	24.68	17.66	43.40
EC85	6.036	31.89	22.19	67.45
EC90	6.282	38.05	25.64	92.19
EC95	6.645	49.42	31.41	148.19
EC99	7.326	80.70	45.05	368.29

Control Resp	Chi-Sq	Critical	Mu	Sigma	Iter
0.000	2.365	11.345	1.180	0.3126	5



Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	357-19	Sample ID:	NAS # 2615E,2639E,2640E
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 91	Sample Type:	EFF2 Industrial
Sample Date:		Analyst Name:	RSC	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Reproduction

Conc-%	1	2	3	4	5	6	7	8	9	10
N Control	33.00	30.00	33.00	29.00	26.00	28.00	35.00	35.00	33.00	27.00
6.25	9.00	9.00	7.00	3.00	3.00	6.00	3.00	2.00	9.00	2.00
12.5	3.00	6.00	3.00	1.00	1.00	2.00	5.00	4.00	2.00	7.00
25	1.00	4.00	0.00	1.00	2.00	3.00	4.00	2.00	2.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

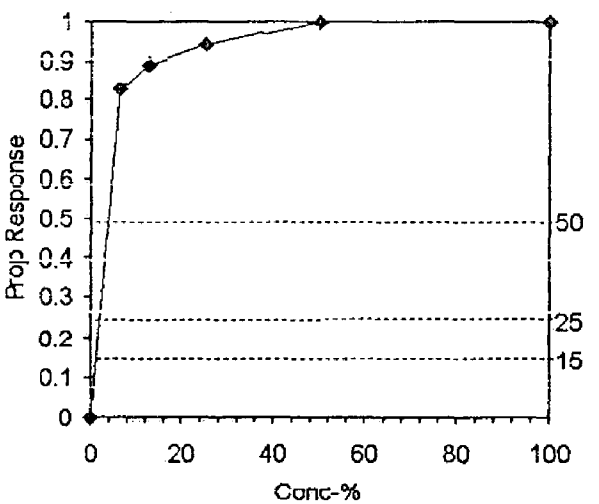
			Untransformed Data					t				
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Stat	Critical	MSD	NRESP	NDOSE
N Control	30.90	1.000	30.90	26.00	35.00	10.73	10					
6.25	5.30	0.172	5.30	2.00	9.00	56.99	10	*22.249	2.137	2.458		
12.5	3.40	0.110	3.40	1.00	7.00	60.75	10	*23.900	2.137	2.458		
25	1.90	0.061	1.90	0.00	4.00	76.27	10	*25.204	2.137	2.458		
50	0.00	0.000										
100	0.00	0.000										

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.949	0.919	0.0813	-1.026
Bartlett's Test indicates equality of variance (p = 0.0883)	6.535	11.345		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	F	Critical	df
Dunnett's Multiple Comparison	<6.25	6.25			2.5588	1891.7	6.6194	285.78	2.8663	3, 36

Linear Interpolation(ICp) with 80 bootstrap resamples

		Prop Response	
Conc-%	Iso	N-Mean	N-Iso
N Control	30.90		
6.25	5.30	0.8285	0.8285
12.5	3.40	0.8900	0.8900
25	1.90	0.9385	0.9385
50	0.00	1.0000	1.0000
100	0.00	1.0000	1.0000



Point	Estimate	SD	95% CL		Skew
IC1*	0.0754	0.0022	0.0725	0.0801	0.252
IC5*	0.3772	0.0109	0.3626	0.4006	0.252
IC10*	0.7544	0.0218	0.7253	0.8013	0.252
IC15*	1.1316	0.0327	1.0879	1.2019	0.252
IC25*	1.8860	0.0545	1.8132	2.0032	0.252
IC40*	3.0176	0.0872	2.9011	3.2051	0.252
IC50*	3.7720	0.1090	3.6264	4.0064	0.252

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 357-19 RTest ID: 999-422 Analyst(s): RSC

Sample ID: NAS # 2615E,2639E,2640E Sample Type: EFF2 Industrial

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number Survived	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	1	1	N Control	1.000	33								1	
	2	2	N Control	1.000	30								1	
	3	3	N Control	1.000	33								1	
	4	4	N Control	1.000	29								1	
	5	5	N Control	1.000	26								1	
	6	6	N Control	1.000	28								1	
	7	7	N Control	1.000	35								1	
	8	8	N Control	1.000	35								1	
	9	9	N Control	1.000	33								1	
	10	10	N Control	1.000	27								1	
	11	1	6.250	1.000	9								1	
	12	2	6.250	1.000	9								1	
	13	3	6.250	1.000	7								1	
	14	4	6.250	1.000	3								1	
	15	5	6.250	0.000	3								0	
	16	6	6.250	1.000	6								1	
	17	7	6.250	1.000	3								1	
	18	8	6.250	1.000	2								1	
	19	9	6.250	1.000	9								1	
	20	10	6.250	1.000	2								1	
	21	1	12.500	0.000	3								0	
	22	2	12.500	1.000	6								1	
	23	3	12.500	1.000	3								1	
	24	4	12.500	0.000	1								0	
	25	5	12.500	1.000	1								1	
	26	6	12.500	1.000	2								1	
	27	7	12.500	0.000	5								0	
	28	8	12.500	0.000	4								0	
	29	9	12.500	0.000	2								0	
	30	10	12.500	1.000	7								1	
	31	1	25.000	1.000	1								1	
	32	2	25.000	1.000	4								1	
	33	3	25.000	1.000	0								1	
	34	4	25.000	1.000	1								1	
	35	5	25.000	0.000	2								0	
	36	6	25.000	0.000	3								0	
	37	7	25.000	0.000	4								0	
	38	8	25.000	0.000	2								0	
	39	9	25.000	0.000	2								0	
	40	10	25.000	0.000	0								0	
	41	1	50.000	0.000	0								0	
	42	2	50.000	0.000	0								0	
	43	3	50.000	0.000	0								0	
	44	4	50.000	0.000	0								0	
	45	5	50.000	0.000	0								0	
	46	6	50.000	0.000	0								0	
	47	7	50.000	0.000	0								0	
	48	8	50.000	0.000	0								0	
	49	9	50.000	0.000	0								0	
	50	10	50.000	0.000	0								0	
	51	1	100.000	0.000	0								0	

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 357-19 RTest ID: 999-422 Analyst(s): RSC

Sample ID: NAS # 2615E,2639E,2640E Sample Type: EFF2 Industrial

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number Survived	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	52	2	100.000	0.000	0								0	
	53	3	100.000	0.000	0								0	
	54	4	100.000	0.000	0								0	
	55	5	100.000	0.000	0								0	
	56	6	100.000	0.000	0								0	
	57	7	100.000	0.000	0								0	
	58	8	100.000	0.000	0								0	
	59	9	100.000	0.000	0								0	
	60	10	100.000	0.000	0								0	

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Avenue	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required ✓: Ceriodaphnia; Hazardous sample Special handling required

Lab Sample number	Date sampled ✓	Time sampled ✓	Type* See key below ✓	Sampled by ✓ Thomas J. Rothschild Sample description ✓	Number of containers ✓	Ceriodaphnia								Remarks ✓
	12 oct 94	0800	AQ	Outfall 24-hour Composite (Wacker #94-61)	1	X								NASH 2615E
														TEMP on Rec'd: 12-0

	Signature ✓	Print Name ✓	Company ✓	Date ✓	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	12Oct94	0900
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Bobb	Gary A Bobb	NAS	10/13/94	0103

NORTHWESTERN AQUATIC SCIENCES

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Avenue	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Analyses required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Ceriodaphnia							Hazardous sample Special handling required	Remarks
94-63	14 Oct 94	0800	AQ	Outfall, 24-hour composite	1	X								NAS 2639E
														Temp on Rec'd 9.3°C

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	14 Oct 94	0830
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	[illegible]	Gary A. [illegible]	NAS	10/15/94	9:58

NORTHWESTERN AQUATIC SCIENCES

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.

SCOEPA00028622

CHAIN OF CUSTODY RECORD

Log Number

Client name: Wacker Siltronics Corp.	Project or PO#: P357
Address: 7200 N.W. Front Avenue	Phone #: 503-243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by / Sample description	Number of containers	Ceridaphnia							Hazardous sample Special handling required	Remarks
94-65	17 Oct 94	0830	AQ	Outfall, 24-hour composite	1	X								Cool, 4°C
														NAS 2640E
														TEMP UPON RECEIPT: 8.1

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	17	
Received by					
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Buhler	Gary A Buhler	NAS	10-18-94	10:30 AM

NORTHWESTERN AQUATIC SCIENCES

A Division of NAS Associates, Inc.

PO Box 1437 [illegible]

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

SCOEPA00028623

APPENDIX III

REFERENCE TOXICANT TEST

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 999-422 Investigator Reviewed PP1-12 GAB 12-12-94

STUDY MANAGEMENT

Client: QC TEST

Client's Study Monitor: NA

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.A. Buhler

QA Officer L.K. Garrison-Nemeth

1. G.J. IRISSARRI, GJI 2.

3. 4.

Study Schedule:

Test Beginning: 10-13-94 130P Test Ending: 10-20-94 200P

TEST MATERIAL

Description: Cadmium - $CdCl_2 \cdot 2\frac{1}{2} H_2O$ Mallinkrodt Lot # TNZ 1mg/ml stock prepd 5-25-94

NAS Sample No.:

Date of Collection:

Date of Receipt:

Conductivity (µmhos/cm):

pH:

Hardness (mg/L):

Alkalinity (mg/L):

:

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)

Date of Preparation: 10-7-94

Water Quality: Conductivity (µmhos/cm) 260 pH 7.6

Hardness (mg/L) 110 Alkalinity (mg/L) 70

Treatments: Aerated 24-hr., AERATED > 24 HRS

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran

Age: (<24-hr; all released within 8 hr) < 24 HRS

Source: (NAS cultures) NAS CULTURES

Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (~~100%, 50%, 25%, 12.5%, 6.25%, 0%~~) 100, 30, 10, 3, 1 µg/L

Test chambers: (30 ml beakers) 30 mL Plastic cups

Test volume: (15 ml) 15 mL

Replicates/treatment: (10) 10

Organisms/treatment: (10) 10 (1/rep)

Test water changes: Daily

Aeration during test: None

Feeding: 0.1 ml each of YTC and algal suspension daily

Beaker placement: Stratified randomization

SCOEPA00028625

COVER DATA SHEET (CONTINUED)

Test No. 999-422 Investigator

RANDOMIZATION CHART

ø	10	1	3	100	3	1	30	ø	100
30	ø	10	100	3	30	100	3	1	ø
3	3	ø	30	1	100	10	100	10	1
1	100	30	1	ø	10	3	1	100	3
10	30	100	ø	30	1	ø	10	3	30
100	1	3	10	10	ø	30	ø	30	10

MISCELLANEOUS NOTES

CADMIUM AS $CdCl_2$

WORKING STOCK (W.S) MADE BY:

1.) 1:99 (1mL + 100mL) DILUTION OF CONCENTRATED 1mg/mL STOCK (FINAL CONCENTRATION 10mg/mL)

2.) 10:90 (10mL + 100mL) DILUTION OF #1 (10mg/mL); FINAL CONCENTRATION 1mg/mL

TEST CONCENTRATION ug/L	VOL W.S. (1mg/mL) (mL)	VOL DILUTION WATER (mL)
100	15	135
30	4.5	145.5
10	1.5	148.5
3	0.45	149.6
1	0.15	149.85
ø	ø	ø

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 999-422 Investigator

DAY 0 (10/13/94) GJI

Conc. (mg/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		8.2		7.7
Med. (10)		8.2		7.7
Low (1)		8.3		7.6
Control		8.2		7.5

Temp #1 (°C): 24.8
Temp #2 (°C): 25.0

Notes:

DAY 1 (10/14/94) GJI

Conc. (mg/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	8.0	7.9	7.5
Med. (10)	7.2	8.0	7.9	7.5
Low (1)	7.2	8.1	7.9	7.6
Control	7.2	8.0	7.9	7.6

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 2 (10/15/94) GAS

Conc. (mg/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	8.2	8.4	7.7	7.6
Med. (10)	8.0	8.4	7.7	7.6
Low (1)	8.0	8.4	7.7	7.6
Control	8.1	8.4	7.8	7.6

Temp #1 (°C): 24.7
Temp #2 (°C): 24.9

Notes:

DAY 3 (10/16/94)

Conc. (mg/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.8	8.4	7.8	7.7
Med. (10)	7.6	8.4	7.8	7.7
Low (1)	7.6	8.4	7.8	7.7
Control	7.6	8.4	7.8	7.7

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 999-422 Investigator

DAY 4 (10/17/94) GJI

Conc ug/L (~~%~~) GJI	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.3	8.1	7.9	7.9
Low (1)	7.3	8.1	7.9	7.9
Control	7.4	8.1	7.9	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 5 (10/18/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.3	8.0	7.8	7.9
Low (1)	7.3	7.9	7.8	7.9
Control	7.2	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.1

Notes:

DAY 6 (10/19/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.1	8.0	7.9	7.9
Low (1)	7.2	8.0	7.8	7.8
Control	7.1	8.0	7.8	7.8

Temp #1 (°C): 24.9
Temp #2 (°C): 25.0

Notes:

DAY 7 (10/20/94) GJI

Conc. (ug/L)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (10)	7.2		7.9	
Low (1)	7.3		7.9	
Control	7.2		7.9	

Temp #1 (°C): 25.0
Temp #2 (°C): 25.2

Notes:

WQ				
$\bar{X}$	7.8		7.8	25.0
SD	0.5		0.1	0.1
(N)	(49)		(49)	(16)

8/1/90

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 999-422 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	6	5	7	7	5	6	4	2	4	6			
Ø	5	6	7	8	12	11	8	3	8	15	12			
	6	0	0	0	0	0	0	0	0	0	0			
	7	14	10	14	16	16	0	13	10	15	15			
	8													
mg/L	Total	26	22	31	35	32	14	20	20	34	33		10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	2	7	5	5	5	5	4	3	4	6			
1.0	5	11	12	12	11	11	10	9	6	12	12			
	6	0	X0	0	0	1	0	0	0	0	8			
	7	14	↓	13	10	10	16	9	14	6	0			
	8													
mg/L	Total	27	X9	~~14~~ 30	26	27	31	22	23	22	26		9	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	5	6	6	7	6	4	4	3	6	5			
3.0	5	11	12	9	10	10	5	7	9	10	12			
	6	0	0	1	0	0	0	0	0	0	0			
	7	10	11	12	15	15	12	10	8	0	0			
	8													
mg/L	Total	26	29	28	32	31	21	21	20	16	17		10	

8/1/90

SCOEPA00028629

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 999-422 Investigator

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	5	4	6	X4	5	3	4	2	4	4			
10	5	6	X0	8	↓	6	X0	7	X0	8	8			
	6	0	↓	0	↓	0	↓	0	↓	0	0			
	7	3	↓	0	↓	0	↓	0	↓	0	0			
	8		↓		↓		↓		↓					
ug/L	Total	14	4	14	4	11	3	11	2	12	12		6	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	X0	X0	0	0	0	0	X0	X0	0	0			
	4	↓	↓	X0	0	2	2	↓	↓	2	X0			
30	5	↓	↓	↓	0	X0	0	↓	↓	X0	↓			
	6	↓	↓	↓	X0	↓	4	↓	↓	↓	↓			
	7	↓	↓	↓	↓	↓	X0	↓	↓	↓	↓			
ug/L	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	Total	0	0	0	0	2	6	0	0	2	0		0	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	X0	0	X0	X0	0	0	X0	0	0	X0			
	3	↓	X0	↓	↓	X0	X0	↓	X0	X0	↓			
	4	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
100	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	6	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	7	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			
ug/L	Total	0	0	0	0	0	0	0	0	0	0		0	

DAY 0 10-7-94 GJI

Brood Board

Discharger: _____ Analyst: _____
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

pH 8.0	DO 8.1 mg/L
COND 270 umhos	HARD 100 ~~80~~ GJI mg/L
TEMP 24.9 °C	ALK 80 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Temp 24.9 ± 0.
DO 8.1 ± 0.1
pH 7.8 ± 0.2
Cond 264 ± ~~49~~ 5
Hard 103 ± 6
Alk 77 ± 6

DAY 1 10-8-94

pH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD 110 mg/L
TEMP 24.9 °C	ALK 70 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 1 10-8-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0	0	0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 2 10-9-94

pH 7.6	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 24.8 °C	ALK — mg/L

DAY 2 10-9-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	0	0	0	0	0	0	0	0	0	0			
	5	0	0	0	0	0	0	0	0	0	0			
	6	0		0	0	0	0	0	0	0	0			
	7	0	0	0	0	0	0	0	0	0	0			
	8	0	0	0	0	0	0	0	0	0	0			
	Total													

DAY 3 10-10-94

pH 7.7	DO 8.1 mg/L
COND 265 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 3 10-10-94 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	2	0	0	1	1	2	3	1	2			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	2	0	0	2	2	2	2	0	0			
	4	0	0	2	2	1	0	2	1	0	0			
	5	0	1	2	0	1	0	0	3	2	2			
	6	2	2	0	1	0	1	0	3	2	1			
	7	0	0	0	2	2	3	2	3	0	2			
	8	2	0	2	0	3	2	0	3	2	2			
	Total													

SCOEPA00028631

DAY 4 10-11-94 GJT — Basso Board

pH 8.0	DO 8.0 mg/L
COND 260 umhos	HARD — mg/L
TEMP 25.0 °C	ALK — mg/L

Discharger:
Location:
Date Sample Collected: DAY 4 10-11-94 GJT
Analyst:
Test Start-Date/Time:
Test Stop -Date/Time:

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	2	0	X	0	0	0	0			
	2	2	2	2	4	0	0	1	4	1	1			
	3	2	0	0	0	X	0	0	0	0	2			
	4	0	0	0	0	0	2	0	0	0	1			
	5	4	0	0	4	0	X	0	0	0	0			
	6	0	0	2	0	0	3	4	0	0	1			
	7	1	0	0	0	0	0	0	0	4	0			
	8	1	2	0	0	0	0	1	0	0	0			
	Total													

DAY 5 10-12-94 GJT

pH 7.8	DO 8.2 mg/L
COND 270 umhos	HARD 100 mg/L
TEMP 25.0 °C	ALK 80 mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3													
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY 5 10-12-94

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	3	1	1	0	4	X	2	3	2	2			
	2	5	6	2	5	3	2	4	9	4	0			
	3	0	2	0	1	X	4	0	6	2	5			
	4	3	2	2	1	2	0	3	5	7	2			
	5	2	1	7	1	6	X	4	2	0	1			
	6	5	3	1	5	3	0	7	2	1	3			
	7	1	0	4	5	0	3	6	2	7	6			
	8	0	2	1	2	4	2	9	2	3	1			
	Total													

DAY 6

pH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1						X							
	2													
	3					X								
	4													
	5						X							
	6													
	7													
	8													
	Total													

DAY

pH	DO mg/L
COND umhos	HARD mg/L
TEMP °C	ALK mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

SCOEPA00028632

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	999-422	Sample ID:	
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 89	Sample Type:	CDCL Cadmium chloride
Sample Date:		Analyst Name:	RSC	Test Species:	CD-Ceriodaphnia dubia
Comments:				Response:	Survival

Conc-µg/L	Alive	Dead	Total	Fisher P
N Control	10	0	10	
1	9	1	10	0.5000
3	10	0	10	1.0000
10	6	4	10	0.0433
30	0	10	10	0.0000
100	0	10	10	0.0000

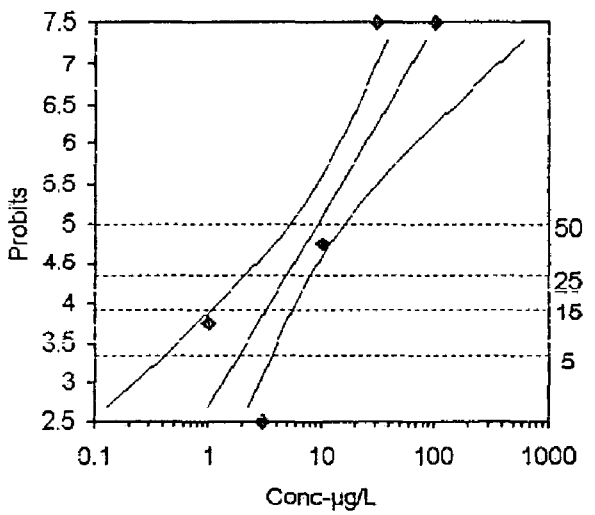
Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	3	10	5.4772	

Maximum Likelihood-Probit Transform

Parameter	Estimate	SE	95% Fiducial Limits	
Slope	2.3981	0.563	1.2945	3.5016
Intercept	2.7035	0.6015	1.5245	3.8825
TSCR	0	0.0455	-0.089	0.0892

Point	Probits	µg/L	95% Fiducial Limits	
EC1	2.674	0.97	0.13	2.20
EC5	3.355	1.87	0.41	3.59
EC10	3.718	2.65	0.76	4.71
EC15	3.964	3.35	1.14	5.71
EC25	4.326	4.75	2.03	7.75
EC40	4.747	7.11	3.76	11.68
EC50	5.000	9.07	5.23	15.57
EC60	5.253	11.57	7.01	21.53
EC75	5.674	17.33	10.64	39.61
EC85	6.036	24.54	14.49	70.21
EC90	6.282	31.05	17.60	105.04
EC95	6.645	44.01	23.15	193.55
EC99	7.326	84.67	37.73	624.70

Control Resp	Chi-Sq	Critical	Mu	Sigma	Iter
0.000	10.829	11.345	0.958	0.417	5



ToxCalc v4.0/047

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94 13:30	Test ID:	999-422	Sample ID:	
End Date:	20 Oct-94 14:00	Protocol ID:	EPAF 91	Sample Type:	CDCL Cadmium chloride
Sample Date:		Analyst Name:	RSC	Test Species:	CD Ceriodaphnia dubia
Comments:				Response:	Reproduction

Conc-µg/L	1	2	3	4	5	6	7	8	9	10
N Control	26.00	22.00	31.00	35.00	32.00	14.00	20.00	20.00	34.00	33.00
1	27.00	19.00	30.00	26.00	27.00	31.00	22.00	23.00	22.00	26.00
3	26.00	29.00	28.00	32.00	31.00	21.00	21.00	20.00	16.00	17.00
10	14.00	4.00	14.00	4.00	11.00	3.00	11.00	2.00	12.00	12.00
30	0.00	0.00	0.00	0.00	2.00	6.00	0.00	0.00	2.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

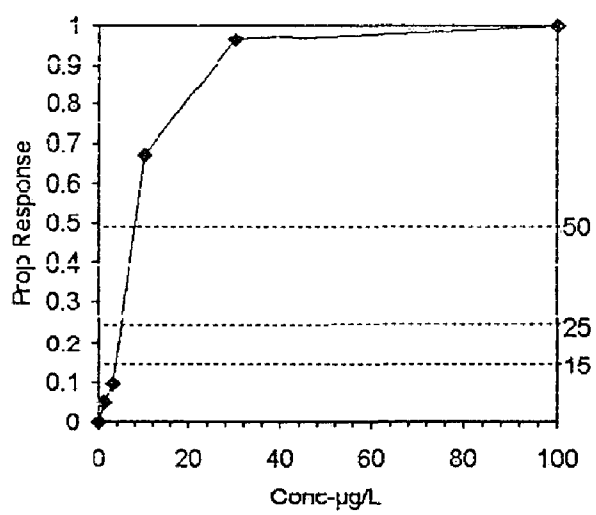
			Untransformed Data					Rank				
Conc-µg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	MSD	NRESP	NDOSE
N Control	26.70	1.000	26.70	14.00	35.00	27.41	10					
1	25.30	0.948	25.30	19.00	31.00	14.91	10	96.5	76.0			
3	24.10	0.903	24.10	16.00	32.00	24.15	10	91.5	76.0			
10	8.70	0.326	8.70	2.00	14.00	55.54	10	*56.0	76.0			
30	1.00	0.037	1.00	0.00	6.00	194.37	10	*55.0	76.0			
100	0.00	0.000										

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.010)	0.968	0.930	-0.285	-0.511
Bartlett's test indicates unequal variances (p = 0.0078)	13.833	13.277		

Hypothesis Test (0.05 alpha)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	3	10	5.4772	

		Prop Response	
Conc-µg/L	Iso	N-Mean	N-Iso
N Control	26.70		
1	25.30	0.0524	0.0524
3	24.10	0.0974	0.0974
10	8.70	0.6742	0.6742
30	1.00	0.9625	0.9625
100	0.00	1.0000	1.0000

Linear Interpolation(ICp) with
80 bootstrap resamples



Point	Estimate	SD	95% CL		Skew
IC1*	0.1907	1.0754	0.0650	3.1196	1.316
IC5*	0.9536	1.1893	0.3250	3.5981	0.422
IC10	3.0318	1.2293	0.6500	4.1961	-0.153
IC15	3.6386	1.0897	0.9750	4.7942	-0.726
IC25	4.8523	0.8234	2.9919	5.9903	-0.470
IC40	6.6727	0.6734	5.3734	7.8733	-0.349
IC50	7.8864	0.6329	6.7892	9.0916	-0.037

Test: Ceriodaphnia Survival and Reproduction Test

Species: CD Ceriodaphnia dubia

Test ID: 999-422 RTest ID: Analyst(s): RSC

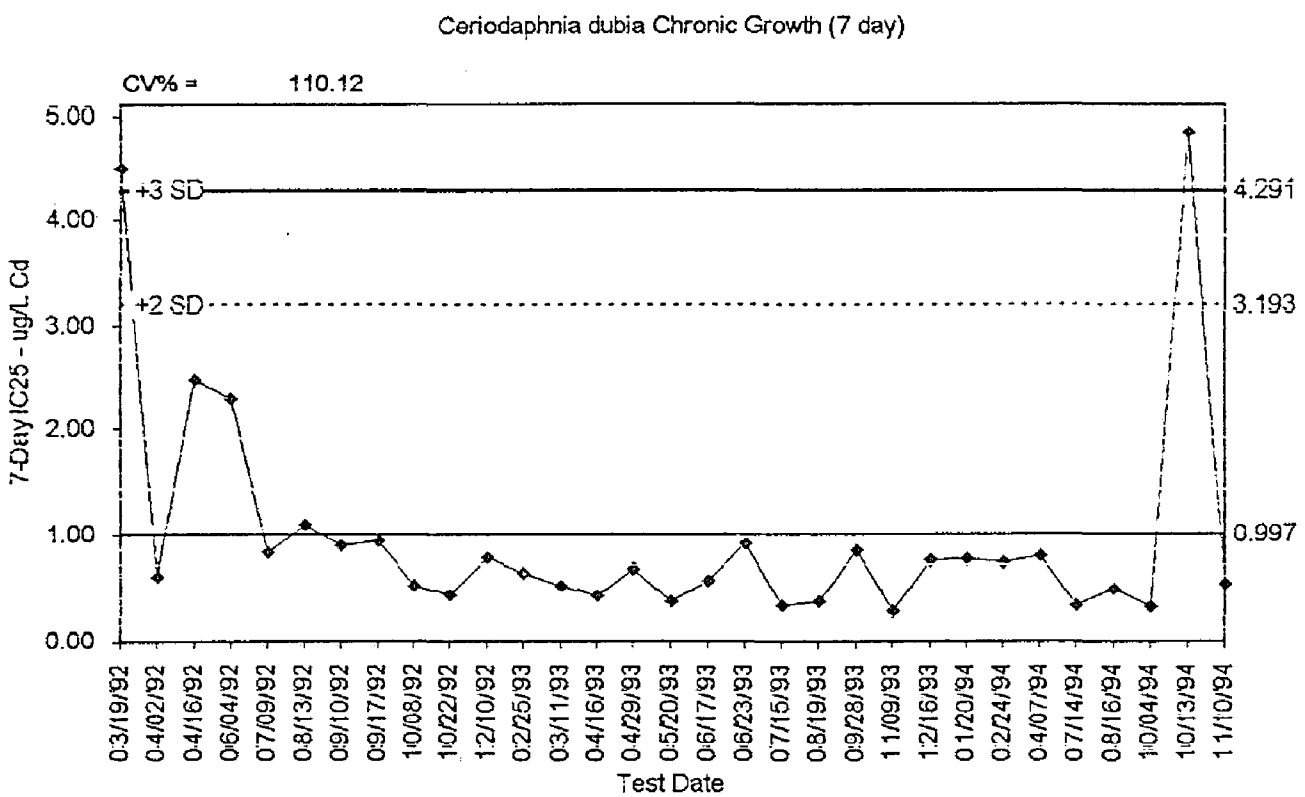
Sample ID: Sample Type: CDCL Cadmium chloride

Start Date/Time: 13 Oct-94 End Date/Time: 20 Oct-94

Pos	ID	Rep	Test Groups	Number of Young	Number of Young	Sex	Survival at Day 1	2	3	4	5	6	End	Notes
	1	1	N Control	26.000	26								1	
	2	2	N Control	22.000	22								1	
	3	3	N Control	31.000	31								1	
	4	4	N Control	35.000	35								1	
	5	5	N Control	32.000	32								1	
	6	6	N Control	14.000	14								1	
	7	7	N Control	20.000	20								1	
	8	8	N Control	20.000	20								1	
	9	9	N Control	34.000	34								1	
	10	10	N Control	33.000	33								1	
	11	1	1.000	27.000	27								1	
	12	2	1.000	19.000	19								0	
	13	3	1.000	30.000	30								1	
	14	4	1.000	26.000	26								1	
	15	5	1.000	27.000	27								1	
	16	6	1.000	31.000	31								1	
	17	7	1.000	22.000	22								1	
	18	8	1.000	23.000	23								1	
	19	9	1.000	22.000	22								1	
	20	10	1.000	26.000	26								1	
	21	1	3.000	26.000	26								1	
	22	2	3.000	29.000	29								1	
	23	3	3.000	28.000	28								1	
	24	4	3.000	32.000	32								1	
	25	5	3.000	31.000	31								1	
	26	6	3.000	21.000	21								1	
	27	7	3.000	21.000	21								1	
	28	8	3.000	20.000	20								1	
	29	9	3.000	16.000	16								1	
	30	10	3.000	17.000	17								1	
	31	1	10.000	14.000	14								1	
	32	2	10.000	4.000	4								0	
	33	3	10.000	14.000	14								1	
	34	4	10.000	4.000	4								0	
	35	5	10.000	11.000	11								1	
	36	6	10.000	3.000	3								0	
	37	7	10.000	11.000	11								1	
	38	8	10.000	2.000	2								0	
	39	9	10.000	12.000	12								1	
	40	10	10.000	12.000	12								1	
	41	1	30.000	0.000	0								0	
	42	2	30.000	0.000	0								0	
	43	3	30.000	0.000	0								0	
	44	4	30.000	0.000	0								0	
	45	5	30.000	2.000	2								0	
	46	6	30.000	6.000	6								0	
	47	7	30.000	0.000	0								0	
	48	8	30.000	0.000	0								0	
	49	9	30.000	2.000	2								0	
	50	10	30.000	0.000	0								0	
	51	1	100.000	0.000	0								0	

APPENDIX IV

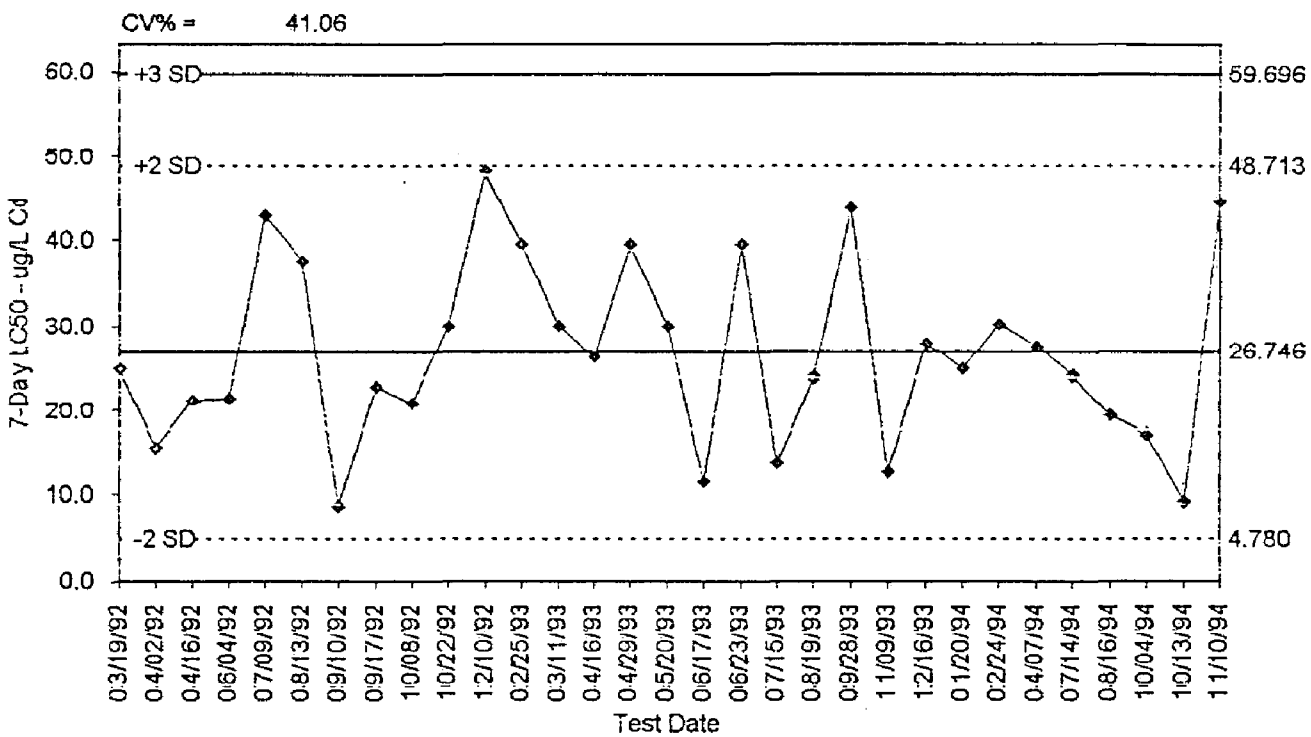
REFERENCE TOXICANT CONTROL CHARTS



12/10/94
RS

ToxCalc v4.0

Ceriodaphnia dubia Chronic Survival (7 day)



12/12/94
BS

ToxCalc v4.0

Ceriodaphnia dubia - 7 day chronic			
Date	LC50	IC25	Test No.
3/19/92	24.7	4.49	999-111
4/2/92	15.7	0.61	999-116
4/16/92	21.2	2.5	999-123
6/4/92	21.5	2.3	999-131
7/9/92	43	0.83	999-144
8/13/92	37.6	1.09	999-153
9/10/92	8.67	0.9	999-166
9/17/92	22.8	0.94	999-168
10/8/92	20.9	0.53	999-175
10/22/92	30	0.43	999-181
12/10/92	48.2	0.78	999-204
2/25/93	39.5	0.64	999-224
3/11/93	30	0.52	999-236
4/16/93	26.1	0.42	999-243
4/29/93	39.5	0.68	999-248
5/20/93	30	0.36	999-258
6/17/93	11.5	0.57	999-265
6/23/93	39.5	0.92	999-271
7/15/93	13.8	0.32	999-274
8/19/93	23.8	0.37	999-286
9/28/93	43.8	0.85	999-295
11/9/93	12.8	0.27	999-304
12/18/93	27.9	0.76	999-310
1/20/94	24.7	0.77	999-323
2/24/94	30.2	0.74	999-340
4/7/94	27.5	0.8	999-351
7/14/94	24	0.33	999-385
8/16/94	19.3	0.49	999-393
10/4/94	17.3	0.31	999-417
10/13/94	9.07	4.85	999-422
11/10/94	44.6	0.54	999-428

12/10/94

RECEIVED NOV 1 5 1994

Columbia Aquatic Sciences

November 7, 1994

TJR

Thomas Rothschild
Wacker Siltronic Corporation
7200 N W Front Avenue
Portland, OR 97201

RE: Toxicity Testing - Test Substance: 94-62 (with renewals 94-64 and 94-66)

Dear Mr. Rothschild:

Attached is the single report for the bioassay required by your NPDES permit. The test was conducted between October 13th and October 21, 1994 and was performed on *Ceriodaphnia dubia* with test substance: 94-62 (with renewals 94-64 and 94-66). The LC_{50} after 192 hours was 15.15 percent of the test substance. The IC_{50} after the same length of exposure, was 9.25 percent of the test substance. The No-Observed-Effect-Concentration (NOEC) was 6.25 percent concentration of the test substance using Bonferroni's Adjusted T Test but was 50 percent when calculated with the Wilcoxon Rank Sum Test. The Lowest-Observed-Effect-Concentration (LOEC) was 100 percent of the test substance using the Wilcoxon method..

For your future reference, CAqS has given test substance 94-62 (with renewals 94-64 and 94-66) the test reference number C94-2184.01.

All testing was performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the sample tested.

If you have any questions regarding the attached reports, or require additional testing, please call me at (619) 931-9225. Thank you for using the aquatic testing services of Columbia Aquatic Sciences.

Regards,

William A. Schmitz
Laboratory Manager

6060 Corte del Cedro ▪ Carlsbad, CA 92009-1514 ▪ Telephone (619) 931-9225 ▪ Fax (619) 931-9251

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

Chronic 7-Day Survival/Reproduction Bioassay
CAS Testing Protocol No. P004.0

Test Organism: *Ceriodaphnia dubia*

Test Solution	Number of Adult Organisms at Start of Test	Number of Dead Adult Organisms at End of Test	Percent Mortality	Mean Number of Young Produced per Adult
Control	10	2	20	15.2
6.25%	10	0	0	11.6
12.5%	10	7	70	3.3
25%	10	7	70	0.4
50%	10	9	90	0.3
100% Effluent	10	10	100	0.0

Acute Toxicity

Exposure (Hours)	LC_{50} (Percent Effluent)	Statistical Method
192	15.15	Trimmed Spearman Karber

Acute Toxicity Statement: Test substance, Secondary 94-62 (renewals 94-64, 94-66) produced an LC_{50} of 15.15 percent concentration of effluent at the end of 8 days.

Approved by _____ Date 7 NOV 94 Page 1

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

Chronic 7-Day Survival/Reproduction Bioassay
CAS Testing Protocol No. P004.0

Test Organism: *Ceriodaphnia dubia*

Chronic Toxicity

Reproduction data do not meet the assumptions of normality (D'Agostino's Test, $p \leq 0.01$), or equality of variance (Bartlett's Test, $p = 4.04E-19$). Bonferroni's Adjusted T Test processing provided an NOEC (No-Observed-Effect-Concentration) of 6.25 percent, and an LOEC (Lowest-Observed-Effect-Concentration) of 12.5 percent. The Wilcoxon Rank Sum Test provided an NOEC of 50 percent and an LOEC of 100 percent.

The Linear Interpolation Method was used to calculate point estimates for effluent concentrations causing 10, 15, 40 and 50 percent reductions in reproduction.

IC_p Point	Concentration Estimate	Standard Deviation	Lower 95% Fiducial Limit	Upper 95% Fiducial Limit
IC_{10}	<6.25	N/A	N/A	N/A
IC_{15}	<6.25	N/A	N/A	N/A
IC_{25}	6.39	N/A	N/A	N/A
IC_{40}	8.11	N/A	N/A	N/A
IC_{50}	9.25	N/A	N/A	N/A

Note: According to EPA 600/4-89/001 Section 12.9, "Tests should be terminated when 60% or more of the surviving females in the controls have produced their third brood." The test was ended on day 8 for this reason.

Chronic Toxicity Statement: Test substance, 94-62 (renewals 94-64, 94-66) produced an IC_{25} of 6.39 percent concentration at the end of 8 days.

Approved by _____ Date 7NOV94

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

Chronic 7-Day Survival/Reproduction Bioassay
CAS Testing Protocol No. P004.0

Test Organism: *Ceriodaphnia dubia*

Test Solution Physical and Chemical Data

Conc.	Statistic	D.O. Initial (mg/L)	D.O. Final (mg/L)	pH Initial	pH Final	Cond. (mS/cm)	Alkalinity (mg/L $CaCO_3$)	Hardness (mg/L $CaCO_3$)
Control	Mean	8.7	7.6	8.1	8.2	0.17	93	85
	Minimum	8.1	7.0	8.0	7.9	0.17	84	76
	Maximum	9.5	7.9	8.1	8.3	0.17	104	92
6.25%	Mean	8.7	7.5	8.0	8.0	0.20	.	.
	Minimum	8.0	7.2	8.1	7.8	0.19	.	.
	Maximum	9.7	8.2	8.1	8.3	0.21	.	.
25%	Mean	8.8	7.5	8.1	8.1	0.30	.	.
	Minimum	8.1	6.9	8.0	8.0	0.27	.	.
	Maximum	10.0	8.2	8.1	8.3	0.32	.	.
100%	Mean	8.7	7.5	7.4	8.0	0.73	43	176
	Minimum	8.0	7.0	7.3	7.9	0.72	36	176
	Maximum	9.0	7.8	7.4	8.0	0.74	52	176

Approved by Will Q. Schaf Date 7NOV94

SCOEPA00028643

COLUMBIA AQUATIC SCIENCES

Analytical Report

Client:	Wacker Siltronic Corporation	**Date Received:**	13,15,18Oct94
Project:	94-62	**Date Test Started:**	13Oct94
Sample Matrix:	Liquid	**Date Test Ended:**	21Oct94
Sample Name/ID	94-62 (64&66)/2184.01	**Work Request No.:**	C94-2184

APPENDIX
Pertinent Test Data

TEST: Chronic 7-Day Survival/Reproduction Bioassay with *Ceriodaphnia dubia*, CAS Testing Protocol No. P004.0

LAB CONTROL WATER: Synthetic moderately hard water (zero time).

Hardness	84 mg/L as $CaCO_3$
Alkalinity	104 mg/L
pH	8.1
Dissolved Oxygen	8.2 mg/L
Temperature	24.9° C

TEST ORGANISM: *Ceriodaphnia dubia*, obtained from in-house cultures.

TEST CHAMBER: Ten replicates, one animal per replicate, concentrations of 0, 6.25, 12.5, 25, 50 and 100 percent. 25 mL plastic cups, brought to a final volume of 20 mL.

EXPERIMENTAL DESIGN:
1. Effluent was collected by Wacker Siltronic Corporation on October 12, 14, and 17, 1994.
2. The temperature of the substance was adjusted to 25 ± 1°C, and the initial dissolved oxygen adjusted to greater than 3.3 mg/L.
3. 1 test organism was placed into each chamber.
4. Test chambers were held at 25°C for 8 days with a photo period of 16 hours light, 8 hours darkness.
5. Test substance was renewed daily.
6. Organisms were fed daily.

REFERENCE TOXICITY:

Toxicant:	$CuSO_4$
Species	*Ceriodaphnia dubia*
Date of Test	10/14/94
48 hour LC_{50}	>48 ppb

MORTALITY CRITERIA: Lack of respiratory movement and lack of reaction to gentle prodding.

STUDY DIRECTOR: D. Griffin

INVESTIGATORS: K. Evans, M.S. Burke

Approved by Wilh Ch. Schr Date 7NOV 94

SCOEPA00028644

Ceriodaphnia Survival and Reproduction Test

Start Date:	13 Oct-94	Permit ID:	0714-001a	Sample ID:	effluent
End Date:	21 Oct-94	Analyst Name:	ke	Protocol ID:	EPA/600/4-89/001
Sample Date:		Response:	Reproduction	Test Species:	Ceriodaphnia dubia
Comments:	MEC Animals				

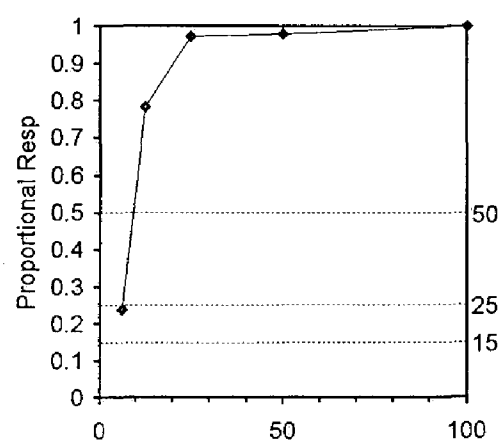
Conc-%	1	2	3	4	5	6	7	8	9	10
N Control	32.00		28.00	14.00	29.00	22.00	0.00	0.00	12.00	0.00
6.25	9.00	12.00	14.00	14.00	10.00	11.00	13.00	9.00	11.00	13.00
12.5	0.00	13.00	0.00	0.00	0.00	0.00	5.00	15.00	0.00	0.00
25	0.00	2.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
50	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

			Transformed (None) Data					T	Rank		Probit Data	
Conc-%	Mean	N-Mean	Mean	Min	Max	Var	SD	Statistic	Sum	Critical	NRESP	NDOSE
N Control	15.22	1.000	15.22	0.00	32.00	173.44	13.17					
6.25	11.60	0.762	11.60	9.00	14.00	3.60	1.90	1.255	90.50	72		
12.5	3.30	0.217	3.30	0.00	15.00	34.46	5.87	*4.130	77.50	72		
25	0.40	0.026	0.40	0.00	2.00	0.49	0.70	*5.135	74.50	72		
50	0.30	0.020	0.30	0.00	1.00	0.23	0.48	*5.170	74.50	72		
100	0.00	0.000										

ANOVA Assumptions	Calculated Statistic	Critical Statistic
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.010)	0.824	0.929
Bartlett's test indicates unequal variances (p = 4.04E-19)	92.416	13.277

Hypothesis Tests (alpha = 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSB	MSE	Critical	df
Bonferroni Adjusted t Test	6.25	12.5	8.8388	16	6.7256	447.61	39.467	2.321	4, 44
Wilcoxon Rank Sum Test	50	100		2					

		Prop Response		Linear Interpolation(ICp) with
Conc-%	Isotonic	N-Mean	Isotonic	80 bootstrap resamples
N Control	15.22			
6.25	11.60	0.238	0.238	
12.5	3.30	0.783	0.783	
25	0.40	0.974	0.974	
50	0.30	0.980	0.980	
100	0.00	1.000	1.000	



Point	Estimate	SD	95% Fiducial Limit:		Skew
IC10	<6.25	#N/A	#N/A	#N/A	#N/A
IC15	<6.25	#N/A	#N/A	#N/A	#N/A
IC25	6.39	#N/A	#N/A	#N/A	#N/A
IC40	8.11	#N/A	#N/A	#N/A	#N/A
IC50	9.25	#N/A	#N/A	#N/A	#N/A

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

Start Date:	13 Oct-94 00:00	Test ID:	2184.01	Sample ID:	Wacker Siltronic
End Date:	21 Oct-94 00:00	Lab ID:	CACAS-Columbia Aquatic S	Sample Type:	EFF1-POTW
Sample Date:		Protocol:	EPAF 91	Test Species:	CD-Ceriodaphnia dubia
Comments:					

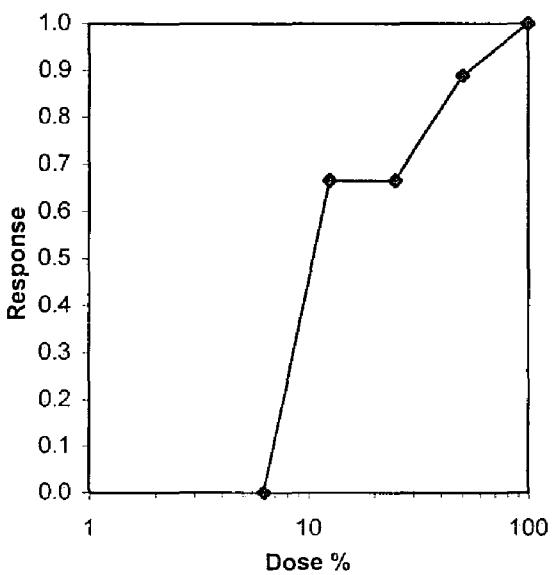
Conc-%	1
Control	0.8000
6.25	1.0000
12.5	0.3000
25	0.3000
50	0.1000
100	0.0000

Conc-%	Mean	N-Mean	Affected	Not Affected	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
Control	0.800	1.000	2	8	10	1			2	10
6.25	1.000	1.250	0	10	10	1	0.237	0.050	0	10
*12.5	0.300	0.375	7	3	10	1	0.035	0.050	7	10
*25	0.300	0.375	7	3	10	1	0.035	0.050	7	10
*50	0.100	0.125	9	1	10	1	0.003	0.050	9	10
*100	0.000	0.000	10	0	10	1	0.000	0.050	10	10

Hypothesis Test (1-tail, p = 0.05	NOEC	LOEC	ChV	TU
Fisher's Exact Test	6.25	12.5	8.83883	16

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	15.154	10.970	20.934
5.0%	14.438	10.151	20.535
10.0%	13.813	9.470	20.147
20.0%	12.645	7.994	20.003
Auto-0.0%	15.154	10.970	20.934



SCOEPA00028646

MEC Analytical Systems, Inc.
Bioassay Division

CHAIN-OF-CUSTODY RECORD

Mailing Address:	
98 Main Street, Suite 428	
Tiburon, CA 94920	
Shipping Address:	
3150 Paradise Drive, Building 36	
Tiburon, CA 94920	
Phone: (415) 435-1847	
Fax: (415) 435-0479	

CLIENT INFORMATION	
Project ID	94-62
Project Manager	Thomas J. Rothschild
Company	Wacker Siltronic Corporation
Address	7200 N.W. Front Avenue
	Portland, Oregon 97210
Phone	(503) 243-2020 Ext. 374
Fax	(503) 241-7599

Page 1 of 1

Shipped via			
	UPS	X	Fed Ex
	Bus		
Sample Disposal			
X	Dispose of		
	Return		

SAMPLE COLLECTION			SAMPLE INFORMATION					ANALYSES REQUIRED						SAMPLE INTEGRITY		
Sample ID	Date	Time	Matrix S=Sediment W=Water	Type G=Grab C=Composite O=Other (Describe)	Preservation	Number of Containers	Volume per Container		Ceriodaphnia					Sample Condition	Temperature upon laboratory receipt	Comments
94-62	12 oct 94	0800	W	C	4°C	1	10L		X							

Thomas J. Rothschild	Wacker Siltronic	12 oct 94/0900
Samplers' Name/Signature	Company Affiliation	Date/Time of Relinquishment
Kathie Evans	MEC	10/13/94 0000
Printed Name/Signature	Company Affiliation	Date/Time of Receipt
		Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt
		Date/Time of Relinquishment
Printed Name/Signature	Company Affiliation	Date/Time of Receipt

MEC Analytical Systems, Inc.
Bioassay Division

CHAIN-OF-CUSTODY RECORD

Mailing Address:	CLIENT INFORMATION	
98 Main Street, Suite 428	Project ID	94 - 64
Tiburon, CA 94920	Project Manager	Thomas J. Rothschild
Shipping Address:	Company	Wacker Siltronic Corporation
3150 Paradise Drive, Building 36	Address	7200 NW Front Avenue
Tiburon, CA 94920		Portland, Oregon 97210
Phone: (415) 435-1847	Phone	503 - 243 - 2020
Fax: (415) 435-0479	Fax	503 - 226 - 0052

Page 1 of 1

Shipped via		
	UPS	X Fed Ex
	Bus	
Sample Disposal		
X	Dispose of	
	Return	

SAMPLE COLLECTION			SAMPLE INFORMATION					ANALYSES REQUIRED						SAMPLE INTEGRITY		
Sample ID	Date	Time	Matrix S=Sediment W=Water	Type G=Grab C=Composite O=Other (Describe)	Preservation	Number of Containers	Volume per Container	Cerioderphnia						Sample Condition	Temperature upon laboratory receipt	Comments
94-64	14 Oct 94	0800	W	C	4°C	1	2.5L	X								Rec at 7.1°C

Thomas J. Rothschild
Samplers' Name/Signature

Wacker Siltronic
Company Affiliation

14 Oct 94/0830
Date/Time of Relinquishment

MARK J. BURKE
Printed Name/Signature

MEC Analytical - Tib
Company Affiliation

10/15/94/1325
Date/Time of Receipt

Date/Time of Relinquishment

Printed Name/Signature

Company Affiliation

Date/Time of Receipt

Date/Time of Relinquishment

Printed Name/Signature

Company Affiliation

Date/Time of Receipt

SCOEPA00028648

MEC Analytical Systems, Inc.
Bioassay Division

CHAIN-OF-CUSTODY RECORD

Mailing Address:	CLIENT INFORMATION	
98 Main Street, Suite 428	Project ID	94-66
Tiburon, CA 94920	Project Manager	Thomas J. Rothschild
Shipping Address:	Company	Wacker Siltronic Corporation
3150 Paradise Drive, Building 36	Address	7200 N.W. Front Avenue
Tiburon, CA 94920		Portland, Oregon 97210
Phone: (415) 435-1847	Phone	503-243-2020
Fax: (415) 435-0479	Fax	

Page 1 of 1

Shipped via			
	UPS	X	Fed Ex
	Bus		
Sample Disposal			
X	Dispose of		
	Return		

SAMPLE COLLECTION			SAMPLE INFORMATION					ANALYSES REQUIRED						SAMPLE INTEGRITY		
Sample ID	Date	Time	Matrix S=Sediment W=Water	Type G=Grab C=Composite O=Other (Describe)	Preservation	Number of Containers	Volume per Container	Cerisolphnic						Sample Condition	Temperature upon laboratory receipt	Comments
94-66	17Oct94	0830	W	C	4°C	1	2.5L	X								24-hour composite

Thomas J. Rothschild
Samplers' Name/Signature

Wacker Siltronic
Company Affiliation

17Oct94/0900
Date/Time of Relinquishment

Kathie Evans
Printed Name/Signature

MEC
Company Affiliation

10-18-94/1040
Date/Time of Receipt

Date/Time of Relinquishment

Printed Name/Signature

Company Affiliation

Date/Time of Receipt

Date/Time of Relinquishment

Printed Name/Signature

Company Affiliation

Date/Time of Receipt

Wacker Siltronic Corporation **WACKER**

P.O. BOX 83180 • PORTLAND, OREGON 97283-0180 • (503) 243-2020

PURCHASE ORDER

DATE	NUMBER	
10/10/94	30482	
CHANGE NOTICE	BLANKET RELEASE	PAGE
		1

VENDOR:

COLUMBIA AQUATIC SCIENCES
6060 CORTE DEL CEDRO

CARLSBAD, CA 92009

ATTN: F. CHARLES NEWTON

SHIP TO: Wacker Siltronic Corp., 7200 N.W. Front Ave., Portland, Oregon 97210-3676
SHIP VIA: ~~UPS MOTOR FRT~~ Federal Express overnight
F.O.B.: SHIPPING POINT
FREIGHT TERMS: PREPAID & ADDED
PAYMENT TERMS: NET 30 DAYS

LINE	QUANTITY	UNIT	DELIVER BY	DESCRIPTION	UNIT PRICE	EXTENSION
001	1	JB	10/30/94	BIOASSAY TEST, CERIEDEPHNIA DUBIA	1200.0000	1200.
				THREE SEPARATE SAMPLES TO BE SHIPPED:		
				1. 12 OCTOBER 1994		
				2. 14 OCTOBER 1994		
				3. 17 OCTOBER 1994		
				BY UPS OVERNIGHT		

LINE	REQUESTOR	DELIVER TO	ACCOUNT TO
01	ROTHSCHILD, TOM	(1)THOMAS ROTHS	1410

INSTRUCTIONS ON FACE AND REVERSE SIDE ARE MADE PART OF THIS ORDER TO WHICH SELLER AGREES BY ACCEPTANCE OF SAME.

KIMBERLEY EVE

PURCHASING AGENT

Kimberley A Eve

ADDITIONAL COST

ORDER TOTAL 1200.

PURCHASING COPY

SCOEPA00028650

June 7th, 1995 SER25:SA

Mr. Elliot Zais
Northwest Region
Department of Environmental Quality
2020 S.W. Fourth Avenue, Suite 400
Portland, Oregon 97201

Dear Mr. Zais:

In November of 1994 Wacker Siltronic Corporation, NPDES permit Number 101128, was notified of a second bioassay failed the chronic toxicity on *Ceriodaphnia dubia*. Procedures outlined in schedule D, section h, of the permit have been followed. In addition, CH_2M Hill was hired in December of 1994 as a consultant to assist in determining the source of toxicity.

Attached is the final report from CH_2M Hill. The past two chronic and past four acute results using *Ceriodaphnia dubia* have shown no toxicity using the current Zone of Immediate Dilution (ZID) and the Mixing Zone.

As indicated in the final report by CH_2M Hill many Toxic Identification Evaluation (TIE) studies have been attempted by Wacker Siltonic, but due to the samples being non-toxic the TIE tests were cancelled. Any future TIE attempts or additional bioassay tests would be unproductive.

A new Mixing Zone Effluent Dilution Evaluation was conducted by CH_2M Hill in April of 1995. Prior to the most recent mixing zone study Wacker Siltronic was using a river velocity of 0 fps. The most recent study indicates that this value can be increased to >0.1 fps. The attached river velocity graph shows that the river flows >0.1 fps during all times of the day with exception to two 15 minute intervals. Therefore, the river flows at >0.1 fps 97.9 % of the time.

With this new information at a river velocity of 0.1 fps the chronic dilution at the 50 foot mixing zone will decrease from the current 17% effluent concentration to 2% effluent concentration. In addition the acute dilution at the 5 foot zone of immediate dilution will decrease from 50% effluent dilution to 18% effluent dilution. We do not anticipate any further bioassay test failures

with the dilutions increased both for the chronic and acute toxicity studies.

If you have any questions regarding the test results, please contact me at 241-7532.

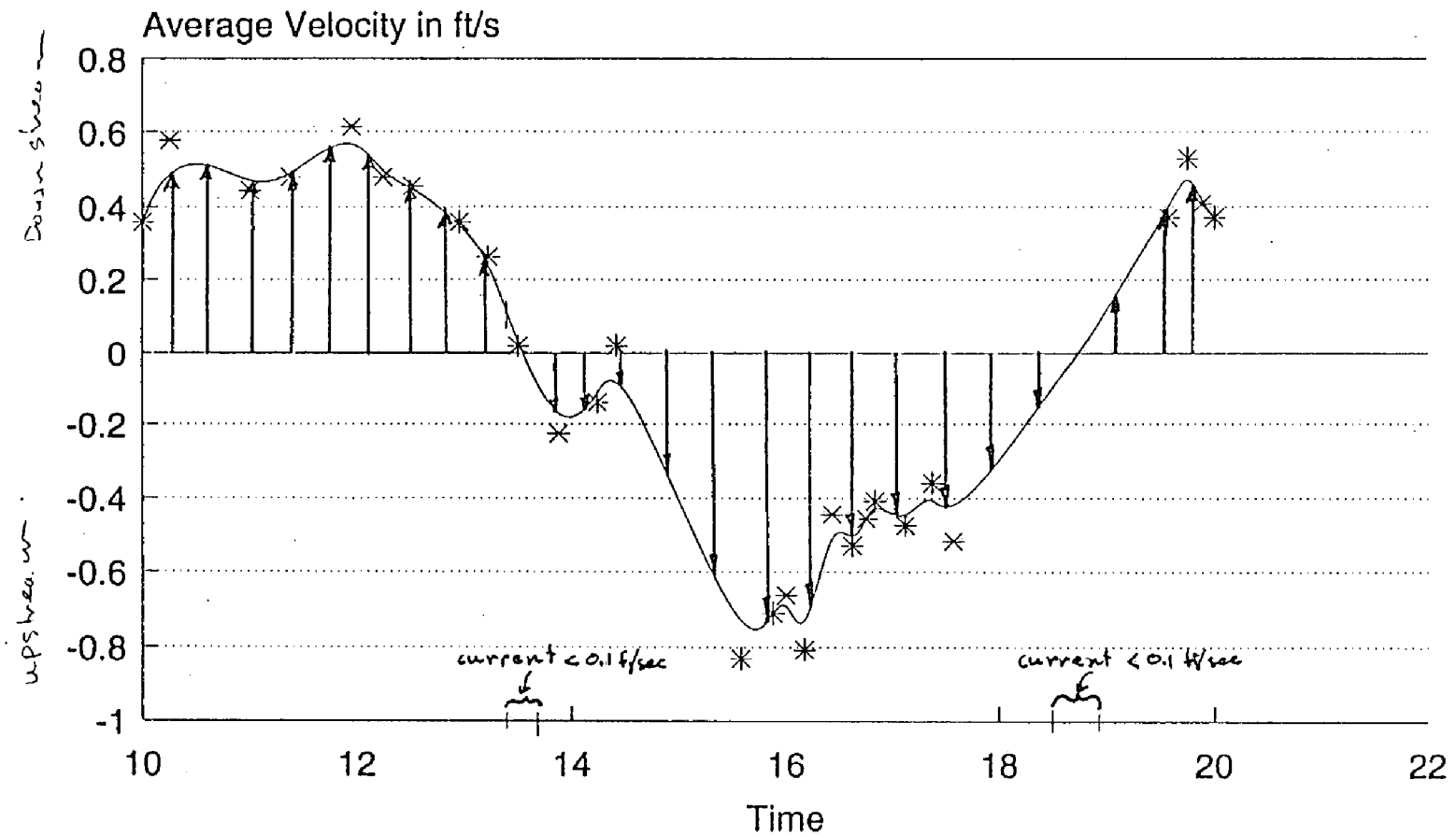
Very truly yours,

WACKER SILTRONIC CORPORATION

Thomas M. McCue
Environmental, Health and Safety Manager

enclosure:
(1) River velocity chart
(1) CH_2M Hill Report Bioassay Report

River Velocities



Average Velocity
10 AUG 1992
WILLAMETTE RIVER
R.M. 7.4

MEMORANDUM

CH2M HILL

TO: Tom McCue/Wacker
Sandra Archer/Wacker

COPIES: Mike Stanaway/CH2M HILL/CVO

FROM: Gary Hickman/CH2M HILL/CVO Gary

DATE: June 2, 1995

SUBJECT: Wacker Siltronic Corporation
Wastewater Toxicity Study
Project Approach and Progress Report

PROJECT: OPE40202.A0

Background

This memo summarizes the study approach, work completed, and test results, for the wastewater toxicity study performed for the Wacker Siltronic Corporation facility in Portland, Oregon.

Unless otherwise stated, use of the terms "effluent" and "whole effluent" in this memo refers to Effluent 001, which is discharged to the Willamette River under Wacker's NPDES discharge permit[1]. This effluent consists primarily of three waste streams: concentrated acid drain (CAD), weak acid drain (WAD) and (RO/DI water concentrate, boiler, and cooling water) blow down (BD). Wastewater treatment includes fluoride precipitation of CAD and neutralization of combined CAD and WAD.

The NPDES discharge permit[1] defines, for Wacker's effluent discharge to the Willamette River, a zone of initial dilution (ZID) having a 5-foot radius from the point of discharge at Outfall 003, and mixing zone having a 50-foot radius from the point of discharge at Outfall 003. A mixing zone dilution study conducted for the Wacker facility[2] identified worst-case (0 current velocity) dilutions at distances of 5 and 50 feet from the discharge point of 2:1 and 6:1 ($Q_{total}/Q_{effluent}$), respectively. These dilutions are equivalent to 50% effluent at the edge of the ZID and 17% effluent at the edge of the mixing zone. According to the discharge permit, the effluent is considered to be acutely toxic if an acute test No-Observable-Effects-Concentration (NOEC) is less than 50% effluent, and the effluent is considered to be chronically toxic if a chronic test NOEC is less than 17% effluent. Conversely, the effluent is considered to be in compliance for toxicity if the acute test NOEC≥50% effluent and the chronic test NOEC≥17% effluent.

[1] Oregon Department of Environmental Quality. National Pollutant Discharge Elimination System, Waste Discharge Permit Number 101128. Issued to Wacker Siltronic Corporation. July 14, 1993.
[2] Raymond, Richard/CH2M HILL. Mixing Zone Effluent Dilution Evaluation, prepared for Wacker Siltronic Corporation, February 4, 1994.

SCOEPA00028654

Approach

The stepwise approach initially proposed for this study was as follows:

1. **Site visit, kickoff meeting, and initial data gathering**. Visit the site to review processes and wastewater sources, and meet with Wacker staff to discuss toxicity issues and initiate data gathering.

Purpose: To gain familiarity with the facility and staff, develop mutual understanding of problem and the project objectives, and kickoff the project.

2. **Existing data review**. Compile and review existing data on effluent toxicity and physical chemical characteristics, as well as known and potential constituents of the waste streams comprising the final effluent.

Purpose: To obtain, to the extent possible, a preliminary indication of wastewater characteristics and potential toxic constituents, and to evaluate the toxicity history of the facility's effluent.

3. **Current effluent toxicity evaluation and toxicity data base expansion**. Conduct fathead minnow and *Ceriodaphnia* dual endpoint acute/chronic tests on whole effluent samples.

Purpose: To enlarge the very limited existing toxicity data base (only one test per year is required by the discharge permit) to obtain a better picture of the variation and magnitude of wastewater toxicity. Also, to allow a more confident identification of the more sensitive test species (if one is in fact significantly more sensitive) and the appropriate bioassay endpoint (acute versus chronic) for use in Toxicity Identification Evaluation (TIE) testing.

4. **Toxicity source investigation**. At the same time as Step 3, collect samples of the CAD (after treatment but before combining with WAD), WAD, and BD streams for toxicity testing. To reduce cost, this testing could involve only *Ceriodaphnia* acute screening tests. There is some risk that existing toxicity will not show up without doing chronic tests or without testing fatheads, but the *Ceriodaphnia* acute screen seems to be the single best, low-cost choice based on the available data.

Purpose: To help focus in on the source(s) of toxicity, and narrow the list of possible toxicity-causing constituents, if appropriate.

5. **Chemical characterization**. Characterize the whole effluent samples used in bioassay testing under Step 3 for the following parameters (based on preliminary review of waste stream constituents): pH, oxidation-reduction potential (ORP), alkalinity, hardness, conductivity, chlorine residual, ammonia-nitrogen (NH_3-N), total Kjeldahl nitrogen (TKN), anionic surfactants as MBAS, total suspended solids (TSS), total dissolved solids (TDS), Total and hexavalent chromium, hydrogen peroxide (measured at time of bioassay testing), sulfide, sulfite, fluoride, COD.

Purpose: To provide a more thorough chemical characterization of Wacker's effluent and to potentially identify possible causes of any toxicity measured.

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6. Housekeeping and chemical use information gathering.
(A) Continue to maintain thorough records of any production changes, atypical batch operations, process upsets, known spills, etc. during the period of sample collection for bioassay and chemical testing.
(B) Continue efforts to estimate usage rates of vendor-supplied products (such as polymers, surfactants, biocides, and defoamers), and request product toxicity data from the suppliers.

Purpose: (A) To identify any occurrences at the facility that might influence the measured toxicity. (B) To try to assess the potential toxicity related to use of products which are difficult to measure directly.

7. Phase I TIE testing. Conduct Phase I Toxicity Identification Evaluation (TIE) testing, involving a array of sample manipulations followed by toxicity testing, either after the above steps are completed or concurrently with that testing. The conditions employed in this testing will be selected based on the results of steps 3 through 6. TIE testing is contingent on obtaining bioassay results indicating that the effluent is toxic at the edge of the ZID or mixing zone.

Purpose: To identify the class(es) of toxic constituents in whole effluent, and provide direction for Phase II and III TIE testing, if necessary.

8. Phase II and III TIE testing (if needed). Conduct Phase II and III TIE testing, if necessary, to confirm the findings of Phase I and identify specific toxic constituents.

Purpose: To identify the cause(s) of effluent toxicity and provide a basis for evaluating mitigation methods.

9. Investigate methods for controlling toxicity (if needed). If effluent is found to be toxic, and after the toxic constituent(s) is(are) identified, investigate one or more methods for controlling toxicity, such as product substitution, process modification, wastewater treatment, source treatment or removal, or outfall/dilution improvement.

10 Control method selection and implementation and follow-up confirmation monitoring (if needed).

Work Performed To-Date

Project work performed to-date includes:

- Site visit, kickoff meeting, and initial data gathering (Step 1) -- 13 January 1995.
- Review of waste streams and constituents (Step 2) -- memo dated 6 February 1995.
- Review of existing effluent toxicity and chemical data (Step 2) -- memo dated 15 February 1995.
- Re-analysis of historical effluent toxicity data considering zone of initial dilution (ZID) and mixing zone dilutions -- results presented at project meeting on 13 April 1995.

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- Evaluation of current effluent toxicity and chemical characteristics (Steps 3 and 5) -- 6 and 21 March, 3 and 21 April, and 12 May 1995. Results of first three test dates presented at project meeting on 13 April 1995; results from all samples summarized in this memo.

- Toxicity source evaluation (Step 4) -- 6 March 1995.

- Test plan for Phase I TIE (Step 7) -- memo dated 17 March 1995.

- Housekeeping and chemical use information (Step 6) -- performed by Wacker staff and presented in memo dated 15 February and at project meeting on 13 April 1995.

- Phase I TIE trials (Step 7) -- 21 March, 3 and 21 April, and 12 May 1995. TIE testing not completed because of low effluent toxicity.

- Project status meeting -- 13 April 1995.

- Draft progress report memo -- 2 May 1995.

- Final progress report memo -- 2 June 1995.

Test Results

Toxicity Data

Table 1 summarizes Wacker's historical effluent toxicity data for 1993 and 1994, and 1995 effluent toxicity data generated under this study. Pertinent observations are summarized below:

- Wacker staff reported that their effluent was nontoxic prior to 1993.

- The historical toxicity data base was quite limited; it consisted of three fathead minnow bioassay tests and four *Ceriodaphnia* tests conducted during 1993 and 1994. The historical data did not provide a good indication of toxicity variability or frequency of pass/fail.

- **Effluent toxicity to fathead minnows**. The August 1993 sample failed to meet the fathead minnow acute toxicity guideline based on 100% effluent and the raw data were not available to determine whether the sample would have passed or failed at 50% effluent. All three subsequent fathead minnow acute tests conducted (September 1993, August 1994, and March 1995) passed the acute toxicity guideline at 50% effluent. All four fathead minnow chronic tests conducted in 1993-95 passed the chronic toxicity guideline at 17% effluent.

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- **Effluent toxicity to *Ceriodaphnia*..**

  ***Ceriodaphnia* acute tests**

  - 1993: both tests passed the acute toxicity guideline of 50% effluent (actually passed at 100% effluent)
  - 1994: one test failed and one passed the acute toxicity guideline of 50% effluent
  - 1995: two test failed and five tests (including the last four) passed the acute toxicity guideline of 50% effluent

  ***Ceriodaphnia* chronic tests**

  - 1993: both tests passed the chronic toxicity guideline of 17% effluent
  - 1994: both tests failed the chronic toxicity guideline of 17% effluent
  - 1995: one test failed and the last two tests passed the chronic toxicity guideline of 17% effluent

- Except for August 1993 sample, effluent toxicity to *Ceriodaphnia* was equal to or greater than the toxicity to fathead minnows (i.e., *Ceriodaphnia* was generally the more sensitive species to Wacker effluent).

- *Ceriodaphnia* acute toxicity single-dilution screening tests performed on CAD, WAD, and BD samples from 6 March 1995 indicated that the CAD and WAD samples were acutely toxic at less than 33% effluent (the only dilution tested), but that the BD sample was not acutely toxic at 33%.

- Based on the 6 March 1995 toxicity testing results, Phase I TIE testing using *Ceriodaphnia* acute tests was planned for effluent samples collected on 20 March and 3 April, but the TIE testing was canceled because of low acute toxicity. Phase I TIE testing using *Ceriodaphnia* chronic tests was planned for effluent samples collected on 21 April and 12 May 1995, but again the TIE testing was canceled when the samples were found to have low toxicity (i.e., they were within compliance toxicity guidelines).

Chemical Data

Table 2 summarizes effluent characterization data for 1995. Comparison of the chemical data between the acutely- and chronically-toxic 6 March sample and the acutely-nontoxic 21 March sample yields mostly negative conclusions with respect to toxicity:

- Ammonia-nitrogen, chlorine residual, and fluoride concentrations were low in both samples, although NH3-N was slightly higher in the toxic sample.

- H2O2 concentrations were high in both samples but not higher in the toxic sample.

- MBAS (indicative of anionic surfactants) concentrations were low in both samples, although somewhat higher in the toxic sample.

- COD was somewhat higher in the toxic sample, possibly indicating the presence of more organic compounds.

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- TDS and conductivity levels were not indicative of osmotic problems in either sample.

- Chromium concentrations were low in both samples.

- Wacker staff have reported that there is no specific reason to suspect the presence of elevated levels of other metals in their wastewater.

Summary and Recommendations

Wacker's effluent toxicity appears to be transient. Since measuring both acute and chronic *Ceriodaphnia* toxicity in the 6 March 1995 sample, a total of five acute tests and two chronic tests have passed the toxicity guidelines, and only one acute test has failed. The last two, and three out of the last four, samples collected for the purpose of conducting Phase I TIE testing turned out to be nontoxic by the regulatory definition, and so TIE testing was canceled (the fourth sample was actually toxic according to the regulatory definition but only marginally so). Consequently, to avoid unnecessary and unproductive effort and expense, we do not recommend further attempts at TIE testing at this time. Instead, we recommend that you share these study results with the DEQ to demonstrate that a considerable effort has been made to investigate the source of toxicity, but that several recent samples have been nontoxic according to the effluent toxicity guidelines.

SCOEPA00028659

Martinsen, John/CVO

From: Skinner, Paul/CVO
To: Sewell, John/BAILEY; Dibble, Robert/BAILEY; Amoth, Alan/CVO; Firth, Alex/CVO; Schwindt, Allan/CVO; Bjerke, Brad/CVO; Byers, Bill/CVO; Collom, Barry/CVO; Irving, Bill/CVO; Wehnert, Bob/CVO; Youker, Bryan/CVO; Burr, Chris/CVO; Dahl, Cindy/CVO; Noling, Calvin/CVO; Amedo, Don/CVO; Brown, Darla/CVO; Castor, Dave/CVO; Grigsby, Dave/CVO; Johnson, Doug/CVO; Leek, Doyle/CVO; Livesay, Dave/CVO; Loehden, Dave/CVO; Morgans, Donna/CVO; Moyano, Dave/CVO; Peters, Dennis/CVO; Hickman, Gary/CVO; Zinkus, Glenn/CVO; Arico, John/CVO; Carr, Jim/CVO; Cave, John/CVO; Celorie, Jay/CVO; Cox, Jim/CVO; Danko, Joe/CVO; Foley, Joe/CVO; Graham, John/CVO; Mackie, Jay/CVO; Martinsen, John/CVO; Obert, Jeff/CVO; Sams, John/CVO; Simonds, John/CVO; Bialek, Kris/CVO; Clegg, Ken/CVO; Snider, Kile/CVO; Baxter, Laura/CVO; Bennett, Lynette/CVO; Maloney, Linda/CVO; Wood, Lionel/CVO; Bailey, Melinda/CVO; Bracken, Mike/CVO; Finerson, Mark/CVO; Harlos, Mike/CVO; Murphy, Mary/CVO; Murray, Marv/CVO; Portera, Michelle/CVO; Sailor, Mike/CVO; Wable, Milind/CVO; Berg, Paul/CVO; Cutsforth, Patti/CVO; Hazel, Paul/CVO; Mueller, Paul/CVO; Damiano, Richard/CVO; Riker, Rick/CVO; Smith, Rick/CVO; Topping, Ray/CVO; Wilson, Roz/CVO; Frey, Sue/CVO; McKinley, Scott/CVO; McLaren, Susan/CVO; Snider, Stacy/CVO; Amidon, Tonya/CVO; Genne, Tom/CVO; Peron, Wil/CVO; Hadfield, Earl/CVO; Schmitz, Barb/CVO; Farley, Jody/CVO; Kramer, Jim/CVO; Volkmann, Andrea/PDX; Crossland, Janis/PDX
Cc: Trost, Bob/CVO; HelpDesk/OPR ComputingServices; Denison, Mike/CVO; Hinman, Alan/PDX; Olmstead, Kim/PDX
Subject: CVO1 Username Changes
Date: Thu, Jun 1, 1995 10:16AM

This message contains additional information about the CVO1 username changes. In addition to your CVO1 username changing, the name of your personal directory will be changed to be the same as the new name. The files in the directory will not be affected.

If you have any questions, please contact me at x.3231

Thanks! Paul

SCOEPA00028660

Table 1
Effluent Toxicity Data

			Toxicity [% Effluent]										
			Fathead minnow, *Pimephales promelas*					Water flea, *Ceriodaphnia dubia*					
			ACUTE		CHRONIC			ACUTE		CHRONIC			
Date	Lab	Sample ID	Survival NOEC	Pass/ Fail	Survival NOEC	Growth NOEC	Pass/ Fail	Survival NOEC	Pass/ Fail	Survival NOEC	Repro NOEC	Pass/ Fail	Comments
18-Aug-93	NAS	93-?		F?	25	25	P	100	P	50	25	P	FH acute failed @ 100%; no data available for other dilutions.
27-Sep-93	NAS	93-?	100	P	50	25	P	100	P	50	50	P	
15-Aug-94	NAS	94-50	100	P	50	50	P	25	F	25	<6.25	F	
12-Oct-94	NAS	94-61						50	P	6.25	<6.25	F	Cerio acute NOEC=50% (Steel's test), NOEC=25% (Wilcoxon test)
12-Oct-94	CAS	94-62								6.25		F	This was a split sample (duplicate) test
6-Mar-95	CH2M	95-4	100	P	33	33	P	17	F	10	3	F	
20-Mar-95	CH2M	95-19						66	P				
3-Apr-95	CH2M	95-20						33	F				
21-Apr-95	CH2M	95-24						50	P	50	17	P	
24-Apr-95	CH2M	95-25						50	P				
12-May-95	CH2M	95-29						50	P	50	17	P	
15-May-95	CH2M	95-30						50	P				

Notes:

NAS = Northwestern Aquatic Sciences, Newport, OR; CAS = Columbia Aquatic Sciences, Carlsbad, CA; CH2M = CH2M HILL, Corvallis, OR

Pass/Fail criteria - Oregon DEQ toxicity guidelines with a 1:1 ZID dilution (acute limit=50% effluent) and a 5:1 mixing zone dilution (chronic limit=17% effluent).

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Table 2

Effluent Characterization Data

Parameter	Units	Sample ID and Date Collected 95-4 6-Mar-95	95-19 20-Mar-95	95-20 3-Apr-95	95-24 21-Apr-95	95-29 15-May-95
Bioassay						
Fathead Acute NOEC	%	100	-	-	-	-
Fathead Chronic NOEC	%	33	-	-	-	-
Cerio Acute NOEC	%	17	66	33	50	50
Cerio Chronic NOEC	%	3	-	-	17	17
Chemical						
pH	pH units	7.1	6.7	6.7	6.4	6.9
Alkalinity	mg/L as CaCO3	5	20	12	10	U 10
Hardness	mg/L as CaCO3	300	244	184	288	218
Conductivity	µmhos/cm	868	690	710	1,013	870
TDS	mg/L	604	554	-	-	-
TSS	mg/L	7	8	-	-	-
COD	mg/L	14	5	-	-	-
NH3-N	mg/L	1.68	0.31	-	-	-
TKN	mg/L	1.81	0.36	-	-	-
Chlorine Residual	mg/L	0.05	0.08	0.06	0.04	0.02
H2O2	mg/L	17	20	-	-	-
Ox-Red Potential	mV	170	-	-	-	-
Fluoride	mg/L	4.4	2.8	-	-	-
Sulfide	mg/L	U 1	-	-	-	-
Sulfite	mg/L	U 0.5	-	-	-	-
MBAS	mg/L	0.25	0.1	-	-	-
Chromium, Total	µg/L	1	1.1	-	-	-
Chromium (VI)	µg/L	U 20	U 8	U 8	-	-
Notes:						
U = Less than specified method detection limit (MDL)						

Wacker Siltronic Corporation WACKER

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180
Phone (503) 243-2020
TDD (503) 241-7519

May 8th, 1995

DEPT OF ENVIRONMENTAL QUALITY RECEIVED

SER20:SA

MAY 10 1995

Mr. Elliot Zais
Northwest Region
Department of Environmental Quality
2020 S.W. Fourth Avenue, Suite 400
Portland, Oregon 97201

NORTHWEST REGION

Dear Mr. Zais:

In November of 1994 Wacker Siltronic Corporation, NPDES permit Number 101128, was notified of a second bioassay failure on *Ceriodaphnia dubia*. Procedures outlined in schedule D, section h, of the permit have been followed. In addition, CH_2M Hill was hired in December of 1994 as a consultant to assist in determining the source of toxicity.

Attached is the progress report along with future recommendations from CH_2M Hill for demonstrating compliance with the water quality. Results to date have been mixed for both acute toxicity and chronic toxicity for *Ceriodaphnia dubia*.

Wacker Siltronic's future plans for demonstrating compliance will follow the recommendations by CH_2M Hill as outlined in the enclosed document.

If you have any questions, please contact Sandra Archer at (503) 243-2020 ext 4684.

Very truly yours,

WACKER SILTRONIC CORPORATION

Thomas C. McCue

Thomas M. McCue
Environmental, Health and Safety Manager

enclosure:
(1) CH_2M Hill Report

Wacker Siltronic Corporation WACKER

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180
Phone (503) 243-2020
TDD (503) 241-7619

91 Z
File WQ-MUL
Facility 93450

June 7th, 1995 SER25:SA

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
JUN 12 1995
NORTHWEST REGION

Mr. Elliot Zais
Northwest Region
Department of Environmental Quality
2020 S.W. Fourth Avenue, Suite 400
Portland, Oregon 97201

Dear Mr. Zais:

In November of 1994 Wacker Siltronic Corporation, NPDES permit Number 101128, was notified of a second bioassay failed the chronic toxicity on *Ceriodaphnia dubia*. Procedures outlined in schedule D, section h, of the permit have been followed. In addition, CH_2M Hill was hired in December of 1994 as a consultant to assist in determining the source of toxicity.

Attached is the final report from CH_2M Hill. The past two chronic and past four acute results using *Ceriodaphnia dubia* have shown no toxicity using the current Zone of Immediate Dilution (ZID) and the Mixing Zone.

As indicated in the final report by CH_2M Hill many Toxic Identification Evaluation (TIE) studies have been attempted by Wacker Siltonic, but due to the samples being non-toxic the TIE tests were cancelled. Any future TIE attempts or additional bioassay tests would be unproductive.

A new Mixing Zone Effluent Dilution Evaluation was conducted by CH_2M Hill in April of 1995. Prior to the most recent mixing zone study Wacker Siltronic was using a river velocity of 0 fps. The most recent study indicates that this value can be increased to >0.1 fps. The attached river velocity graph shows that the river flows >0.1 fps during all times of the day with exception to two 15 minute intervals. Therefore, the river flows at >0.1 fps 97.9 % of the time.

With this new information at a river velocity of 0.1 fps the chronic dilution at the 50 foot mixing zone will decrease from the current 17% effluent concentration to 2% effluent concentration. In addition the acute dilution at the 5 foot zone of immediate dilution will decrease from 50% effluent dilution to 18% effluent dilution. We do not anticipate any further bioassay test failures

with the dilutions increased both for the chronic and acute toxicity studies.

If you have any questions regarding the test results, please contact me at 241-7532.

Very truly yours,

WACKER SILTRONIC CORPORATION

Thomas M. McCue

Thomas M. McCue
Environmental, Health and Safety Manager

enclosure:
(1) River velocity chart
(1) CH_2M Hill Report Bioassay Report

T- for the files?

Bioassay Report 1993

RECEIVED
MAR 16 1994
WACKER SILTRONIC
Environmental Health & Safety

Oregon
DEPARTMENT OF
ENVIRONMENTAL
QUALITY
NORTHWEST REGION

March 15, 1994

TOM MCCUE ENVIRONMENTAL MANAGER
WACKER SILTRONIC CORPORATION
PO BOX 83180
PORTLAND OREGON 97283-0180

Re: WQ-Multnomah Co.
Wacker Siltronic
Permit No. 101128

Dear Mr. McCue:

Thank you for submitting the mixing zone evaluation report for Wacker's outfall. The evaluation report was submitted with your letter dated February 11, 1994.

The Department has reviewed the mixing zone evaluation, along with the bioassay results for the bioassay tests conducted in August and September, 1993. The bioassay test results are briefly summarized below:

Date	Test Species	Acute Result	Chronic Result
August 1993	Ceriodaphnia Dubia	100% survival	NOEC 25% Effluent LOEC 50% Effluent
	Pimephales Promelas	0% survival	n/a
September 1993	Ceriodaphnia Dubia	100% survival	NOEC 25% Effluent LOEC 50% Effluent
	Pimephales Promelas	100% survival	NOEC 25% Effluent LOEC 50% Effluent

Based on the bioassay results, it appears that Wacker's effluent exhibits chronic toxicity at effluent concentrations of 50% or greater, with No Observable Effect at 25% effluent. The mixing zone evaluation indicates that at worst-case conditions, 5:1 dilution occurs at the edge of the mixing zone (50 feet from the outfall), corresponding to an effluent concentration of 17%. Chronic toxicity is allowed within, but not beyond, the mixing zone. The bioassay results indicate that this condition is being met, since the NOEC is 25% effluent.

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD

DEQ-1

It also appears that Wacker's effluent may exhibit acute toxicity in 100% effluent. Acutely toxic conditions are not allowed within a mixing zone, unless a Zone of Immediate Dilution (ZID) is established and specified within the NPDES permit. If a ZID is not established, the effluent must not exhibit any acute toxicity, and any future bioassay result which indicates acute toxicity within the mixing zone would be regarded as a violation of Oregon environmental law.

Pursuant to Oregon Administrative Rule 340-45-445, the Department may establish a small ZID, in which acute toxicity is allowed. The mixing zone evaluation indicates that at worst-case conditions, (zero feet per second current flow in the receiving stream), 1:1 dilution occurs at a distance of 5 feet from the outfall, corresponding to an effluent concentration of 50%. We note that there was no acute toxicity at 50% or less effluent. Thus, if Wacker were to request establishment of a ZID, it appears that a radius of 5 feet from the outfall would be sufficient to ensure that acutely toxic conditions would not extend beyond the edge of the ZID.

At this time, the Department asks that Wacker consider whether or not it wishes to request a permit modification to establish a ZID. As I recall, we also discussed the possibility of changing the compliance point for chromium during the last inspection. Both of these items could be requested in a single modification request. A modification request can be made in the form of a letter detailing the requested changes; the fee for modifications that do not involve increases to permit limits is $550.

I would also like to inform you that as of April 1, I will assume a new position in the Northwest Region's Air Quality Section; Wacker will not be assigned to me in that position. It has been a pleasure working with you and Chip, and if I can provide assistance or historical perspective in your future dealings with the Department, please don't hesitate to contact me. Until April 1, I can be reached at 229-5292.

Sincerely,

George Davis

George F. Davis
Regional Engineer
Northwest Region

GFD:gfd

cc: Water Quality Division, DEQ

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

JUL 14 1993
SJR

July 9, 1993

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is your most recent NPDES toxicity test report. We will stay in touch regarding the scheduling of your next test. If you should have any questions, please do not hesitate to call at (503) 265-7225.

Sincerely,

Richard S. Caldwell, Ph.D.
Director

Encl.

Copy To: Chip Bloome

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-11

Title: *Oncorhynchus mykiss*, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SG-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (*Salmo gairdneri*). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; B. Crowe, B.S., Tech.

Study Schedule:

Test Beginning: 6-9-93, 11:00 a.m.

Test Ending: 6-13-93, 1:00 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronics Corp. effluent, (24 HC). Details are as follows:

NAS Sample No.	9641D
Collection Date	--
Receipt Date	6-9-93
Conductivity (µmhos/cm)	500
pH	7.3
Hardness (mg/L)	120
Alkalinity (mg/L)	20

Treatments: Samples briefly temperature equilibrated and aerated prior to use.

Storage: Stored at 4°C in the dark until used.

DILUTION WATER

Source: City of Newport water.

Date of Collection: 6-7-93 .

SCOEPA00028670

Pretreatment: Dechlorinated using sodium thiosulfate and aeration.

TEST ORGANISMS

Species: Oncorhynchus mykiss, rainbow trout.
Size/Weight: 0.19 g
Source: Mount Lassen Trout Farms, Red Bluff, CA. Received on 5-21-93. Hatch date: 4-30-93.
Acclimation: Temperature, 14.0 ± 1.0°C; dissolved oxygen, 10.3 ± 0.1 mg/L; pH, 7.1 ± 0.2; conductivity, 479 ± 294 µmhos/cm; hardness, 90 ± 14 mg/L as $CaCO_3$; and alkalinity, 30 ± 14 mg/L as $CaCO_3$ for the two week period prior to testing. Acclimation tank loading: 0.63 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: one-gallon glass jars; vol. 3.5 L.
Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.
Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 0.54 g/L
Aeration: All test containers were continuously aerated using 1 ml disposable pipets and minimal bubbling rates.
Feeding: None during the test or for 24 hours prior to testing.
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.4 ± 0.3°C; dissolved oxygen, 10.3 ± 0.0 mg/L; pH, 7.0 ± 0.1; conductivity, 427 ± 3 µmhos/cm (100% effluent), 131 ± 5 µmhos/cm (control); hardness, 120 ± 0 mg/L as $CaCO_3$ (100% effluent), 80 ± 0 mg/L as $CaCO_3$ (control); alkalinity, 25 ± 7 mg/L as $CaCO_3$ (100% effluent), 50 ± 14 mg/L as $CaCO_3$ (control). Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

Smaller sample containers were used than specified in the protocol, but these were sufficient to keep fish loading within accepted levels. Therefore, this deviation should not affect the test result.

REFERENCE TOXICANT TEST

Test No.: 999-263
Test Date: 6-14-93
Reference Toxicant and Source: LAS (Linear alkyl sulfonate), Banco, Lot No. D3-01, Exp. Oct. 1993.
Dilution Water Used: Dechlorinated City of Newport water.
Result: 48-hr LC50, 6.07 mg/L.

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TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	>100
(95% C.I.)	--
Method	by inspection

STUDY APPROVAL

Study Director 7/9/93 Date

Quality Assurance Unit 7/8/93 Date

SCOEPA00028672

Table 1. Survival of Oncorhynchus mykiss exposed to Wacker Siltronics effluent.

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	9	7	7	7	70.0	
	2	10	10	9	9	8	80.0	75.0
60	1	10	10	9	9	8	80.0	
	2	10	10	9	9	9	90.0	85.0
36	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
22	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

4 DAYS

SCOEPA00028673

TOXICITY TEST REPORT

SEP 14 1993
JJR

TEST IDENTIFICATION

Test No.: 357-13

Title: Cladoceran (*Ceriodaphnia dubia*) dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall.

Protocol No.: NAS-XXX-CD2, August 2, 1990. Revision 1 (1-18-92). Based on U.S. EPA. 1989. Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test, pp. 105-146. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR 97210.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: G.A. Buhler, B.S., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.J. Irissarri, B.S., Tech.

Study Schedule:

Test Beginning: 8-19-93, 2:00 p.m.

Test Ending: 8-26-93, 3:30 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	0091E	0100E	0119E
Collection Date	8-18-93	8-20-93	8-23-93
Receipt Date	8-19-93	8-21-93	8-24-93
Conductivity (µmhos/cm)	725	550	550
pH	7.1	7.1	7.0
Hardness (mg/L)	160	140	120
Alkalinity (mg/L)	40	30	30

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

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DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 8-16-93 & 8-24-93
Pretreatment: Aerated.

TEST ORGANISMS

Species: *Ceriodaphnia dubia*, cladoceran
Age: <24-hr
Source: NAS cultures
Culture Conditions: Temperature, 24.1 ± 0.4°C; dissolved oxygen, 8.4 ± 0.1 mg/L; conductivity, 278 ± 28 µmhos/cm; pH, 7.7 ± 0.2; hardness, 100 ± 0 mg/L as $CaCO_3$; alkalinity, 63 ± 5 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 1 oz. polystyrene cups containing 15 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 10
Organisms/Treatment: 10
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: 0.1 ml each of YTC and *Selenastrum* suspension daily/beaker.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) inhibition of reproduction. Mortality was defined as lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.
Water Quality and Other Test Conditions: Temperature, 24.9 ± 0.4°C; dissolved oxygen, 8.2 ± 0.6 mg/L; conductivity, 608 ± 101 µmhos/cm (100% effluent), 300 ± 71 µmhos/cm (control); pH, 7.3 ± 0.3; hardness, 140 ± 20 mg/L as $CaCO_3$ (100% effluent), 80 ± 0 mg/L as $CaCO_3$ (control); alkalinity, 33 ± 6 mg/L as $CaCO_3$ (100% effluent), 65 ± 7 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

In the acute exposure (48 hour), survival was compared between the control and the 100% effluent concentration using student's T-Test on arcsine transformed survival data. The statistical software used was Crunch Statistical Package (Crunch Software, Oakland, CA). In the chronic test, results are based on survival of the introduced cladocerans and the numbers of young produced. The LC50 (survival) was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). The IC25 (reproduction) was calculated using the Linear Interpolation Method (EPA/600/4-89/001a). NOEC and LOEC values for survival and reproduction were computed using Fisher's Exact Test and T-Test with Bonferroni's adjustment, respectively. The statistical software employed for these calculations was Toxstat, Release 3.3, Univ. of Wyoming, Laramie.

PROTOCOL DEVIATIONS

None

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REFERENCE TOXICANT TEST

Test No.: 999-286
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 8-19-93
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 23.8 µg/L Cd; 7-day IC25, 0.37 µg/L Cd; NOEC, <1.0 µg/L Cd.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. The 48-hour survival for *C. dubia* exposed to 100% Wacker Siltronics outfall was not significantly different from the control survival. Therefore, the effluent passed the acute test according to DEQ guidelines.

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2 and Table 3. The biological effects, given as the NOEC and LOEC for survival and reproduction, the LC50 for survival, and the IC25 for reproduction are shown below.

	Survival	Reproduction
NOEC (%)	50	25
LOEC (%)	100	50
7-Day LC50/IC25 (%)	79.6	45.5
(95% conf. int.)	0 - inf.	--
Method	Moving average	Linear Interpolation

STUDY APPROVAL

Gary A Buhler 9/13/93
Study Director Date

Julie R. Fiore 9-13-93
Quality Assurance Unit Date

Rick D. Caldwell 9/13/93
Director, Aquatic Toxicology Date

SCOEPA00028676

Table 1. Ceriodaphnia survival data, 48-hour.

	Effluent concentration (%)	
	Control	100
Number exposed	10	10
Number dead	0	0

*Significantly different from the control (P=0.05).

Table 2. Ceriodaphnia survival data, 7-day. 7 DAYS

	Effluent concentration (%)					
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	0	0	0	3*	6*

*Significantly different from the control (P=0.05).

Table 3. Ceriodaphnia reproduction data (Number of young produced).

		Effluent concentration (%)				
Replicate	Control	6.25	12.5	25	50	100
1	16	20	16	17	11	5
2	18	11	7	12	13	8
3	17	22	15	23	7	12
4	13	23	9	22	18	0
5	22	21	19	29	0	19
6	25	17	20	19	2	10
7	15	22	7	33	18	6
8	0a	12	11	14	12	4
9	24	22	21	20	9	0
10	18	14	14	12	23	0
Mean	18.7	18.4	13.9	20.1	11.3*	6.4*

*Significantly less than the control (P=0.05).
[a]Adult in this replicate identified as a male.

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APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

CLADOCERAN (*CERIODAPHNIA DUBIA*) SURVIVAL AND REPRODUCTION TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the cladoceran, *Ceriodaphnia dubia* (EPA Method 1002.0).

1.2 Summary of Method: Neonate (<24-hr-old) *Ceriodaphnia dubia*, are exposed for seven days (or until 60% of surviving control organisms have three broods of young) to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 30 ml borosilicate glass or plastic beakers, each containing 15 ml of test solution. Ten replicate beakers, each with one neonate, are employed at each test concentration. Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Qual. Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

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2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 30 ml borosilicate glass or plastic beakers holding 15 ml of test solution. Temperature and photoperiod control of test chambers is provided by incubation in an environmental chamber or water bath.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS

6.1 Species: Cladoceran, *Ceriodaphnia dubia*

6.2 Source: *Ceriodaphnia* neonates are supplied from the NAS laboratory culture. The original culture was obtained from the EPA Environmental Research Laboratory, Corvallis, OR.

6.3 Age at Study Initiation: <24-hr-old neonates; and all released within an 8-hr period.

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6.4 Pretest Culture and Handling: Individual cultures are used as the immediate source of neonates for toxicity testing. Source cultures are handled in a similar manner as test organisms for at least seven days and the neonates are then used to initiate tests. Source cultures are transferred to new medium and fed at least three times a week (e.g. Mon, Wed, Fri). Records of the source cultures are kept and if mortality exceeds 20% or if less than 15 young are produced per week, the cultures are not used as a source of neonates for testing.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of neonates to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days or until 60% of the surviving control animals produce three broods. Each treatment consists of ten replicate test containers each containing one cladoceran. A stratified random design is used for beaker placement.

7.2 Effect Criteria: The effect criteria are: 1) mortality, and 2) inhibition of reproduction. Mortality is defined as the lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.

7.3 Test Conditions: The test temperature employed is 25 ± 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. The test solution is replaced once daily.

7.4 Beginning of Test: The test solutions are added to the test beakers and food is added. The test is then begun by adding one neonate to each test container.

7.5 Feeding: The organisms are fed when the test is initiated, and daily thereafter. Food is added to the fresh medium immediately before or immediatedly after the adults are transferred. Each feeding consists of 0.1 ml YTC per 15 ml test solution and 0.1 ml *Selanastrum* concentrate per 15 ml test solution.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days (or until 60% of surviving control organisms have three broods of young). The type and frequency of observations to be made during the test are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival (of adult)	Daily before transfer
Reproduction (young produced)	Daily after adult transfer
Physical and Chemical Data	
Temperature (two locations in environmental control system)	Daily

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Dissolved oxygen, pH (High, medium, & low concentrations & control)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control & each new effluent sample)	e.g. Days 1, 3, & 5

During the test, dead adult organisms are removed every 24 hours and the young are discarded daily after counting. Dissolved oxygen is measured in each stock test solution using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured in each stock test solution using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using test kits.

7.7 Criteria of Test Acceptance: The test results are acceptable if: 1) survival in the controls is at least 80% and reproduction in the controls averages 15 or more young per surviving female. At least 60% of surviving females in controls should have produced their third brood.

8. DATA ANALYSIS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests (e.g. Dunnett's Test, Fisher's Exact Test, or Steel's Many-one Rank Test).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

SCOEPA00028682

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. Environmental Protection Agency. 1989. Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test. Method 1002.0. *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

U.S. Environmental Protection Agency. 1989. Supplement to "Short-term methods for estimating the chronic toxicity of effluents and surface waters to freshwater organisms". Revision 1. EPA/600/4-89/001a.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028683

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

SEP 14 1993
JgR

September 13, 1993

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed are reports for the two dual endpoint (acute/chronic) tests performed in August with your effluent. Both of the test species were fairly similar in their responses: 1) there was little difference between lethal and sublethal response concentrations; and 2) effect levels were roughly 50% effluent for both species. At least with respect to the second point, the similarity in response suggests that ammonia may not be the toxic component since these two species differ somewhat in their ammonia toxicity.

There are Toxicity Identification Evaluation (TIE) methods that can be used to find the toxic fractions in an effluent, but this is an expensive task. At this stage you should just try to identify some obvious possibilities if you can and proceed with the second test. At the least, the latter should verify that there is something going on.

If you should have any questions at this time, please do not hesitate to call at (503) 265-7225. We are tentatively scheduling your next test set for September 28, 1993. We should know for sure early next week so we can begin the necessary preparations.

Sincerely,

Richard S. Caldwell, Ph.D.
Director

Encl.

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

RAINBOW TROUT (ONCHRHYNCHUS MYKISS) ACUTE TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to determine the acute toxicity of effluents and/or receiving waters using rainbow trout (Oncorhynchus mykiss).

1.2 Summary of Method: Rainbow trout (Oncorhynchus mykiss) juveniles are exposed for 96-hr (24-hr in screening test) to different concentrations of effluent, receiving water, or reference toxicant in a static test. The test may be performed either in a renewal or non-renewal form. Test chambers should constructed of glass and be large enough so that the loading limit is not exceeded. Two replicate aquaria (three for screening test), each with 10 fish, are employed at each test concentration. A standard experimental design is employed consisting of exposure of the test animals to five test concentrations, and a dilution water control in the definitive test (100% concentration and control in the screening test). Mortality is the effect criterion. The data analysis consists of calculation of the LC50 and 95% confidence intervals (t-test in the screening test).

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Quality Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologist: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the

SCOEPA00028686

EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is LAS (1.00 mg/ml stock solution).

4. DILUTION WATER

The dilution water is NAS laboratory spring water or dechlorinated city water from the City of Newport.

5. TEST ORGANISMS

5.1 Species: Rainbow trout, *Oncorhynchus mykiss*.

5.2 Source: Rainbow trout are purchased from a reputable supplier or local grower. A frequently used source is Northwest Trout, Corvallis, OR 97330.

5.3. Age: Juvenile (0.8-5.0 g)

5.4 Acclimation and Pretest Observation: After receipt of fish from a source known to have healthy fish, a minimum observation time of 48 hours is required prior to testing. If fish appear diseased, discolored, or otherwise stressed, or if more than 5% of the fish die during the 48-hr holding period, then the fish must be discarded and a new group obtained.

Care must be used to ensure that fish are not subjected to unusual handling or environmental stress either before or during the testing period. Fish should be handled only the minimum necessary using suitable dipnets and should not be subjected to more than a 3°C temperature change during any 12 hour period. The dissolved oxygen level must be maintained at a level of 60% of saturation or greater. During holding, loading of fish in aquaria should not exceed 10 g/L, and holding water should be replaced at a minimum rate of 2 tank volumes per day. Fish should be fed to satiation at least once a day with a commercial food obtained from the fish grower. Fish are shielded from any unusual visual stress and treated with a photoperiod of 16 hours light and 8 hours darkness. A daily log of feeding, behavioral observations, mortality, and water quality should be maintained

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers are may be glass jars or small plate glass aquaria. The containers are covered to minimize evaporation of volatile compounds. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath. The system is maintained in a photoperiod-controlled room or enclosure. Test solutions are aerated by slow bubbling of oil-free compressed air through 1 ml disposable pipets.

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6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of juvenile rainbow trout to five test concentrations in a logarithmic series and a dilution water control. A 60% dilution series is normally used in this test with effluents giving test concentrations of 100%, 60%, 36%, 22%, 13%, and 0%, but other dilutions are satisfactory. Exposures are for 96 hours. Each treatment consists of duplicate test chambers each containing ten fish. A stratified random design is used to place test chambers in the water bath which is used for temperature control. Test organisms are impartially distributed to the test chambers by adding two animals to each chamber and repeating the process until each contains 10 organisms. In the screening test only the 100% effluent and control levels are used, and three replicates are employed.

7.2 Effect Criterion: The effect criterion used in the rainbow trout bioassay is mortality, defined as a lack of visible respiratory movement and absence of response to tactile stimulation.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 60% saturation throughout the 96-hr test. Test containers are gently aerated if required to maintain the oxygen level. If aeration is employed, all containers are treated equally. The test temperature employed is 12 $\pm$ 2°C. The photoperiod is 16 hours of light and 8 hours of darkness. Loading must not exceed 0.8 g/L.

7.4 Preparation of Test Solutions: Effluent, groundwater, receiving water, or stock solutions of manufactured chemical products are diluted with dilution water to prepare a series of test concentrations. The test dilutions are brought to the test temperature by partial immersion of the test containers in a water bath and, if necessary, are gently aerated until the dissolved oxygen concentration is greater than 80% of saturation in each vessel.

7.5 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described.

7.6 Feeding: Animals are not fed during the test nor during the preceding 24 hours.

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7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 96 hours. The type and frequency of observations to be made are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival	Daily
Physical and Chemical Data	
Dissolved oxygen, pH, temperature, and conductivity (one repl. only)	Daily
Hardness and alkalinity (highest test concentration and control) (one replicate only)	0- and 96-hr

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is measured directly in test aquaria using a polarographic oxygen probe calibrated in air. The pH is also measured directly in the test aquaria by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured using a mercury thermometer or a telethermometer calibrated with a mercury thermometer. Conductivity, hardness, and alkalinity are measured using EPA approved or suggested methods (EPA 1979).

7.8 Criteria of Test Acceptance: For the test to be considered acceptable, the minimum survival of organisms in the control treatment at the end of the test must be 90%.

8. DATA ANALYSIS

Percent survival is calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). In the screening test, comparison of the 100% level with the control is done using a t-test.

9. REPORTING

A report of the test results must include the following information: name and identification of the test; the investigator and laboratory; information on the test material; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; the 24-, 48-, 72-, and 96-hr LC50s and 95% confidence limits; any unusual information about the test or deviations from procedures.

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10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect, and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

EPA. 1979. Methods for chemical analysis of water and wastes. Environmental Protection Agency, Cincinnati, (EPA 600/4-79-020).

Peltier, W.H. and C.I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. EPA 600/4-85-013.

12. APPROVALS

_____ for _____

Name Date

_____ for Northwestern Aquatic Sciences

Name Date

SCOEPA00028690

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-14

Title: Fathead Minnow dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall composite.

Protocol No.: NAS-XXX-PP2, September 15, 1990, Revision 1 (10-30-91). Based on U.S. EPA. 1989. Method 1000.0, Fathead minnow, *Pimephales promelas*, larval survival and growth test, pp. 33-74, In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; B.D. Crowe, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 9-28-93, 11:00 a.m.

Test Ending: 10-5-93, 11:00 a.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	0323E	0347E	0358E
Collection Date	9-27-93	9-29-93	10-1-93
Receipt Date	9-28-93	9-30-93	10-2-93
Conductivity (µmhos/cm)	550	150	600
pH	7.1	6.5	6.7
Hardness (mg/L)	120	180	160
Alkalinity (mg/L)	30	20	20

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

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DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 9-21-93, 10-1-93.
Pretreatment: Aerated ≥24 hr

TEST ORGANISMS

Species: *Pimephales promelas*, fathead minnow.
Size/Weight: 24-hr-old.
Source: Florida Bioassay Supply, Gainsville, FL
Acclimation: Holding conditions in the receiving water were: Temperature, 25.0°C; dissolved oxygen, 8.0 mg/L; pH, 7.1; conductivity, 250 µmhos/cm; hardness, 180 mg/L as $CaCO_3$; and alkalinity, 160 mg/L as $CaCO_3$.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 600 ml glass beakers containing 250 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 4
Organisms/Treatment: 40
Loading (based on final weight of control organisms): 0.017 g/L
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: Approx. 700 *Artemia* nauplii per beaker three times daily except on day 7.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) growth inhibition. Mortality was defined as lack of visible movement during a 30 second observation period. Growth inhibition was measured as the difference in weight gain of fish between a treatment level and the control.
Water Quality and Other Test Conditions: Temperature, 24.1 ± 0.1°C; dissolved oxygen, 7.4 ± 0.7 mg/L; conductivity, 671 ± 58 µmhos/cm (100% effluent), 382 ± 53 µmhos/cm (control); pH, 7.3 ± 0.2; hardness, 128 ± 13 mg/L as $CaCO_3$ (100% effluent), 80 ± 0 mg/L as $CaCO_3$ (control); alkalinity, 25 ± 5 mg/L as $CaCO_3$ (100% effluent), 61 ± 4 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

In the acute exposure (48 hour), no statistical comparison of survival was performed between the control and the 100% effluent concentration because no mortality was observed in the latter after 48 hours. In the chronic test, percent survival and the average weight per larva are calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 (survival) is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). The IC25 (growth) is calculated using the Linear Interpolation Method (EPA 600/4-89/001a). NOEC and LOEC values for survival and growth are computed using ANOVA and an appropriate *post hoc* test (Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni Adjustment). The appropriate test is selected after evaluating the data for normality and homogeneity of variance. Weight data are excluded from the ANOVA calculation if there is a survival effect. An arcsine transformation is performed on the survival data prior to statistical analysis. The statistical software employed for these calculations is TOXSTAT, Release 3.3, Univ. of Wyoming, Laramie, WY.

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PROTOCOL DEVIATIONS

None.

REFERENCE TOXICANT TEST

Test No.: 999-294
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 9-28-93
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 25.1 µg/L Cd; 7-day IC25, 22.3 µg/L Cd; NOEC, 10 µg/L Cd. This result is within the laboratory's control chart limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was no mortality of fathead minnows exposed to 100% Wacker Siltronics outfall composite after 48 hours. Therefore, the effluent passed the acute test according to Oregon DEQ guidelines (DEQ Whole Effluent Toxicity Testing Guidance Manual, January 1993).

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2. The biological effects, given as the NOEC and LOEC for survival and growth, and the LC50/IC25 for survival/growth, are shown below.

	Survival	Growth
NOEC (%)	50	25
LOEC (%)	100	50
7-Day LC50/IC25 (%)	70.7	49.3
(95% conf. int.)	(50 - 100)	--
Method	Binomial	Linear interpolation

STUDY APPROVAL

Rick D. Caldwell 10/20/93
Study Director Date

Julie R. Fiore 10/21/93
Quality Assurance Unit Date

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Table 1. Survival of fathead minnow larvae exposed for 48-hours to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae: Exposed	Dead	Surviving	Percent survival	Mean* percent survival
100	1	10	0	10	100.0	
	2	10	0	10	100.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	100.0
Control	1	10	0	10	100.0	
	2	10	0	10	100.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	100.0

* An asterisk next to a treatment mean indicates that it is significantly ($P<0.05$) less than the control mean.

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Table 2. Survival and growth of fathead minnow larvae exposed for seven days to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae: Exposed	Dead	Surviving	Percent survival	Mean* percent survival	Ave. wt. per larva (mg)	Mean* weight (mg)
100	1	10	10	0	0.0		--	
	2	10	10	0	0.0		--	
	3	10	10	0	0.0		--	
	4	10	10	0	0.0	0.0*	--	--
50	1	10	0	10	100.0		0.357	
	2	10	0	10	100.0		0.309	
	3	10	0	10	100.0		0.347	
	4	10	0	10	100.0	100.0	0.315	0.332*
25	1	10	0	10	100.0		0.439	
	2	10	0	10	100.0		0.442	
	3	10	0	10	100.0		0.423	
	4	10	0	10	100.0	100.0	0.462	0.441
12.5	1	10	0	10	100.0		0.539	
	2	10	0	10	100.0		0.453	
	3	10	0	10	100.0		0.443	
	4	10	1	9	90.0	97.5	0.494	0.482
6.25	1	10	0	10	100.0		0.424	
	2	10	0	10	100.0		0.411	
	3	10	0	10	100.0		0.418	
	4	10	0	10	100.0	100.0	0.448	0.425
Control	1	10	0	10	100.0		0.424	
	2	10	0	10	100.0		0.427	
	3	10	0	10	100.0		0.376	
	4	10	0	10	100.0	100.0	0.494	0.430

* An asterisk next to a treatment mean indicates that it is significantly ($P<0.05$) less than the control mean.

SCOEPA00028695

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

FATHEAD MINNOW (PIMEPHALES PROMELAS) LARVAL SURVIVAL AND GROWTH TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the fathead minnow (Pimephales promelas).

1.2 Summary of Method: Fathead minnow (Pimephales promelas) larvae (<24-hr old) are exposed for seven days to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 600 ml borosilicate glass beakers, each containing 250 ml of test solution. Four replicate beakers, each with 10 larvae, are employed at each test concentration. Test results are based on the survival and growth of the larvae. The data analysis includes calculation of the 7-day LC50 and the determination of a NOEC and LOEC for both growth and survival using ANOVA and an appropriate post-hoc test.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: Tests will be performed at the firm's laboratory at Newport, OR.

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: Richard S. Caldwell, Ph.D.
Qual. Assurance Officer: Donald R. Buhler, Ph.D.
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29,

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1983 (40 CFR Part 792).

3. TEST MATERIAL:

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM:

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 600 ml Pyrex beakers holding 250 ml of test solution. Temperature control of test chambers is provided by partial immersion of the beakers in a temperature controlled water bath. Aeration is employed only if necessary to maintain the dissolved oxygen concentration within acceptable limits, and, if used, is provided to all test containers by bubbling oil free air through 1 ml disposable glass pipets. The required photoperiod is achieved by timer control of the room lights.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E-729-80, paragraph 6.6. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 5% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER:

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS:

6.1 Species: Fathead minnow, *Pimephales promelas*

6.2 Source: Fathead minnow larvae are supplied from laboratory culture or from a reputable supplier. A recommended supplier is Aquatox, Inc., Hot Springs, Arkansas.

6.3 Age at Study Initiation: <24-hr-old if cultured; <48-hr-old (and all within 24-hr of the same age) if shipped.

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6.4 Acclimation and Pretest Observation: Since the larvae are used within 24 hours of receipt (or hatching), pretest observation is limited to the determination that water quality conditions upon receipt are within acceptable limits and that mortalities during shipping were minimal and that the fish appear to be healthy.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES:

7.1 Experimental Design: The test involves exposure of fathead minnow larvae to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days. Each treatment consists of four replicate test containers each containing ten larvae. Test containers are placed, using a stratified random design, in a water bath for temperature control. Test organisms are impartially distributed to the test chambers by adding two to three test organisms to each and repeating the process until each chamber contains 10 organisms.

7.2 Effect Criterion: The effect criteria are: 1) mortality, and 2) growth inhibition. Mortality is defined as the lack of visible movement during a 30 second observation period. Growth inhibition is measured as the difference in weight gain of fish between a treatment level and the control.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 40% saturation at all times. If necessary to achieve this, test containers should be gently aerated by slow bubbling through 1.0 ml disposable pipets. The test temperature employed is 25 $\pm$ 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. Loading of organisms should not exceed 0.8 g/L wet wt. (0.2 g/L dry wt.) in the test chambers. The test solution is replaced once daily.

7.4 Beginning of Test: The test is begun by adding the test organisms to the equilibrated test solutions as previously described.

7.5 Feeding: Test organisms are fed newly hatched *Artemia salina* nauplii three times daily. The feeding level is approximately 700 *Artemia* per beaker. The feeding level can be adjusted as necessary to minimize overfeeding which can lead to water fouling, but should be sufficient to support rapid growth of the larvae. Care must be taken that all treatments receive equal quantities of food daily. Uneaten food is removed once daily from test containers as part of the water changing routine to minimize water quality degradation. Larvae are not fed on day 7 of the test.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days. The type and frequency of observations to be made during the test are summarized as follows:

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Type of Observation	Times of Observation
Biological Data	
Survival	Daily
Growth	at end of test
Physical and Chemical Data	
Temperature (one replicate at all test levels)	Daily before solution renewal
Dissolved oxygen, pH (one replicate at all test levels)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control and high test concentration of one replicate)	Daily before solution renewal

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is directly measured in test beakers using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured directly in the test beakers by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alklinity are measured using test kits.

7.7 Growth Measurement Growth is measured as average dry weight of animals in a test replicate at the end of the test on day 7. Pooled animals from each test replicate are rinsed with deionized water, gently blotted and placed into tared aluminum weigh pans. The pans are dried at 100°C for a minimum of 2 hours. The dried larvae are dessicated and weighed as soon as possible to the nearest 0.00001 g. The total weight of the dried fish in each pan is divided by the number of fish weighed to obtain an average dry weight per fish.

7.8 Criteria of Test Acceptance: The test results are acceptable if: 1) the average survival of control larvae is $\geq$ 80%; and 2) the mean dry weight of control larvae preserved in 4% formalin solution is $\geq$ 0.25 mg for tests begun with <24-hr-old larvae.

8. DATA ANALYSIS:

The end points of the fathead minnow toxicity test are survival and growth. Survival is tabulated daily from direct count of live organisms. Average fish weight, measured at the end of the test, is used to compare growth between individual effluent treatments and the control. Point estimates, e.g. LC50, are calculated using the moving average or probit analysis. LOEC and NOEC values, for survival and growth, are obtained using appropriate hypothesis test statistics including ANOVA with Dunnett's or Bonferroni t-test post-hoc treatment comparisons. An arcsine transformation of survival data is employed prior to the ANOVA test.

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9. REPORTING:

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION:

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED GUIDELINES

U.S. Environmental Protection Agency. 1989. Fathead minnow, *Pimephales promelas*, larval survival and growth test, Method 1000.0. pp. 33-74 *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

12. APPROVALS:

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028701

APPENDIX II

RAW DATA

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

COVER DATA SHEET

Test No. 357-14 Client WACKER Siltronics Investigator [illegible] 10/14/93

STUDY MANAGEMENT

Client: WACKER Siltronics
Client's Study Monitor: Tom Rothchild
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. R.S. Caldwell
QA Officer L.K. Garrison-Nemeth
1. BD Crowe BC 2. G.A. Bohler
3. 4.
Study Schedule:
Test Beginning: 9-28-93 1100 Am Test Ending: 10-5-93 1100 Am

TEST MATERIAL

Description: Outfall composite

NAS Sample No.:	0323 E	0347 E	0358 E	
Date of Collection:	9-27-93	9-29-93	10-1-93	
Date of Receipt:	9-28-93	9-30-93	10-2-93	
Conductivity (µmhos/cm):	550	150	600	
pH:	7.1	6.5	6.7	
Hardness (mg/L):	120	180	160	
Alkalinity (mg/L):	30	20	20	
:				

DILUTION WATER

Description: Moderately Hard Synthetic Water prep'd from Milli-Q
Date of Preparation: 9-21-93, 10-1-93
Water Quality: Conductivity (µmhos/cm) 325, 300 pH 7.3, 7.4
Hardness (mg/L as $CaCO_3$) 100, 100 Alkalinity (mg/L as $CaCO_3$ 60, 60
Treatments: Aerated 24 hrs

TEST ORGANISMS

Species: Pimephales promelas, Fathead minnow
Age: (<24-hr old; 24-48 hr old if purchased) 24 hrs
Source: Florida Biosassay Supply, Gainesville, FL
Acclimation Data:

Date	Temp (°C	DO (mg/L)	pH	Cond µmh/cm	Hard (mg/L)	Alk (mg/L)	Comments
9-28-93	25.0	8.0	7.1	250	180	160	Rec. water
Mean							
S.D.							
(N)							

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COVER DATA SHEET (CONTINUED)

Test No. 357-14 Client _____ Investigator [illegible] 10/12/93

TEST PROCEDURES AND CONDITIONS

Test concentrations: (50% series recommended) 100, 50, 25, 12.5, 6.25, 0 %

Test chambers: (600 ml beakers) 600 mL Beakers
Test volume: (250 ml) 250 mL
Replicates/treatment: (4) 4
Organisms/treatment: (15) 10
Test water changes: Daily
Aeration during test: None
Feeding: 700-1000 three times daily
Beaker placement: Stratified randomization

Randomization chart:

A	Q	6.25	50	25	12.5	100
B	12.5	25	Q	6.25	100	50
C	12.5	Q	25 ~~12.5~~	50	6.25	100
D	6.25	50	100	12.5	25	Q

PREPARATION OF TEST SOLUTIONS

Concentration of working stock solution (%)

Test Conc (%)	~~Toxicant~~ Effluent ( ) (ml/L)	Dilution Water (ml/L)
100	1000	0
50	500	500
25	250	750
12.5	125	875
6.25	62.5	937.5
Q	0	1000

LOADING

$$\text{Loading} = \frac{\text{Sum of total wts in controls (mg)}}{\text{Total vol. in controls (ml)}} = \frac{(4.24)+(4.57)+(3.76)+(4.94)}{(1000)} = 0.017 \text{ g/L}$$

MISCELLANEOUS NOTES

SCOEPA00028704

WATER QUALITY DATA SHEET

Test No. 357-14 Client Wacker Investigator [illegible] 10/12/93

DAY 0 (9/28/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100			8.2		7.3	
2. 50			8.2		7.4	
3. 25			8.2		7.5	
4. 12.5			8.2		7.5	
5. 6.25			8.2		7.5	
6. 0			8.0		7.5	
7.						

Notes:

DAY 1 (9/29/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.2	6.2	8.1	6.9	~~7.6~~ 7.3	575/120/20
2. 50	24.1	6.2	8.1	7.0	~~7.6~~ 7.4	
3. 25	24.2	6.3	8.0	7.1	~~7.5~~ 7.4	
4. 12.5	24.2	6.5	8.0	7.2	7.5	
5. 6.25	24.0	6.5	8.0	7.3	7.5	
6. 0	24.1	6.9	8.0	7.1	7.5	350/80/60
7.						

Notes:

DAY 2 (9/30/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.2	6.2	8.0	7.0	7.0	650/120/30
2. 50	24.1	6.2	8.1	7.2	7.4	
3. 25	24.2	6.2	8.2	7.3	7.5	
4. 12.5	24.2	6.4	8.0	7.3	7.5	
5. 6.25	24.0	6.7	8.0	7.4	7.5	
6. 0	24.0	6.6	8.0	7.1	7.2	350/80/60
7.						

Notes:

DAY 3 (10/1/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.2	7.0	8.0	6.9	7.0	675/[illegible]/130
2. 50	24.2	6.8	8.1	7.3	7.3	
3. 25	24.1	6.8	8.1	7.3	7.4	
4. 12.5	24.2	7.1	8.0	7.4	7.5	
5. 6.25	24.1	7.2	8.0	7.5	7.5	
6. 0	24.0	7.0	8.0	7.4	7.4	350/80/60
7.						

Notes:

Remarks:

SCOEPA00028705

WATER QUALITY DATA SHEET

Test No. 357-14 Client WACKER Investigator BK 10/12/93

DAY 4 (10/2/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.4	6.6	8.0	6.8	7.3	675/120/30
2.	50	24.3	7.0	8.0	7.2	7.7	
3.	25	24.2	6.8	8.0	7.3	7.8	
4.	12.5	24.3	6.8	8.0	7.4	7.8	
5.	6.25	24.2	7.0	8.0	7.4	7.8	
6.	Q	24.0	7.0	8.0	7.3	7.8	500/80/60
7.							

Notes:

DAY 5 (10/3/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.1	7.4	7.8	6.7	7.0	700/140/20
2.	50	24.2	7.5	8.0	7.2	7.2	
3.	25	24.1	7.5	8.0	7.4	7.4	
4.	12.5	24.1	7.4	8.0	7.4	7.5	
5.	6.25	24.1	7.4	8.0	7.3	7.5	
6.	Q	24.0	7.5	8.0	7.3	7.5	375/80/60
7.							

Notes:

DAY 6 (10/4/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.3	6.7	—	6.5	—	750/150/20
2.	50	24.2	7.0	8.1	7.0	7.2	
3.	25	24.2	6.8	8.1	7.2	7.3	
4.	12.5	24.3	6.8	8.0	7.4	7.4	
5.	6.25	24.0	6.8	8.0	7.4	7.4	
6.	Q	24.1	7.0	8.0	7.5	7.4	375/80/70
7.							

Notes:

DAY 7 (10/5/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	—	—		—		—
2.	50	24.0	7.0		7.0		
3.	25	24.0	7.0		7.2		
4.	12.5	24.0	7.0		7.3		
5.	6.25	24.0	7.0		7.4		
6.	Q	24.1	7.0		7.4		375/80/60
7.							

Notes:

Remarks:

SCOEPA00028706

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

SURVIVAL DATA SHEET

Test No. 357-14 Client _____ Investigator BC 10/12/93

Conc. (%)	Repl	Survival on day (D=dead; M=missing) 0	1	2	3	4	5	6	7	Proportion
1. 100	A	10	10	10	10	6(4D)	4(2D)	0(4D)	0	0
	B	10	10	10	10	5(5D)	5	0(5D)	0	0
	C	10	10	10	10	8(2D)	7(1D)	0(7D)	0	0
	D	10	10	10	10	6(4D)	3(3D)	0(3D)	0	0
2. 50	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
3. 25	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
4. 12.5	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	9(1D)	9	9	9	9	.9
5. 6.25	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
6. ~~0~~	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
7.	A									
	B									
	C									
	D									
Initial		BC	BC	BC	BC	BC	BC	BC	BC	
Remarks:		9-28-93	9-29-93	9-30-93	10-1-93	10-2-93	10-3-93	10-4-93	10-5-93	

SCOEPA00028707

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

WEIGHING DATA SHEET

Test No. 357-14 Client WACKER Silhouette Investigator [illegible] 10/12/93
Tare: Date 10-1-93 Oven temp(°C) 102°C Drying time(hr) 24hrs Init. JRF
Final: Date 10-6-93 Oven temp(°C) 103°C Drying time(hr) 24hrs Init. JRF
Equip. Used: Oven Blue-M Balance Sartorius M3P

Conc. (%)	Repl	Pan #	A Tare wt (mg)	B Total wt (mg)	B-A Fish wt (mg)	C # of Fish	B-A/C Ave. wt (mg)	Comments
1.	A	25	31.23	—		0		
	B	26	35.05	—		0		
100	C	27	33.36	—		0		
	D	28	36.47	—		0		
2.	A	29	35.45	~~37.78~~ JF 39.02		10	0.357	
	B	30	35.32	38.41		10	0.309	
50	C	31	33.58	37.05		10	0.347	
	D	32	34.63	37.78		10	0.315	
3.	A	33	35.27	39.66		10	0.439	
	B	34	33.82	38.24		10	0.442	
25	C	35	36.43	40.66		10	0.423	
	D	36	33.10	37.72		10	0.462	
4.	A	37	34.21	39.60		10	0.539	
	B	38	33.32	37.85		10	0.453	
12.5	C	39	33.25	37.68		10	0.443	
	D	40	34.44	38.89		9	~~0.445~~	0.494 JRF 10/12/93
5.	A	41	37.27	41.51		10	0.424	
	B	42	36.94	41.05		10	0.411	
6.25	C	43	33.44	37.62		10	0.418	
	D	44	33.58	38.06		10	0.448	
6.	A	45	32.99	37.23	4.24	10	0.424	
	B	46	31.40	35.67	4.27	10	0.427	
Ø	C	47	36.08	39.84	3.76	10	0.376	
	D	48	34.41	39.35	4.94	10	0.494	
7.	A							
	B							
	C							
	D							

Remarks:

10-1-93 JRF 100mg std wt = 100.02 mg

10-6-93 JRF 100mg std wt = 100.02 mg

SCOEPA00028708

Gs 10/12/93

Data listing File: p357w14 Date: 10-12-1993

.TER: None

Obs.	DAY	CONC	OLDNEW	TEMP	DO	PH	COND	HARD	ALK
1	0	100.00	1	-1.0	-1.0	-1.0	-1	-1	-1
2	0	50.00	1	-1.0	-1.0	-1.0	-1	-1	-1
3	0	25.00	1	-1.0	-1.0	-1.0	-1	-1	-1
4	0	12.50	1	-1.0	-1.0	-1.0	-1	-1	-1
5	0	6.25	1	-1.0	-1.0	-1.0	-1	-1	-1
6	0	0.00	1	-1.0	-1.0	-1.0	-1	-1	-1
7	0	100.00	2	-1.0	8.2	7.3	-1	-1	-1
8	0	50.00	2	-1.0	8.2	7.4	-1	-1	-1
9	0	25.00	2	-1.0	8.2	7.5	-1	-1	-1
10	0	12.50	2	-1.0	8.2	7.5	-1	-1	-1
11	0	6.25	2	-1.0	8.2	7.5	-1	-1	-1
12	0	0.00	2	-1.0	8.0	7.5	-1	-1	-1
13	1	100.00	1	24.2	6.2	6.9	575	120	20
14	1	50.00	1	24.1	6.2	7.0	-1	-1	-1
15	1	25.00	1	24.2	6.3	7.1	-1	-1	-1
16	1	12.50	1	24.2	6.5	7.2	-1	-1	-1
17	1	6.25	1	24.0	6.5	7.3	-1	-1	-1
18	1	0.00	1	24.1	6.9	7.1	350	80	60
19	1	100.00	2	-1.0	8.1	7.3	-1	-1	-1
20	1	50.00	2	-1.0	8.1	7.4	-1	-1	-1
21	1	25.00	2	-1.0	8.0	7.4	-1	-1	-1
22	1	12.50	2	-1.0	8.0	7.5	-1	-1	-1
23	1	6.25	2	-1.0	8.0	7.5	-1	-1	-1
24	1	0.00	2	-1.0	8.0	7.5	-1	-1	-1
25	2	100.00	1	24.2	6.2	7.0	650	120	30
26	2	50.00	1	24.1	6.2	7.2	-1	-1	-1
27	2	25.00	1	24.2	6.2	7.3	-1	-1	-1
28	2	12.50	1	24.2	6.4	7.3	-1	-1	-1
29	2	6.25	1	24.0	6.7	7.4	-1	-1	-1
30	2	0.00	1	24.0	6.6	7.1	350	80	60
31	2	100.00	2	-1.0	8.0	7.0	-1	-1	-1
32	2	50.00	2	-1.0	8.1	7.4	-1	-1	-1
33	2	25.00	2	-1.0	8.2	7.5	-1	-1	-1
34	2	12.50	2	-1.0	8.0	7.5	-1	-1	-1
35	2	6.25	2	-1.0	8.0	7.5	-1	-1	-1
36	2	0.00	2	-1.0	8.0	7.2	-1	-1	-1
37	3	100.00	1	24.2	7.0	6.9	675	120	30
38	3	50.00	1	24.2	6.8	7.3	-1	-1	-1
39	3	25.00	1	24.1	6.8	7.3	-1	-1	-1
40	3	12.50	1	24.2	7.1	7.4	-1	-1	-1
41	3	6.25	1	24.1	7.2	7.5	-1	-1	-1
42	3	0.00	1	24.0	7.0	7.4	350	80	60
43	3	100.00	2	-1.0	8.0	7.0	-1	-1	-1
44	3	50.00	2	-1.0	8.1	7.3	-1	-1	-1
45	3	25.00	2	-1.0	8.1	7.4	-1	-1	-1
46	3	12.50	2	-1.0	8.0	7.5	-1	-1	-1
47	3	6.25	2	-1.0	8.0	7.5	-1	-1	-1
48	3	0.00	2	-1.0	8.0	7.4	-1	-1	-1
49	4	100.00	1	24.4	6.6	6.8	675	120	30
50	4	50.00	1	24.3	7.0	7.2	-1	-1	-1
51	4	25.00	1	24.2	6.8	7.3	-1	-1	-1
52	4	12.50	1	24.3	6.8	7.4	-1	-1	-1
53	4	6.25	1	24.2	7.0	7.4	-1	-1	-1
54	4	0.00	1	24.0	7.0	7.3	500	80	60
55	4	100.00	2	-1.0	8.0	7.3	-1	-1	-1

-7-

Rec 10/12/93

Data listing File: p357w14 Date: 10-12-1993

F TER: None

Obs.	DAY	CONC	OLDNEW	TEMP	DO	PH	COND	HARD	ALK
56	4	50.00	2	-1.0	8.0	7.7	-1	-1	-1
57	4	25.00	2	-1.0	8.0	7.8	-1	-1	-1
58	4	12.50	2	-1.0	8.0	7.8	-1	-1	-1
59	4	6.25	2	-1.0	8.0	7.8	-1	-1	-1
60	4	0.00	2	-1.0	8.0	7.8	-1	-1	-1
61	5	100.00	1	24.1	7.4	6.7	700	140	20
62	5	50.00	1	24.2	7.5	7.2	-1	-1	-1
63	5	25.00	1	24.1	7.5	7.4	-1	-1	-1
64	5	12.50	1	24.1	7.4	7.4	-1	-1	-1
65	5	6.25	1	24.1	7.4	7.3	-1	-1	-1
66	5	0.00	1	24.0	7.5	7.3	375	80	60
67	5	100.00	2	-1.0	7.8	7.0	-1	-1	-1
68	5	50.00	2	-1.0	8.0	7.2	-1	-1	-1
69	5	25.00	2	-1.0	8.0	7.4	-1	-1	-1
70	5	12.50	2	-1.0	8.0	7.5	-1	-1	-1
71	5	6.25	2	-1.0	8.0	7.5	-1	-1	-1
72	5	0.00	2	-1.0	8.0	7.5	-1	-1	-1
73	6	100.00	1	24.3	6.7	6.5	750	150	20
74	6	50.00	1	24.2	7.0	7.0	-1	-1	-1
75	6	25.00	1	24.2	6.8	7.2	-1	-1	-1
76	6	12.50	1	24.3	6.8	7.4	-1	-1	-1
77	6	6.25	1	24.0	6.8	7.4	-1	-1	-1
78	6	0.00	1	24.1	7.0	7.5	375	80	70
79	6	100.00	2	-1.0	-1.0	-1.0	-1	-1	-1
80	6	50.00	2	-1.0	8.1	7.2	-1	-1	-1
81	6	25.00	2	-1.0	8.1	7.3	-1	-1	-1
82	6	12.50	2	-1.0	8.0	7.4	-1	-1	-1
83	6	6.25	2	-1.0	8.0	7.4	-1	-1	-1
84	6	0.00	2	-1.0	8.0	7.4	-1	-1	-1
85	7	100.00	1	-1.0	-1.0	-1.0	-1	-1	-1
86	7	50.00	1	24.0	7.0	7.0	-1	-1	-1
87	7	25.00	1	24.0	7.0	7.2	-1	-1	-1
88	7	12.50	1	24.0	7.0	7.3	-1	-1	-1
89	7	6.25	1	24.0	7.0	7.4	-1	-1	-1
90	7	0.00	1	24.1	7.0	7.4	375	80	60
91	7	100.00	2	-1.0	-1.0	-1.0	-1	-1	-1
92	7	50.00	2	-1.0	-1.0	-1.0	-1	-1	-1
93	7	25.00	2	-1.0	-1.0	-1.0	-1	-1	-1
94	7	12.50	2	-1.0	-1.0	-1.0	-1	-1	-1
95	7	6.25	2	-1.0	-1.0	-1.0	-1	-1	-1
96	7	0.00	2	-1.0	-1.0	-1.0	-1	-1	-1

SCOEPA00028710

RL 10/12/93

Descriptive statistics File: p357w14 Date: 10-12-1993

FILTER: None

Observations meeting filter conditions: 96

Variable	N	Mean	Standard Deviation	Minimum	Maximum	Coeff. of Variation
TEMP	41	24.134	0.106	24.000	24.400	0.441
DO	82	7.445	0.658	6.200	8.200	8.845
PH	82	7.320	0.234	6.500	7.800	3.195

Descriptive statistics File: p357w14 Date: 10-12-1993

FILTER: Keep if CONC = 100

Observations meeting filter conditions: 16

Variable	N	Mean	Standard Deviation	Minimum	Maximum	Coeff. of Variation
COND	6	670.833	57.915	575.000	750.000	8.633
HARD	6	128.333	13.292	120.000	150.000	10.357
ALK	6	25.000	5.477	20.000	30.000	21.909

Descriptive statistics File: p357w14 Date: 10-12-1993

FILTER: Keep if CONC = 0

Observations meeting filter conditions: 16

Variable	N	Mean	Standard Deviation	Minimum	Maximum	Coeff. of Variation
COND	7	382.143	53.452	350.000	500.000	13.988
HARD	7	80.000	0.000	80.000	80.000	0.000
ALK	7	61.429	3.780	60.000	70.000	6.153

SCOEPA00028711

PBL 10/12/93

Test 357-14: Fathead 7-day survival
File: C:\ws4\temp6\p357a14.tst Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro Wilks test for normality

D = 0.020

W = 0.465

Critical W (P = 0.05) (n = 24) = 0.916
Critical W (P = 0.01) (n = 24) = 0.884

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Test 357-14: Fathead 7-day survival
File: C:\ws4\temp6\p357a14.tst Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

SCOEPA00028712

BFo 10/12/93

TITLE: Test 357-14: Fathead 7-day survival
FILE: C:\ws4\temp6\p357a14.tst
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	1.0000	1.4120
1	Control	2	1.0000	1.4120
1	Control	3	1.0000	1.4120
1	Control	4	1.0000	1.4120
2	6.25%	1	1.0000	1.4120
2	6.25%	2	1.0000	1.4120
2	6.25%	3	1.0000	1.4120
2	6.25%	4	1.0000	1.4120
3	12.5%	1	1.0000	1.4120
3	12.5%	2	1.0000	1.4120
3	12.5%	3	1.0000	1.4120
3	12.5%	4	0.9000	1.2490
4	25%	1	1.0000	1.4120
4	25%	2	1.0000	1.4120
4	25%	3	1.0000	1.4120
4	25%	4	1.0000	1.4120
5	50%	1	1.0000	1.4120
5	50%	2	1.0000	1.4120
5	50%	3	1.0000	1.4120
5	50%	4	1.0000	1.4120
6	100%	1	0.0000	0.1588
6	100%	2	0.0000	0.1588
6	100%	3	0.0000	0.1588
6	100%	4	0.0000	0.1588

Test 357-14: Fathead 7-day survival
File: C:\ws4\temp6\p357a14.tst Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	1.412				
2	6.25%	1.412	18.00	10.00	4.00	
3	12.5%	1.371	16.00	10.00	4.00	
4	25%	1.412	18.00	10.00	4.00	
5	MOEC 50%	1.412	18.00	10.00	4.00	
6	LOEC 100%	0.159	10.00	10.00	4.00	*

Critical values use k = 5, are 1 tailed, and alpha = 0.05

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

10/12/93

Shapiro Wilks test for normality

D = 0.016

W = 0.966

Critical W (P = 0.05) (n = 20) = 0.905
Critical W (P = 0.01) (n = 20) = 0.868

Data PASS normality test at P=0.01 level. Continue analysis.

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 5.63
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 3.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

BR
10/12/93

TITLE: Test 357-14: Fathead 7-day growth
FILE: C:\ws4\temp6\p357b14.tst
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.4240	0.4240
1	Control	2	0.4270	0.4270
1	Control	3	0.3760	0.3760
1	Control	4	0.4940	0.4940
2	6.25%	1	0.4240	0.4240
2	6.25%	2	0.4110	0.4110
2	6.25%	3	0.4180	0.4180
2	6.25%	4	0.4480	0.4480
3	12.5%	1	0.5390	0.5390
3	12.5%	2	0.4530	0.4530
3	12.5%	3	0.4430	0.4430
3	12.5%	4	0.4940	0.4940
4	25%	1	0.4390	0.4390
4	25%	2	0.4420	0.4420
4	25%	3	0.4230	0.4230
4	25%	4	0.4620	0.4620
5	50%	1	0.3570	0.3570
5	50%	2	0.3090	0.3090
5	50%	3	0.3470	0.3470
5	50%	4	0.3150	0.3150

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	0.049	0.012	11.410
Within (Error)	15	0.016	0.001	
Total	19	0.065		

Critical F value = 3.06 (0.05,4,15)
Since F > Critical F REJECT Ho:All groups equal

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.430	0.430		
2	6.25%	0.425	0.425	0.216	

-13-

5	LOEC	50%	0.332	0.332	4.251 *

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, df=15,4)

10/12/93

357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	4			
2	6.25%	4	0.055	12.7	0.005
3	12.5%	4	0.055	12.7	-0.052
4	25%	4	0.055	12.7	-0.011
5	50%	4	0.055	12.7	0.098

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LC50 TOXDAT MULTI-METHOD CALCULATION RESULTS
****

PB 10/12/93

Test 357-14: Fathead 7-day LC50

CONCENTRATION EXPRESSED AS : % effluent

CONC.	NUMBER EXPOSED	NUMBER AFFECTED	PERCENT AFFECTED
100	40	40	100
50	40	0	0
25	40	0	0
12.5	40	1	2.5
6.25	40	0	0

THE BINOMIAL TEST SHOWS THAT 50 AND 100 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 70.71067

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

END OF REPORT.

BR 10/12/93

CALCULATION OF IC_p FOR:

___Ceriodaphnia 7-day reproduction
X Fathead minnow 7-day growth
___Menidia 7-day growth
___Other_____

Test No.: 357-14
Date of Calc.: 10-12-93
Initials: BR

	Conc. (%)	Y_i	M_i	M_i	M_i
1.	control	.430	.446		
2.	6.25	.425	.446		
3.	12.5	.482	.446		
4.	25	.441	.441		
5.	50	.332	.332		
6.	100	0	0		

25% Reduction = .335
(control x .75)

50% Reduction =
(control x .50)

$$IC_{25} = 25 + [.335 - .441] \frac{(50 - 25)}{(.332 - .441)} = 49.3$$

$$IC_{50} = \quad + [\quad - \quad] \frac{(\quad - \quad)}{(\quad - \quad)} =$$

Where: Y_i=observed means
M_i=smoothed means
Concentrations go from low to high.

SAMPLE CALC.:

	Conc. (ug/L Cd)	Y_i	M_i	M_i	M_i
1.	control	.588	.598	.596	
2.	2.5	.607	.598	.596	
3.	5.0	.578	.578	.596	
4.	10	.609		.596	
5.	20	.235		.235	
6.					

50% Reduction = .596 x .50 = .298
(control x .50)

$$IC_{50} = 10 + [.298 - .596] \frac{(20 - 10)}{(.235 - .596)} = 18.3 \text{ ug/L}$$

SCOEPA00028718

Client name	Project or PO#
Wacker-Siltronics Corp.	—
Address	**Phone #**
7200 N.W. Front St.	(503) 243-2020
City, State, Zip	**Report attention**
Portland, OR. 97210	Tom Rothschild

Analyses required: Bioassay Test; Hazardous sample Special handling required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by ~~Thomas J Rothschild~~ * Dianne Mullan	Number of containers	Bioassay Test								Remarks
				Sample description										
	27 Sep 1993	0800	AQ	Outfall Composite	1	X								*Thomas Rothschild
														absent from
														work - sampler
														was Dianne Mullan
														NAS# 0323E

	Signature	Print Name	Company	Date	Time
Relinquished by	* Dianne Mullan ~~Thomas J Rothschild~~	Dianne Mullan ~~Thomas J Rothschild~~	Wacker Siltronic Corporation	27 Sep 93	0900 ~~1000~~
Received by	Brad Wardle	Brad Wardle	UPS	27 Sep 93	1100
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Buhler	GARY A Buhler	NAS	9-28-93	10 40 AM

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

ent name	Wacker Siltronics Corp.
Project or PO#	93-63
dress	7200 N.W. Front St.
Phone #	(503) 243-2020
y, State, Zip	Portland, OR. 97210
Report attention	Tom Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sampled by Thomas J. Rothschild / Sample description	Number of containers	Bioassay Test						Hazardous sample Special handling required	Remarks
	29 Sep 93	0800	AQ	Outfall composite	1								NAS # 0347E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	29 Sep 93	1000
Received by					
Relinquished by					
Received by	B Wardle				
Relinquished by					
Received by Laboratory	B D Crowe	Brent D Crowe	Northwestern Aquatic Sciences	30 Sept 93	1019 Am

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

SCOEPA00028720

Client name: Wacker Siltronics Corp.	Project or PO#: 93-65
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test								Remarks
	1 Oct 93	0800	AQ	outfall composite	1	X								NAS# 0358 E

Analyses required: Bioassay Test; Hazardous sample Special handling required

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	1 Oct 93	1000
Received by					
Relinquished by					
Received by	B Wardle				
Relinquished by					
Received by Laboratory	Brent A Crowe	Brent A Crowe	Northwestern Aquatic Sciences	Oct 2, 93	115pm

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-15

Title: Cladoceran (*Ceriodaphnia dubia*) dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall.

Protocol No.: NAS-XXX-CD2, August 2, 1990. Revision 1 (1-18-92). Based on U.S. EPA. 1989. Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test, pp. 105-146. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR 97210.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; G.J. Irissarri, B.S., Tech.

Study Schedule:

Test Beginning: 9-28-93, 2:00 p.m.

Test Ending: 10-5-93, 2:30 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	0323E	0347E	0358E
Collection Date	9-27-93	9-29-93	10-1-93
Receipt Date	9-28-93	9-30-93	10-2-93
Conductivity (µmhos/cm)	550	150	600
pH	7.1	6.5	6.7
Hardness (mg/L)	120	180	160
Alkalinity (mg/L)	30	20	20

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

SCOEPA00028722

DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 9-21-93, 10-1-93.
Pretreatment: Aerated ≥24 hr

TEST ORGANISMS

Species: *Ceriodaphnia dubia*, cladoceran
Age: <24-hr
Source: NAS cultures
Culture Conditions: Temperature, 24.2 ± 0.1°C; dissolved oxygen, 8.5 ± 0.2 mg/L; conductivity, 375 ± 91 µmhos/cm; pH, 7.4 ± 0.1; hardness, 100 ± 0 mg/L as $CaCO_3$; alkalinity, 65 ± 10 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 1 oz. polystyrene cups containing 15 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 10
Organisms/Treatment: 10
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: 0.1 ml each of YTC and *Selenastrum* suspension daily/beaker.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) inhibition of reproduction. Mortality was defined as lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.
Water Quality and Other Test Conditions: Temperature, 25.2 ± 0.1°C; dissolved oxygen, 7.6 ± 0.5 mg/L; conductivity, 433 ± 247 µmhos/cm (100% effluent), 313 ± 18 µmhos/cm (control); pH, 7.2 ± 0.3; hardness, 153 ± 31 mg/L as $CaCO_3$ (100% effluent), 100 ± 0 mg/L as $CaCO_3$ (control); alkalinity, 23 ± 6 mg/L as $CaCO_3$ (100% effluent), 60 ± 0 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

In the acute exposure (48 hour), no statistical comparison of survival was performed between the control and the 100% effluent concentration because no mortality was observed in the latter after 48 hours. In the chronic test, results are based on survival of the introduced cladocerans and the numbers of young produced. The 7-day LC50 (survival) was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). The IC25 (reproduction) was calculated using the Linear Interpolation Method (EPA/600/4-89/001a). NOEC and LOEC values for survival and reproduction were computed using Fisher's Exact Test and Dunnett's test, respectively. The statistical software employed for these calculations was Toxstat, Release 3.3, Univ. of Wyoming, Laramie.

PROTOCOL DEVIATIONS

None

SCOEPA00028723

REFERENCE TOXICANT TEST

Test No.: 999-295

Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.

Test Date: 9-28-93

Dilution Water Used: Moderately hard synthetic water.

Result: 7-day LC50, 43.8 µg/L Cd; 7-day IC25, 0.85 µg/L Cd; NOEC, <1.0 µg/L Cd. These results are within the laboratory's control chart warning limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was no mortality of *C. dubia* exposed to 100% Wacker Siltronics outfall after 48 hours. Therefore, the effluent passed the acute test according to Oregon DEQ guidelines.

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2 and Table 3. The biological effects, given as the NOEC and LOEC for survival and reproduction, the 7-day LC50 for survival, and the 7-day IC25 for reproduction are shown below.

	Survival	Reproduction
NOEC (%)	50	50
LOEC (%)	100	>50
7-Day LC50/IC25 (%)	70.7	43.5
(95% conf. int.)	(50 - 100)	--
Method	Binomial	Linear Interpolation

STUDY APPROVAL

Rick D. P. Caldwell 10/13/93 — Study Director, Date

Julie R. Fiore 10-13-93 — Quality Assurance Unit, Date

SCOEPA00028724

Table 1. Ceriodaphnia survival data, 48-hour.

	Effluent concentration (%)	
	Control	100
Number exposed	10	10
Number dead	0	0

Table 2. Ceriodaphnia survival data, 7-day.

		Effluent concentration (%)				
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	0	1	0	0	10*

*Significantly different from the control (P=0.05).

Table 3. Ceriodaphnia reproduction data (Number of young produced).

		Effluent concentration (%)				
Replicate	Control	6.25	12.5	25	50	100
1	21	26	17	14	18	2
2	12	22	14	24	9	0
3	23	12	27	20	10	0
4	8	17	22	25	17	0
5	28	7	25	27	8	0
6	15	14	27	14	17	0
7	10	20	29	25	3	0
8	19	3	22	12	17	0
9	4	9	19	10	6	0
10	16	16	6	14	11	0
Mean	15.6	14.6	20.8	18.5	11.6	0.4*

*Significantly less than the control (P=0.05).
[a]Adult in this replicate identified as a male.

SCOEPA00028725

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

CLADOCERAN (CERIODAPHNIA DUBIA) SURVIVAL AND REPRODUCTION TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the cladoceran, Ceriodaphnia dubia (EPA Method 1002.0).

1.2 Summary of Method: Neonate (<24-hr-old) Ceriodaphnia dubia, are exposed for seven days (or until 60% of surviving control organisms have three broods of young) to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 30 ml borosilicate glass or plastic beakers, each containing 15 ml of test solution. Ten replicate beakers, each with one neonate, are employed at each test concentration. Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Qual. Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

SCOEPA00028727

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 30 ml borosilicate glass or plastic beakers holding 15 ml of test solution. Temperature and photoperiod control of test chambers is provided by incubation in an environmental chamber or water bath.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS

6.1 Species: Cladoceran, *Ceriodaphnia dubia*

6.2 Source: *Ceriodaphnia* neonates are supplied from the NAS laboratory culture. The original culture was obtained from the EPA Environmental Research Laboratory, Corvallis, OR.

6.3 Age at Study Initiation: <24-hr-old neonates; and all released within an 8-hr period.

SCOEPA00028728

6.4 Pretest Culture and Handling: Individual cultures are used as the immediate source of neonates for toxicity testing. Source cultures are handled in a similar manner as test organisms for at least seven days and the neonates are then used to initiate tests. Source cultures are transferred to new medium and fed at least three times a week (e.g. Mon, Wed, Fri). Records of the source cultures are kept and if mortality exceeds 20% or if less than 15 young are produced per week, the cultures are not used as a source of neonates for testing.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of neonates to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days or until 60% of the surviving control animals produce three broods. Each treatment consists of ten replicate test containers each containing one cladoceran. A stratified random design is used for beaker placement.

7.2 Effect Criteria: The effect criteria are: 1) mortality, and 2) inhibition of reproduction. Mortality is defined as the lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.

7.3 Test Conditions: The test temperature employed is 25 ± 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. The test solution is replaced once daily.

7.4 Beginning of Test: The test solutions are added to the test beakers and food is added. The test is then begun by adding one neonate to each test container.

7.5 Feeding: The organisms are fed when the test is initiated, and daily thereafter. Food is added to the fresh medium immediately before or immediatedly after the adults are transferred. Each feeding consists of 0.1 ml YTC per 15 ml test solution and 0.1 ml *Selanastrum* concentrate per 15 ml test solution.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days (or until 60% of surviving control organisms have three broods of young). The type and frequency of observations to be made during the test are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival (of adult)	Daily before transfer
Reproduction (young produced)	Daily after adult transfer
Physical and Chemical Data	
Temperature (two locations in environmental control system)	Daily

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Dissolved oxygen, pH (High, medium, & low concentrations & control)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control & each new effluent sample)	e.g. Days 1, 3, & 5

During the test, dead adult organisms are removed every 24 hours and the young are discarded daily after counting. Dissolved oxygen is measured in each stock test solution using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured in each stock test solution using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using test kits.

7.7 Criteria of Test Acceptance: The test results are acceptable if: 1) survival in the controls is at least 80% and reproduction in the controls averages 15 or more young per surviving female. At least 60% of surviving females in controls should have produced their third brood.

8. DATA ANALYSIS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests (e.g. Dunnett's Test, Fisher's Exact Test, or Steel's Many-one Rank Test).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

SCOEPA00028730

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. Environmental Protection Agency. 1989. Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test. Method 1002.0. *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

U.S. Environmental Protection Agency. 1989. Supplement to "Short-term methods for estimating the chronic toxicity of effluents and surface waters to freshwater organisms". Revision 1. EPA/600/4-89/001a.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028731

APPENDIX II

RAW DATA

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 357-15 Investigator [illegible] 10/13/93

STUDY MANAGEMENT

Client: WACKER Silfronics

Client's Study Monitor: Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. M.S. Caldwell

QA Officer L.K. Garrison-Nemeth

1. G.J. IRISSARRI GJI 2. G.A. [illegible]

3. 4.

Study Schedule:

Test Beginning: 9-28-93 2:00pm Test Ending: 10-5-93 2:30pm

TEST MATERIAL

Description: OUTFALL COMPOSITE

NAS Sample No.:	0323E	0347E	0358E	
Date of Collection:	9-27-93	9-29-93	10-1-93	
Date of Receipt:	9-28-93	9-30-93	10-2-93	
Conductivity (µmhos/cm):	550	150	600	433 ± 247
pH:	7.1	6.5	6.7	
Hardness (mg/L):	120	~~120~~ 180 GJI	160	153 ± 31
Alkalinity (mg/L):	30	~~280~~ 20 GJI	20	23 ± 6
:				

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)

Date of Preparation: 9-21-93, 10-1-93

Water Quality: Conductivity (µmhos/cm) 325, 300 pH 7.3, 7.4 313 ± 18

Hardness (mg/L) 100, 100, 100 ± 0 Alkalinity (mg/L) 60, 60 60 ± 0

Treatments: Aerated 24-hr., Aerated ≥ 24 hr

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran

Age: (<24-hr; all released within 8 hr) < 24 hr

Source: (NAS cultures) NAS cultures

Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (100%, 50%, 25%, 12.5%, 6.25%, 0%) 100, 50, 25, 12.5, 6.25, + 0 %

Test chambers: (30 ml beakers) 30 ml plastic cups

Test volume: (15 ml) 15 ml

Replicates/treatment: (10) 10

Organisms/treatment: (10) 10 (1/repl)

Test water changes: Daily

Aeration during test: None

Feeding: 0.1 ml each of YTC and algal suspension daily

Beaker placement: Stratified randomization

COVER DATA SHEET (CONTINUED)

Test No. 357-15 Investigator RK 10/13/93

Randomization chart:

12.5	100	25	6.25	Ø	25	50	Ø	100	12.5
6.25	50	50	25	12.5	100	Ø	12.5	Ø	6.25
100	25	6.25	Ø	100	50	12.5	6.25	25	25
Ø	12.5	100	50	6.25	12.5	25	100	50	Ø
25	6.25	Ø	12.5	50	Ø	100	25	6.25	50
50	Ø	12.5	100	25	6.25	6.25	50	12.5	100

PREPARATION OF TEST SOLUTIONS

Concentration of working stock solution ( )

(A 1.0 µg/L working stock is prep'd from the conc. stock by serial dilution; e.g. 1 to 10, then 1 to 100.)

Test Conc (%)	EFFLUENT ~~Toxicant~~ ( ) (ml/150 ml)	Dilution Water (ml/150 ml)
100	150	0
50	75	75
25	37.5	112.5
12.5	18.75	131.25
6.25	9.4	140.6
Ø	0	150

MISCELLANEOUS NOTES

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-15 Investigator RS 10/13/93

DAY 0 (9/28/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		7.4		7.1
Med. (25)		7.8		7.6
Low (6.25)		7.8		7.5
Control		8.0		7.6

Temp #1 (°C): 25.3
Temp #2 (°C): 25.3

Notes:

DAY 1 (9/29/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.0	7.4	6.8	6.9
Med. (25)	7.0	8.2	7.3	7.4
Low (6.25)	7.0	8.2	7.4	7.4
Control	6.8	8.2	7.3	7.3

Temp #1 (°C): 25.3
Temp #2 (°C): 25.3

Notes:

DAY 2 (9/30/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.4	7.6	6.7	7.0
Med. (25)	7.4	8.4	7.2	7.5
Low (6.25)	7.4	8.4	7.3	7.6
Control	7.4	8.4	7.1	7.6

Temp #1 (°C): 25.2
Temp #2 (°C): 25.3

Notes:

DAY 3 (10/1/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	7.4	6.5	6.8
Med. (25)	7.2	7.3	7.3	7.4
Low (6.25)	7.0	8.4	7.2	7.4
Control	7.2	8.4	7.0	7.3

Temp #1 (°C): 25.2
Temp #2 (°C): 25.2

Notes:

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-15 Investigator RK 10/03/93

DAY 4 (10/2/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.6	7.6	6.6	6.8
Med. (25)	7.6	8.0	7.3	7.4
Low (6.25)	7.4	8.0	7.3	7.3
Control	7.4	8.2	7.2	7.1

Temp #1 (°C): 25.2
Temp #2 (°C): 25.2

Notes:

DAY 5 (10/3/93) GJS

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.7	7.9	6.8	7.0
Med. (25)	7.7	7.9	7.3	7.5
Low (6.25)	7.5	8.2	7.4	7.5
Control	7.8	8.2	7.4	7.4

Temp #1 (°C): 25.1
Temp #2 (°C): 25.1

Notes:

DAY 6 (10/4/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	7.3	6.9	6.9
Med. (25)	7.2	8.0	7.4	7.4
Low (6.25)	7.2	8.2	7.4	7.4
Control	7.1	8.2	7.2	7.3

Temp #1 (°C): 25.3
Temp #2 (°C): 25.2

Notes:

DAY 7 (10/5/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.0		7.3	
Low (6.25)	7.3		7.3	
Control	7.2		7.2	

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

$\bar{x}$	7.6	7.2	25.2
SD	0.5	0.3	0.1
N	55	55	16

8/1/90

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NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-~~17~~ 15 Investigator RK 10/13/93

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	6	5	0	0	0	6	0	6	0	0			
Ø	5	5	0	8	6	7	9	10	9	3	8			
	6	10	7	8	1	10	0	0	0	1	0			
	7	0	0	7	1	11	0	0	4	0	8			
%	8													
	Total	21	12	23	8	28	15	10	19	4	10	156	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	4	4	0	0	0	5	6	0	0	0			
6.25	5	0	0	5	4	2	3	0	0	4	7			
	6	8	7	7	9	5	6	5	3	5	9			
	7	14	11	0	4	0	0	9	0	0	0			
%	8													
	Total	26	22	12	17	7	14	20	3	9	16	146	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	5	5	4	0	1	5	6	6	6	0			
12.5	5	0	0	0	2	3	10	0	9	0	4			
	6	5	8	10	8	9	12	10	0	7	X 2			
	7	7	1	13	12	12	0	13	7	6	X			
%	8													
	Total	17	14	27	22	25	27	29	22	19	6	208	9	

8/1/90

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NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-~~14~~ 15 Investigator RK 10/13/93

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
25 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	3	5	4	5	4	3	5	3	0	0			
	5	6	0	0	0	0	4	0	5	3	6			
	6	5	8	6	8	8	0	7	1	7	0			
	7	0	11	10	12	15	7	13	3	0	8			
	8													
	Total	14	24	20	25	27	14	25	12	10	14	185	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
50 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	1	2	1	4	1	3	3	4	0	2			
	5	2	4	3	4	0	0	0	0	3	4			
	6	8	0	6	0	3	5	0	4	3	0			
	7	7	3	0	9	4	9	0	9	0	5			
	8													
	Total	18	9	10	17	8	17	3	17	6	11	116	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
100 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	X[c]			
	4	2	0	X[a]	X[c]	X[a]	0	0	X[c]	0	X			
	5	X[o]	0	|	|	|	X[o]	X[o]	|	X[o]	|		
	6	|	X[o]	|	|	|	|	|	|	|	|			
	7	|	|	|	|	|	|	|	|	|	|			
	8													
	Total	2	0	0	0	0	0	0	0	0	0	2	0	

8/1/90

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Kaood Board

Discharger: _____ Analyst: _____ 10/13/93
Location: _____ Test Start-Date/Time: _____
Date Sample Collected: _____ Test Stop -Date/Time: _____

WQ

Temp: 24.2 ± 0.1
DO: 8.5 ± 0.2
pH: 7.4 ± 0.1
Cond: 375 ± 91
Hard: 100 ± 0
Alk: 65 ± 10

DAY 0 9-21-93 GJI

pH 7.3	DO 8.2 mg/L
COND 325 umhos	HARD 100 mg/L
TEMP 24.1 °C	ALK 60 mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 2 9-23-93 GJI

pH 7.5	DO 8.4 mg/L
COND 425 umhos	HARD 100 mg/L
TEMP 24.2 °C	ALK 60 mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 2 9-23-93 GJI

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	1	1	1	1	1	1	1	1	1	1			
	3	1	1	1	1	1	1	1	1	1	1			
	4	1	1	1	1	1	1	1	1	1	1			
	5	1	1	1	1	1	1	1	1	1	1			
	6	1	1	1	1	1	1	1	1	1	1			
	7	1	1	1	1	1	1	1	1	1	1			
	8	1	1	1	1	1	1	1	1	1	1			
	Total													

DAY 4 9-25-93 GJI

pH 7.4	DO 8.6 mg/L
COND 275 umhos	HARD 100 mg/L
TEMP 24.2 °C	ALK 60 mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	2	4	3	0	3	1	0	3	4	4			
	2	4	2	1	0	0	3	0	3	3	0			
	3	4	4	0	0	0	0	3	3	2	2			
	4	0	0	0	0	0	2	0	2	0	0			
	5	3	4	3	0	4	2	4	3	4	0			
	6	4	1	2	0	0	4	2	1	3	1			
	7	0	4	4	3	5	3	1	3	4	4			
	8	1	4	3	7	6	3	0	3	2	0			
	Total													

DAY 4 9-25-93 GJI

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 6 9-27-93 GJI

pH 7.5	DO 8.6 mg/L
COND 475 umhos	HARD 100 mg/L
TEMP 24.2 °C	ALK 80 mg/L

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 6 9-27-93 GJI

Conc.	Day	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	9	8	8	4	7	6	0	9	4	9			
	2	6	9	8	0	4	9	1	9	6	1			
	3	0	1	5	2	7	7	5	9	3	11			
	4	2	0	4	8	4	9	4	11	5	2			
	5	3	2	0	4	10	0	7	10	6	4			
	6	9	4	10	8	3	7	5	2	8	0			
	7	7	5	8	3	10	8	7	8	0	11			
	8	8	9	0	3	5	0	7	0	9	0			
	Total													

PKG 10/13/53

357-175 BW

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
6.25%	10	0	10
TOTAL	20	0	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
12.5%	9	1	10
TOTAL	19	1	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 9.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
25%	10	0	10
TOTAL	20	0	20

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Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

PS 10/13/93

FISHERS EXACT TEST 357-17 B

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
50%	10	0	10
TOTAL	20	0	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
100%	0	10	10
TOTAL	10	10	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 0.
Since b is less than or equal to 6 there is a significant difference between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHERS EXACT TESTS

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	10	0	
1	6.25%	10	0	
2	12.5%	10	1	
3	25%	10	0	
4	HIGH 50%	10	0	
5	LOW 100%	10	10	*

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15 RB

RB 10/13/93

Test 357-~~17~~: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 2007.300

W = 0.966

Critical W (P = 0.05) (n = 50) = 0.947
Critical W (P = 0.01) (n = 50) = 0.930

Data PASS normality test at P=0.01 level. Continue analysis.

Test 357-17: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 1.08
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 9.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

15 PLG

PG 10/13/93

TITLE: Test 357-17: Cerio 7-day reproduction
FILE: C:\ws4\temp6\p357b17.tst
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	21.0000	21.0000
1	Control	2	12.0000	12.0000
1	Control	3	23.0000	23.0000
1	Control	4	8.0000	8.0000
1	Control	5	28.0000	28.0000
1	Control	6	15.0000	15.0000
1	Control	7	10.0000	10.0000
1	Control	8	19.0000	19.0000
1	Control	9	4.0000	4.0000
1	Control	10	16.0000	16.0000
2	6.25%	1	26.0000	26.0000
2	6.25%	2	22.0000	22.0000
2	6.25%	3	12.0000	12.0000
2	6.25%	4	17.0000	17.0000
2	6.25%	5	7.0000	7.0000
2	6.25%	6	14.0000	14.0000
2	6.25%	7	20.0000	20.0000
2	6.25%	8	3.0000	3.0000
2	6.25%	9	9.0000	9.0000
2	6.25%	10	16.0000	16.0000
3	12.5%	1	17.0000	17.0000
3	12.5%	2	14.0000	14.0000
3	12.5%	3	27.0000	27.0000
3	12.5%	4	22.0000	22.0000
3	12.5%	5	25.0000	25.0000
3	12.5%	6	27.0000	27.0000
3	12.5%	7	29.0000	29.0000
3	12.5%	8	22.0000	22.0000
3	12.5%	9	19.0000	19.0000
3	12.5%	10	6.0000	6.0000
4	25%	1	14.0000	14.0000
4	25%	2	24.0000	24.0000
4	25%	3	20.0000	20.0000
4	25%	4	25.0000	25.0000
4	25%	5	27.0000	27.0000
4	25%	6	14.0000	14.0000
4	25%	7	25.0000	25.0000
4	25%	8	12.0000	12.0000
4	25%	9	10.0000	10.0000
4	25%	10	14.0000	14.0000
5	50%	1	18.0000	18.0000
5	50%	2	9.0000	9.0000
5	50%	3	10.0000	10.0000
5	50%	4	17.0000	17.0000
5	50%	5	8.0000	8.0000
5	50%	6	17.0000	17.0000
5	50%	7	3.0000	3.0000
5	50%	8	17.0000	17.0000
5	50%	9	6.0000	6.0000
5	50%	10	11.0000	11.0000

ANOVA TABLE

PB 10/13/93

SOURCE	DF	SS	MS	F
Between	4	505.280	126.320	2.832 *
Within (Error)	45	2007.300	44.607	
Total	49	2512.580		

Critical F value = 2.61 (0.05,4,40)
Since F > Critical F REJECT Ho:All groups equal

15 PB

Test 357-~~17~~: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	15.600	15.600		
2	6.25%	14.600	14.600	0.335	
3	12.5%	20.800	20.800	-1.741	
4	25%	18.500	18.500	-0.971	
5	NOEC 50%	11.600	11.600	1.339	

Dunnett table value = 2.23 (1 Tailed Value, P=0.05, df=40,4)

15 PB

Test 357-~~17~~: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	10			
2	6.25%	10	6.661	42.7	1.000
3	12.5%	10	6.661	42.7	-5.200
4	25%	10	6.661	42.7	-2.900
5	50%	10	6.661	42.7	4.000

SCOEPA00028744

NORTHWESTERN AQUATIC SCIENCES
LC50 TOXDAT MULTI-METHOD CALCULATION RESULTS
****

RK 10/13/53

Test 357-~~V~~ 15 ~~6~~: Cerio 7-day LC50

CONCENTRATION EXPRESSED AS : % effluent

CONC.	NUMBER EXPOSED	NUMBER AFFECTED	PERCENT AFFECTED
100	10	10	100
50	10	0	0
25	10	0	0
12.5	10	1	10
6.25	10	0	0

THE BINOMIAL TEST SHOWS THAT 50 AND 100 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.80469 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 70.71067

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

END OF REPORT.

CALCULATION OF IC_p FOR: X Ceriodaphnia 7-day reproduction
___Fathead minnow 7-day growth
___Menidia 7-day growth
___Other_____

10/13/93

Test No.: 357-27 15 RB
Date of Calc.: 10-13-93
Initials: RB

	Conc. (%)	Y_i	M_i	M_i	M_i
1.	control	15.6	17.0	17.4	
2.	6.25	14.6	17.0	17.4	
3.	12.5	20.8	17.0	17.4	
4.	25	18.5		17.4	
5.	50	11.6		11.6	
6.	100	0.2		0.2	

25% Reduction = 13.1
(control x .75)

50% Reduction =
(control x .50)

$$IC_{25} = 25 + [13.1 - 17.4]\frac{(50 - 25)}{(11.6 - 17.4)} = 43.5$$

$$IC_{50} = \quad + [\quad - \quad]\frac{(\quad - \quad)}{(\quad - \quad)} =$$

Where: Y_i=observed means
M_i=smoothed means
Concentrations go from low to high.

SAMPLE CALC.:

	Conc. (ug/L Cd)	Y_i	M_i	M_i	M_i
1.	control	.588	.598	.596	
2.	2.5	.607	.598	.596	
3.	5.0	.578	.578	.596	
4.	10	.609		.596	
5.	20	.235		.235	
6.					

50% Reduction = .596 x .50 = .298
(control x .50)

$$IC_{50} = 10 + [.298 - .596]\frac{(20 - 10)}{(.235 - .596)} = 18.3 \text{ ug/L}$$

SCOEPA00028746

Client name	Project or PO#
Wa[illegible]r-Siltronics Corp.	—
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Analyses required: Bioassay Test; Hazardous sample Special handling required

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by: ~~Thomas J Rothschild~~ Dianne Mullan	Sample description	Number of containers	Bioassay Test								Remarks
	27 Sep 1993	0800	AQ		Outfall Composite	1	X								*Thomas Rothschild
															absent from
															work - sampler
															was Dianne Mullan
															NAS# 0323E

	Signature	Print Name	Company	Date	Time
Relinquished by	~~Thomas J Rothschild~~ Dianne Mullan	~~Thomas J Rothschild~~ Dianne Mullan	Wacker Siltronic Corporation	27 Sep 93	~~1000~~ 0900
Received by	Brad Wardle	Brad Wardle	UPS	27 Sep 93	1100
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Buhler	GARY A Buhler	NAS	9-28-93	10 40 AM

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petrole

Client name	Wacker-Siltronics Corp.
Project or PO#	93-63
Address	7200 N.W. Front St.
Phone #	(503) 243-2020
City, State, Zip	Portland, OR. 97210
Report attention	Tom Rothschild

Analyses required: Bioassay Test; Hazardous sample Special handling required

Sampled by: Thomas J. Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test	Hazardous sample Special handling required	Remarks
	29 Sep 93	0800	AQ	Outfall composite	1			NAS # 0347E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	29 Sep 93	1000
Received by					
Relinquished by					
Received by	B Waddle				
Relinquished by					
Received by Laboratory	B D Crowe	Brent D Crowe	Northwestern Aquatic Sciences	30 Sept 93	1019 Am

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

Client name: Wacker-Siltronics Corp.	Project or PO#: 93-65
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test	Hazardous sample Special handling required	Remarks
	1 Oct 93	0800	AQ	outfall composite	1	X		NAS# 0358 E

Signature	Print Name	Company	Date	Time
Relinquished by: Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	1 Oct 93	1000
Received by:				
Relinquished by:				
Received by: B Wardle				
Relinquished by:				
Received by Laboratory: Brent D Crane	Brent D Crane	Northwestern Aquatic Sciences	Oct 2, 93	115pm

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

SCOEPA00028749

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-16

Title: *Oncorhynchus mykiss*, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SG-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (*Salmo gairdneri*). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; B.D. Crowe, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 9-30-93, 10:30 a.m.

Test Ending: 10-4-93, 10:30 a.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronics Corp. effluent, (24 HC). Details are as follows:

NAS Sample No.	0347E
Collection Date	10-29-93
Receipt Date	10-30-93
Conductivity (µmhos/cm)	150
pH	6.5
Hardness (mg/L)	180
Alkalinity (mg/L)	20

Treatments: Samples briefly temperature equilibrated and aerated prior to use.

Storage: Stored at 4°C in the dark until used.

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DILUTION WATER

Source: NAS spring water
Date of Collection: 9-30-93
Pretreatment: Aerated prior to use.

TEST ORGANISMS

Species: *Oncorhynchus mykiss*, rainbow trout.
Size/Weight: 0.14 g/fish.
Source: Purchased 9-23-93 from Sticklebacks Unlimited, Vallejo, CA.
Acclimation: Temperature, 14.2 ± 1.6°C; dissolved oxygen, 8.8 ± 0.2 mg/L; pH, 7.0 ± 0.3; and conductivity, 1,317 ± 435 µmhos/cm for the prior week. Acclimation tank loading: 0.58 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: one-gallon glass jars; vol. 3.5 L.
Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.
Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 0.40 g/L
Aeration: All test containers were continuously aerated using 1 ml disposable pipets and minimal bubbling rates.
Feeding: None during the test or for 24 hours prior to testing.
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.0 ± 0.2°C; dissolved oxygen, 10.3 ± 0.1 mg/L; pH, 7.3 ± 0.2; conductivity, 456 ± 49 µmhos/cm; hardness, 140 ± 35 mg/L as $CaCO_3$; alkalinity, 47 ± 23 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

Smaller sample containers were used than specified in the protocol, but these were sufficient to keep fish loading within accepted levels. Therefore, this deviation should not affect the test result.

REFERENCE TOXICANT TEST

Test No.: 999-296
Test Date: 9-30-93
Reference Toxicant and Source: LAS (Linear alkyl sulfonate), Banco, Lot No. D3-01, Exp. Oct. 1993.
Dilution Water Used: NAS spring water
Result: 96-hr LC50, 5.26 mg/L. This result is within the laboratory's control chart warning limits.

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TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	71.8
(95% C.I.)	(60 - 100)
Method	Binomial

STUDY APPROVAL

Rick D. Caldwell	10/20/93	Julie R. Fiore	10/20/93
Study Director	Date	Quality Assurance Unit	Date

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Table 1. Survival of Oncorhynchus mykiss exposed to Wacker Siltronics effluent.

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	0	0	0	0	0.0	
	2	10	0	0	0	0	0.0	0.0
60	1	10	7	7	7	7	70.0	
	2	10	10	10	10	10	100.0	85.0
36	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
22	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	9	90.0	
	2	10	10	10	10	10	100.0	95.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

SCOEPA00028753

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

RAINBOW TROUT (ONCHRHYNCHUS MYKISS) ACUTE TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to determine the acute toxicity of effluents and/or receiving waters using rainbow trout (Oncorhynchus mykiss).

1.2 Summary of Method: Rainbow trout (Oncorhynchus mykiss) juveniles are exposed for 96-hr (24-hr in screening test) to different concentrations of effluent, receiving water, or reference toxicant in a static test. The test may be performed either in a renewal or non-renewal form. Test chambers should constructed of glass and be large enough so that the loading limit is not exceeded. Two replicate aquaria (three for screening test), each with 10 fish, are employed at each test concentration. A standard experimental design is employed consisting of exposure of the test animals to five test concentrations, and a dilution water control in the definitive test (100% concentration and control in the screening test). Mortality is the effect criterion. The data analysis consists of calculation of the LC50 and 95% confidence intervals (t-test in the screening test).

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Quality Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologist: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the

SCOEPA00028755

EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is LAS (1.00 mg/ml stock solution).

4. DILUTION WATER

The dilution water is NAS laboratory spring water or dechlorinated city water from the City of Newport.

5. TEST ORGANISMS

5.1 Species: Rainbow trout, *Oncorhynchus mykiss*.

5.2 Source: Rainbow trout are purchased from a reputable supplier or local grower. A frequently used source is Northwest Trout, Corvallis, OR 97330.

5.3. Age: Juvenile (0.8-5.0 g)

5.4 Acclimation and Pretest Observation: After receipt of fish from a source known to have healthy fish, a minimum observation time of 48 hours is required prior to testing. If fish appear diseased, discolored, or otherwise stressed, or if more than 5% of the fish die during the 48-hr holding period, then the fish must be discarded and a new group obtained.

Care must be used to ensure that fish are not subjected to unusual handling or environmental stress either before or during the testing period. Fish should be handled only the minimum necessary using suitable dipnets and should not be subjected to more than a 3°C temperature change during any 12 hour period. The dissolved oxygen level must be maintained at a level of 60% of saturation or greater. During holding, loading of fish in aquaria should not exceed 10 g/L, and holding water should be replaced at a minimum rate of 2 tank volumes per day. Fish should be fed to satiation at least once a day with a commercial food obtained from the fish grower. Fish are shielded from any unusual visual stress and treated with a photoperiod of 16 hours light and 8 hours darkness. A daily log of feeding, behavioral observations, mortality, and water quality should be maintained

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers are may be glass jars or small plate glass aquaria. The containers are covered to minimize evaporation of volatile compounds. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath. The system is maintained in a photoperiod-controlled room or enclosure. Test solutions are aerated by slow bubbling of oil-free compressed air through 1 ml disposable pipets.

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6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of juvenile rainbow trout to five test concentrations in a logarithmic series and a dilution water control. A 60% dilution series is normally used in this test with effluents giving test concentrations of 100%, 60%, 36%, 22%, 13%, and 0%, but other dilutions are satisfactory. Exposures are for 96 hours. Each treatment consists of duplicate test chambers each containing ten fish. A stratified random design is used to place test chambers in the water bath which is used for temperature control. Test organisms are impartially distributed to the test chambers by adding two animals to each chamber and repeating the process until each contains 10 organisms. In the screening test only the 100% effluent and control levels are used, and three replicates are employed.

7.2 Effect Criterion: The effect criterion used in the rainbow trout bioassay is mortality, defined as a lack of visible respiratory movement and absence of response to tactile stimulation.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 60% saturation throughout the 96-hr test. Test containers are gently aerated if required to maintain the oxygen level. If aeration is employed, all containers are treated equally. The test temperature employed is 12 $\pm$ 2°C. The photoperiod is 16 hours of light and 8 hours of darkness. Loading must not exceed 0.8 g/L.

7.4 Preparation of Test Solutions: Effluent, groundwater, receiving water, or stock solutions of manufactured chemical products are diluted with dilution water to prepare a series of test concentrations. The test dilutions are brought to the test temperature by partial immersion of the test containers in a water bath and, if necessary, are gently aerated until the dissolved oxygen concentration is greater than 80% of saturation in each vessel.

7.5 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described.

7.6 Feeding: Animals are not fed during the test nor during the preceding 24 hours.

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7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 96 hours. The type and frequency of observations to be made are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival	Daily
Physical and Chemical Data	
Dissolved oxygen, pH, temperature, and conductivity (one repl. only)	Daily
Hardness and alkalinity (highest test concentration and control) (one replicate only)	0- and 96-hr

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is measured directly in test aquaria using a polarographic oxygen probe calibrated in air. The pH is also measured directly in the test aquaria by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured using a mercury thermometer or a telethermometer calibrated with a mercury thermometer. Conductivity, hardness, and alkalinity are measured using EPA approved or suggested methods (EPA 1979).

7.8 Criteria of Test Acceptance: For the test to be considered acceptable, the minimum survival of organisms in the control treatment at the end of the test must be 90%.

8. DATA ANALYSIS

Percent survival is calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). In the screening test, comparison of the 100% level with the control is done using a t-test.

9. REPORTING

A report of the test results must include the following information: name and identification of the test; the investigator and laboratory; information on the test material; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; the 24-, 48-, 72-, and 96-hr LC50s and 95% confidence limits; any unusual information about the test or deviations from procedures.

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10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect, and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

EPA. 1979. Methods for chemical analysis of water and wastes. Environmental Protection Agency, Cincinnati, (EPA 600/4-79-020).

Peltier, W.H. and C.I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. EPA 600/4-85-013.

12. APPROVALS

_____ for _____

Name Date

_____ for Northwestern Aquatic Sciences

Name Date

SCOEPA00028759

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-
ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-16 Client WACKER Siltronics Investigator [illegible] 10/12/93
Test Type (rangefinding/definitive) _____ Test Length (hr) 96hr
Species Oncorhynchus mykiss (Rainbow Trout)

STUDY MANAGEMENT

Client: WACKER Siltronics
Client's Study Monitor: Tom Rothschild
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. D.S. Caldwell
QA Officer L.K. Garrison-Nemeth
1. BD Crow BC 2. G.A. [illegible]
3. _____ 4. _____
Study Schedule:
Test Beginning: 9-30-93 1630 Am Test Ending: 10-4-93 1030 Am

TEST MATERIAL

Description: Outfall Composite

NAS Sample No.:	0347E			
Date of Collection:	10-29-93			
Date of Receipt:	10-30-93			
Conductivity (µmhos/cm):	150			
pH:	6.5			
Hardness (mg/L):	180			
Alkalinity (mg/L):	20			
_____:				

DILUTION WATER

Description: NAS Spring Water
Date of Preparation/Collection: 9-30-93
Water Quality: Cond.(µmhos/cm) 500 Salinity (ppt) — pH 7.3
Hardness (mg/L as $CaCO_3$) 140 Alkalinity (mg/L as $CaCO_3$ 80
Treatments: Aerated

TEST ORGANISMS

Species: O. mykiss (Rainbow Trout) Age: _____ Size: _____
Source: Stickleberks Unlimited, Vallejo, CA
Acclimation Data:

Date	Temp (°C)	DO (mg/L)	pH	Sal/Cond	Comments
9-23-93	16.2	Saturated	7.0	8250	Treated with Prolong Hard: 140 Al
9-24-93	12.8	8.8	6.7	1650	Hard: 140 mg/L Alk: 80 mg/L
9-28-93	12.9	8.7	6.9	1475	
9-29-93	14.8	9.0	7.5	825	Hard: 140 mg/L Alk: 80 mg/L
Mean	14.2	8.8	7.0	1317	
S.D.	1.6	0.2	0.3	435	
(N)	4	3	4	3	

SCOEPA00028761

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-
ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-16 Client Wacker-Silfronics Investigator PBr 10/12/93

TEST PROCEDURES AND CONDITIONS

Test concentrations: (50% series recommended) 100, 60, 36, 22, 13, 0 %

Test chambers: 1 gallon jars Test volume: 3.5 L
Replicates/treatment: (2) 2 Organisms/treatment: (20) 20 (10/rep)
Test water changes: None Aeration during test: Yes
Feeding: None
Beaker placement: Stratified randomization

Randomization chart:

A	60	Q	22	36	100	13
B	13	60	100	Q	22	36
C						
D						

MISCELLANEOUS NOTES

Conc (%)	Vol (mL) Effluent	Vol. Dil'n Water (mL)
100	3500	Q
60	2100	1400
36	1300	2200
22	800	2700
13	500	3000
Q	Q	3500

Loading
fish = 20
total wt (G) = 2.76 g
2.76/20 = 0.14 g/fish

Loading
Test: $\frac{0.14 \text{ g/fish} \times 10 \text{ fish}}{3.5 \text{ L}} = 0.40 \text{ g/L}$
Acct: $\frac{0.14 \text{ g/fish} \times 250 \text{ fish}}{60 \text{ L}} = 0.58 \text{ g/L}$

SCOEPA00028762

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-16 Client Wacker - Silbronicer Investigator [illegible] 10/12/93

DAY 0 (9/30/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.0	10.3		575	6.8	180	120	10	10
2.	60	12.1	10.3		500	7.0	+		10	10
3.	36	12.0	10.3		450	7.0	+		10	10
4.	22	12.0	10.3		425	7.1	+		10	10
5.	13	12.5	10.3		425	7.1	+		10	10
6.	Q	12.7	10.3		400	7.1	120	60	10	10

DAY 1 (10/1/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.0	10.1		575	7.0			0(100)	0(100)
2.	60	12.0	10.3		500	7.4			7(30)	10
3.	36	11.9	10.2		450	7.5			10	10
4.	22	11.9	10.2		450	7.6			10	10
5.	13	12.0	10.3		425	7.5			10	10
6.	Q	12.2	10.3		400	7.5			10	10

DAY 2 (10/2/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	—	—		—	—			0	0
2.	60	12.0	10.3		500	7.4			7	10
3.	36	12.0	10.3		450	7.5			10	10
4.	22	11.9	10.3		425	7.5			10	10
5.	13	11.9	10.3		425	7.5			10	10
6.	Q	12.0	10.3		400	7.6			10	10

DAY 3 (10/3/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	—	—		—	—			0	0
2.	60	11.9	10.3		500	7.2			7	10
3.	36	11.9	10.2		475	7.4			10	10
4.	22	11.9	10.1		450	7.4			10	10
5.	13	11.9	10.3		425	7.4			10	10
6.	Q	12.0	10.3		410	7.4			10	10

DAY 4 (10/4/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	—	—		—	—	+		0	0
2.	60	11.9	10.2		525	7.1	+		7	10
3.	36	11.9	10.2		475	7.2	+		10	10
4.	22	12.0	10.2		450	7.5	+		10	10
5.	13	12.0	10.2		425	7.5	+		9(10)	10
6.	Q	12.0	10.2		400	7.5	120	60	10	10

Remarks:

$\bar{X}$	12.0	10.3	456	7.3	140	47
SD	0.2	0.1	49	0.2	35	23
N	27	27	27	27	3	3

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NORTHWESTERN AQUATIC SCIENCES
LC50 TOXDAT MULTI-METHOD CALCULATION RESULTS
****

RS
10/12/93

Test 357-16: Trout 96-hr LC50

CONCENTRATION EXPRESSED AS : % effluent

CONC.	NUMBER EXPOSED	NUMBER AFFECTED	PERCENT AFFECTED
100	20	20	100
60	20	3	15
36	20	0	0
22	20	0	0
13	20	1	5

THE BINOMIAL TEST SHOWS THAT 60 AND 100 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS 99.87106 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 71.79422

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS SET OF DATA
BECAUSE NO SPAN WHICH PRODUCED MOVING AVERAGE ANGLES THAT BRACKET
45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. THE PROBIT METHOD PROBABLY
CANNOT BE USED WITH THIS SET OF DATA.

END OF REPORT.

Client name: Wacker-Siltronics Corp.	Project or PO#: 93-64
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test (rainbow trout)							Hazardous sample Special handling required	Remarks
	29 Sep 93	0800	AQ	Outfall composite	2	X								VAS # 0347 E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	29 Sep 93	1000
Received by					
Relinquished by					
Received by	B Wardle				
Relinquished by					
Received by Laboratory	BD Crowe	Brent D Crowe	Northwestern Aquatic Sciences	30 Sept 93	1020 AM

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A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

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A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

September 13, 1993

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed are reports for the two dual endpoint (acute/chronic) tests performed in September with your effluent. The Ceriodaphnia test results were very similar to those found in the August tests; there was no acute toxicity in either test, the 7-day LC50 and IC25s were nearly the same, and the NOECs were the same for survival and only one concentration different for reproduction.

The fathead minnow chronic tests also gave quite similar responses between the August and September tests. However, the acute test results were different. In August the acute test was failed, no fish survived 48 hours at 100% effluent, and in the September test the acute test passed, all fish survived the 100% effluent for 48 hours. Close inspection of the survival raw data (raw data page 5) from both tests reveals the reason which is basically that the onset of toxicity in September was slower than in August.

If you should have any questions at this time, please do not hesitate to call at (503) 265-7225. Also let us know what we can do to help you further.

Sincerely,

Richard S. Caldwell, Ph.D.
Director

Encl.

P.S. Tom, also enclosed is the trout test reports. Should be self explanatory. I'll review this by separate post.
Dick

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-14

Title: Fathead Minnow dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall composite.

Protocol No.: NAS-XXX-PP2, September 15, 1990, Revision 1 (10-30-91). Based on U.S. EPA. 1989. Method 1000.0, Fathead minnow, *Pimephales promelas*, larval survival and growth test, pp. 33-74, In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; B.D. Crowe, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 9-28-93, 11:00 a.m.

Test Ending: 10-5-93, 11:00 a.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	0323E	0347E	0358E
Collection Date	9-27-93	9-29-93	10-1-93
Receipt Date	9-28-93	9-30-93	10-2-93
Conductivity (µmhos/cm)	550	150	600
pH	7.1	6.5	6.7
Hardness (mg/L)	120	180	160
Alkalinity (mg/L)	30	20	20

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

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DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 9-21-93, 10-1-93.
Pretreatment: Aerated ≥24 hr

TEST ORGANISMS

Species: *Pimephales promelas*, fathead minnow.
Size/Weight: 24-hr-old.
Source: Florida Bioassay Supply, Gainsville, FL
Acclimation: Holding conditions in the receiving water were: Temperature, 25.0°C; dissolved oxygen, 8.0 mg/L; pH, 7.1; conductivity, 250 µmhos/cm; hardness, 180 mg/L as $CaCO_3$; and alkalinity, 160 mg/L as $CaCO_3$.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 600 ml glass beakers containing 250 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 4
Organisms/Treatment: 40
Loading (based on final weight of control organisms): 0.017 g/L
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: Approx. 700 *Artemia* nauplii per beaker three times daily except on day 7.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) growth inhibition. Mortality was defined as lack of visible movement during a 30 second observation period. Growth inhibition was measured as the difference in weight gain of fish between a treatment level and the control.
Water Quality and Other Test Conditions: Temperature, 24.1 ± 0.1°C; dissolved oxygen, 7.4 ± 0.7 mg/L; conductivity, 671 ± 58 µmhos/cm (100% effluent), 382 ± 53 µmhos/cm (control); pH, 7.3 ± 0.2; hardness, 128 ± 13 mg/L as $CaCO_3$ (100% effluent), 80 ± 0 mg/L as $CaCO_3$ (control); alkalinity, 25 ± 5 mg/L as $CaCO_3$ (100% effluent), 61 ± 4 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

In the acute exposure (48 hour), no statistical comparison of survival was performed between the control and the 100% effluent concentration because no mortality was observed in the latter after 48 hours. In the chronic test, percent survival and the average weight per larva are calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 (survival) is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). The IC25 (growth) is calculated using the Linear Interpolation Method (EPA 600/4-89/001a). NOEC and LOEC values for survival and growth are computed using ANOVA and an appropriate *post hoc* test (Dunnett's test, T-Test with Bonferroni's adjustment, Steels Many-One Rank Test, or Wilcoxon Rank Sum Test with Bonferroni Adjustment). The appropriate test is selected after evaluating the data for normality and homogeneity of variance. Weight data are excluded from the ANOVA calculation if there is a survival effect. An arcsine transformation is performed on the survival data prior to statistical analysis. The statistical software employed for these calculations is TOXSTAT, Release 3.3, Univ. of Wyoming, Laramie, WY.

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PROTOCOL DEVIATIONS

None.

REFERENCE TOXICANT TEST

Test No.: 999-294
Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.
Test Date: 9-28-93
Dilution Water Used: Moderately hard synthetic water.
Result: 7-day LC50, 25.1 µg/L Cd; 7-day IC25, 22.3 µg/L Cd; NOEC, 10 µg/L Cd. This result is within the laboratory's control chart limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was no mortality of fathead minnows exposed to 100% Wacker Siltronics outfall composite after 48 hours. Therefore, the effluent passed the acute test according to Oregon DEQ guidelines (DEQ Whole Effluent Toxicity Testing Guidance Manual, January 1993).

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2. The biological effects, given as the NOEC and LOEC for survival and growth, and the LC50/IC25 for survival/growth, are shown below.

	Survival	Growth
NOEC (%)	50	25
LOEC (%)	100	50
7-Day LC50/IC25 (%)	70.7	49.3
(95% conf. int.)	(50 - 100)	--
Method	Binomial	Linear interpolation

STUDY APPROVAL

Rick D. Caldwell 10/20/93 — Study Director, Date

Julie R. Fiore 10/21/93 — Quality Assurance Unit, Date

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Table 1. Survival of fathead minnow larvae exposed for 48-hours to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae Exposed	Dead	Surviving	Percent survival	Mean* percent survival
100	1	10	0	10	100.0	
	2	10	0	10	100.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	100.0
Control	1	10	0	10	100.0	
	2	10	0	10	100.0	
	3	10	0	10	100.0	
	4	10	0	10	100.0	100.0

* An asterisk next to a treatment mean indicates that it is significantly ($P<0.05$) less than the control mean.

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Table 2. Survival and growth of fathead minnow larvae exposed for seven days to Wacker Siltronic Corporation outfall composite.

Effluent concentration (%)	Repl.	Number of larvae: Exposed	Dead	Surviving	Percent survival	Mean* percent survival	Ave. wt. per larva (mg)	Mean* weight (mg)
100	1	10	10	0	0.0		--	
	2	10	10	0	0.0		--	
	3	10	10	0	0.0		--	
	4	10	10	0	0.0	0.0*	--	--
50	1	10	0	10	100.0		0.357	
	2	10	0	10	100.0		0.309	
	3	10	0	10	100.0		0.347	
	4	10	0	10	100.0	100.0	0.315	0.332*
25	1	10	0	10	100.0		0.439	
	2	10	0	10	100.0		0.442	
	3	10	0	10	100.0		0.423	
	4	10	0	10	100.0	100.0	0.462	0.441
12.5	1	10	0	10	100.0		0.539	
	2	10	0	10	100.0		0.453	
	3	10	0	10	100.0		0.443	
	4	10	1	9	90.0	97.5	0.494	0.482
6.25	1	10	0	10	100.0		0.424	
	2	10	0	10	100.0		0.411	
	3	10	0	10	100.0		0.418	
	4	10	0	10	100.0	100.0	0.448	0.425
Control	1	10	0	10	100.0		0.424	
	2	10	0	10	100.0		0.427	
	3	10	0	10	100.0		0.376	
	4	10	0	10	100.0	100.0	0.494	0.430

* An asterisk next to a treatment mean indicates that it is significantly ($P<0.05$) less than the control mean.

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APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

FATHEAD MINNOW (PIMEPHALES PROMELAS) LARVAL SURVIVAL AND GROWTH TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the fathead minnow (Pimephales promelas).

1.2 Summary of Method: Fathead minnow (Pimephales promelas) larvae (<24-hr old) are exposed for seven days to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 600 ml borosilicate glass beakers, each containing 250 ml of test solution. Four replicate beakers, each with 10 larvae, are employed at each test concentration. Test results are based on the survival and growth of the larvae. The data analysis includes calculation of the 7-day LC50 and the determination of a NOEC and LOEC for both growth and survival using ANOVA and an appropriate post-hoc test.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: Tests will be performed at the firm's laboratory at Newport, OR.

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: Richard S. Caldwell, Ph.D.
Qual. Assurance Officer: Donald R. Buhler, Ph.D.
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29,

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1983 (40 CFR Part 792).

3. TEST MATERIAL:

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM:

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 600 ml Pyrex beakers holding 250 ml of test solution. Temperature control of test chambers is provided by partial immersion of the beakers in a temperature controlled water bath. Aeration is employed only if necessary to maintain the dissolved oxygen concentration within acceptable limits, and, if used, is provided to all test containers by bubbling oil free air through 1 ml disposable glass pipets. The required photoperiod is achieved by timer control of the room lights.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E-729-80, paragraph 6.6. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 5% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER:

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS:

6.1 Species: Fathead minnow, *Pimephales promelas*

6.2 Source: Fathead minnow larvae are supplied from laboratory culture or from a reputable supplier. A recommended supplier is Aquatox, Inc., Hot Springs, Arkansas.

6.3 Age at Study Initiation: <24-hr-old if cultured; <48-hr-old (and all within 24-hr of the same age) if shipped.

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6.4 Acclimation and Pretest Observation: Since the larvae are used within 24 hours of receipt (or hatching), pretest observation is limited to the determination that water quality conditions upon receipt are within acceptable limits and that mortalities during shipping were minimal and that the fish appear to be healthy.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES:

7.1 Experimental Design: The test involves exposure of fathead minnow larvae to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days. Each treatment consists of four replicate test containers each containing ten larvae. Test containers are placed, using a stratified random design, in a water bath for temperature control. Test organisms are impartially distributed to the test chambers by adding two to three test organisms to each and repeating the process until each chamber contains 10 organisms.

7.2 Effect Criterion: The effect criteria are: 1) mortality, and 2) growth inhibition. Mortality is defined as the lack of visible movement during a 30 second observation period. Growth inhibition is measured as the difference in weight gain of fish between a treatment level and the control.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 40% saturation at all times. If necessary to achieve this, test containers should be gently aerated by slow bubbling through 1.0 ml disposable pipets. The test temperature employed is 25 $\pm$ 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. Loading of organisms should not exceed 0.8 g/L wet wt. (0.2 g/L dry wt.) in the test chambers. The test solution is replaced once daily.

7.4 Beginning of Test: The test is begun by adding the test organisms to the equilibrated test solutions as previously described.

7.5 Feeding: Test organisms are fed newly hatched *Artemia salina* nauplii three times daily. The feeding level is approximately 700 *Artemia* per beaker. The feeding level can be adjusted as necessary to minimize overfeeding which can lead to water fouling, but should be sufficient to support rapid growth of the larvae. Care must be taken that all treatments receive equal quantities of food daily. Uneaten food is removed once daily from test containers as part of the water changing routine to minimize water quality degradation. Larvae are not fed on day 7 of the test.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days. The type and frequency of observations to be made during the test are summarized as follows:

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Type of Observation	Times of Observation
Biological Data	
Survival	Daily
Growth	at end of test
Physical and Chemical Data	
Temperature (one replicate at all test levels)	Daily before solution renewal
Dissolved oxygen, pH (one replicate at all test levels)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control and high test concentration of one replicate)	Daily before solution renewal

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is directly measured in test beakers using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured directly in the test beakers by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alklinity are measured using test kits.

7.7 Growth Measurement Growth is measured as average dry weight of animals in a test replicate at the end of the test on day 7. Pooled animals from each test replicate are rinsed with deionized water, gently blotted and placed into tared aluminum weigh pans. The pans are dried at 100°C for a minimum of 2 hours. The dried larvae are dessicated and weighed as soon as possible to the nearest 0.00001 g. The total weight of the dried fish in each pan is divided by the number of fish weighed to obtain an average dry weight per fish.

7.8 Criteria of Test Acceptance: The test results are acceptable if: 1) the average survival of control larvae is $\geq$ 80%; and 2) the mean dry weight of control larvae preserved in 4% formalin solution is $\geq$ 0.25 mg for tests begun with <24-hr-old larvae.

8. DATA ANALYSIS:

The end points of the fathead minnow toxicity test are survival and growth. Survival is tabulated daily from direct count of live organisms. Average fish weight, measured at the end of the test, is used to compare growth between individual effluent treatments and the control. Point estimates, e.g. LC50, are calculated using the moving average or probit analysis. LOEC and NOEC values, for survival and growth, are obtained using appropriate hypothesis test statistics including ANOVA with Dunnett's or Bonferroni t-test post-hoc treatment comparisons. An arcsine transformation of survival data is employed prior to the ANOVA test.

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9. REPORTING:

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION:

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED GUIDELINES

U.S. Environmental Protection Agency. 1989. Fathead minnow, *Pimephales promelas*, larval survival and growth test, Method 1000.0. pp. 33-74 *In*: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

12. APPROVALS:

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028777

APPENDIX II

RAW DATA

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

COVER DATA SHEET

Test No. 357-14 Client WACKER Siltronics Investigator [illegible] 10/12/93

STUDY MANAGEMENT

Client: WACKER Siltronics
Client's Study Monitor: Tom Rothchild
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. R.S. Caldwell
QA Officer L.K. Garrison-Nemeth
1. RD Crowe BC 2. G.A. Bohler
3. 4.
Study Schedule:
Test Beginning: 9-28-93 1100 Am Test Ending: 10-5-93 1100 Am

TEST MATERIAL

Description: Outfall composite

NAS Sample No.:	0323E	0347E	0358E	
Date of Collection:	9-27-93	9-29-93	10-1-93	
Date of Receipt:	9-28-93	9-30-93	10-2-93	
Conductivity (µmhos/cm):	550	150	600	
pH:	7.1	6.5	6.7	
Hardness (mg/L):	120	180	160	
Alkalinity (mg/L):	30	20	20	
:				

DILUTION WATER

Description: Moderately Hard Synthetic Water prep'd from Milli-Q
Date of Preparation: 9-21-93, 10-1-93
Water Quality: Conductivity (µmhos/cm) 325, 300 pH 7.3, 7.4
Hardness (mg/L as $CaCO_3$) 100, 100 Alkalinity (mg/L as $CaCO_3$ 60, 60
Treatments: Aerated ≥24 hrs

TEST ORGANISMS

Species: Pimephales promelas, Fathead minnow
Age: (<24-hr old; 24-48 hr old if purchased) 24 hrs
Source: Florida Bioassay Supply, Gainesville, FL
Acclimation Data:

Date	Temp (°C	DO (mg/L)	pH	Cond µmh/cm	Hard (mg/L)	Alk (mg/L)	Comments
9-28-93	25.0	8.0	7.1	250	180	160	Rec. water
Mean							
S.D.							
(N)							

SCOEPA00028779

COVER DATA SHEET (CONTINUED)

Test No. 357-14 Client _____ Investigator [illegible] 10/12/93

TEST PROCEDURES AND CONDITIONS

Test concentrations: (50% series recommended) 100, 50, 25, 12.5, 6.25, 0 %

Test chambers: (600 ml beakers) 600 mL Beakers
Test volume: (250 ml) 250 mL
Replicates/treatment: (4) 4
Organisms/treatment: (15) 10
Test water changes: Daily
Aeration during test: None
Feeding: 700-1000 three times daily
Beaker placement: Stratified randomization

Randomization chart:

A	0	6.25	50	25	12.5	100
B	12.5	25	0	6.25	100	50
C	12.5	0	25 ~~75~~ BC	50	6.25	100
D	6.25	50	100	12.5	25	0

PREPARATION OF TEST SOLUTIONS

Concentration of working stock solution (%)

Test Conc (%)	~~Toxicant~~ Effluent ( ) (ml/L)	Dilution Water (ml/L)
100	1000	0
50	500	500
25	250	750
12.5	125	875
6.25	62.5	937.5
0	0	1000

LOADING

$$\text{Loading} = \frac{\text{Sum of total wts in controls (mg)}}{\text{Total vol. in controls (ml)}} = \frac{(4.24)+(4.57)+(3.76)+(4.94)}{(1000)} = 0.017 \text{ g/L}$$

MISCELLANEOUS NOTES

SCOEPA00028780

WATER QUALITY DATA SHEET

Test No. 357-14 Client Wacker Investigator [illegible] 10/12/93

DAY 0 (9/28/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100			8.2		7.3	
2. 50			8.2		7.4	
3. 25			8.2		7.5	
4. 12.5			8.2		7.5	
5. 6.25			8.2		7.5	
6. Q			8.0		7.5	
7.						

Notes:

DAY 1 (9/29/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.2	6.2	8.1	6.9	~~7.6~~ 7.3	575/120/20
2. 50	24.1	6.2	8.1	7.0	~~7.6~~ 7.4	
3. 25	24.2	6.3	8.0	7.1	~~7.5~~ 7.4	
4. 12.5	24.2	6.5	8.0	7.2	7.5	
5. 6.25	24.0	6.5	8.0	7.3	7.5	
6. Q	24.1	6.9	8.0	7.1	7.5	350/80/60
7.						

Notes:

DAY 2 (9/30/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.2	6.2	8.0	7.0	7.0	650/120/30
2. 50	24.1	6.2	8.1	7.2	7.4	
3. 25	24.2	6.2	8.2	7.3	7.5	
4. 12.5	24.2	6.4	8.0	7.3	7.5	
5. 6.25	24.0	6.7	8.0	7.4	7.5	
6. Q	24.0	6.6	8.0	7.1	7.2	350/80/60
7.						

Notes:

DAY 3 (10/1/93) BC

Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1. 100	24.2	7.0	8.0	6.9	7.0	675/[illegible]/130
2. 50	24.2	6.8	8.1	7.3	7.3	
3. 25	24.1	6.8	8.1	7.3	7.4	
4. 12.5	24.2	7.1	8.0	7.4	7.5	
5. 6.25	24.1	7.2	8.0	7.5	7.5	
6. Q	24.0	7.0	8.0	7.4	7.4	350/80/60
7.						

Notes:

Remarks:

SCOEPA00028781

WATER QUALITY DATA SHEET

Test No. 357-14 Client WACKER Investigator BK 10/12/93

DAY 4 (10/2/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.4	6.6	8.0	6.8	7.3	675/120/30
2.	50	24.3	7.0	8.0	7.2	7.7	
3.	25	24.2	6.8	8.0	7.3	7.8	
4.	12.5	24.3	6.8	8.0	7.4	7.8	
5.	6.25	24.2	7.0	8.0	7.4	7.8	
6.	Ø	24.0	7.0	8.0	7.3	7.8	500/80/60
7.							

Notes:

DAY 5 (10/3/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.1	7.4	7.8	6.7	7.0	700/140/20
2.	50	24.2	7.5	8.0	7.2	7.2	
3.	25	24.1	7.5	8.0	7.4	7.4	
4.	12.5	24.1	7.4	8.0	7.4	7.5	
5.	6.25	24.1	7.4	8.0	7.3	7.5	
6.	Ø	24.0	7.5	8.0	7.3	7.5	375/80/60
7.							

Notes:

DAY 6 (10/4/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	24.3	6.7	—	6.5	—	750/150/20
2.	50	24.2	7.0	8.1	7.0	7.2	
3.	25	24.2	6.8	8.1	7.2	7.3	
4.	12.5	24.3	6.8	8.0	7.4	7.4	
5.	6.25	24.0	6.8	8.0	7.4	7.4	
6.	Ø	24.1	7.0	8.0	7.5	7.4	375/80/70
7.							

Notes:

DAY 7 (10/5/93) BC

	Conc. (%)	Temp (°C) (Old)	DO (mg/L) (Old)	DO (mg/L) (New)	pH (Old)	pH (New)	Cond/Hard/Alk (Old)-Hi/zero
1.	100	—	—		—		—
2.	50	24.0	7.0		7.0		
3.	25	24.0	7.0		7.2		
4.	12.5	24.0	7.0		7.3		
5.	6.25	24.0	7.0		7.4		
6.	Ø	24.1	7.0		7.4		375/80/60
7.							

Notes:

Remarks:

SCOEPA00028782

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

SURVIVAL DATA SHEET

Test No. 357-14 Client _____ Investigator [illegible] 10/12/93

Conc. (%)	Repl	Survival on day (D=dead; M=missing) 0	1	2	3	4	5	6	7	Proportion
1. 100	A	10	10	10	10	6(4D)	4(2D)	0(4D)	0	0
	B	10	10	10	10	5(5D)	5	0(5D)	0	0
	C	10	10	10	10	8(2D)	7(1D)	0(7D)	0	0
	D	10	10	10	10	6(4D)	3(3D)	0(3D)	0	0
2. 50	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
3. 25	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
4. 12.5	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	9(1D)	9	9	9	9	.9
5. 6.25	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
6. ~~3~~	A	10	10	10	10	10	10	10	10	1.0
	B	10	10	10	10	10	10	10	10	1.0
	C	10	10	10	10	10	10	10	10	1.0
	D	10	10	10	10	10	10	10	10	1.0
7.	A									
	B									
	C									
	D									
Initial		BC	BC	BC	BC	BC	BC	BC	BC	
Remarks:		9-28-93	9-29-93	9-30-93	10-1-93	10-2-93	10-3-93	10-4-93	10-5-93	

SCOEPA00028783

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

WEIGHING DATA SHEET

Test No. 357-14 Client WACKER Silitronics Investigator [illegible] 10/12/93
Tare: Date 10-1-93 Oven temp(°C) 102°C Drying time(hr) 2hrs Init. JRF
Final: Date 10-6-93 Oven temp(°C) 103°C Drying time(hr) 2hrs Init. JRF
Equip. Used: Oven Blue-M Balance Sartorius M3P

Conc. (%)	Repl	Pan #	A Tare wt (mg)	B Total wt (mg)	B-A Fish wt (mg)	C # of Fish	B-A/C Ave. wt (mg)	Comments
1.	A	25	31.23	—		0		
	B	26	35.05	—		0		
100	C	27	33.36	—		0		
	D	28	36.47	—		0		
2.	A	29	35.45	~~37.78~~ JF 39.02		10	0.357	
	B	30	35.32	38.41		10	0.309	
50	C	31	33.58	37.05		10	0.347	
	D	32	34.63	37.78		10	0.315	
3.	A	33	35.27	39.66		10	0.439	
	B	34	33.82	38.24		10	0.442	
25	C	35	36.43	40.66		10	0.423	
	D	36	33.10	37.72		10	0.462	
4.	A	37	34.21	39.60		10	0.539	
	B	38	33.32	37.85		10	0.453	
12.5	C	39	33.25	37.68		10	0.443	
	D	40	34.44	38.89		9	~~0.445~~	0.494 JRF 10/12/93
5.	A	41	37.27	41.51		10	0.424	
	B	42	36.94	41.05		10	0.411	
6.25	C	43	33.44	37.62		10	0.418	
	D	44	33.58	38.06		10	0.448	
6.	A	45	32.99	37.23	4.24	10	0.424	
	B	46	31.40	35.67	4.27	10	0.427	
Ø	C	47	36.08	39.84	3.76	10	0.376	
	D	48	34.41	39.35	4.94	10	0.494	
7.	A							
	B							
	C							
	D							

Remarks:

10-1-93 JRF 100mg std wt = 100.02 mg

10-6-93 JRF 100mg std wt = 100.02 mg

SCOEPA00028784

Rec 10/12/93

Data listing File: p357w14 Date: 10-12-1993

FILTER: None

Obs.	DAY	CONC	OLDNEW	TEMP	DO	PH	COND	HARD	ALK
1	0	100.00	1	-1.0	-1.0	-1.0	-1	-1	-1
2	0	50.00	1	-1.0	-1.0	-1.0	-1	-1	-1
3	0	25.00	1	-1.0	-1.0	-1.0	-1	-1	-1
4	0	12.50	1	-1.0	-1.0	-1.0	-1	-1	-1
5	0	6.25	1	-1.0	-1.0	-1.0	-1	-1	-1
6	0	0.00	1	-1.0	-1.0	-1.0	-1	-1	-1
7	0	100.00	2	-1.0	8.2	7.3	-1	-1	-1
8	0	50.00	2	-1.0	8.2	7.4	-1	-1	-1
9	0	25.00	2	-1.0	8.2	7.5	-1	-1	-1
10	0	12.50	2	-1.0	8.2	7.5	-1	-1	-1
11	0	6.25	2	-1.0	8.2	7.5	-1	-1	-1
12	0	0.00	2	-1.0	8.0	7.5	-1	-1	-1
13	1	100.00	1	24.2	6.2	6.9	575	120	20
14	1	50.00	1	24.1	6.2	7.0	-1	-1	-1
15	1	25.00	1	24.2	6.3	7.1	-1	-1	-1
16	1	12.50	1	24.2	6.5	7.2	-1	-1	-1
17	1	6.25	1	24.0	6.5	7.3	-1	-1	-1
18	1	0.00	1	24.1	6.9	7.1	350	80	60
19	1	100.00	2	-1.0	8.1	7.3	-1	-1	-1
20	1	50.00	2	-1.0	8.1	7.4	-1	-1	-1
21	1	25.00	2	-1.0	8.0	7.4	-1	-1	-1
22	1	12.50	2	-1.0	8.0	7.5	-1	-1	-1
23	1	6.25	2	-1.0	8.0	7.5	-1	-1	-1
24	1	0.00	2	-1.0	8.0	7.5	-1	-1	-1
25	2	100.00	1	24.2	6.2	7.0	650	120	30
26	2	50.00	1	24.1	6.2	7.2	-1	-1	-1
27	2	25.00	1	24.2	6.2	7.3	-1	-1	-1
28	2	12.50	1	24.2	6.4	7.3	-1	-1	-1
29	2	6.25	1	24.0	6.7	7.4	-1	-1	-1
30	2	0.00	1	24.0	6.6	7.1	350	80	60
31	2	100.00	2	-1.0	8.0	7.0	-1	-1	-1
32	2	50.00	2	-1.0	8.1	7.4	-1	-1	-1
33	2	25.00	2	-1.0	8.2	7.5	-1	-1	-1
34	2	12.50	2	-1.0	8.0	7.5	-1	-1	-1
35	2	6.25	2	-1.0	8.0	7.5	-1	-1	-1
36	2	0.00	2	-1.0	8.0	7.2	-1	-1	-1
37	3	100.00	1	24.2	7.0	6.9	675	120	30
38	3	50.00	1	24.2	6.8	7.3	-1	-1	-1
39	3	25.00	1	24.1	6.8	7.3	-1	-1	-1
40	3	12.50	1	24.2	7.1	7.4	-1	-1	-1
41	3	6.25	1	24.1	7.2	7.5	-1	-1	-1
42	3	0.00	1	24.0	7.0	7.4	350	80	60
43	3	100.00	2	-1.0	8.0	7.0	-1	-1	-1
44	3	50.00	2	-1.0	8.1	7.3	-1	-1	-1
45	3	25.00	2	-1.0	8.1	7.4	-1	-1	-1
46	3	12.50	2	-1.0	8.0	7.5	-1	-1	-1
47	3	6.25	2	-1.0	8.0	7.5	-1	-1	-1
48	3	0.00	2	-1.0	8.0	7.4	-1	-1	-1
49	4	100.00	1	24.4	6.6	6.8	675	120	30
50	4	50.00	1	24.3	7.0	7.2	-1	-1	-1
51	4	25.00	1	24.2	6.8	7.3	-1	-1	-1
52	4	12.50	1	24.3	6.8	7.4	-1	-1	-1
53	4	6.25	1	24.2	7.0	7.4	-1	-1	-1
54	4	0.00	1	24.0	7.0	7.3	500	80	60
55	4	100.00	2	-1.0	8.0	7.3	-1	-1	-1

-7-

Rec 10/12/93

Data listing File: p357w14 Date: 10-12-1993

FILTER: None

Obs.	DAY	CONC	OLDNEW	TEMP	DO	PH	COND	HARD	ALK
56	4	50.00	2	-1.0	8.0	7.7	-1	-1	-1
57	4	25.00	2	-1.0	8.0	7.8	-1	-1	-1
58	4	12.50	2	-1.0	8.0	7.8	-1	-1	-1
59	4	6.25	2	-1.0	8.0	7.8	-1	-1	-1
60	4	0.00	2	-1.0	8.0	7.8	-1	-1	-1
61	5	100.00	1	24.1	7.4	6.7	700	140	20
62	5	50.00	1	24.2	7.5	7.2	-1	-1	-1
63	5	25.00	1	24.1	7.5	7.4	-1	-1	-1
64	5	12.50	1	24.1	7.4	7.4	-1	-1	-1
65	5	6.25	1	24.1	7.4	7.3	-1	-1	-1
66	5	0.00	1	24.0	7.5	7.3	375	80	60
67	5	100.00	2	-1.0	7.8	7.0	-1	-1	-1
68	5	50.00	2	-1.0	8.0	7.2	-1	-1	-1
69	5	25.00	2	-1.0	8.0	7.4	-1	-1	-1
70	5	12.50	2	-1.0	8.0	7.5	-1	-1	-1
71	5	6.25	2	-1.0	8.0	7.5	-1	-1	-1
72	5	0.00	2	-1.0	8.0	7.5	-1	-1	-1
73	6	100.00	1	24.3	6.7	6.5	750	150	20
74	6	50.00	1	24.2	7.0	7.0	-1	-1	-1
75	6	25.00	1	24.2	6.8	7.2	-1	-1	-1
76	6	12.50	1	24.3	6.8	7.4	-1	-1	-1
77	6	6.25	1	24.0	6.8	7.4	-1	-1	-1
78	6	0.00	1	24.1	7.0	7.5	375	80	70
79	6	100.00	2	-1.0	-1.0	-1.0	-1	-1	-1
80	6	50.00	2	-1.0	8.1	7.2	-1	-1	-1
81	6	25.00	2	-1.0	8.1	7.3	-1	-1	-1
82	6	12.50	2	-1.0	8.0	7.4	-1	-1	-1
83	6	6.25	2	-1.0	8.0	7.4	-1	-1	-1
84	6	0.00	2	-1.0	8.0	7.4	-1	-1	-1
85	7	100.00	1	-1.0	-1.0	-1.0	-1	-1	-1
86	7	50.00	1	24.0	7.0	7.0	-1	-1	-1
87	7	25.00	1	24.0	7.0	7.2	-1	-1	-1
88	7	12.50	1	24.0	7.0	7.3	-1	-1	-1
89	7	6.25	1	24.0	7.0	7.4	-1	-1	-1
90	7	0.00	1	24.1	7.0	7.4	375	80	60
91	7	100.00	2	-1.0	-1.0	-1.0	-1	-1	-1
92	7	50.00	2	-1.0	-1.0	-1.0	-1	-1	-1
93	7	25.00	2	-1.0	-1.0	-1.0	-1	-1	-1
94	7	12.50	2	-1.0	-1.0	-1.0	-1	-1	-1
95	7	6.25	2	-1.0	-1.0	-1.0	-1	-1	-1
96	7	0.00	2	-1.0	-1.0	-1.0	-1	-1	-1

Rx 10/12/93

Descriptive statistics File: p357w14 Date: 10-12-1993

FILTER: None

Observations meeting filter conditions: 96

Variable	N	Mean	Standard Deviation	Minimum	Maximum	Coeff. of Variation
TEMP	41	24.134	0.106	24.000	24.400	0.441
DO	82	7.445	0.658	6.200	8.200	8.845
PH	82	7.320	0.234	6.500	7.800	3.195

Descriptive statistics File: p357w14 Date: 10-12-1993

FILTER: Keep if CONC = 100

Observations meeting filter conditions: 16

Variable	N	Mean	Standard Deviation	Minimum	Maximum	Coeff. of Variation
COND	6	670.833	57.915	575.000	750.000	8.633
HARD	6	128.333	13.292	120.000	150.000	10.357
ALK	6	25.000	5.477	20.000	30.000	21.909

Descriptive statistics File: p357w14 Date: 10-12-1993

FILTER: Keep if CONC = 0

Observations meeting filter conditions: 16

Variable	N	Mean	Standard Deviation	Minimum	Maximum	Coeff. of Variation
COND	7	382.143	53.452	350.000	500.000	13.988
HARD	7	80.000	0.000	80.000	80.000	0.000
ALK	7	61.429	3.780	60.000	70.000	6.153

SCOEPA00028787

RBC 10/12/93

Test 357-14: Fathead 7-day survival
File: C:\ws4\temp6\p357a14.tst Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro Wilks test for normality

D = 0.020

W = 0.465

Critical W (P = 0.05) (n = 24) = 0.916
Critical W (P = 0.01) (n = 24) = 0.884

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

Test 357-14: Fathead 7-day survival
File: C:\ws4\temp6\p357a14.tst Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

SCOEPA00028788

BTS 10/12/93

TITLE: Test 357-14: Fathead 7-day survival
FILE: C:\ws4\temp6\p357a14.tst
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	1.0000	1.4120
1	Control	2	1.0000	1.4120
1	Control	3	1.0000	1.4120
1	Control	4	1.0000	1.4120
2	6.25%	1	1.0000	1.4120
2	6.25%	2	1.0000	1.4120
2	6.25%	3	1.0000	1.4120
2	6.25%	4	1.0000	1.4120
3	12.5%	1	1.0000	1.4120
3	12.5%	2	1.0000	1.4120
3	12.5%	3	1.0000	1.4120
3	12.5%	4	0.9000	1.2490
4	25%	1	1.0000	1.4120
4	25%	2	1.0000	1.4120
4	25%	3	1.0000	1.4120
4	25%	4	1.0000	1.4120
5	50%	1	1.0000	1.4120
5	50%	2	1.0000	1.4120
5	50%	3	1.0000	1.4120
5	50%	4	1.0000	1.4120
6	100%	1	0.0000	0.1588
6	100%	2	0.0000	0.1588
6	100%	3	0.0000	0.1588
6	100%	4	0.0000	0.1588

Test 357-14: Fathead 7-day survival
File: C:\ws4\temp6\p357a14.tst Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	1.412				
2	6.25%	1.412	18.00	10.00	4.00	
3	12.5%	1.371	16.00	10.00	4.00	
4	25%	1.412	18.00	10.00	4.00	
5	MOEC 50%	1.412	18.00	10.00	4.00	
6	LOEC 100%	0.159	10.00	10.00	4.00	*

Critical values use k = 5, are 1 tailed, and alpha = 0.05

SCOEPA00028789

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

10/12/93

Shapiro Wilks test for normality

D = 0.016

W = 0.966

Critical W (P = 0.05) (n = 20) = 0.905
Critical W (P = 0.01) (n = 20) = 0.868

Data PASS normality test at P=0.01 level. Continue analysis.

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 5.63
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 3.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

BR
10/12/93

TITLE: Test 357-14: Fathead 7-day growth
FILE: C:\ws4\temp6\p357b14.tst
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	0.4240	0.4240
1	Control	2	0.4270	0.4270
1	Control	3	0.3760	0.3760
1	Control	4	0.4940	0.4940
2	6.25%	1	0.4240	0.4240
2	6.25%	2	0.4110	0.4110
2	6.25%	3	0.4180	0.4180
2	6.25%	4	0.4480	0.4480
3	12.5%	1	0.5390	0.5390
3	12.5%	2	0.4530	0.4530
3	12.5%	3	0.4430	0.4430
3	12.5%	4	0.4940	0.4940
4	25%	1	0.4390	0.4390
4	25%	2	0.4420	0.4420
4	25%	3	0.4230	0.4230
4	25%	4	0.4620	0.4620
5	50%	1	0.3570	0.3570
5	50%	2	0.3090	0.3090
5	50%	3	0.3470	0.3470
5	50%	4	0.3150	0.3150

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	0.049	0.012	11.410
Within (Error)	15	0.016	0.001	
Total	19	0.065		

Critical F value = 3.06 (0.05,4,15)
Since F > Critical F REJECT Ho:All groups equal

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.430	0.430		
2	6.25%	0.425	0.425	0.216	

-13-

5	LOEC	50%	0.332	0.332	4.251 *

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, df=15,4)

PK 10/12/93

Test 357-14: Fathead 7-day growth
File: C:\ws4\temp6\p357b14.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	4			
2	6.25%	4	0.055	12.7	0.005
3	12.5%	4	0.055	12.7	-0.052
4	25%	4	0.055	12.7	-0.011
5	50%	4	0.055	12.7	0.098

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LC50 TOXDAT MULTI-METHOD CALCULATION RESULTS
****

PK 10/21/93

Test 357-14: Fathead 7-day LC50

CONCENTRATION EXPRESSED AS : % effluent

CONC.	NUMBER EXPOSED	NUMBER AFFECTED	PERCENT AFFECTED
100	40	40	100
50	40	0	0
25	40	0	0
12.5	40	1	2.5
6.25	40	0	0

THE BINOMIAL TEST SHOWS THAT 50 AND 100 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 70.71067

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

END OF REPORT.

BR 10/12/93

CALCULATION OF IC_p FOR:

___Ceriodaphnia 7-day reproduction
X Fathead minnow 7-day growth
___Menidia 7-day growth
___Other_____

Test No.: 357-14
Date of Calc.: 10-12-93
Initials: RK

	Conc. (%)	Y_i	M_i	M_i	M_i
1.	control	.430	.446		
2.	6.25	.425	.446		
3.	12.5	.482	.446		
4.	25	.441	.441		
5.	50	.332	.332		
6.	100	0	0		

25% Reduction = .335
(control x .75)

50% Reduction =
(control x .50)

$$IC_{25} = 25 + [.335 - .441] \frac{(50 - 25)}{(.332 - .441)} = 49.3$$

$$IC_{50} = \quad + [\quad - \quad] \frac{(\quad - \quad)}{(\quad - \quad)} =$$

Where: Y_i=observed means
M_i=smoothed means
Concentrations go from low to high.

SAMPLE CALC.:

	Conc. (ug/L Cd)	Y_i	M_i	M_i	M_i
1.	control	.588	.598	.596	
2.	2.5	.607	.598	.596	
3.	5.0	.578	.578	.596	
4.	10	.609		.596	
5.	20	.235		.235	
6.					

50% Reduction = .596 x .50 = .298
(control x .50)

$$IC_{50} = 10 + [.298 - .596] \frac{(20 - 10)}{(.235 - .596)} = 18.3 \text{ ug/L}$$

SCOEPA00028794

Client name	Project or PO#
Wacker-Siltronics Corp.	—
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: ~~Thomas J. Rothschild~~ Dianne Mullan

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test								Remarks
	27 Sep 1993	0800	AQ	Outfall Composite	1	X								*Thomas Rothschild
														absent from
														work - sampler
														was Dianne Mullan
														NAS# 0323E

	Signature	Print Name	Company	Date	Time
Relinquished by	~~Thomas J. Rothschild~~ Dianne Mullan	~~Thomas J. Rothschild~~ Dianne Mullan	Wacker Siltronic Corporation	27 Sep 93	~~1000~~ 0900
Received by	Brad Wardle	Brad Wardle	UPS	27 Sep 93	1100
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Buhler	GARY A Buhler	NAS	9-28-93	10 40 AM

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P.O. Box 1437, Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

ent name: Wacker-Siltronics Corp.

Project or PO#: 93-63

dress: 7200 N.W. Front St.

Phone #: (503) 243-2020

y, State, Zip: Portland, OR. 97210

Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Analyses required: Bioassay Test; Hazardous sample special handling required

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test							Remarks
	29 Sep 93	0800	AQ	Outfall composite	1								NAS # 0347E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	29 Sep 93	1000
Received by					
Relinquished by					
Received by	B Wardle				
Relinquished by					
Received by Laboratory	B D Crowe	Brent D Crowe	Northwestern Aquatic Sciences	30 Sept 93	1019 Am

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

Client name: Wacker-Siltronics Corp.	Project or PO#: 93-65
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test							Hazardous sample Special handling required	Remarks
	1 Oct 93	0800	AQ	outfall composite	1	X								NAS# 0358 E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	1 Oct 93	1000
Received by					
Relinquished by					
Received by	B Wardle				
Relinquished by					
Received by Laboratory	Brent D Crome	Brent D Crome	Northwestern Aquatic Sciences	Oct 2, 93	1130 pm

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-15

Title: Cladoceran (*Ceriodaphnia dubia*) dual endpoint (acute/chronic) toxicity test using static exposure to Wacker Siltronic Corp. outfall.

Protocol No.: NAS-XXX-CD2, August 2, 1990. Revision 1 (1-18-92). Based on U.S. EPA. 1989. Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, survival and reproduction test, pp. 105-146. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronic Corporation, P.O. Box 03180, Portland, OR 97210.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; G.J. Irissarri, B.S., Tech.

Study Schedule:

Test Beginning: 9-28-93, 2:00 p.m.

Test Ending: 10-5-93, 2:30 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronic Corp. outfall; samples are 24HC. Details are as follows:

NAS Sample No.	0323E	0347E	0358E
Collection Date	9-27-93	9-29-93	10-1-93
Receipt Date	9-28-93	9-30-93	10-2-93
Conductivity (µmhos/cm)	550	150	600
pH	7.1	6.5	6.7
Hardness (mg/L)	120	180	160
Alkalinity (mg/L)	30	20	20

Treatments: Samples thermal equilibrated and briefly aerated each day prior to use in test.

Storage: Stored refrigerated (4°C) in sealed container until tested.

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DILUTION WATER

Source: Moderately hard synthetic water prepared from Milli-Q water.
Date of Preparation: 9-21-93, 10-1-93.
Pretreatment: Aerated ≥24 hr

TEST ORGANISMS

Species: *Ceriodaphnia dubia*, cladoceran
Age: <24-hr
Source: NAS cultures
Culture Conditions: Temperature, 24.2 ± 0.1°C; dissolved oxygen, 8.5 ± 0.2 mg/L; conductivity, 375 ± 91 µmhos/cm; pH, 7.4 ± 0.1; hardness, 100 ± 0 mg/L as $CaCO_3$; alkalinity, 65 ± 10 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

TEST PROCEDURES AND CONDITIONS

Test Chambers: 1 oz. polystyrene cups containing 15 ml of test solutions.
Test Concentrations: 100, 50, 25, 12.5, 6.25, and 0 % (control).
Replicates/Treatment: 10
Organisms/Treatment: 10
Water Volume Changes per 24 hr: 1
Aeration: None
Feeding: 0.1 ml each of YTC and *Selenastrum* suspension daily/beaker.
Effects Criteria: The effect criteria used were: 1) mortality, and 2) inhibition of reproduction. Mortality was defined as lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.
Water Quality and Other Test Conditions: Temperature, 25.2 ± 0.1°C; dissolved oxygen, 7.6 ± 0.5 mg/L; conductivity, 433 ± 247 µmhos/cm (100% effluent), 313 ± 18 µmhos/cm (control); pH, 7.2 ± 0.3; hardness, 153 ± 31 mg/L as $CaCO_3$ (100% effluent), 100 ± 0 mg/L as $CaCO_3$ (control); alkalinity, 23 ± 6 mg/L as $CaCO_3$ (100% effluent), 60 ± 0 mg/L as $CaCO_3$ (control); and photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

In the acute exposure (48 hour), no statistical comparison of survival was performed between the control and the 100% effluent concentration because no mortality was observed in the latter after 48 hours. In the chronic test, results are based on survival of the introduced cladocerans and the numbers of young produced. The 7-day LC50 (survival) was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). The IC25 (reproduction) was calculated using the Linear Interpolation Method (EPA/600/4-89/001a). NOEC and LOEC values for survival and reproduction were computed using Fisher's Exact Test and Dunnett's test, respectively. The statistical software employed for these calculations was Toxstat, Release 3.3, Univ. of Wyoming, Laramie.

PROTOCOL DEVIATIONS

None

SCOEPA00028799

REFERENCE TOXICANT TEST

Test No.: 999-295

Reference Toxicant and Source: $CdCl_2$-2.5H_2O, Mallinckrodt, Lot No. TNZ.

Test Date: 9-28-93

Dilution Water Used: Moderately hard synthetic water.

Result: 7-day LC50, 43.8 µg/L Cd; 7-day IC25, 0.85 µg/L Cd; NOEC, <1.0 µg/L Cd. These results are within the laboratory's control chart warning limits.

TEST RESULTS

Acute endpoint: A detailed tabulation of the acute test results is given in Table 1. There was no mortality of *C. dubia* exposed to 100% Wacker Siltronics outfall after 48 hours. Therefore, the effluent passed the acute test according to Oregon DEQ guidelines.

Chronic endpoint: A detailed tabulation of the chronic test results is given in Table 2 and Table 3. The biological effects, given as the NOEC and LOEC for survival and reproduction, the 7-day LC50 for survival, and the 7-day IC25 for reproduction are shown below.

	Survival	Reproduction
NOEC (%)	50	50
LOEC (%)	100	>50
7-Day LC50/IC25 (%)	70.7	43.5
(95% conf. int.)	(50 - 100)	--
Method	Binomial	Linear Interpolation

STUDY APPROVAL

Rick D. Caldwell 10/13/93 — Study Director, Date

Julie R. Fiore 10-13-93 — Quality Assurance Unit, Date

SCOEPA00028800

Table 1. Ceriodaphnia survival data, 48-hour.

	Effluent concentration (%)	
	Control	100
Number exposed	10	10
Number dead	0	0

Table 2. Ceriodaphnia survival data, 7-day.

	Effluent concentration (%)					
	Control	6.25	12.5	25	50	100
Number exposed	10	10	10	10	10	10
Number dead	0	0	1	0	0	10*

*Significantly different from the control (P=0.05).

Table 3. Ceriodaphnia reproduction data (Number of young produced).

	Effluent concentration (%)					
Replicate	Control	6.25	12.5	25	50	100
1	21	26	17	14	18	2
2	12	22	14	24	9	0
3	23	12	27	20	10	0
4	8	17	22	25	17	0
5	28	7	25	27	8	0
6	15	14	27	14	17	0
7	10	20	29	25	3	0
8	19	3	22	12	17	0
9	4	9	19	10	6	0
10	16	16	6	14	11	0
Mean	15.6	14.6	20.8	18.5	11.6	0.4*

*Significantly less than the control (P=0.05).
[a]Adult in this replicate identified as a male.

SCOEPA00028801

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

CLADOCERAN (CERIODAPHNIA DUBIA) SURVIVAL AND REPRODUCTION TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to measure the chronic toxicity of effluents and receiving waters using the cladoceran, Ceriodaphnia dubia (EPA Method 1002.0).

1.2 Summary of Method: Neonate (<24-hr-old) Ceriodaphnia dubia, are exposed for seven days (or until 60% of surviving control organisms have three broods of young) to different concentrations of effluent, receiving water, or cadmium reference toxicant in a static-renewal test. The test chambers are 30 ml borosilicate glass or plastic beakers, each containing 15 ml of test solution. Ten replicate beakers, each with one neonate, are employed at each test concentration. Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Qual. Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologust: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection. Reference toxicant test to be run concurrently.

SCOEPA00028803

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is cadmium as cadmium chloride (1.0 mg/ml stock solution used to make test solutions daily).

4. DESCRIPTION OF TEST SYSTEM

4.1 Preparation of Test Concentrations: Test concentrations are prepared by manual dilution of effluent, receiving water, or cadmium working stock solution with dilution water. Prior to mixing, both effluent and dilution water are aerated, if required, and brought to test temperature.

4.2 Test Chambers and Environmental Control: Test chambers are 30 ml borosilicate glass or plastic beakers holding 15 ml of test solution. Temperature and photoperiod control of test chambers is provided by incubation in an environmental chamber or water bath.

4.3 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

5. DILUTION WATER

Dilution water is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals.

6. TEST ORGANISMS

6.1 Species: Cladoceran, *Ceriodaphnia dubia*

6.2 Source: *Ceriodaphnia* neonates are supplied from the NAS laboratory culture. The original culture was obtained from the EPA Environmental Research Laboratory, Corvallis, OR.

6.3 Age at Study Initiation: <24-hr-old neonates; and all released within an 8-hr period.

SCOEPA00028804

6.4 Pretest Culture and Handling: Individual cultures are used as the immediate source of neonates for toxicity testing. Source cultures are handled in a similar manner as test organisms for at least seven days and the neonates are then used to initiate tests. Source cultures are transferred to new medium and fed at least three times a week (e.g. Mon, Wed, Fri). Records of the source cultures are kept and if mortality exceeds 20% or if less than 15 young are produced per week, the cultures are not used as a source of neonates for testing.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of neonates to five effluent, receiving water, or cadmium concentrations in a logarithmic series and a dilution water control. A 50% dilution series is recommended. Exposures are for 7 days or until 60% of the surviving control animals produce three broods. Each treatment consists of ten replicate test containers each containing one cladoceran. A stratified random design is used for beaker placement.

7.2 Effect Criteria: The effect criteria are: 1) mortality, and 2) inhibition of reproduction. Mortality is defined as the lack of visible movement during a 30 second observation period. Reproduction is evaluated as the mean number of young produced per surviving female cladoceran.

7.3 Test Conditions: The test temperature employed is 25 ± 1°C. The photoperiod is 16 hours of light and 8 hours of darkness. Illumination is supplied by daylight fluorescent lamps. The test solution is replaced once daily.

7.4 Beginning of Test: The test solutions are added to the test beakers and food is added. The test is then begun by adding one neonate to each test container.

7.5 Feeding: The organisms are fed when the test is initiated, and daily thereafter. Food is added to the fresh medium immediately before or immediatedly after the adults are transferred. Each feeding consists of 0.1 ml YTC per 15 ml test solution and 0.1 ml *Selanastrum* concentrate per 15 ml test solution.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The test duration is 7 days (or until 60% of surviving control organisms have three broods of young). The type and frequency of observations to be made during the test are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival (of adult)	Daily before transfer
Reproduction (young produced)	Daily after adult transfer
Physical and Chemical Data	
Temperature (two locations in environmental control system)	Daily

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Dissolved oxygen, pH (High, medium, & low concentrations & control)	Daily before and after solution renewal
Conductivity, hardness, & alkalinity (control & each new effluent sample)	e.g. Days 1, 3, & 5

During the test, dead adult organisms are removed every 24 hours and the young are discarded daily after counting. Dissolved oxygen is measured in each stock test solution using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is also measured in each stock test solution using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using test kits.

7.7 Criteria of Test Acceptance: The test results are acceptable if: 1) survival in the controls is at least 80% and reproduction in the controls averages 15 or more young per surviving female. At least 60% of surviving females in controls should have produced their third brood.

8. DATA ANALYSIS

Test results are based on survival of the introduced cladocerans and the numbers of young produced. The data analysis includes calculation of a 7-day LC50 and IC25 for mortality and inhibition of reproduction, respectively, and the determination of a NOEC and LOEC for both survival and reproduction using appropriate parametric or non-parametric tests (e.g. Dunnett's Test, Fisher's Exact Test, or Steel's Many-one Rank Test).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses; a description of the statistical methods used; any unusual information about the test or deviations from procedures.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the Sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and Sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

SCOEPA00028806

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. Environmental Protection Agency. 1989. Cladoceran, Ceriodaphnia dubia, survival and reproduction test. Method 1002.0. In: Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Second edition. EPA/600/4-89/001.

U.S. Environmental Protection Agency. 1989. Supplement to "Short-term methods for estimating the chronic toxicity of effluents and surface waters to freshwater organisms". Revision 1. EPA/600/4-89/001a.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028807

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

COVER DATA SHEET

Test No. 357-15 Investigator [illegible] 10/13/93

STUDY MANAGEMENT

Client: WACKER Silfronics

Client's Study Monitor: Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. R.S. Caldwell

QA Officer L.K. Garrison-Nemeth

1. G.J. IRISSARRI GJI 2. G.A. [illegible]

3. 4.

Study Schedule:

Test Beginning: 9-28-93 2:00pm Test Ending: 10-5-93 2:30pm

TEST MATERIAL

Description: OUTFALL COMPOSITE

NAS Sample No.:	0323E	0347E	0358E	
Date of Collection:	9-27-93	9-29-93	10-1-93	
Date of Receipt:	9-28-93	9-30-93	10-2-93	
Conductivity (µmhos/cm):	550	150	600	433 ± 247
pH:	7.1	6.5	6.7	
Hardness (mg/L):	120	~~120~~ 180 GJI	160	153 ± 31
Alkalinity (mg/L):	30	~~280~~ 20 GJI	20	23 ± 6
:				

DILUTION WATER

Description: Moderately hard synthetic water (prep'd from Milli-Q water)

Date of Preparation: 9-21-93, 10-1-93

Water Quality: Conductivity (µmhos/cm) 325, 300 313 ± 18 pH 7.3, 7.4

Hardness (mg/L) 100, 100 100 ± 0 Alkalinity (mg/L) 60, 60 60 ± 0

Treatments: Aerated 24-hr., Aerated ≥ 24 hr

TEST ORGANISMS

Species: Ceriodaphnia dubia, cladoceran

Age: (<24-hr; all released within 8 hr) < 24 hr

Source: (NAS cultures) NAS cultures

Acclimation: See seperate data sheet

TEST PROCEDURES AND CONDITIONS

Test concentrations: (100%, 50%, 25%, 12.5%, 6.25%, 0%) 100, 50, 25, 12.5, 6.25, + 0 %

Test chambers: (30 ml beakers) 30 ml Plastic cups

Test volume: (15 ml) 15 ml

Replicates/treatment: (10) 10

Organisms/treatment: (10) 10 (1/repl)

Test water changes: Daily

Aeration during test: None

Feeding: 0.1 ml each of YTC and algal suspension daily

Beaker placement: Stratified randomization

COVER DATA SHEET (CONTINUED)

Test No. 357-15 Investigator RK 10/13/93

Randomization chart:

12.5	100	25	6.25	Ø	25	50	Ø	100	12.5
6.25	50	50	25	12.5	100	Ø	12.5	Ø	6.25
100	25	6.25	Ø	100	50	12.5	6.25	25	25
Ø	12.5	100	50	6.25	12.5	25	100	50	Ø
25	6.25	Ø	12.5	50	Ø	100	25	6.25	50
50	Ø	12.5	100	25	6.25	6.25	50	12.5	100

PREPARATION OF TEST SOLUTIONS

Concentration of working stock solution ( )

(A 1.0 µg/L working stock is prep'd from the conc. stock by serial dilution; e.g. 1 to 10, then 1 to 100.)

Test Conc (%)	EFFLUENT ~~Toxicant~~ ( ) (ml/150 ml)	Dilution Water (ml/150 ml)
100	150	0
50	75	75
25	37.5	112.5
12.5	18.75	131.25
6.25	9.4	140.6
Ø	0	150

MISCELLANEOUS NOTES

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-15 Investigator RS 10/13/93

DAY 0 (9/28/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)		7.4		7.1
Med. (25)		7.8		7.6
Low (6.25)		7.8		7.5
Control		8.0		7.6

Temp #1 (°C): 25.3
Temp #2 (°C): 25.3

Notes:

DAY 1 (9/29/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.0	7.4	6.8	6.9
Med. (25)	7.0	8.2	7.3	7.4
Low (6.25)	7.0	8.2	7.4	7.4
Control	6.8	8.2	7.3	7.3

Temp #1 (°C): 25.3
Temp #2 (°C): 25.3

Notes:

DAY 2 (9/30/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.4	7.6	6.7	7.0
Med. (25)	7.4	8.4	7.2	7.5
Low (6.25)	7.4	8.4	7.3	7.6
Control	7.4	8.4	7.1	7.6

Temp #1 (°C): 25.2
Temp #2 (°C): 25.3

Notes:

DAY 3 (10/1/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	7.4	6.5	6.8
Med. (25)	7.2	7.3	7.3	7.4
Low (6.25)	7.0	8.4	7.2	7.4
Control	7.2	8.4	7.0	7.3

Temp #1 (°C): 25.2
Temp #2 (°C): 25.2

Notes:

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

WATER QUALITY DATA SHEET

Test No. 357-15 Investigator RK 10/23/93

DAY 4 (10/2/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.6	7.6	6.6	6.8
Med. (25)	7.6	8.0	7.3	7.4
Low (6.25)	7.4	8.0	7.3	7.3
Control	7.4	8.2	7.2	7.1

Temp #1 (°C): 25.2
Temp #2 (°C): 25.2

Notes:

DAY 5 (10/3/93) GJS

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.7	7.9	6.8	7.0
Med. (25)	7.7	7.9	7.3	7.5
Low (6.25)	7.5	8.2	7.4	7.5
Control	7.8	8.2	7.4	7.4

Temp #1 (°C): 25.1
Temp #2 (°C): 25.1

Notes:

DAY 6 (10/4/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	7.2	7.3	6.9	6.9
Med. (25)	7.2	8.0	7.4	7.4
Low (6.25)	7.2	8.2	7.4	7.4
Control	7.1	8.2	7.2	7.3

Temp #1 (°C): 25.3
Temp #2 (°C): 25.2

Notes:

DAY 7 (10/5/93) GJI

Conc. (%)	DO (mg/L) Old	DO (mg/L) New	pH Old	pH New
High (100)	—	—	—	—
Med. (25)	7.0		7.3	
Low (6.25)	7.3		7.3	
Control	7.2		7.2	

Temp #1 (°C): 25.1
Temp #2 (°C): 25.2

Notes:

$\bar{x}$	7.6	7.2	25.2
SD	0.5	0.3	0.1
N	55	55	16

8/1/90

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-~~17~~ 15 Investigator RK 10/13/93

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	6	5	0	0	0	6	0	6	0	0			
Ø	5	5	0	8	6	7	9	10	9	3	8			
	6	10	7	8	1	10	0	0	0	1	0			
	7	0	0	7	1	11	0	0	4	0	8			
%	8													
	Total	21	12	23	8	28	15	10	19	4	10	156	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	4	4	0	0	0	5	6	0	0	0			
6.25	5	0	0	5	4	2	3	0	0	4	7			
	6	8	7	7	9	5	6	5	3	5	9			
	7	14	11	0	4	0	0	9	0	0	0			
%	8													
	Total	26	22	12	17	7	14	20	3	9	16	146	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	5	5	4	0	1	5	6	6	6	0			
12.5	5	0	0	0	2	3	10	0	9	0	4			
	6	5	8	10	8	9	12	10	0	7	X 2			
	7	7	1	13	12	12	0	13	7	6	X			
%	8													
	Total	17	14	27	22	25	27	29	22	19	6	208	9	

8/1/90

SCOEPA00028813

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CD

CERIODAPHNIA DUBIA 7-DAY SURVIVAL AND REPRODUCTION TEST

SURVIVAL/REPRODUCTION DATA SHEET

Test No. 357-~~14~~ 15 SK Investigator DK 10/13/93

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
25 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	3	5	4	5	4	3	5	3	0	0			
	5	6	0	0	0	0	4	0	5	3	6			
	6	5	8	6	8	8	0	7	1	7	0			
	7	0	11	10	12	15	7	13	3	0	8			
	8													
	Total	14	24	20	25	27	14	25	12	10	14	185	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
50 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	0			
	4	1	2	1	4	1	3	3	4	0	2			
	5	2	4	3	4	0	0	0	0	3	4			
	6	8	0	6	0	3	5	0	4	3	0			
	7	7	3	0	9	4	9	0	9	0	5			
	8													
	Total	18	9	10	17	8	17	3	17	6	11	116	10	

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
100 %	1	0	0	0	0	0	0	0	0	0	0			
	2	0	0	0	0	0	0	0	0	0	0			
	3	0	0	0	0	0	0	0	0	0	X[c]			
	4	2	0	X[c]	X[c]	X[c]	0	0	X[c]	0	X			
	5	X[o]	0	|	|	|	X[o]	X[o]	|	X[o]	|		
	6	|	X[o]	|	|	|	|	|	|	|	|		
	7	|	|	|	|	|	|	|	|	|	|		
	8	|	|	|	|	|	|	|	|	|	|		
	Total	2	0	0	0	0	0	0	0	0	0	2	0	

8/1/90

SCOEPA00028814

Broad Board

Discharger:
Location:
Date Sample Collected:

Analyst: 10/13/93
Test Start-Date/Time:
Test Stop -Date/Time:

WQ

Temp: 24.2 ± 0.1
DO: 8.5 ± 0.2
pH: 7.4 ± 0.1
Cond: 375 ± 91
Hard: 100 ± 0
Alk: 65 ± 10

DAY 0 9-21-93 GJI

pH 7.3	DO 8.2 mg/L
COND 325 umhos	HARD 100 mg/L
TEMP 24.1 °C	ALK 60 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 2 9-23-93 GJI

pH 7.5	DO 8.4 mg/L
COND 425 umhos	HARD 100 mg/L
TEMP 24.2 °C	ALK 60 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 2 9-23-93 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	0	0	0	0	0	0	0	0	0	0			
	2	1	1	1	1	1	1	1	1	1	1			
	3	1	1	1	1	1	1	1	1	1	1			
	4	1	1	1	1	1	1	1	1	1	1			
	5	1	1	1	1	1	1	1	1	1	1			
	6	1	1	1	1	1	1	1	1	1	1			
	7	1	1	1	1	1	1	1	1	1	1			
	8	1	1	1	1	1	1	1	1	1	1			
	Total													

DAY 4 9-25-93 GJI

pH 7.4	DO 8.6 mg/L
COND 275 umhos	HARD 100 mg/L
TEMP 24.2 °C	ALK 60 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 4 9-25-93 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	2	4	3	0	3	1	0	3	4	4			
	2	4	2	1	0	0	3	0	3	3	0			
	3	4	4	0	0	0	0	3	3	2	2			
	4	0	0	0	0	0	2	0	2	0	0			
	5	3	4	3	0	4	2	4	3	4	0			
	6	4	1	2	0	0	4	2	1	3	1			
	7	0	4	4	3	5	3	1	3	4	4			
	8	1	4	3	7	6	3	0	3	2	0			
	Total													

DAY 6 9-27-93 GJI

pH 7.5	DO 8.6 mg/L
COND 475 umhos	HARD 100 mg/L
TEMP 24.2 °C	ALK 80 mg/L

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1													
	2													
	3													
	4													
	5													
	6													
	7													
	8													
	Total													

DAY 6 9-27-93 GJI

Conc.	Day	Replicate 1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Young per Adult
	1	9	8	3	4	7	6	0	9	4	9			
	2	6	9	8	0	4	9	1	9	6	1			
	3	0	1	5	2	7	7	5	9	7	11			
	4	2	0	4	8	4	9	4	11	5	2			
	5	8	2	0	4	10	0	7	10	6	4			
	6	9	4	10	8	5	7	5	2	8	0			
	7	7	5	8	3	10	8	7	8	0	11			
	8	8	9	0	3	5	0	7	0	9	0			
	Total													

PK 10/13/93

357-175 DW

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
6.25%	10	0	10
TOTAL	20	0	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
12.5%	9	1	10
TOTAL	19	1	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 9.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
25%	10	0	10
TOTAL	20	0	20

Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

PS 10/17/93

FISHERS EXACT TEST 357-17 5 PS

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
50%	10	0	10
TOTAL	20	0	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 10.
Since b is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHERS EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
100%	0	10	10
TOTAL	10	10	20

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 0.
Since b is less than or equal to 6 there is a significant difference between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHERS EXACT TESTS

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	10	0	
1	6.25%	10	0	
2	12.5%	10	1	
3	25%	10	0	
4	HOEC 50%	10	0	
5	LOEC 100%	10	10	*

SCOEPA00028817

Test 357-17: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

Shapiro Wilks test for normality

D = 2007.300

W = 0.966

Critical W (P = 0.05) (n = 50) = 0.947
Critical W (P = 0.01) (n = 50) = 0.930

Data PASS normality test at P=0.01 level. Continue analysis.

Test 357-17: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 1.08
Table Chi-square value = 13.28 (alpha = 0.01)
Table Chi-square value = 9.49 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 9.00
Used for Chi-square table value ==> df (#groups-1) = 4

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

15 PLG

PG 10/13/53

TITLE: Test 357-~~17~~: Cerio 7-day reproduction
FILE: C:\ws4\temp6\p357b17.tst
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Control	1	21.0000	21.0000
1	Control	2	12.0000	12.0000
1	Control	3	23.0000	23.0000
1	Control	4	8.0000	8.0000
1	Control	5	28.0000	28.0000
1	Control	6	15.0000	15.0000
1	Control	7	10.0000	10.0000
1	Control	8	19.0000	19.0000
1	Control	9	4.0000	4.0000
1	Control	10	16.0000	16.0000
2	6.25%	1	26.0000	26.0000
2	6.25%	2	22.0000	22.0000
2	6.25%	3	12.0000	12.0000
2	6.25%	4	17.0000	17.0000
2	6.25%	5	7.0000	7.0000
2	6.25%	6	14.0000	14.0000
2	6.25%	7	20.0000	20.0000
2	6.25%	8	3.0000	3.0000
2	6.25%	9	9.0000	9.0000
2	6.25%	10	16.0000	16.0000
3	12.5%	1	17.0000	17.0000
3	12.5%	2	14.0000	14.0000
3	12.5%	3	27.0000	27.0000
3	12.5%	4	22.0000	22.0000
3	12.5%	5	25.0000	25.0000
3	12.5%	6	27.0000	27.0000
3	12.5%	7	29.0000	29.0000
3	12.5%	8	22.0000	22.0000
3	12.5%	9	19.0000	19.0000
3	12.5%	10	6.0000	6.0000
4	25%	1	14.0000	14.0000
4	25%	2	24.0000	24.0000
4	25%	3	20.0000	20.0000
4	25%	4	25.0000	25.0000
4	25%	5	27.0000	27.0000
4	25%	6	14.0000	14.0000
4	25%	7	25.0000	25.0000
4	25%	8	12.0000	12.0000
4	25%	9	10.0000	10.0000
4	25%	10	14.0000	14.0000
5	50%	1	18.0000	18.0000
5	50%	2	9.0000	9.0000
5	50%	3	10.0000	10.0000
5	50%	4	17.0000	17.0000
5	50%	5	8.0000	8.0000
5	50%	6	17.0000	17.0000
5	50%	7	3.0000	3.0000
5	50%	8	17.0000	17.0000
5	50%	9	6.0000	6.0000
5	50%	10	11.0000	11.0000

SCOEPA00028819

ANOVA TABLE

RS 10/13/93

SOURCE	DF	SS	MS	F
Between	4	505.280	126.320	2.832
Within (Error)	45	2007.300	44.607	
Total	49	2512.580		

Critical F value = 2.61 (0.05,4,40)
Since F > Critical F REJECT Ho:All groups equal

15 RS

Test 357-~~17~~: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	15.600	15.600		
2	6.25%	14.600	14.600	0.335	
3	12.5%	20.800	20.800	-1.741	
4	25%	18.500	18.500	-0.971	
5	NOEC 50%	11.600	11.600	1.339	

Dunnett table value = 2.23 (1 Tailed Value, P=0.05, df=40,4)

15 RS

Test 357-~~17~~: Cerio 7-day reproduction
File: C:\ws4\temp6\p357b17.tst Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	10			
2	6.25%	10	6.661	42.7	1.000
3	12.5%	10	6.661	42.7	-5.200
4	25%	10	6.661	42.7	-2.900
5	50%	10	6.661	42.7	4.000

SCOEPA00028820

NORTHWESTERN AQUATIC SCIENCES
LC50 TOXDAT MULTI-METHOD CALCULATION RESULTS
****

PK
10/13/53

Test 357-~~M~~ PK: Cerio 7-day LC50

CONCENTRATION EXPRESSED AS : % effluent

CONC.	NUMBER EXPOSED	NUMBER AFFECTED	PERCENT AFFECTED
100	10	10	100
50	10	0	0
25	10	0	0
12.5	10	1	10
6.25	10	0	0

THE BINOMIAL TEST SHOWS THAT 50 AND 100 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.80469 PERCENT.

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 70.71067

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

END OF REPORT.

CALCULATION OF IC_p FOR:

X Ceriodaphnia 7-day reproduction
___Fathead minnow 7-day growth
___Menidia 7-day growth
___Other_____

Test No.: 357-27 15 PS
Date of Calc.: 10-13-93
Initials: RS

	Conc. (%)	Y_i	M_i	M_i	M_i
1.	control	15.6	17.0	17.4	
2.	6.25	14.6	17.0	17.4	
3.	12.5	20.8	17.0	17.4	
4.	25	18.5		17.4	
5.	50	11.6		11.6	
6.	100	0.2		0.2	

25% Reduction = 13.1
(control x .75)

50% Reduction =
(control x .50)

$$IC_{25} = 25 + [13.1 - 17.4]\frac{(50 - 25)}{(11.6 - 17.4)} = 43.5$$

$$IC_{50} = \quad + [\quad - \quad]\frac{(\quad - \quad)}{(\quad - \quad)} =$$

Where: Y_i=observed means
M_i=smoothed means
Concentrations go from low to high.

SAMPLE CALC.:

	Conc. (ug/L Cd)	Y_i	M_i	M_i	M_i
1.	control	.588	.598	.596	
2.	2.5	.607	.598	.596	
3.	5.0	.578	.578	.596	
4.	10	.609		.596	
5.	20	.235		.235	
6.					

50% Reduction = .596 x .50 = .298
(control x .50)

$$IC_{50} = 10 + [.298 - .596]\frac{(20 - 10)}{(.235 - .596)} = 18.3 \text{ ug/L}$$

SCOEPA00028822

Client name	Project or PO#
Wacker-Siltronics Corp.	—
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Lab Sample number	Date sampled	Time sampled	Type* See key below	Sampled by: *Dianne Mullan ~~Thomas J Rothschild~~ — Sample description	Number of containers	Bioassay Test							Hazardous sample special handling required	Remarks
	27 Sep 1993	0800	AQ	Outfall Composite	1	X								*Thomas Rothschild absent from work - sampler was Dianne Mullan NAS# 0323E

	Signature	Print Name	Company	Date	Time
Relinquished by	*Dianne Mullan ~~Thomas J Rothschild~~	Dianne Mullan ~~Thomas J Rothschild~~	Wacker Siltronic Corporation	27 Sep 93	0900 ~~1000~~
Received by	Brad Wardle	Brad Wardle	UPS	27 Sep 93	1100
Relinquished by					
Received by					
Relinquished by					
Received by Laboratory	Gary A Buhler	GARY A Buhler	NAS	9-28-93	10 40 AM

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petrole

Client name: Wacker-Siltronics Corp.	Project or PO#: 93-63
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Analyses required: Bioassay Test; Hazardous sample Special handling required

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Remarks
	29 Sep 93	0800	AQ	outfall composite	1	NAS # 0347 E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	29 Sep 93	1000
Received by					
Relinquished by					
Received by	B Wardle				
Relinquished by					
Received by Laboratory	B D Crowe	Brent D Crowe	Northwestern Aquatic Sciences	30 Sept 93	1019 Am

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

SCOEPA00028824

Client name: Wacker-Siltronics Corp.	Project or PO#: 93-65
Address: 7200 N.W. Front St.	Phone #: (503) 243-2020
City, State, Zip: Portland, OR. 97210	Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test							Hazardous sample Special handling required	Remarks
	1 Oct 93	0800	AQ	outfall composite	1	X								NAS# 0358 E

	Signature	Print Name	Company	Date	Time
Relinquished by	Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	1 Oct 93	1000
Received by					
Relinquished by					
Received by	B Wyatt				
Relinquished by					
Received by Laboratory	Brent D Crowe	Brent D Crowe	Northwestern Aquatic Sciences	Oct 2, 93	115pm

NORTHWESTERN AQUATIC SCIENCES

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Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

lab is
sending
a correction
← 10/30

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-16

Title: *Oncorhynchus mykiss*, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SG-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (*Salmo gairdneri*). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; B.D. Crowe, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 9-30-93, 10:30 a.m.

Test Ending: 10-4-93, 10:30 a.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 334 S.W. 7th Street, Suite B, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronics Corp. effluent, (24 HC). Details are as follows:

NAS Sample No.	0347E
Collection Date	10-29-93
Receipt Date	10-30-93
Conductivity (µmhos/cm)	150
pH	6.5
Hardness (mg/L)	180
Alkalinity (mg/L)	20

Treatments: Samples briefly temperature equilibrated and aerated prior to use.

Storage: Stored at 4°C in the dark until used.

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DILUTION WATER

Source: NAS spring water
Date of Collection: 9-30-93
Pretreatment: Aerated prior to use.

TEST ORGANISMS

Species: *Oncorhynchus mykiss*, rainbow trout.
Size/Weight: 0.14 g/fish.
Source: Purchased 9-23-93 from Sticklebacks Unlimited, Vallejo, CA.
Acclimation: Temperature, 14.2 ± 1.6°C; dissolved oxygen, 8.8 ± 0.2 mg/L; pH, 7.0 ± 0.3; and conductivity, 1,317 ± 435 µmhos/cm for the prior week. Acclimation tank loading: 0.58 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: one-gallon glass jars; vol. 3.5 L.
Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.
Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 0.40 g/L
Aeration: All test containers were continuously aerated using 1 ml disposable pipets and minimal bubbling rates.
Feeding: None during the test or for 24 hours prior to testing.
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.0 ± 0.2°C; dissolved oxygen, 10.3 ± 0.1 mg/L; pH, 7.3 ± 0.2; conductivity, 456 ± 49 µmhos/cm; hardness, 140 ± 35 mg/L as $CaCO_3$; alkalinity, 47 ± 23 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

Smaller sample containers were used than specified in the protocol, but these were sufficient to keep fish loading within accepted levels. Therefore, this deviation should not affect the test result.

REFERENCE TOXICANT TEST

Test No.: 999-296
Test Date: 9-30-93
Reference Toxicant and Source: LAS (Linear alkyl sulfonate), Banco, Lot No. D3-01, Exp. Oct. 1993.
Dilution Water Used: NAS spring water
Result: 96-hr LC50, 5.26 mg/L. This result is within the laboratory's control chart warning limits.

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TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	71.8
(95% C.I.)	(60 - 100)
Method	Binomial

STUDY APPROVAL

Rick D. Caldwell 10/20/93 — Study Director, Date

Julie R. Fiore 10/20/93 — Quality Assurance Unit, Date

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Table 1. Survival of Oncorhynchus mykiss exposed to Wacker Siltronics effluent.

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	0	0	0	0	0.0	
	2	10	0	0	0	0	0.0	0.0
60	1	10	7	7	7	7	70.0	
	2	10	10	10	10	10	100.0	85.0
36	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
22	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	9	90.0	
	2	10	10	10	10	10	100.0	95.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

SCOEPA00028830

APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

RAINBOW TROUT (ONCHRHYNCHUS MYKISS) ACUTE TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this test is to determine the acute toxicity of effluents and/or receiving waters using rainbow trout (Oncorhynchus mykiss).

1.2 Summary of Method: Rainbow trout (Oncorhynchus mykiss) juveniles are exposed for 96-hr (24-hr in screening test) to different concentrations of effluent, receiving water, or reference toxicant in a static test. The test may be performed either in a renewal or non-renewal form. Test chambers should constructed of glass and be large enough so that the loading limit is not exceeded. Two replicate aquaria (three for screening test), each with 10 fish, are employed at each test concentration. A standard experimental design is employed consisting of exposure of the test animals to five test concentrations, and a dilution water control in the definitive test (100% concentration and control in the screening test). Mortality is the effect criterion. The data analysis consists of calculation of the LC50 and 95% confidence intervals (t-test in the screening test).

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Project Manager/Technical Director: _____
Quality Assurance Officer: _____
Aquatic Biologist: _____
Aquatic Biologist: _____

2.6 Proposed Study Schedule: Effluent/receiving water tests to begin within three days of sample collection.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the

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EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

3. TEST MATERIAL

An effluent or receiving water sample. The reference toxicant is LAS (1.00 mg/ml stock solution).

4. DILUTION WATER

The dilution water is NAS laboratory spring water or dechlorinated city water from the City of Newport.

5. TEST ORGANISMS

5.1 Species: Rainbow trout, *Oncorhynchus mykiss*.

5.2 Source: Rainbow trout are purchased from a reputable supplier or local grower. A frequently used source is Northwest Trout, Corvallis, OR 97330.

5.3. Age: Juvenile (0.8-5.0 g)

5.4 Acclimation and Pretest Observation: After receipt of fish from a source known to have healthy fish, a minimum observation time of 48 hours is required prior to testing. If fish appear diseased, discolored, or otherwise stressed, or if more than 5% of the fish die during the 48-hr holding period, then the fish must be discarded and a new group obtained.

Care must be used to ensure that fish are not subjected to unusual handling or environmental stress either before or during the testing period. Fish should be handled only the minimum necessary using suitable dipnets and should not be subjected to more than a 3°C temperature change during any 12 hour period. The dissolved oxygen level must be maintained at a level of 60% of saturation or greater. During holding, loading of fish in aquaria should not exceed 10 g/L, and holding water should be replaced at a minimum rate of 2 tank volumes per day. Fish should be fed to satiation at least once a day with a commercial food obtained from the fish grower. Fish are shielded from any unusual visual stress and treated with a photoperiod of 16 hours light and 8 hours darkness. A daily log of feeding, behavioral observations, mortality, and water quality should be maintained

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers are may be glass jars or small plate glass aquaria. The containers are covered to minimize evaporation of volatile compounds. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath. The system is maintained in a photoperiod-controlled room or enclosure. Test solutions are aerated by slow bubbling of oil-free compressed air through 1 ml disposable pipets.

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6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E 1383-90, paragraph 8.5. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 10% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of juvenile rainbow trout to five test concentrations in a logarithmic series and a dilution water control. A 60% dilution series is normally used in this test with effluents giving test concentrations of 100%, 60%, 36%, 22%, 13%, and 0%, but other dilutions are satisfactory. Exposures are for 96 hours. Each treatment consists of duplicate test chambers each containing ten fish. A stratified random design is used to place test chambers in the water bath which is used for temperature control. Test organisms are impartially distributed to the test chambers by adding two animals to each chamber and repeating the process until each contains 10 organisms. In the screening test only the 100% effluent and control levels are used, and three replicates are employed.

7.2 Effect Criterion: The effect criterion used in the rainbow trout bioassay is mortality, defined as a lack of visible respiratory movement and absence of response to tactile stimulation.

7.3 Test Conditions: The dissolved oxygen concentration in each test container must be greater than 60% saturation throughout the 96-hr test. Test containers are gently aerated if required to maintain the oxygen level. If aeration is employed, all containers are treated equally. The test temperature employed is 12 $\pm$ 2°C. The photoperiod is 16 hours of light and 8 hours of darkness. Loading must not exceed 0.8 g/L.

7.4 Preparation of Test Solutions: Effluent, groundwater, receiving water, or stock solutions of manufactured chemical products are diluted with dilution water to prepare a series of test concentrations. The test dilutions are brought to the test temperature by partial immersion of the test containers in a water bath and, if necessary, are gently aerated until the dissolved oxygen concentration is greater than 80% of saturation in each vessel.

7.5 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described.

7.6 Feeding: Animals are not fed during the test nor during the preceding 24 hours.

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7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 96 hours. The type and frequency of observations to be made are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Survival	Daily
Physical and Chemical Data	
Dissolved oxygen, pH, temperature, and conductivity (one repl. only)	Daily
Hardness and alkalinity (highest test concentration and control) (one replicate only)	0- and 96-hr

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is measured directly in test aquaria using a polarographic oxygen probe calibrated in air. The pH is also measured directly in the test aquaria by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured using a mercury thermometer or a telethermometer calibrated with a mercury thermometer. Conductivity, hardness, and alkalinity are measured using EPA approved or suggested methods (EPA 1979).

7.8 Criteria of Test Acceptance: For the test to be considered acceptable, the minimum survival of organisms in the control treatment at the end of the test must be 90%.

8. DATA ANALYSIS

Percent survival is calculated for each treatment replicate from the raw data and the means are obtained for each treatment level. The LC50 is calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013). In the screening test, comparison of the 100% level with the control is done using a t-test.

9. REPORTING

A report of the test results must include the following information: name and identification of the test; the investigator and laboratory; information on the test material; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; the 24-, 48-, 72-, and 96-hr LC50s and 95% confidence limits; any unusual information about the test or deviations from procedures.

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10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect, and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED GUIDELINES

ASTM. 1990. Standard guide for conducting sediment toxicity tests with freshwater invertebrates. ASTM Standard Method No. E 1383-90. Am. Soc. Test. Mat., Philadelphia, PA.

EPA. 1979. Methods for chemical analysis of water and wastes. Environmental Protection Agency, Cincinnati, (EPA 600/4-79-020).

Peltier, W.H. and C.I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. EPA 600/4-85-013.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SCOEPA00028836

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-16 Client WACKER Siltronics Investigator [illegible] 10/12/93

Test Type (rangefinding/definitive) _____ Test Length (hr) 96hr

Species Oncorhynchus mykiss (Rainbow Trout)

STUDY MANAGEMENT

Client: WACKER Siltronics

Client's Study Monitor: Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. D.S. Caldwell

QA Officer L.K. Garrison-Nemeth

1. BO Crane BC 2. G.A. [illegible]

3. _____ 4. _____

Study Schedule:

Test Beginning: 9-30-93 1030 Am Test Ending: 10-4-93 1030 Am

TEST MATERIAL

Description: Outfall composite

NAS Sample No.:	0347E			
Date of Collection:	10-29-93			
Date of Receipt:	10-30-93			
Conductivity (µmhos/cm):	150			
pH:	6.5			
Hardness (mg/L):	180			
Alkalinity (mg/L):	20			
_____:				

DILUTION WATER

Description: NAS Spring Water

Date of Preparation/Collection: 9-30-93

Water Quality: Cond. (µmhos/cm) 500 Salinity (ppt) — pH 7.3

Hardness (mg/L as $CaCO_3$) 140 Alkalinity (mg/L as $CaCO_3$ 80

Treatments: Aerated

TEST ORGANISMS

Species: O. mykiss (Rainbow Trout) Age: _____ Size: _____

Source: Stichlebacks Unlimited, Vallejo, CA

Acclimation Data:

Date	Temp (°C)	DO (mg/L)	pH	Sal/Cond	Comments
9-23-93	16.2	Saturated	7.0	8250	Treated with Prolong Hard: 140 Al
9-24-93	12.8	8.8	6.7	1650	Hard: 140 mg/L Alk: 80 mg/L
9-28-93	12.9	8.7	6.9	1475	
9-29-93	14.8	9.0	7.5	825	Hard: 140 mg/L Alk: 80 mg/L
Mean	14.2	8.8	7.0	1317	
S.D.	1.6	0.2	0.3	435	
(N)	4	3	4	3	

SCOEPA00028838

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-
ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-16 Client Wacker-Siltronics Investigator PSR 10/12/93

TEST PROCEDURES AND CONDITIONS

Test concentrations: (50% series recommended) 100, 60, 36, 22, 13, 0 %

Test chambers: 1 gallon jars Test volume: 3.5 L
Replicates/treatment: (2) 2 Organisms/treatment: (20) 20 (10/rep)
Test water changes: None Aeration during test: Yes
Feeding: None
Beaker placement: Stratified randomization

Randomization chart:

A	60	Q	22	36	100	13
B	13	60	100	Q	22	36
C						
D						

MISCELLANEOUS NOTES

Conc (%)	Vol (mL) Effluent	vol. Dil'n Water (mL)
100	3500	Q
60	2100	1400
36	1300	2200
22	800	2700
13	500	3000
Q	Q	3500

Loading
fish = 20
total wt (g) = 2.76 g
2.76/20 = 0.14 g/fish

Load: Test
$\frac{0.14 \text{ g/fish} \times 10 \text{ fish}}{3.5 \text{ L}} = 0.40 \text{ g/L}$

Acc.
$\frac{0.14 \text{ g/fish} \times 250 \text{ fish}}{60 \text{ L}} = 0.58 \text{ g/L}$

SCOEPA00028839

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-1C Client Wacker - Silbronicer Investigator [illegible] 10/21/93

DAY 0 (9/30/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.0	10.3		575	6.8	180	120	10	10
2.	60	12.1	10.3		500	7.0	+		10	10
3.	36	12.0	10.3		450	7.0	+		10	10
4.	22	12.0	10.3		425	7.1	+		10	10
5.	13	12.5	10.3		425	7.1	+		10	10
6.	Q	12.7	10.3		400	7.1	120	60	10	10

DAY 1 (10/1/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.0	10.1		575	7.0			0(100)	0(100)
2.	60	12.0	10.3		500	7.4			7(30)	10
3.	36	11.9	10.2		450	7.5			10	10
4.	22	11.9	10.2		450	7.6			10	10
5.	13	12.0	10.3		425	7.5			10	10
6.	Q	12.2	10.3		400	7.5			10	10

DAY 2 (10/2/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	—	—		—	—			0	0
2.	60	12.0	10.3		500	7.4			7	10
3.	36	12.0	10.3		450	7.5			10	10
4.	22	11.9	10.3		425	7.5			10	10
5.	13	11.9	10.3		425	7.5			10	10
6.	Q	12.0	10.3		400	7.6			10	10

DAY 3 (10/3/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	—	—		—	—			0	0
2.	60	11.9	10.3		500	7.2			7	10
3.	36	11.9	10.2		475	7.4			10	10
4.	22	11.9	10.1		450	7.4			10	10
5.	13	11.9	10.3		425	7.4			10	10
6.	Q	12.0	10.3		410	7.4			10	10

DAY 4 (10/4/93) BC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	—	—		—	—	+		0	0
2.	60	11.9	10.2		525	7.1	+		7	10
3.	36	11.9	10.2		475	7.2	+		10	10
4.	22	12.0	10.2		450	7.5	+		10	10
5.	13	12.0	10.2		425	7.5	+		9(10)	10
6.	Q	12.0	10.2		400	7.5	120	60	10	10

Remarks:

$\bar{X}$	12.0	10.3	456	7.3	140	47
SD	0.2	0.1	49	0.2	35	23
N	27	27	27	27	3	3

3/1/91

SCOEPA00028840

NORTHWESTERN AQUATIC SCIENCES
LC50 TOXDAT MULTI-METHOD CALCULATION RESULTS
****

RS
10/12/93

Test 357-16: Trout 96-hr LC50

CONCENTRATION EXPRESSED AS : % effluent

CONC.	NUMBER EXPOSED	NUMBER AFFECTED	PERCENT AFFECTED
100	20	20	100
60	20	3	15
36	20	0	0
22	20	0	0
13	20	1	5

THE BINOMIAL TEST SHOWS THAT 60 AND 100 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.87106 PERCENT

AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 71.79422

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS SET OF DATA BECAUSE NO SPAN WHICH PRODUCED MOVING AVERAGE ANGLES THAT BRACKET 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. THE PROBIT METHOD PROBABLY CANNOT BE USED WITH THIS SET OF DATA.

END OF REPORT.

Client name: Wacker-Siltronics Corp.

Project or PO#: 93-64

Address: 7200 N.W. Front St.

Phone #: (503) 243-2020

City, State, Zip: Portland, OR. 97210

Report attention: Tom Rothschild

Sampled by: Thomas J. Rothschild

Analyses required: Bioassay Test (Rainbow Trout); Hazardous sample Special handling required

Lab sample number	Date sampled	Time sampled	Type* See key below	Sample description	Number of containers	Bioassay Test (Rainbow Trout)	Hazardous sample Special handling required	Remarks
	29 Sep 93	0800	AQ	Outfall composite	2	X		NAS # 0347 E

Signature	Print Name	Company	Date	Time
Relinquished by: Thomas J. Rothschild	Thomas J. Rothschild	Wacker Siltronic Corporation	29 Sep 93	1000
Received by:				
Relinquished by:				
Received by: B Wardle				
Relinquished by:				
Received by Laboratory: BD Crowe	Brent D Crowe	Northwestern Aquatic Sciences	30 Sept 93	1020 am

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 • (503) 265-7225

Note:
Samples are discarded 30 days after results are reported unless other arrangements are made.
Hazardous samples will be returned to client or disposed of at client expense.

*KEY: AQ—Aqueous NA—Nonaqueous SL—Sludge GW—Groundwater SO—Soil OT—Other PE—Petroleum

See Note
Last Page

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P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

Rec'd 3-26-91 38R

March 20, 1991

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is your most recent NPDES toxicity test report. We will be getting in touch with you late in the summer to schedule the next test. If you should have any questions, please do not hesitate to call me or Linda Garrison at (503) 265-7225.

Sincerely,

Richard S. Caldwell, Ph.D.
Director

Encl.

Copy To: Tom McCue
Jerry Linden

TEST REPORT

TEST IDENTIFICATION

Test No.: 357-7

Title: Oncorhynchus mykiss, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SM-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (Salmo gairdneri). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; D.R. Buhler, Ph.D., QA Officer; Linda K. Garrison, B.A., Aq. Biol.; Shelley A. Manwaring, B.S., Aq. Biol.; Julie R. Fiore, Tox. Tech.

Study Schedule:

Test Beginning: 3-12-91, 4:00 p.m.

Test Ending: 3-16-91, 3:30 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at: Northwestern Aquatic Sciences, Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

TEST MATERIAL

Description: Wacker Siltronics Corporation river outfall effluent (NAS Sample No. 4882D) was collected on 3-12-91. The effluent was received on 3-12-91 used the same day. Effluent was aerated and thermal equilibrated prior to use. Sample characteristics: pH: 7.4; conductivity: 305 µmhos/cm.

DILUTION WATER

Source: NAS spring water.

Date of Collection: 3-12-91.

Pretreatment: Filtered, aerated.

TEST ORGANISMS

Species: Oncorhynchus mykiss, rainbow trout (formerly Salmo gairdneri).

Size/Weight: 0.4g

Source: NW Trout, Corvallis, OR.

Acclimation: Temperature, 12.5 ± 0.3°C; Dissolved oxygen, 8.7 ± 0.1 mg/L; pH, 7.1 ± 0.6; and conductivity, 150 µmhos/cm for the two day period prior to testing. Acclimation tank loading: 2.7 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: glass aquaria; depth 30 cm; vol. 27 L.

Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.

SCOEPA00028845

Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 0.1 g/L
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.6 ± 0.4°C; dissolved oxygen, 9.9 ± 0.6 mg/L; pH, 6.7 ± 0.5; conductivity, 129 - 310 µmhos/cm. Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

None.

TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	>100
(95% C.I.)	--
Method	by inspection

STUDY APPROVAL

3/21/91

Study Director Date

SCOEPA00028846

Table 1. Survival of Oncorhynchus mykiss exposed to Wacker Siltronics river outfall effluent (NAS Sample No. 4882D).

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
60	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
36	1	10	10	10	10	10	100.0	
	2	9	9	9	9	9	100.0	100.0
22	1	9	9	9	9	9	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

32 - 2 test was Done with only 9 fish
22 - 1 Because one fish Jumped out of tank
+ Could not be put back into tank.

SCOEPA00028847

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

RECEIVED
AUG 7 198
WACKER SILTRONIC ENGINEERING

August 1, 1987
Log #M870707-R
PO # 65508

Wacker Siltronic
P.O. Box 03180
Portland, OR 97203

Attention: Murray Tilson

Sample Received: July 7, 1987

Analysis Requested: 96hr. Acute Toxicity,TSS,Flouride, Metals

Samples Collected/Delivered by: client

Date Collected: 7-7-87

Sample ID: WSC Bioassay

ANALYSIS	RESULTS	METHOD
Fluoride	4.1	EPA 300
Total Susp. Solids	35.2	EPA 160.2
Chromium	< 0.010	*
Calcium	113	*
Magnesium	0.997	*
Hardness	286	SM 314

Results in mg/L

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

See next page for 96hr. Acute Toxicity results.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

August 1, 1987
Log#A8707-R
PO# 65508
Page 2

Wacker Siltronic
P.O. Box 03180
Portland, OR 97203
Attention: Murray Tilson

Analysis Requested: 96 Hour Aquatic Acute Toxicity Test
Test Organism Used: Pimephales promelas (Fathead Minnow)
Fish spawned May 19, 1987

Sample Concentration: 100 mg Sample per Liter of Dilution Water
1000 mg Sample per Liter of Dilution Water
Test Chamber Size: 37.8 Liters (10 Gallons)

Methodology Reference: Biological Testing Methods, Hazardous Waste Section, Washington State Department of Ecology, July 1981, DOE 80-12

SAMPLE CONCENTRATION	LIVE ORGANISMS AT TEST START	DEATHS AFTER 96 HOURS	HAZARDOUS WASTE CLASSIFICATION
100% effluent	30	0	---
50% effluent	30	0	---
Control	30	0	

Observations: After 96 hrs. sample fish showed no color loss or exhibited signs of erratic swimming. All of the fish accepted food at completion of the test. However, the control fish were the first, and immediately went to the top for food. The 50% and 100% concentration sample fish ate only from the bottom at first, and seemed to be more nervous of the net.

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gle

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory 76
Analyst B.V.

Industry/Toxicant: WACKER
Address
Collector
Date Sample Collected

Beginning: Date 7/14/87 Time
Ending: Date 7/18/87 Time
Test Organism TUFFIES
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	
M870707-R			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	1	0%	0	0	0	0	0	9.4	9.1	7.8	8.2	7.85	7.15	7.18	7.29	7.2	7.33	18	20	19	19	19.5	63	65	16.5	16.5	162	174
CONTROL	2	0%	0	0	0	0	0	9.4	9.1	7.8	8.1	7.85	7.17	7.20	7.36	7.57	7.46	19	19.5	19.5	17	19.5	61	65	19.0	17.0	171	178
CONTROL	3	0%	0	0	0	0	0	9.1	8.95	7.7	7.8	7.75	7.20	7.33	7.37	7.60	7.6	18	20	20	19	20	61.5	64	18.0	16.5	168	176
12 L	4	50%	0	0	0	0	0	8.4	8.3	7.6	7.7	7.6	7.53	7.63	7.47	7.52	7.53	29	20	19	19	19.5	168	167	48.0	48.5	580	587
12 L	5	50%	0	0	0	0	0	8.4	8.4	7.05	7.75	7.7	7.70	7.71	7.68	7.54	7.59	24	20	19	18	19.5	165	171	47.0	45.5	580	587
12 L	6	50%	0	0	0	0	0	8.4	8.6	7.4	8.0	7.9	7.78	7.80	7.61	7.68	7.69	23.5	20	19	19	19.5	170	171	47.0	47.5	574	590
24 L	7	100%	0	0	0	0	0	8.3	8.5	7.5	8.0	7.7	7.61	7.61	7.79	7.64	7.62	23	19.8	19	19	20	281	286	60.5	63.5	940	958
24 L	8	100%	0	0	0	0	0	8.2	8.4	7.3	7.8	7.7	7.54	7.59	7.61	7.56	7.51	23	19.8	19	18	19.5	283	285	62.0	63.0	965	964
24 L	9	100%	0	0	0	0	0	8.3	8.4	7.4	7.75	7.7	7.52	7.58	7.58	7.53	7.52	23	20	19	19	19.5	279	286	61.5	63.0	965	964

Sample Description
Average Weight Mean Length Longest Shortest Ratio (long/short)
Number of organisms per chamber Ratio of flesh to water 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 DATE

EHW > 10/30
DW > 11/30

SCOEPA00028850

Wacker Siltronic Corporation

RECEIVED

MAY 6 1987

WACKER SILTRONIC
ENGINEERING

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
TWX 910-464-4777
FAX 503 226-0052

May 5, 1987

Mr. Larry Patterson
Water Quality Division
D.E.Q.
N.W. Region
811 SW Sixth Avenue
Portland, Oregon 97204

Subject: Bioassay Test Requirement
NPDES Permit No. 100286

Dear Mr. Patterson:

As discussed in our conversation on May 01, 1987, enclosed you will find a copy of the 96 hour acute toxicity bioassay we plan to run on our effluent. The test organisms will be fat hand minnows less than 90 day old. We will follow the EPA method EPA 600/4-85-013 as you specified, along with method EPA-600/4-78-012. Depending upon the results of this test, the next semi-annual test may be modified to more closely determine the 1C-50 of the effluent, if any, and determine the recovery parameters of the test organisms after the 96 hour test.

We will proceed with this test after your approval in writing of this test procedure.

Very truly your,

WACKER SILTRONIC CORPORATION

Greg Carr

Greg E. Carr
Environmental Engineer

GEC/md

Enclosed:

cc: Susan Coffey - Coffey Labs
Murray Tilson - Wacker Siltronic Corporation
File

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

April 29, 1987

Wacker Siltronic Corporation
P.O. Box 03180
7200 N.W. Front Ave.
Portland, Oregon 97210

Attention: Gregory E. Carr

Dear Mr. Carr,

Enclosed is a description of the 96-Hour Fish Toxicity Test. Listed below are the price quotes for the analyses requested:

96-Hour Fish Aquatic Toxicity Test

1st Sample.....$300.00
2nd Sample.....$250.00

96-Hour Gammarus Toxicity Test

1st Sample.....$ 75.00
Each additional sample.....$ 65.00

Suspended Solids, Fluoride,
Biological Oxygen Demand,
Chromium.....$ 65.00 Total

If you need additional analyses, please do not hesitate to call.

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

April 29, 1987

Wacker Siltronic Corporation
P.O. Box 03180
7200 N.W. Front Ave.
Portland, Oregon 97210

Attention: Gregory E. Carr

Re: Aquatic Acute Toxicity Test

For the Aquatic Acute Toxicity Test the following conditions will be used:

Test Organism:	Pimephales promelas (Fathead minnow)
Test Temperature:	17 degrees C
Test Chamber:	37.8 Liter (10 gallon) glass aquariums
Test Duration:	96 hours (4 days)
Sample Concentration, Dilution Water, and Sample Tank Set Up:	Three tanks will be set up with a 100% concentration of the Wacker effluent sample provided. Three more tanks will be set up with a 50% concentration of the Wacker effluent sample and 50% dilution water. Three tanks will be the control tanks and will have 100% dilution water. The dilution water used will be non-chlorinated well water. There will be 10 fish in each chamber which will weigh between 0.5 and 5.0 grams each. The fish will be disease free and will have been in a holding tank at least 2 weeks before the start of the test.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

April 29, 1987

Wacker Siltronic Corporation
Page Two

Attention: Gregory E. Carr

Re: Aquatic Acute Toxicity Test

The following schedule of analyses will be done:

Twice per day:	Temperature
Once per day:	D.O., pH
At the beginning and the end of the test:	Total Hardness, Total Alkalinity, Conductivity

Method Reference: Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms, EPA-600/4-78-012 revised July, 1978. Copies of the methods are available upon request.

Biological Testing Methods, Hazardous Waste Section, Washington State Department of Ecology, July 1981, DOE 80-12.

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gs

cc: John Pittman
Jerry Schaefer
Greg Cara
Sam Pierce

STATE OF OREGON
Environmental Quality
Laboratories & Applied Research

INTEROFFICE MEMO

TO: See Distribution List

DATE: November 13, 1985

FROM: Gerald M. Bell, Aquatic Toxicologist

SUBJECT: Results of a Toxicity Bioassay Performed on The Wacker Siltronic of Portland Wastewater Discharge

Wacker Siltronic Corporation operates a silicon wafer manufacturing facility at 7200 N.W. Front Avenue, Portland. The company grows silicon columns and slices them into thin wafers for polishing. The company discharges an average of 0.32 million gallons per day of process wastewater and 0.19 million gallons per day of cooling water to the Willamette River at River Mile 6.3.

An acute toxicity bioassay was requested by Water Quality Program to determine if the discharge could have a lethal effect on a representative fish species.

Results of this type of short-term test indicate acute responses to the effluent but do not reflect the possibility that there may or may not be a long-term chronic (Mutagenesis, carcinogenesis, teratogenicity, and other reproductive and/or birth defects) affect of the effluent on this and other organisms found within the receiving area.

If more specific details are desired about any aspects of this test, contact Gerry Bell - DEQ Laboratory at 229-5983.

GMB:mal

Distribution List

Alan Hose
Harold Sawyer
Andy Schaedel
Fred Bolton
Kent Ashbaker
Larry Patterson
Northwest Region
Al Goodman
Joe Cummins
Bruce Cleland
Murray Tilson - Wacker Siltronics

81-125-1387

WACKER SILTRONICS TOXICITY BIOASSAY RESULTS

COLLECTION

Sample Type: Silicon Manufacturing Waste

Source/Date: Wacker Siltronics Corp., /8 hour composite, September 17, 1985

Dilution Water: Upstream river water

Source/Date: Willamette River/September 17, 1985

TEST SPECIES

Type: *Salmo gairdneri* (Steelhead trout)

Source: Marion Forks Hatchery

Date: September 5, 1985

METHODS

All Methods and procedures utilized in the testing, plus equipment and handling materials recommended are found in the reference source: Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms, EPA-600/4-78-012 revised July, 1978. A copy of the methods is available upon request.

RESULTS

Date Test Started: September 18, 1985 Laboratory # 85-0690

96 Hour LC_{50} = N/A

95% Upper Confidence Limit N/A : 95% Lower Confidence Limit N/A

Leucocrit Test: N/A

REMARKS

Dilutions tested: 100% effluent, 50% effluent and control (upstream Willamette water). After 24 hours of 100% effluent exposure, the response of the test fish were from 1) Color change 2) erratic swimming 3) loss of equilibrium 4) moribund condition, to 5) death (1). There was no noticeable change in the 50% concentration fish.

REMARKS (continued)

At the 48 hour mark, all 100% concentration surviving fish (9) were in a moribund condition. There was a noticeable darkening of color in the 50% concentration fish. At this time the surviving 100% concentration fish were transferred to the upstream control water to see if the toxic conditions were reversible. The 50% concentration test was continued.

At the 72 hour mark, all of the surviving 100% concentration fish (8), minus one who had died right after being transferred to the control water, had recovered to a bright color condition. The 50% fish still had a dark color but exhibited no swimming complications.

At the test end; i.e. after 96 hours of exposure, the 50% fish still exhibited the same conditions as they had at the 72 hour mark; a loss of bright color only. At this time all 50% fish were transferred to control water.

24 hours after the transfer of the 50% fish, all of the exposed (100% + 50%) fish accepted food, a sign of total recovery as feeding is one of the first behaviors lost when fish are stressed.

An overall analysis of the test results was that a toxic element or compound is present in the wastewater being discharged that is slowly toxic in a 100% concentration exposure. Fish stress response behavior progressed from loss of bright color (darkening) through erratic swimming, loss of equilibrium, moribund to death. The toxic component was sufficiently diluted at a 50% concentration such that only the loss of color response occurred.

When the stressed fish are removed from the presence of the toxin, their return to a stable condition indicates that the toxin is not persistant or accumulating; and that it can be purged or expelled from the affected organs through the organism's internal detoxifying systems.

Results of a Laboratory Analysis of the
Wacker Siltronics Effluent Collected on September 17, 1985

PARAMETER	CONCENTRATION
pH	8.17 S.U.
Alkalinity	16 mg/l as $CaCO_3$
Total Hardness	49 mg/l as $CaCO_3$
Color	< 5 PT-CO units
Turbidity	7 F.T.U.
Suspended Solids	5 mg/l
Total Solids	469 mg/l
Conductivity	664 µmhos/cm @ 25°C
Sodium, Diss	3.3 mg/l
Calcium, Diss	18 mg/l
Magnesium, Diss	1.1 mg/l
Fluoride, Total	3.4 mg/l
Cyanide, Total	< 0.002 mg/l
Sulfide	27 mg/l
Ammonia	7.4 mg/l as N
Nitrite/Nitrate	51 mg/l as N
Total Kjel Nitrogen	6.8 mg/l
Orthophosphate, Diss	0.002 mg/l as P
Phosphate, Total	0.019 mg/l as P
C.O.D.	19 mg/l
T.O.C.	4 mg/l as C
Arsenic, Diss	0.005 mg/l
Cadmium, Diss	0.001 mg/l
Chromium, Diss	0.004 mg/l
Copper, Diss	0.007 mg/l
Lead, Diss	< 0.010 mg/l
Mercury, Diss	< 0.0005 mg/l
Nickel, Diss	< 0.05 mg/l
Selenium	< 0.005 mg/l
Silver, Total	< 0.001 mg/l
Zinc, Total	0.05 mg/l

PURGEABLE PRIORITY POLLUTANTS
EPA METHOD 624

DATE: 19 SEP 85

LAB #: 85-066
SAMPLE: COMPOSIT
ITEM #: 1-8

AMOUNT MG/L	PARAMETER	CAS REGISTRY NUMBER	STORET NO.
<.001	CHLOROMETHANE	74-87-3	34418
<.001	BROMOMETHANE	74-83-9	34413
<.001	VINYL CHLORIDE	75-01-4	39175
<.001	CHLOROETHANE	75-00-3	34311
<.001	METHYLENE CHLORIDE	75-09-2	34423
<.001	TRICHLOROFLUOROMETHANE	75-69-4	34488
<.001	1,1-DICHLOROETHYLENE	75-35-4	34501
<.001	1,1-DICHLOROETHANE	75-34-3	34531
.002	TRANS-1,2-DICHLOROETHYLENE	156-60-5	34546
<.001	CHLOROFORM	67-66-3	32106
<.001	1,2-DICHLOROETHANE	107-06-2	34531
<.001	1,1,1-TRICHLOROETHANE	71-55-6	34506
<.001	CARBON TETRACHLORIDE	56-23-5	32102
<.001	BROMODICHLOROMETHANE	75-27-4	32101
<.001	1,2-DICHLOROPROPANE	78-87-5	34541
<.001	CIS-1,3-DICHLOROPROPENE	10061-01-5	34704
.034	TRICHLOROETHYLENE	79-01-6	39180
<.001	BENZENE	71-43-2	34030
<.001	DIBROMOCHLOROMETHANE	124-48-1	32105
<.001	1,1,2-TRICHLOROETHANE	79-00-5	34511
<.001	TRANS-1,3-DICHLOROPROPENE	10061-02-6	34699
<.001	2-CHLOROETHYL VINYL ETHER	110-75-8	34576
<.001	BROMOFORM	75-25-2	32104
<.001	1,1,2,2-TETRACHLOROETHANE	79-34-5	34516
<.001	1,1,2,2-TETRACHLOROETHYLENE	127-18-4	34475
<.001	TOLUENE	108-88-3	34010
<.001	CHLOROBENZENE	108-90-7	34301
<.001	ETHYLBENZENE	100-41-4	34371
<.001	1,3-DICHLOROBENZENE	541-73-1	34566
<.001	1,2 / 1,4-DICHLOROBENZENE	95-50-1 / 106-46-7	
<.001	1,2-DIBROMOETHANE (EDB)	106-93-4	

Wacker Siltronic Corporation

WACKER

TO: Jerry Schaeffer

FROM: Greg Carr

SUB: DEQ Bioassay Test September 17-23, 1985

DATE: September 27, 1985

The DEQ ran a special bioassay text on our effluent to the Williamette River the week of September 16, 1985. On Tuesday September 17, 1985 they visited the Wacker plantsite. They collected 250 gallons of Willamette River water from a spot upstream of the outfall, right along the bank. They also collected 8 3-gallon effluent samples from the outfall pH pump discharge. One sample was taken each hour, to give a composite sampling of our effluent.

The bioassay test was run in the DEQ lab at P.S.U.. They set up 6 tanks of water, maintained at 12 degree C in a temperature-controlled room. Two tanks contained 100% Willamette River water, two contained 50% river water/50% Wacker effluent, and the last two contained 100% Wacker effluent. The water was refreshed at 24 hours intervals with fresh mixes of water. There were 10 steelhead fingerlings in each tank.

I visited the lab on Friday morning, 48 hours after the start of the test. The fingerlings in the river water were fine. The fingerlings in the 50/50 mixture were suffering some stress, because they had darkened in color. The fingerlings in the 100% effluent were very sick, although none had died. They were very dark, and were all laying at the bottom of the tank. The symptoms appeared to be cyanide or sulfide poisioning. Jerry Bell and I discussed what could be hurting the fish. At that time, the best we could think of was sulfide from the Nox Scrubber, some effect of the detergent in the waste, or Hydrogen Peroxide.

Friday evening, eleven of the twenty fingerlings in the 100% effluent had died. Since it was evident that the other nine would die before the test was finished (total 96 hours of test) Jerry removed the nine living fish and put them back into 100% river water. None of the fish in the 50/50 mixture died by the end of the test. They were also put back into river water at the end of the test to see if they would recover. All the fish put back into the 100% river water recovered, even to the extend of going back onto their feed- a very good sign of complete recovery. It's apparent that even severely stressing a fish by prolonged expose to our effluent is reversable if the fish is removed from the effluent. Jerry also said that since our effluent is warmer than the river, these type of fishes (Salmon type) would quickly leave the effluent plume, just because they don't like warm water.

Based on the fishes symptoms, Jerry had the DEQ lab run some extra tests for cyanide and sulfide. The sulfide test was positive - we had 26 to 31 ppm sulfide in the effluent composite sample. This does explain why the fish were stressed by our effluent. At the present, Sam and I think the sulfide comes from the clarifier. We feed aluminum sulfate (alum) into the clarifier to coagulate the suspended solids. The clarifier is probably anaerobic in the bottom; that is, there is not any oxygen. In anaerobic conditions there are sulfur-reducing bacteria that will change sulfates into sulfides (it is their food). Sam says he he can do some analytical work and verify this.

In any event, I don't think we should get too worried. Jerry Bell feels there is not any affect on the fish population on the river, since the fish won't stay in the concentrated waste plume. The waste plume, once diluted, does not effect the fish. A little investigative work on our part is in order however, so that we can have an answer for the DEQ as to why there is sulfide in our effluent.

Greg Carr

GC/md

cc: Jim Ellis
Sam Pengally
Murray Tilson
File

Jerry Bell, DEQ.

1.)

100% - 55% mortality 3rd pm.

change the water pour in the field

50% - Dark stream

100% now all swing.

purged out

Look at the way they were CN.

Sulphide — 31 - 26 ppm sulphide

1,2, Dichloro

{TCE - 0.034 ppm}

Early

LC50 -

will cause

-28-

Mike Hawey

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

REC'D MAR 30 1992
SJR

March 26, 1992

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is your most recent NPDES toxicity test report. We will get back to you when it is time to schedule the next test. If you should have any questions, please do not hesitate to call me or Linda Garrison at (503) 265-7225.

I've also enclosed some pages explaining the performance evaluation program for your information.

Sincerely,

Richard S. Caldwell

Richard S. Caldwell, Ph.D.
Director

Encl.

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 357-9

Title: *Oncorhynchus mykiss*, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SM-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (*Salmo gairdneri*). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; L.K. Garrison, B.A., QA Officer; G.A. Buhler, B.S., Aq. Toxicol.; J.A. Rash, B.A., Sr. Tech.; S.J. Nemeth, B.S., Sr. Tech.

Study Schedule:

Test Beginning: 2-26-92, 2:30 p.m.

Test Ending: 3-1-92, 1:30 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at: Northwestern Aquatic Sciences, Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Description: Wacker Siltronics Corporation effluent (NAS Sample No. 6784D) was collected on 2-25-92. The effluent was received on 2-25-92 and used the next day. The sample was stored at 4°C in the dark until used. Effluent was aerated and thermal equilibrated prior to use. Sample characteristics: pH: 7.7; conductivity: 380 µmhos/cm.

DILUTION WATER

Source: NAS spring water.

Date of Collection: 2-26-92.

Pretreatment: Filtered, aerated.

TEST ORGANISMS

Species: *Oncorhynchus mykiss*, rainbow trout.

Size/Weight: 0.25 g

Source: NW Trout, Corvallis, OR.

Acclimation: Temperature, 12.8 ± 0.7°C; dissolved oxygen, 10.7 ± 0.6 mg/L; pH, 7.1 ± 0.3; conductivity, 188 ± 43 µmhos/cm; hardness, 47 ± 10 mg/L as $CaCO_3$; and alkalinity, 40 ± 0 mg/L as $CaCO_3$ for the six day

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period prior to testing. Acclimation tank loading: 1.25 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: one-gallon glass jars; vol. 3.5 L.
Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.
Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 0.72 g/L
Aeration: All test containers were continuously aerated using 1 ml disposable pipets and minimal bubbling rates.
Feeding: None during the test or for 24 hours prior to testing.
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.4 ± 0.6°C; dissolved oxygen, 11.0 ± 0.2 mg/L; pH, 6.9 ± 0.3; conductivity, 430 ± 4 µmhos/cm (100% effluent), 212 ± 9 µmhos/cm (control); hardness, 56 ± 10 mg/L as $CaCO_3$; alkalinity, 40 ± 7 mg/L as $CaCO_3$. Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

Smaller sample containers were used than specified in the protocol, but these were sufficient to keep fish loading within accepted levels. Therefore, this deviation should not affect the test result.

REFERENCE TOXICANT TEST

Reference Toxicant and Source: LAS (Linear alkyl sulfonate), Banco, Lot No. H1-26, Exp. March 1992.
Test Date: 2-26-92
Test No.: 999-106
Dilution Water Used: NAS spring water.
Result: 48-hr LC50 8.95 mg/L. (This result exceeds our upper warning limit, 8.21 mg/L, but not our upper control limit, 9.04 mg/L based on 10 previous tests.). Therefore, the result is considered to be acceptable.

TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	>100
(95% C.I.)	--
Method	by inspection

STUDY APPROVAL

Rick D. Caldwell 3/21/92 — Study Director, Date

Linda K. Harrison 3/21/92 — Quality Assurance Unit, Date

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Table 1. Survival of *Oncorhynchus mykiss* exposed to Wacker Siltronics effluent.

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
60	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
36	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
22	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

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APPENDIX I

TEST PROTOCOL

TEST PROTOCOL

STATIC 96-HOUR NON-RENEWAL EFFLUENT TOXICITY TEST USING RAINBOW TROUT (*SALMO GAIRDNERI*)

Prepared for Wacker Siltronics Corporation, Portland, OR

INTRODUCTION

Referenced Guidelines: The basic standard reference for conducting the 96-hour static effluent toxicity test is the EPA manual entitled "Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms (Third Edition)" (Peltier and Weber 1985). A supplementary reference is ASTM Standard No. E-729 entitled "Standard Practice for Conducting Acute Toxicity Tests with Fishes, Macroinvertebrates and Amphibians" (ASTM 1980).

Scope and Application: The purpose of this test is to determine the acute toxicity of an industrial effluent to a cold water fish.

Summary of Method: The test is conducted on juvenile rainbow trout obtained from a commercial grower. The test employs a 96-hr static non-renewal exposure of the effluent, in test containers holding 27 liters (L) of test solution. A standard experimental design is employed consisting of exposure of the test animals to five effluent concentrations, and a dilution water control. Duplicate exposure vessels are used at each treatment level, each containing ten fish. Death is the effect criterion employed, and the results are computed by the probit, moving average, or binomial method as appropriate to the data (Stephan 1976). The types and frequency of test observations, and the monitoring of water quality conditions, are as specified in the ASTM and EPA Standard Methods.

STUDY MANAGEMENT

Sponsor's Name and Address: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Testing Laboratory's Name and Test Location: Northwestern Aquatic Sciences, Yaquina Bay Road, P.O. Box 1437, Newport, OR 97365.

Laboratory's Key Personnel Responsible for Studies: Dr. Richard S. Caldwell, Director of Aquatic Toxicology Programs and Study Director; and Dr. Donald R. Buhler, Quality Assurance Officer.

Proposed Study Schedule: Studies to be performed at approximately six month intervals beginning July, 1988.

Good Laboratory Practices: The tests are conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

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DESCRIPTION OF TEST SYSTEM

Test Chambers and Environmental Control: Test chambers used in the toxicity test are 34 L glass aquaria (30cm x 30cm x 38cm) designed to hold 27 L of test solution (30cm depth). The containers are covered with glass lids to minimize evaporation of volatile compounds. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath. The system is maintained in a photoperiod-controlled room or enclosure.

Cleaning: All laboratory glassware, including test chambers, is cleaned as described in ASTM Standard No. E-729, paragraph 6.6. New glassware and test systems are washed with laboratory detergent, followed by rinses with tap water, pesticide-free acetone, water, 5% nitric or hydrochloric acid, and twice with tap water. Following every test, reusable glassware is rinsed with water, cleaned using a procedure appropriate for removing the toxicant tested (i.e., acid to remove metals, bases, and mineral deposits; detergent and pesticide-free acetone to remove organic compounds; and a 200 mg/L solution of hypochlorite to aid in removal of organic matter and to disinfect glassware), and rinsed twice with tap water. Test systems and chambers are rinsed again with dilution water just before use.

DILUTION WATER

Dilution water for the test performed at the Newport laboratory is unchlorinated spring water of moderate hardness (80-120 mg/L as $CaCO_3$). The water is particle filtered to remove sand or other large debri. The filtered water is of high quality and meets ASTM standards.

PREPARATION OF TEST CONCENTRATIONS

Full-strength effluent is diluted with dilution water to prepare a series of effluent test concentrations. The effluent dilutions are brought to the test temperature by partial immersion in a water bath and, if necessary, gently aerated until the dissolved oxygen concentration is greater than 80% of saturation. The minimum volume of effluent required is 125 L (33 gal).

TEST ORGANISMS

For each test, a minimum of 150 fingerling rainbow trout are purchased from a commercial grower. Allowing for growth, trout at the time of testing should not exceed 5.0 g wet weight. After receipt of fish from a source known to have healthy fish, a minimum observation time of 48 hours is required prior to testing. If fish appear diseased, discolored, or otherwise stressed, or if more than 5% of the fish die during the 48-hr holding period, then the fish must be discarded and a new group obtained.

Care must be used to ensure that fish are not subjected to unusual handling or environmental stress either before or during the testing period. Fish will be handled only the minimum necessary using suitable dipnets and will not be subjected to more than a 3°C temperature change during any 12 hour period. The dissolved oxygen level must be maintained at a level of 60% of saturation or greater. During holding, loading of fish in aquaria should not exceed 10 g/L, and holding water should be replaced at a minimum rate of 2 tank volumes per day. Fish will be fed to satiation at least once a day with a commercial food obtained from the fish grower. Fish will be shielded from any

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unusual visual stress and treated with a photoperiod of 16 hours light and 8 hours darkness. A daily log of feeding, behavioral observations, mortality, and water quality will be maintained

EXPERIMENTAL DESIGN AND TEST PROCEDURES

Experimental Design: A standard experimental design consisting of exposure of test organisms to five toxicant concentrations in a logarithmic series and a zero percent effluent control is employed. Each treatment consists of duplicate test chambers each containing ten animals as shown in the following scheme:

Replicate 1	10					
Replicate 2						
	0	13	22	36	60	100

Percent Effluent Concentration

Randomization of test containers in the water bath involves random assignment of one test chamber for each treatment in one row, followed by random assignment of a second test chamber for each treatment in another row. Test organisms are impartially distributed to the test chambers by adding two animals to each chamber and repeating the process until each contains 10 organisms.

Effect Criterion: The effect criterion used in the rainbow trout bioassay is death, defined as the lack of visible respiratory movement and absence of response to tactile stimulation.

Test Conditions: The dissolved oxygen concentration in each test container must be greater than 60% saturation throughout the 96-hr test. Test containers are gently aerated if required to maintain the oxygen level. If aeration is employed, all containers are treated equally. The test temperature employed is 12 ± 2°C. The photoperiod is 16 hours of light and 8 hours of darkness. Loading must not exceed 0.8 g/L.

Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described.

Feeding: Animals are not fed during the test nor during the preceding 24 hours.

Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 96 hours. The type and frequency of observations to be made are summarized as follows:

Type of Observation	Times of Observation
Biological Data	
Percent survival	0-, 24-, 48-, 72- and 96-hr

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Physical and Chemical Data

Dissolved oxygen, pH, temperature, and conductivity (all containers)	0-, 24-, 48-, 72- and 96-hr
Hardness and alkalinity (highest test concentration and control)	24-, 48-, 72- and 96-hr

During the test, dead organisms are removed at least every 24 hours. Dissolved oxygen is measured directly in test aquaria using a polarographic oxygen probe calibrated in air. The pH is also be measured directly in the test aquaria by careful use of a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured using a mercury thermometer or a YSI telethermometer calibrated with a mercury thermometer. Temperature is continuously recorded in at least one aquarium using a recording telethermometer. Conductivity, hardness, and alkalinity are measured using EPA approved or suggested methods (EPA 1979).

Criteria of Test Acceptance: For the test to be considered acceptable, the minimum survival of organisms in the control treatment at the end of the test must be 90%.

DATA ANALYSIS

The 24-, 48-, 72-, and 96-hr LC50s and 95% confidence limits are computed by the binomial, the moving angle, or probit method using the TOXDAT computer program published by EPA (Peltier and Weber 1985). Results are calculated on the basis of the nominal effluent concentration.

REPORTING

A report of the test results must include the following information: name and identification of the test; the investigator and laboratory; information on the effluent; information on the dilution water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; information about any aeration that may have been required; definition of the effect criteria and other observations; responses, if any, in the control treatment; the 24-, 48-, 72-, and 96-hr LC50s and 95% confidence limits; any unusual information about the test or deviations from procedures.

REFERENCES

ASTM. 1980. Standard practice for conducting acute toxicity tests with fishes, macroinvertebrates and amphibians. ASTM Standard Method No. E-729.

EPA. 1979. Methods for chemical analysis of water and wastes. Environmental Protection Agency, Cincinnati, (EPA 600/4-79-020).

Peltier, W.H. and C.I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. EPA 600/4-85-013.

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Stephan C.W. 1976. Methods for calculating an LC50. *In* Aquatic toxicology and hazard evaluation (F.L. Mayer and J.L. Hamelink, eds.). Am. Soc. for Testing and Materials, Philadelphia, pp. 65-84.

APPROVALS:

7/26/88 for Wacker Siltronics Corporation

Name Date

7-26-88 for Northwestern Aquatic Sciences

Name Date

SCOEPA00028873

APPENDIX II

RAW DATA

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-9 Client Wacker Siltronics Investigator [illegible]

Test Type ~~(rangefinding~~/definitive) Test Length (hr) 96-hr

Species O. mykiss (rainbow trout)

STUDY MANAGEMENT

Client: Wacker Siltronics

Client's Study Monitor: Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. R.S. Caldwell

QA Officer L.C. Cosmin

1. G.A. Buhler 2. S.J. Nemeth

3. J.A. Rash 4.

Study Schedule:

Test Beginning: 2-26-92 2:30PM Test Ending: 3-1-92 1:30pm

TEST MATERIAL

Description: effluent

NAS Sample No.:	67840			
Date of Collection:	2-25-92			
Date of Receipt:	2-25-92			
Conductivity (µmhos/cm):	380			
pH:	7.7			
Hardness (mg/L):	30			
Alkalinity (mg/L):	20			
:				

DILUTION WATER

Description: NAS spring water

Date of Preparation/Collection: 2/26/92

Water Quality: Cond.(µmhos/cm)____ Salinity (ppt)____ pH____

Hardness (mg/L as $CaCO_3$)____ Alkalinity (mg/L as $CaCO_3$)____

Treatments: none - filtered + aerated

TEST ORGANISMS

Species: O. mykiss (rainbow trout) Age: Size: 0.25g/fish

Source: NW Trout, Corvallis, OR - picked up on 2/20/92

Acclimation Data:

Date	Temp (°C)	DO (mg/L)	pH	Sal/Cond	Comments	
2/20/92	12.8	10.4	6.9	158	hard = 40	alk = 40
2/21/92	12.0	11.4	7.0	250	50	40
2/24/92	13.5	10.2	7.6	185	40	40
2/26/92	—	—	7.1	160	60	40
Mean	12.8	10.7	7.1	188	47	40
S.D.	0.7	0.6	0.3	43	10	0
(N)	(3)	(3)	(4)	(4)	(4)	(4)

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Test No. 357-9 Client Wada - Silkonics Investigator

TEST PROCEDURES AND CONDITIONS

Test concentrations: (50% series recommended) 100, 60, 36, 22, 13, + 0%

Test chambers: 1gal glass JARS Test volume: 3.5L
Replicates/treatment: (2) 2 Organisms/treatment: (20) 20
Test water changes: none Aeration during test: yes
Feeding: None
Beaker placement: Stratified randomization

Randomization chart:

A	60	13	100	22	36	Ø
B	36	60	Ø	22	13	100
C						
D						

MISCELLANEOUS NOTES

Loading:
# of fish: 40
total fish wt: 0.03
= 0.25 g/fish

Tank Loading = $\frac{10 \text{ fish} \times 0.25 \text{ g/fish}}{3.5 \text{ L}}$ = 0.7

Acct. Loading = $\frac{300 \text{ fish} \times \overset{0.25}{\cancel{300}} \text{ g/fish}}{60 \text{ L}}$ 1.25g (flow thru

Conc prep:

%	Vol (EFF) (mL)	Vol Dilr water (mL)
100	3,500	Ø
60	2,100	1,400
36	1,260	2,240
22	770	2,730
13	460	3,050
Ø	Ø	3,500

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NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 357-9 Client Weeden Siltronics Investigator

DAY 0 (2/26/92) SJN

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.7	11.3		430	7.3	60	40	10	10
2.	60	12.6	11.2		350	6.5	—		10	10
3.	36	12.6	11.2		290	6.5	—		10	10
4.	22	12.6	11.4		260	6.3	—		10	10
5.	13	12.6	11.6		245	6.3	—		10	10
6.	Ø	12.5	11.4		220	6.3	40	40	10	10

DAY 1 (2/27/92) SJN/JAR

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.9	11.0		425	6.8	50	40	10	10
2.	60	12.9	11.0		350	6.7	—		10	10
3.	36	12.9	11.0		280	6.7	—		10	10
4.	22	13.0	11.2		250	6.5	—		10	10
5.	13	13.0	11.0		230	6.5	—		10	10
6.	Ø	13.0	11.0		210	6.8	40	40	10	10

DAY 2 (2/28/92) JAR

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	11.1	11.0		430	6.8	60	40	10	10
2.	60	11.1	11.1		345	6.9	—		10	10
3.	36	11.1	11.0		290	7.0	—		10	10
4.	22	11.5	11.0		260	7.0	—		10	10
5.	13	11.5	10.9		240	6.9	—		10	10
6.	Ø	11.5	10.7		210	6.8	60	40	10	10

DAY 3 (2/29/92) GAD/RSC

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.6	11.2		435	7.4	60	30	10	10
2.	60	12.8	11.2		355	7.2	—		10	10
3.	36	12.8	11.2		300	7.2	—		10	10
4.	22	12.9	11.1		270	7.1	—		10	10
5.	13	12.9	11.1		250	7.0	—		10	10
6.	Ø	12.8	11.0		222	6.8	60	50	10	10

DAY 4 (3/1/92) GAD

	Conc. (%)	Temp. (°C)	DO (mg/L)	Sal. (ppt)	Cond. (µmh/cm)	pH	Hard. (mg/L)	Alk. (mg/L)	Survivors A	Survivors B
1.	100	12.3	11.0		450	7.3	40	30	10	10
2.	60	12.4	10.9		340	7.3	—		10	10
3.	36	12.4	10.7		285	7.2	—		10	10
4.	22	12.7	10.6		254	7.0	—		10	10
5.	13	12.7	10.6		240	7.0	—		10	10
6.	Ø	12.6	10.8		200	6.9	60	50	10	10

Remarks:

			100%	0%			
WQ			430	212	6.9	56	40
$\bar{X}$	12.4	11.0	±4	±9	0.3	10	7
SD	0.6	0.2					
(N)	(30)	(30)	(5)	(5)	(30)	(10)	(10)

3/1/91

SCOEPA00028877

NAS # 6 78 9P

REQUEST FOR:

PICKUP _____

DELIVERY _____

REQUESTOR: Tom Rothschild EXT: 374

DATE: 25 February 92

PLACE: Northwest Aquatic Sciences (Dr Cadwell)
P.O. Box 1437
Newport, Oregon 97365
Phone: 265-7225

P.O.#: Requisition Submitted

CASH: —

WHAT: 6 each 5-gallon Cubitainers

FOR: Bioassay Analysis

NEEDED BY: _____ TIME: _____ AM _____ PM _____

COMMENTS:

Greyhound will pick up at approximately 0700

Wacker Siltronic Corporation

RECEIVED
ENGINEERING
SEP 27 1985

9/27/85

John L. Pittman
Wacker Siltronic

F.Y.I.
JERRY

TO: Jerry Schaeffer

FROM: Greg Carr

SUB: DEQ Bioassay Test September 17-23, 1985

DATE: September 27, 1985

The DEQ ran a special bioassay text on our effluent to the Williamette River the week of September 16, 1985. On Tuesday September 17, 1985 they visited the Wacker plantsite. They collected 250 gallons of Willamette River water from a spot upstream of the outfall, right along the bank. They also collected 8 3-gallon effluent samples from the outfall pH pump discharge. One sample was taken each hour, to give a composite sampling of our effluent.

The bioassay test was run in the DEQ lab at P.S.U.. They set up 6 tanks of water, maintained at 12 degree C in a temperature-controlled room. Two tanks contained 100% Willamette River water, two contained 50% river water/50% Wacker effluent, and the last two contained 100% Wacker effluent. The water was refreshed at 24 hours intervals with fresh mixes of water. There were 10 steelhead fingerlings in each tank.

I visited the lab on Friday morning, 48 hours after the start of the test. The fingerlings in the river water were fine. The fingerlings in the 50/50 mixture were suffering some stress, because they had darkened in color. The fingerlings in the 100% effluent were very sick, although none had died. They were very dark, and were all laying at the bottom of the tank. The symptoms appeared to be cyanide or sulfide poisioning. Jerry Bell and I discussed what could be hurting the fish. At that time, the best we could think of was sulfide from the Nox Scrubber, some effect of the detergent in the waste, or Hydrogen Peroxide.

Friday evening, eleven of the twenty fingerlings in the 100% effluent had died. Since it was evident that the other nine would die before the test was finished (total 96 hours of test) Jerry removed the nine living fish and put them back into 100% river water. None of the fish in the 50/50 mixture died by the end of the test. They were also put back into river water at the end of the test to see if they would recover. All the fish put back into the 100% river water recovered, even to the extend of going back onto their feed- a very good sign of complete recovery. It's apparent that even severely stressing a fish by prolonged expose to our effluent is reversable if the fish is removed from the effluent. Jerry also said that since our effluent is warmer than the river, these type of fishes (Salmon type) would quickly leave the effluent plume, just because they don't like warm water.

Based on the fishes symptoms, Jerry had the DEQ lab run some extra tests for cyanide and sulfide. The sulfide test was positive - we had 26 to 31 ppm sulfide in the effluent composite sample. This does explain why the fish were stressed by our effluent. At the present, Sam and I think the sulfide comes from the clarifier. We feed aluminum sulfate (alum) into the clarifier to coagulate the suspended solids. The clarifier is probably anaerobic in the bottom; that is, there is not any oxygen. In anaerobic conditions there are sulfur-reducing bacteria that will change sulfates into sulfides (it is their food). Sam says he he can do some analytical work and verify this.

In any event, I don't think we should get too worried. Jerry Bell feels there is not any affect on the fish population on the river, since the fish won't stay in the concentrated waste plume. The waste plume, once diluted, does not effect the fish. A little investigative work on our part is in order however, so that we can have an answer for the DEQ as to why there is sulfide in our effluent.

Greg Carr

GC/md

cc: Jim Ellis
Sam Pengally
Murray Tilson
File

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
FAX 503-226-0052
TWX 910-464-4777
TLX 4970339

August 29, 1989

George Yun
Environmental Consultant
Northwest Region
Department of Environmental Quality
811 S.W. 6th Avenue
Portland, Oregon 97204

Subject: Bioassay Test for NPDES Permit No. 100286

Dear Mr. Yun:

As per Schedule B, Bioassay Test Requirement, of our NPDES Discharge Permit, I am submitting the results of a study completed by Northwestern Aquatic Sciences, Inc., of Newport, Oregon, of our treated effluent which was sampled on August 14, 1989.

The LC50 was reported as greater than 100% concentration for our effluent as shown in the attached report from Northwestern Aquatic Sciences, Inc. dated August 21, 1989.

Please call me at 243-2020, extension 132, if you have any questions or comments regarding this report.

Very truly yours,

WACKER SILTRONIC CORPORATION

Richard G. Gariepy
Environmental Engineer

Enclosure: (1) Northwestern Aquatic Sciences, Inc. Aquatic Toxicity Test dated August 21, 1989.

cc: John Pittman
Jerry Schaeffer

mmr/biofl89.ltr

NORTHWESTERN AQUATIC SCIENCES, Inc.
P.O. Box 1437 • Newport, Oregon 97365 • (503) 265-7225

№ 4356 T

AQUATIC TOXICITY TEST REPORT

TEST NO. 357-4
REPORT DATE 8-21-89
APPROVAL

TEST NAME OR DESCRIPTION
Rainbow trout 96-hr non-renewal bioassay

CLIENT: Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203

1. SAMPLE/TOXICANT DATA

Type of Sample
Pure Compound ☐; Effluent ☒
Mixture or Formulation ☐;
Other ☐

Sample Name / Description / Source
Final effluent

Sample Characteristics
pH: 5.8
Conductivity: 320 umhos/cm

2. LABORATORY PROCESSING DATA

Date and Time of Sample Receipt: 8-15-89 1:00 ~~AM~~ P.M.
Sample No. 2025D

Sample Treatment/Storage
Stored at 5°C in the dark overnight. Aerated and thermal equilibrated prior to using.

Test Begun: 8-16-89 10:00 AM ~~PM~~
Test Ended: 8-20-89 10:00 AM ~~PM~~

Test Location/Laboratory
Northwestern Aquatic Sciences
Newport, OR 97365

Investigator
L.K. Garrison/G.A. Buhler

Remarks
Sample collected and shipped by client.

3. DILUTION WATER

Source
NAS spring water

Date and Time of Collection
8-15-89 3:00 p

Pretreatment
Aerated/thermal equilibrated

Characteristics (mg/l as appropriate)

Cond. (µmhos/cm)	211 ± 7	pH	7.8 ± 0.2
Hard. ($CaCO_3$)	85 ± 7	Alk. ($CaCO_3$)	45 ± 7
Ca		Mg	
Na		K	
Cl		SO_4	
Salinity (‰)			

4. TEST ORGANISMS

Species
Salmo gairdneri

Length (mm)
Weight (g) 2.6

Age
Developmental Stage

Source
Brian Trout Farm, Sandy, OR

History

Diseases/Treatments
none

Acclimation Conditions
Accl. 24 days in lab:
Temp: 10.7 ± 1.1°C; DO: 10.0 ± 1.0 mg/L; pH; 7.5 ± 0.4; Cond: 192 ± 11 umhos/cm

5. TEST PROCEDURES AND CONDITIONS

Test Chambers/Depth/Volume
Glass aquaria : depth 30 cm, vol. 22.7 L

Diluters/Concentrations
Test concentrations: 100, 60, 36, 22, 13, and 0% (control).

Organisms per Treat. 10/repl.
Replicates per Treat. 2
Loading (g/l) 1.15
Water Vol. Changes per 24 Hr. non-renewal

Effects Criteria
Death (lack of respiratory movement and lack of response to tactile stimulation).

Other Test Conditions (mg/l as appropriate)
DO 10.2 ± 0.3
pH 7.7 ± 0.1
Temp (°C) 12.0 ± 0.5
Salinity (‰)
Hardness ($CaCO_3$)
Alkalinity ($CaCO_3$)
Photoperiod 16L - 8D

6. TEST RESULTS

LC50 ☒; EC50 ☐; and 95% Confidence Limits

24 Hour	>100
48 Hour	>100
72 Hour	>100
96 Hour	>100

Remarks At 72 hr. 3 fish in 100% effluent were quiescent, on their sides on the bottom and exhibiting labored respiration. At 96 hr. the number of fish exhibiting these sub-lethal effects increased to 4. See attached table for fish survival data.

NAS 302, Revised 7/81

Northwestern Aquatic Sciences
Newport, OR 97365

Report No. 4356T
Test No. 357-4

Table 1. Tabular summary of fish survival data. Data given as numbers of fish surviving in each replicate tank at 0-, 24-, 48-, 72-, and 96-hours.

	0-hr		24-hr		48-hr		72-hr		96-hr	
Effluent Concentnration	A	B	A	B	A	B	A	B	A	B
100%	10	10	10	10	10	10	10	10	10	10
60%	10	10	10	10	10	10	9	10	9	10
36%	10	10	10	10	10	10	10	10	10	10
22%	10	10	10	10	10	10	10	10	10	10
13%	10	10	10	10	10	10	10	10	10	10
control	10	10	10	10	10	10	10	10	10	10

8/21/89

Wacker Siltronic Corporation

WACKER

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
FAX 503-226-0052
TWX 910-464-4777
TLX 4970339

March 13, 1989

Chris Chalfant
Environmental Consultant
Northwest Region
Department of Environmental Quality
811 S.W. 6th Avenue
Portland, Oregon 97204

Subject: Bioassay Test for NPDES Permit No. 100286

Dear Mr. Chalfant:

As per Schedule B, Bioassay Test Requirement, of our NPDES Discharge Permit, I am submitting the results of a study completed by Northwestern Aquatic Sciences, Inc., of Newport, Oregon, of our treated effluent which was sampled on February 22, 1989.

The LC50 was reported as greater than 100% concentration for our effluent as shown in the attached report from Northwestern Aquatic Sciences, Inc. dated March 6, 1989.

Please call me at 243-2020, extension 132, if you have any questions or comments regarding this report.

Very truly yours,

WACKER SILTRONIC CORPORATION

Richard G. Gariepy

Richard G. Gariepy
Environmental Engineer

Enclosure: (1) Northwestern Aquatic Sciences, Inc. Aquatic Toxicity Test dated March 6, 1989.

cc: John Pittman
Jerry Schaeffer

NORTHWESTERN AQUATIC SCIENCES, Inc.
P.O. Box 1437 • Newport, Oregon 97365 • (503) 265-7225

№ 4324 T

AQUATIC TOXICITY TEST REPORT

TEST NO. 357-3
REPORT DATE 3-6-89
APPROVAL

TEST NAME OR DESCRIPTION
Rainbow trout 96-hr non-renewal bioassay

CLIENT:
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

1. SAMPLE/TOXICANT DATA

Type of Sample
Pure Compound ☐; Effluent ☒
Mixture or Formulation ☐;
Other ☐
2-22-89 24-hr composite

Sample Name / Description / Source
Final Effluent

Sample Characteristics
Conductivity: 320 umhos/cm
pH: 5.7

Remarks
Sample collected and shipped by client.

2. LABORATORY PROCESSING DATA

Date and Time of Sample Receipt: 2-23-89 12:00 ~~AM~~ P.M.
Sample No.: 9060C

Sample Treatment/Storage
Aerated, thermal equilibrated and dilutions prepared within 3 hours.

Test Begun: 2-23-89 3:00 ~~AM~~ PM
Test Ended: 2-27-89 3:00 ~~AM~~ PM

Test Location/Laboratory
Northwestern Aquatic Sciences
Newport, OR 97365

Investigator
R.S. Caldwell/ L.K. Garrison

3. DILUTION WATER

Source: NAS Spring Water

Date and Time of Collection: 2-23-89 12:00pm

Pretreatment: aerated

Characteristics (mg/l as appropriate)

Cond. (µmhos/cm)	168 ± 6	pH	6.2 ± 0.5
Hard. ($CaCO_3$)	45 ± 7	Alk. ($CaCO_3$)	25 ± 0
Ca		Mg	
Na		K	
Cl		SO_4	
Salinity (‰)			

4. TEST ORGANISMS

Species: Salmo gairdneri

Length (mm):
Weight (g): 0.15

Age:
Developmental Stage:

Source: N.W. Trout, Corvallis, OR

History:

Diseases/Treatments: none

Acclimation Conditions
Accl. in dil'n water 6 days: Loading 1.12g/L; temp. 11.8 ± 0.9 °C; D.O. 9.6 ± 0.5 mg/L; pH 6.5 ± 0.9; Cond. 161 ± 14 umhos/cm; Hard. 45 mg/L; Alk. 20 mg/L.

5. TEST PROCEDURES AND CONDITIONS

Test Chambers/Depth/Volume
Glass aquaria: depth 32 cm, vol. 27.0 L

Diluters/Concentrations
Test concentrations: 100,60,36,22,13 and 0% (control).

Organisms per Treat.: 20
Replicates per Treat.: 2

Loading (g/l): 0.066
Water Vol. Changes per 24 Hr.: non-renewal test

Effects Criteria
Death (lack of respiratory movement and lack of response to touch).

Other Test Conditions (mg/l as appropriate)

DO	10.4 ± 0.5
pH	6.3 ± 0.5
Temp (°C)	12.6 ± 0.3
Salinity (‰)	
Hardness ($CaCO_3$)	
Alkalinity ($CaCO_3$)	
Photoperiod	16L - 8D

6. TEST RESULTS

LC50 ☒; EC50 ☐; and 95% Confidence Limits

24 Hour	> 100%
48 Hour	> 100%
72 Hour	> 100%
96 Hour	> 100%

Remarks
One fish in 100% effluent was quiescent and on its side from 48-96 hr. No other sub-lethal effects were observed. See attached table for fish survival data.

NAS 302, Revised 7/81

White – Client Copy
Canary – 2nd Copy
Pink – Client File
Goldenrod – Lab. Master File

Table 1. Tabular summary of fish survival data. Data given as numbers of fish surviving in each replicate tank at 0-, 24-, 48-, 72-, and 96-hours.

Effluent concentration	0-hr		24-hr		48-hr		72-hr		96-hr	
	A	B	A	B	A	B	A	B	A	B
100%	10	10	10	10	10	10	10	10	10	10
60%	10	10	10	10	10	10	10	10	10	10
36%	10	10	10	9	10	10	10	9	10	9
22%	10	10	10	10	10	10	10	10	10	10
13%	10	10	10	10	10	10	10	9	10	9
control	10	10	10	9	10	8	10	8	10	8

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
FAX 503-226-0052
TWX 910-464-4777
TLX 4970339

March 3, 1989

Mr. Chris Chalfant
Environmental Consultant
Northwest Region
Department of Environmental Quality
811 S.W. 6th Avenue
Portland, Oregon 97204

Dear Mr. Chalfant:

As required by Schedule B of our NPDES Waste Discharge Permit (Permit No. 100286), I am submitting the results of our yearly Total Toxic Organics analysis. The total concentration of the compound found in the sample was 0.092 mg/l, which is well below our permitted limit of 1.37 mg/l.

If you have any questions or comments, please call me at 243-2020, ext. 132.

Very truly yours,

WACKER SILTRONIC CORPORATION

Richard G. Gariepy
Environmental Engineer

RGG:md

Enclosure

cc: John Pittman
Jerry Schaeffer

MISC/TTOSP89.LTR

NORTHWEST TESTING LABORATORIES, INC.

NSTRUCTION INSPECTION
ERIALS INSPECTION
EMICAL ANALYSIS
PHYSICAL TESTING

5405 N. Lagoon Avenue
P.O. Box 17126
Portland, Oregon 97217-0126
Phone: (503) 289-1778

NON-DESTRUCTIVE TESTING
WELDING CERTIFICATION
SOIL TESTING
ASSAYING

January 24, 1989

RECEI
JAN 26 1
WAC

Wacker Siltronic Corporation
P.O. Box 03180
Portland, Oregon 97203

Attention: Murry Tilson

Subject: Analysis performed on one (1) sample received 1/16/89, per your P.O. #20066

Item: Water
EPA Method: 3810, 625

REPORT:

Analysis: (Listing inclusive of total toxic organics)

SEE ATTACHED SHEETS

Respectfully,
NORTHWEST TESTING LABORATORIES, INC.

Donald P. Marshall
Donald P. Marshall, Chemist

Herbert L. Page
Herbert L. Page
Supervisor, Chemistry

Report Number: 320840

AS A MUTUAL PROTECTION TO CLIENTS, THE PUBLIC AND OURSELVES, ALL REPORTS ARE SUBMITTED AS THE CONFIDENTIAL PROPERTY OF CLIENTS AND ARE INTENDED FOR THE USE OF OUR CLIENTS ONLY. NO OTHER PERSON

NORTHWEST TESTING LABORATORIES, INC.

5405 N. Lagoon Avenue P.O. Box 17126 Portland, Oregon 97217-0126

Phone: (503) 289-1778

Wacker Siltronic Corporation
P.O. Box 03180
Portland, Oregon 97203

Attention: Murry Tilson

UNITS: ug/L

Compound	Sample Name or Number			
Chloromethane	-------			
Bromomethane	-------			
Vinyl Chloride	-------			
Chloroethane	-------			
Methylene Chloride	<50			
Acetone				
Carbon Disulfide				
1,1-Dichloroethene				
1,1-Dichloroethane				
1,2-Dichloroethene (total)				
Chloroform				
1,2-Dichloroethane				
2-Butanone				
1,1,1-Trichloroethane				
Carbon Tetrachloride				
Vinyl Acetate				
Bromodichloromethane				
1,2-Dichloropropene				
cis-1,3-Dichloropropene				
Trichloroethene				
Dibromochloromethane				
1,1,2-Trichloroethane				
Benzene				
trans-1,3-Dichloropropene				
Bromoform				
4-Methyl-2-Pentanone				
2-Hexanone				
Tetrachloroethene				
1,1,2,2-Tetrachloroethane				
Toluene				
Chlorobenzene				
Ethylbenzene				
Styrene				
Xylene (total)	<50			

REPORT NUMBER: 320840

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NORTHWEST TESTING LABORATORIES, INC.

5405 N. Lagoon Avenue P.O. Box 17126 Portland, Oregon 97217-0126
Phone: (503) 289-1778

Wacker Siltronic Corporation
P.O. box 03180
Portland, Oregon 97203

Attention: Murry Tilson

UNITS: ug/L

	Sample Name or Number			
Compound				
Phenol	<10			
bis(2-Chloroethyl)ether				
2-Chlorophenol				
1,3-Dichlorobenzene				
1,4-Dichlorobenzene				
Benzyl alcohol				
1,2-Dichlorobenzene				
2-Methylphenol				
bis(2-Chloroisopropyl)ether				
4-Methylphenol				
N-Nitroso-di-n-propylamine				
Hexachloroethane				
Isophorone				
2-Nitrophenol				
2,4-Dimethylphenol				
Benzoic acid				
bis(2-Chloroethoxy)methane				
2,4-Dichlorophenol				
1,2,4-Trichlorobenzene				
Naphthalene				
4-Chloroaniline				
Hexachlorobutadiene				
4-Chloro-3-methylphenol				
2-Methylnaphthalene				
Hexachlorocyclopentadiene				
2,4,6-Trichlorophenol				
2,4,5-Trichlorophenol				
2-Chloronaphthalene				
2-Nitroaniline				
Dimethylphthalate				
Acenaphthylene				
2,6-Dinitrotoluene	<10			

REPORT NUMBER: 320840

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NORTHWEST TESTING LABORATORIES, INC.

5405 N. Lagoon Avenue P.O. Box 17126 Portland, Oregon 97217-0126
Phone: (503) 289-1778

Wacker Siltronic Corporation
P.O. Box 03180
Portland, Oregon 97203

Attention: Murry Tilson

UNITS: ug/L

Compound	Sample Name or Number			
3-Nitroaniline	<10			
Acenaphthene				
2,4-Dinitrophenol				
4-Nitrophenol				
Dibenzofuran				
2,4-Dinitrotoluene				
Diethylphthalate				
4-Chlorophenyl-phenylether	<10			
Flourene	11			
Nitroaniline	<10			
4,6-Dinitro-2-methylphenol				
N-Nitrosodiphenylamine				
4-Bromophenyl-phenylether				
Hexachlorobenzene				
Pentachlorophenol	<10			
Phenanthrene	40			
Anthracene	<10			
Di-n-butylphthalate	<10			
Fluoranthene	24			
Pyrene	17			
Butylbenzylphthalate	<10			
3,3'-Dichlorobenzidine				
Benzo(a)anthracene				
Chrysene				
bis(2-Ethylhexyl)phthalate				
Di-n-octylphthalate				
Benzo(b)fluoranthene				
Benzo(k)fluoranthene				
Benzo(a)pyrene				
Indeno(1,2,3-cd)pyrene				
Dibenz(a,h)anthracene				
Benzo(g,h,i)perylene	<10			

REPORT NUMBER: 320840

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Wacker Siltronic Corporation

WACKER

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180
Phone (503) 243-2020
FAX (503) 226-0052

November 15, 1990

George Yun
Environmental Consultant
Northwest Region
Department of Environmental Quality
811 S.W. 6th Avenue
Portland, Oregon 97204

Subject: Bioassay Test for NPDES Permit No. 100286

Dear Mr. Yun:

As per Schedule B, Bioassay Test Requirement, of our NPDES Permit, I am submitting the results of a bioassay study completed by Northwestern Aquatic Sciences, Inc. of Newport, Oregon, of our treated effluent which was sampled on August 10, 1990.

The LC50 was reported as greater than 100% for our effluent as shown in the attached report from Northwestern Aquatic Sciences, Inc., dated October 11, 1990.

Please call me at 243-2020, extension 132, if you have any questions or comments regarding this report.

Very truly yours,

WACKER SILTRONIC CORPORATION

Richard G. Gariepy

Richard G. Gariepy
Environmental Engineer

Enclosure (1) Northwestern Aquatic Sciences, Inc. test report dated October 11, 1990.

cc: John Pittman
Jerry Schaeffer

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

Rec'd 15 Nov 90 JJR

October 11, 1990

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is your most recent NPDES toxicity test report. We are now using a new test report format that should make it easier to find information. If you have any questions, please feel free to call me or Linda Garrison at (503) 265-7225.

Sincerely,

Richard S. Caldwell, Ph.D.
Director

Encl.

Copies To: Jerry Linden
Rick Gariepy

TEST REPORT

TEST IDENTIFICATION

Test No.: 357-6

Title: Oncorhynchus mykiss, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SM-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (Salmo gairdneri). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; D.R. Buhler, Ph.D., QA Officer; Linda K. Garrison, B.A., Aq. Biol.; Gary A. Buhler, Tox. Tech.

Study Schedule:

Test Beginning: 9-12-90, 12:10 p.m.

Test Ending: 9-16-90, 12:00 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at: Northwestern Aquatic Sciences, Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

TEST MATERIAL

Description: Wacker Siltronics Corporation river outfall effluent (NAS Sample No. 3998D) was collected on 9-10-90. The effluent was received on 9-11-90, stored overnight at 5°C and used the next day. Effluent was aerated and thermal equilibrated prior to use. Sample characteristics: pH: 7.4; conductivity: 600 µmhos/cm.

DILUTION WATER

Source: NAS spring water.

Date of Collection: 9-11-90.

Pretreatment: Filtered, aerated.

TEST ORGANISMS

Species: Oncorhynchus mykiss, rainbow trout (formerly Salmo gairdneri).

Size/Weight: 6.5g

Source: R.W. Cristler, Seal Rock, OR.

Acclimation: Temperature, 14.1 ± 0.2°C; Dissolved oxygen, 8.1 ± 0.1 mg/L; pH, 7.2 ± 0.5; and conductivity, 248 ± 16 µmhos/cm for the two day period prior to testing. Acclimation tank loading: 16.3 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: glass aquaria; depth 30 cm; vol. 27 L.

Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.

SCOEPA00028894

Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 2.4 g/L
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.7 ± 0.7°C; dissolved oxygen, 9.5 ± 0.2 mg/L; pH, 7.3 ± 0.2; conductivity, 236 - 488 µmhos/cm. Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

1. Loading exceeded 0.8g in the test. The only available trout for testing exceeded the 5.0g suggested weight.

TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	>100
(95% C.I.)	--
Method	by inspection

STUDY APPROVAL

Richard P. Calhoun 10/11/90

Study Director Date

SCOEPA00028895

Table 1. Survival of *Oncorhynchus mykiss* exposed to Wacker Siltronics river outfall effluent (NAS Sample No. 3998D).

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
60	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
36	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
22	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

SCOEPA00028896

NORTHWESTERN AQUATIC SCIENCES
A Division of NAS Associates, Inc.
P.O. Box 1437, Newport, Oregon 97365 (503) 265-7225

Rec'd 15 Nov 90 JJR

October 11, 1990

Mr. Tom Rothschild
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

Dear Tom:

Enclosed is your most recent NPDES toxicity test report. We are now using a new test report format that should make it easier to find information. If you have any questions, please feel free to call me or Linda Garrison at (503) 265-7225.

Sincerely,

Richard S. Caldwell, Ph.D.
Director

Encl.

Copies To: Jerry Linden
Rick Gariepy

TEST REPORT

TEST IDENTIFICATION

Test No.: 357-6

Title: Oncorhynchus mykiss, rainbow trout 96-hr non-renewal bioassay.

Protocol No.: 357-SM-1; Static 96-hour Non-renewal Effluent Toxicity Test Using Rainbow Trout (Salmo gairdneri). July 25, 1988. Based on Peltier and Weber. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. (EPA 600/4-85-013).

STUDY MANAGEMENT

Study Sponsor: Wacker Siltronics Corporation, P.O. Box 03180, Portland, OR 97203.

Sponsor's Study Monitor: Mr. Tom Rothschild

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365.

Test Location: Newport Laboratory.

Laboratory's Study Personnel: R.S. Caldwell, Ph.D., Proj. Man./Study Dir.; D.R. Buhler, Ph.D., QA Officer; Linda K. Garrison, B.A., Aq. Biol.; Gary A. Buhler, Tox. Tech.

Study Schedule:

Test Beginning: 9-12-90, 12:10 p.m.

Test Ending: 9-16-90, 12:00 p.m.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at: Northwestern Aquatic Sciences, Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations effective December 29, 1983 (40 CFR Part 792).

TEST MATERIAL

Description: Wacker Siltronics Corporation river outfall effluent (NAS Sample No. 3998D) was collected on 9-10-90. The effluent was received on 9-11-90, stored overnight at 5°C and used the next day. Effluent was aerated and thermal equilibrated prior to use. Sample characteristics: pH: 7.4; conductivity: 600 µmhos/cm.

DILUTION WATER

Source: NAS spring water.

Date of Collection: 9-11-90.

Pretreatment: Filtered, aerated.

TEST ORGANISMS

Species: Oncorhynchus mykiss, rainbow trout (formerly Salmo gairdneri).

Size/Weight: 6.5g

Source: R.W. Cristler, Seal Rock, OR.

Acclimation: Temperature, 14.1 ± 0.2°C; Dissolved oxygen, 8.1 ± 0.1 mg/L; pH, 7.2 ± 0.5; and conductivity, 248 ± 16 µmhos/cm for the two day period prior to testing. Acclimation tank loading: 16.3 g/L.

TEST PROCEDURES AND CONDITIONS

Test Chambers: glass aquaria; depth 30 cm; vol. 27 L.

Test Concentrations: 100, 60, 36, 22, 13, and 0% effluent.

SCOEPA00028898

Replicates/Treatment: 2
Organisms/Treatment: 20
Loading: 2.4 g/L
Water Volume Changes per 24 hr: None.
Effects Criteria: Mortality, defined as the lack of respiratory movement in response to tactile stimulation.
Water Quality and Other Test Conditions: Temperature, 12.7 ± 0.7°C; dissolved oxygen, 9.5 ± 0.2 mg/L; pH, 7.3 ± 0.2; conductivity, 236 - 488 µmhos/cm. Photoperiod 16:8 hr, L:D.

DATA ANALYSIS METHODS

Percent survival was calculated for each treatment replicate from the raw data and the means were obtained for each treatment level. The LC50 was calculated using the EPA TOXDAT Multi-Method program (EPA 600/4-85/013).

PROTOCOL DEVIATIONS

1. Loading exceeded 0.8g in the test. The only available trout for testing exceeded the 5.0g suggested weight.

TEST RESULTS

A detailed tabulation of the test results is given in Table 1. The biological effect given as the LC50 is as shown below.

96-hr LC50 (%)	>100
(95% C.I.)	--
Method	by inspection

STUDY APPROVAL

R. D. Calhoun 10/11/90

Study Director Date

SCOEPA00028899

Table 1. Survival of Oncorhynchus mykiss exposed to Wacker Siltronics river outfall effluent (NAS Sample No. 3998D).

Effluent Conc. (%)	Repl.	Number of trout surviving					96-hr % Survival	
		0-hr	24-hr	48-hr	72-hr	96-hr	individual	mean
100	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
60	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
36	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
22	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
13	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0
Control	1	10	10	10	10	10	100.0	
	2	10	10	10	10	10	100.0	100.0

SCOEPA00028900

Wacker Siltronic Corporation

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180
7200 N.W. Front Ave.
Portland, OR 97210-3676
Phone (503) 243-2020
FAX 503-226-0052
TWX 910-464-4777
TLX 4970339

April 19, 1990

George Yun
Environmental Consultant
Northwest Region
Department of Environmental Quality
811 S.W. 6th Avenue
Portland, Oregon 97204

Subject: Bioassay Test for NPDES Permit No. 100286

Dear Mr. Yun:

As per Schedule B, Bioassay Test Requirement, of our NPDES Discharge Permit, I am submitting the results of a bioassay study completed by Northwestern Aquatic Sciences, Inc., of Newport, Oregon, of our treated effluent which was sampled on March 19 through 20, 1990.

The LC50 was reported as greater than 100% concentration for our effluent as shown in the attached report from Northwestern Aquatic Sciences, Inc. dated March 27, 1990.

Please call me at 243-2020, extension 132, if you have any questions or comments regarding this report.

Very truly yours,

WACKER SILTRONIC CORPORATION

Richard G. Gariepy
Environmental Engineer

Enclosure: (1) Northwestern Aquatic Sciences, Inc. Aquatic Toxicity Test dated March 27, 1990.

cc: John Pittman
Jerry Schaeffer

reports\deqnpdes\biosp90.ltr

NORTHWESTERN AQUATIC SCIENCES, Inc.
P.O. Box 1437 • Newport, Oregon 97365 • (503) 265-7225

№ 4372 T

AQUATIC TOXICITY TEST REPORT

TEST NO. 357-5
REPORT DATE 3/27/90
APPROVAL

TEST NAME OR DESCRIPTION
Rainbow trout 96-hr non-renewal bioassay Protocol No. 357-SM-1

CLIENT:
Wacker Siltronics Corporation
P.O. Box 03180
Portland, OR 97203

1. SAMPLE/TOXICANT DATA

Type of Sample
Pure Compound ☐; Effluent X;
Mixture or Formulation ☐;
Other ☐

Sample Name / Description / Source
final effluent

Sample Characteristics
pH: 7.6
conductivity: 599 umhos/cm

Remarks
Sample collected and shipped by client.

2. LABORATORY PROCESSING DATA

Date and Time of Sample Receipt: 3/20/90 3:00 ~~AM~~ P.M.
Sample No.: 3012D

Sample Treatment/Storage
Held overnight in 4°C storage room.
Aerated & thermal equilibrated prior to test.

Test Begun: 3/21/90 10:50 AM ~~PM~~ XX
Test Ended: 3/25/90 2:00 p.m. ~~AM~~ ~~PM~~

Test Location/Laboratory
Northwestern Aquatic Sciences
Newport, OR 97365

Investigator
L. Garrison / V. Shaffer

3. DILUTION WATER

Source
NAS spring water

Date and Time of Collection
3/21/90 9:00 a.m.

Pretreatment
aerated

Characteristics (mg/l as appropriate)

Cond. (µmhos/cm)	194	pH	7.7
Hard. ($CaCO_3$)	60	Alk. ($CaCO_3$)	20
Ca		Mg	
Na		K	
Cl		SO_4	
Salinity (‰)			

4. TEST ORGANISMS

Species
Oncorhynchus mykiss (formerly Salmo gairdneri)

Length (mm)
Weight (g): 0.25

Age
Developmental Stage

Source
Brian Trout Farm, Sandy, OR

History

Diseases/Treatments
none

Acclimation Conditions
Accl. 16 days in lab:
Temp.: 12.7 ± 0.8°C DO: 8.6 ± 0.6 mg/L
Cond.: 188 ± 16 umhos/cm pH: 7.0 ± 0.3

5. TEST PROCEDURES AND CONDITIONS

Test Chambers/Depth/Volume
glass aquaria / 32 cm / 27.0 L

Diluters/Concentrations
Test concentrations: 100, 60, 36, 22, 13, and 0% (control).

Organisms per Treat.: 20
Replicates per Treat.: 2
Loading (g/l): 0.1
Water Vol. Changes per 24 Hr.: non-renewal test

Effects Criteria
Death (lack of respiratory movement and lack of response to tactile stimulation)

Other Test Conditions (mg/l as appropriate)

DO	9.9 ± 0.4
pH	7.5 ± 0.3
Temp (°C)	12.7 ± 0.4
Salinity (‰)	
Hardness ($CaCO_3$)	
Alkalinity ($CaCO_3$)	
Photoperiod	16L - 8D

6. TEST RESULTS

LC50 X EC50 ☐; and 95% Confidence Limits

24 Hour	>100
48 Hour	>100
72 Hour	>100
96 Hour	>100

Remarks
At 24 hr. all 20 fish in 100% effluent were quiescent & remained so through 96 hr., with 4 lying on their sides at 96 hr. Also, at 96 hr 5 fish in 60% effluent were quiescent. See attached table for fish survival data.

NAS 302, Revised 7/81

White — Client Copy
Canary — 2nd Copy
Pink — Client File
Goldenrod — Lab. Master File

Tabular summary of fish survival data. Data given as numbers of fish surviving in each replicate tank at 0-, 24-, 48-, 72-, and 96-hr.

Effluent concentration	0-hr		24-hr		48-hr		72-hr		96-hr	
	A	B	A	B	A	B	A	B	A	B
100%	10	10	10	10	10	10	10	10	10	10
60%	10	10	10	10	10	10	10	10	10	10
36%	10	10	10	10	10	10	10	10	10	10
22%	10	10	10	10	10	10	10	10	10	10
13%	10	10	10	10	10	10	10	10	10	10
Control	10	10	10	10	10	10	10	10	10	10

Wacker Siltronic Corporation WACKER

August 11, 1987

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
TLX 4970339
FAX 503-226-0052

Mr. George Davis
Field Representative
Northwest Region
Department of Environmental Quality
811 S.W. 6th Avenue
Portland, Oregon 97204

Dear Mr. Davis:

NPDES Permit Bioassay Test:

As per Schedule B, Bioassay Test requirement, of our NPDES Discharge Permit (Permit No. 100286) I am submitting the results of a study completed by Coffey Laboratories, Inc. of our treated effluent dated August 1, 1987.

The wastewater sample used was a 24-hour composite of our treated effluent collected on July 7, 1987. Both the 100 % and 50 % effluent tests resulted in no signs of stress or death to any of the fathead minnows as a result of the 96 hour Aquatic Acute Toxicity Test.

Please call me at 503/243-2020, extension 301, if you have any questions regarding this test.

Very Truly Yours,

WACKER SILTRONIC CORPORATION

Murray M. Tilson, P.E.
Environmental Manager

MMT:ll

Enclosure: (1) Coffey Laboratories, Inc. 96-hr Bioassay Test Results dated 8/1/87.

cc: John Pittman (w/encl)
Greg Carr (w/encl)
Mike Pilkington (w/encl)
Tom Rothschild (w/encl)
Larry Patterson, DEQ, Water Quality Division

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

RECEIVED
AUG 7 198
WACKER SILTRONIC ENGINEERING

August 1, 1987
Log #M870707-R
PO # 65508

Wacker Siltronic
P.O. Box 03180
Portland, OR 97203

Attention: Murray Tilson

Sample Received: July 7, 1987

Analysis Requested: 96hr. Acute Toxicity,TSS,Flouride, Metals

Samples Collected/Delivered by: client

Date Collected: 7-7-87

Sample ID: WSC Bioassay

ANALYSIS	RESULTS	METHOD
Fluoride	4.1	EPA 300
Total Susp. Solids	35.2	EPA 160.2
Chromium	< 0.010	*
Calcium	113	*
Magnesium	0.997	*
Hardness	286	SM 314

Results in mg/L

The less than "<" symbol means none detected at or above the indicated value and represents the detection limit for the method.

See next page for 96hr. Acute Toxicity results.

COFFEY LABORATORIES, INC.
4914 N.E. 122nd Ave.
Portland, OR 97230
Phone: (503) 254-1794

August 1, 1987
Log#A8707-R
PO# 65508
Page 2

Wacker Siltronic
P.O. Box 03180
Portland, OR 97203
Attention: Murray Tilson

Analysis Requested: 96 Hour Aquatic Acute Toxicity Test
Test Organism Used: Pimephales promelas (Fathead Minnow)
Fish spawned May 19, 1987

Sample Concentration: 100 mg Sample per Liter of Dilution Water
1000 mg Sample per Liter of Dilution Water
Test Chamber Size: 37.8 Liters (10 Gallons)

Methodology Reference: Biological Testing Methods, Hazardous Waste Section, Washington State Department of Ecology, July 1981, DOE 80-12

SAMPLE CONCENTRATION	LIVE ORGANISMS AT TEST START	DEATHS AFTER 96 HOURS	HAZARDOUS WASTE CLASSIFICATION
100% effluent	30	0	---
50% effluent	30	0	---
Control	30	0	

Observations: After 96 hrs. sample fish showed no color loss or exhibited signs of erratic swimming. All of the fish accepted food at completion of the test. However, the control fish were the first, and immediately went to the top for food. The 50% and 100% concentration sample fish ate only from the bottom at first, and seemed to be more nervous of the net.

Sincerely,

Susan M. Coffey

Susan M. Coffey,
President

SMC/gle

This report is for the sole and exclusive use of the above client. Samples are retained a maximum of 15 days from the date of this letter.

State of Washington Department of Ecology

DATA SHEET FOR STATIC BASIC ACUTE FISH TOXICITY TEST*

Laboratory: 76°
Analyst: B.V.

Industry/Tenant: WACKER
Address:
Collector:
Date Sample Collected:

Beginning: Date 7/14/87 Time:
Ending: Date 7/18/87 Time:
Test Organism: TUFFIES
Required Test Temperature Range:

Laboratory Reference Number M880707-R	Test Container No.	Conc. mg/l	Number of Cumulative Deaths					Dissolved Oxygen (mg/l)					pH 25 C					Temperature (C)					Total Hardness (mg/l as CaCO3)		Total Alkalinity (mg/l as CaCO3)		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	1	0%	0	0	0	0	0	9.4	9.1	7.8	8.2	7.85	7.15	7.18	7.29	7.2	7.33	18	20	19	19	19.5	63	65	16.5	16.5	162	174
CONTROL	2	0%	0	0	0	0	0	9.4	9.1	7.8	8.1	7.85	7.17	7.20	7.36	7.57	7.46	19	19.5	19.5	17	19.5	61	65	19.0	17.0	171	178
CONTROL	3	0%	0	0	0	0	0	9.1	8.95	7.7	7.8	7.75	7.20	7.33	7.37	7.60	7.6	18	20	20	19	20	61.5	64	18.0	16.5	168	176
12 L	4	50%	0	0	0	0	0	8.4	8.3	7.6	7.7	7.6	7.53	7.63	7.47	7.52	7.53	24	20	19	19	19.5	168	167	48.0	48.5	580	587
12 L	5	50%	0	0	0	0	0	8.4	8.4	7.05	7.75	7.7	7.70	7.71	7.68	7.54	7.59	24	20	19	18	19.5	165	171	47.0	45.5	580	587
12 L	6	50%	0	0	0	0	0	8.4	8.6	7.4	8.0	7.9	7.76	7.80	7.81	7.68	7.69	23.5	20	19	19	19.5	170	171	47.0	47.5	574	590
24 L	7	100%	0	0	0	0	0	8.3	8.5	7.5	8.0	7.7	7.61	7.61	7.79	7.64	7.62	23	19.8	19	19	20	281	286	60.5	63.5	940	958
24 L	8	100%	0	0	0	0	0	8.2	8.4	7.3	7.8	7.7	7.54	7.59	7.61	7.58	7.51	23	19.8	19	18	19.5	283	285	62.0	63.0	965	964
24 L	9	100%	0	0	0	0	0	8.3	8.4	7.4	7.75	7.7	7.52	7.58	7.58	7.53	7.52	23	20	19	19	19.5	279	286	61.5	63.0	965	964

Sample Description:
Average Weight: Mean Length: Longest: Shortest: Ratio (long/short):
Number of organisms per chamber: Ratio of flesh to water: Comments:

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

DATA VERIFIED BY: DATE:

EHW > 10/30
DW > 11/30

ECY 020-1-40

SCOEPA00028907

Laura

Willamette River Sampling and Analysis Plan

Site Inspections

Portland Harbor, Oregon

EPA REGION X

Contract No. 68-W9-0046
Work Assignment No. 46-23-0JZZ
Work Order No. 4000-19-36-3300
Document Control No. 4000-19-36-AAAF

July 1997

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SCOEPA00028908

WILLAMETTE RIVER
SAMPLING AND ANALYSIS PLAN
Site Inspections
Portland Harbor, Oregon

Prepared for
U.S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Contract No. 68-W9-0046
Work Assignment No. 46-23-0JZZ
Work Order No. 4000-19-36-3300
Document Control No. 4000-19-36-AAAF

July 1997

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
AUG 1 1997
NORTHWEST REGION

Prepared by
Roy F. Weston, Inc.
700 Fifth Avenue
Suite 5700
Seattle, WA 98104-5057

ARCS QUALITY ASSURANCE CONCURRENCE

Willamette River
Sampling and Analysis Plan
Portland Harbor, Oregon

Project Name:	Site Inspections
Contract Number:	68-W9-0046
Work Assignment Number:	46-23-0JZZ
Responsible Organization:	Roy F. Weston, Inc. 700 Fifth Avenue, Suite 5700 Seattle, Washington 98104

Concurrences:

Name: Karen M. Stash
Title: Project Manager, Roy F. Weston, Inc.
Signature: _____ Date 30 Jul 97

Name: Daniel Handschin
Title: Deputy QA Manager, Roy F. Weston, Inc.
Signature: _____ Date: 30 Jul 97

Name: Frank Monahan
Title: FOR ARCS Program Manager, Roy F. Weston, Inc.
Signature: _____ Date 30 July 97

This document was prepared by Roy F. Weston, Inc. expressly for the EPA. It shall not be disclosed in whole or in part without the express, written permission of the EPA.

Roy F. Weston, Inc.
Suite 5700
700 5th Avenue
Seattle, Washington 98104-5057
206-521-7600 • Fax 206-521-7601

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
AUG 15 1997
NORTHWEST REGION

13 August 1997

Mr. Dave Bennett
U.S. Environmental Protection Agency
Region X, ECL-115
1200 Sixth Avenue
Seattle, WA 98101

WO 4000-19-36-3300
DCN 4000-19-36-AAAH

Subject: Site Inspections
Additional Tasks—Willamette River SI
Contract No. 68-W9-0046
Work Assignment No. 46-23-0JZZ

Dear Dave:

Based on a recent conversation with Gil Wistar of Oregon Department of Environmental Quality and John Meyer, the following items will be added to the final Willamette River Sampling and Analysis Plan (SAP; July, 1997):

1. Analyses of chlorinated herbicides by Manchester Laboratory for six samples (75, 77, 78, 80, 81, and 88). Method 8151A will be performed for these samples and the following quantitation limits will be requested:

Analyte	Quantitation Limit Goal (µg/kg)	Reference Method
2,4-D	2	8151A
2,4-DB	5	8151A
2,4,5-TP (silvex)	2	8151A
2,4,5-T	2	8151A
Dalapon	2	8151A
Dicamba	2	8151A
Dichloroprop	2	8151A
Dinoseb	2	8151A
MCPA	700	8151A
MCPP	700	8151A

Click to WESTON On The Web http://www.rfweston.com

SCOEPA00028911

2. Dioxin samples will be collected for the following six samples, as requested by G. Wistar: 72, 78, 79, 82, 86, and 92. The subsurface interval at locations 72, 78, and 92 will be analyzed for dioxins, while the surface interval will be analyzed for dioxins at stations 79, 82, and 86.

Analyte	Quantitation Limit Goal (ng/kg)	Reference Method
2,3,7,8-TCDF	2	8290
Total TCDF	2	8290
2,3,7,8-TCDD	2	8290
Total TCDD	2	8290
1,2,3,7,8-PeCDF	10	8290
2,3,4,7,8-PeCDF	10	8290
Total PeCDF	10	8290
1,2,3,7,8-PeCDD	10	8290
Total PeCDD	10	8290
1,2,3,4,7,8-HxCDF	10	8290
1,2,3,6,7,8-HxCDF	10	8290
1,2,3,7,8,9-HxCDF	10	8290
2,3,4,6,7,8-HxCDF	10	8290
Total HxCDF	10	8290
1,2,3,4,7,8-HxCDD	10	8290
1,2,3,6,7,8-HxCDD	10	8290
1,2,3,7,8,9-HxCDD	10	8290
Total HxCDD	10	8290
1,2,3,4,6,7,8-HpCDF	20	8290
1,2,3,4,7,8,9-HpCDF	20	8290
Total HpCDF	20	8290
1,2,3,4,6,7,8-HpCDD	20	8290
Total HpCDD	20	8290
OCDF	20	8290
OCDD	20	8290

SCOEPA00028912

3. A list of the twenty most intensely detected tentatively-identified compounds (TICs) will be requested from the laboratories for the base/neutral acid compounds (BNAs). WESTON will request non-petroleum related compounds and will pass this information onto EPA and ODEQ. These compounds will not be added into the database or presented in the SI report.

Please call me if you have any questions. Thank you.

ROY F. WESTON, INC.

Karen M. Stash
Site Manager

cc: G. Wistar (ODEQ)
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SECTION 1

INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0046, Roy F. Weston, Inc. (WESTON) is conducting a Site Inspection (SI) in the Willamette River from river mile (RM) 3.5 to RM 9.5 (see Figure 1-1). The EPA Site Inspection process is intended to evaluate actual or potential environmental hazards at a particular site relative to other sites across the nation for the purpose of identifying remedial action priorities. The SI, under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) is intended to collect sufficient data to enable evaluation of a site's potential for inclusion on the National Priorities List (NPL) and establish priorities for additional action, if warranted. The decision as to whether a site is placed on the NPL is made based on the EPA's Revised Hazard Ranking System (HRS) criteria. The HRS assesses the relative threat to human health and the environment associated with the actual or potential releases of hazardous substances at a site.

This Sampling and Analysis Plan (SAP), which is to be used in conjunction with the Quality Assurance Program Plan (QAPP) (WESTON, 1994) as amended by WESTON's 30 June 1997 letter, describes the activities that will collect sufficient data to support an HRS evaluation. In total, five discrete river reaches have been established (Figure 1-1) and an individual HRS evaluation will be conducted for each reach. The data collection efforts in this project area are also intended to support the Oregon Department of Environmental Quality's (ODEQ's) ongoing investigations of the potential need for remedial actions associated with possible upland sources adjacent to the Willamette River.

The purpose of this investigation is to provide an assessment of sediment contamination in the Portland Harbor reach of the Willamette River. The specific objectives of this investigation are to:

- Characterize the nature and areal extent of sediment contamination distribution in surface sediments
- Characterize the nature and vertical extent of sediment contaminant distribution in shallow subsurface sediments

The methods and procedures for sample collection and handling to address the above objectives are described herein, and will be pursued according to the 40 CFR Part 300, Hazard Ranking System, Final Rule. This SAP, and hence, the SI process, does not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment.

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SECTION 2

BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The Willamette River originates in the Cascade Mountain Range and flows approximately 187 miles north before discharging into the Columbia River, which flows an additional 100 miles westward to the Pacific Ocean. The point of confluence of the Willamette and Columbia rivers denotes RM 0. Most development along the Willamette River has occurred within the project area, referred to as the Portland Harbor. Portland Harbor has been dredged to provide a shipping channel generally 300 feet wide and 40 feet deep from the mouth of the Willamette River upriver to the Broadway Bridge (RM 11.8) (Caldwell and Doyle, 1995). Channel depths currently range from 10 to 140 feet, with an average depth of 45 feet. In this reach, the river is deep, slow moving, and tidally influenced. During periods of medium and low flows, tidal effects are evident to RM 26.5 (Willamette Falls); reverse flow has been measured as far upstream as Ross Island (RM 15) during low flow periods.

Habitat in the Willamette River near Portland has been altered to accommodate urban development and a growing shipping industry. Shoreline features include steeply sloped banks covered with riprap or constructed bulkheads, with manmade structures such as piers and wharves extending out over the water. Because of dredging, many portions of the riverbed are steeply sloped and maintain substrates composed mainly of silts and sands (Farr and Ward, 1991).

2.2 INDUSTRIAL OPERATIONS IN THE PROJECT AREA

Much of the upland areas adjacent to the Willamette River within Portland Harbor are heavily industrialized, and marine traffic within the river is considered to be intensive. Within the 6-mile project area, a number of industrial operations have been identified as potential sources of contamination to sediment in the Willamette River. Historical or current industrial operations include hazardous waste storage; marine construction; bulk petroleum product storage and handling; oil fire fighting training activities; oil gasification plant operations; wood-treating; agricultural chemical production; battery processing; liquid natural gas plant operations; chlorine production; ship loading and unloading; ship maintenance and repair (i.e., sandblasting, scaling, repair, painting, refueling); and rail car manufacturing.

Numerous past investigations within the Portland Harbor area have been conducted at varying levels of scope. A portion of the studies focused on specific properties, while the remaining studies were river-wide and incorporated sediment sampling as one component of the entire study. A summary of existing sediment chemical data is provided in the Executive Summary of Historical Sediment Data (WESTON, 1997). Past sediment studies have demonstrated the

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presence of polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), dioxins, metals, organotins, pentachlorophenol, and solvents in sediment. These contaminants may have entered the river via spillage during product shipping and handling, direct disposal or discharge, accidental spills, contaminated groundwater discharge, surface water runoff, stormwater discharge, or contaminated soil erosion.

2.3 AQUATIC RESOURCES AND CRITICAL HABITATS

Recent studies have identified 39 species of fish in the Willamette River within the project area. The lower Willamette River upstream to the Willamette Falls provides a significant migratory corridor, nursery habitat, and adult forage area for two runs of chinook, two runs of steelhead, and individual runs of coho and sockeye salmon (Massey, 1992; Farr and Ward, 1991). In general, chinook and steelhead populations are the largest and most widespread of the salmonids found in the Willamette River basin (Melcher, 1992). Steelhead salmon utilizing the Willamette River are being considered for placement on the threatened species list of the Endangered Species Act of 1973. Pacific lamprey are also present in the river and are currently classified as a species of special concern by the U.S. Fish and Wildlife Service (USFWS). Species of special concern are qualified as those organisms whose conservation status is of concern to the USFWS, but for which further information is needed.

Commercial fishing in the Willamette River within the project area is limited to a small Pacific lamprey fishery (Melcher, 1992). In contrast, recreational fishing is extremely popular throughout the lower Willamette basin. Highest angling pressure is directed toward spring chinook, steelhead, coho, American shad, and white sturgeon. Resident species such as largemouth bass, black crappie, white crappie, and walleye also support a significant recreational fishery (Farr and Ward, 1991).

Numerous piscivorous birds, migratory water fowl, and raptors utilize the lower Willamette River during various times of the year. Great blue heron, osprey, merganser, kingfisher, and bald eagle routinely forage within the study area. Both great blue heron and osprey nest sites are located adjacent to the river and represent significant potential receptors.

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SECTION 3

FIELD ACTIVITIES

3.1 SAMPLING LOCATIONS AND RATIONALE

The overall purposes of conducting sediment sampling activities in the Willamette River are to generate data that can be used for HRS scoring, to provide information on contaminant distribution in the Portland Harbor area, and to support potential future investigations within the river. The sampling plan therefore focuses on identifying areas of sediment contamination. Based on historical data, contaminants of potential concern in sediment include metals, base-neutral acid extractables (BNAs) (primarily PAHs), PCBs, pesticides, and organotins. Because organotins are of potential concern, the sampling plan will also focus on evaluating the potential bioavailability of organotins to aquatic receptors through the collection and analysis of sediment porewater. In addition, the uncertainties associated with the bioavailability of metals bound in sandblast grit or paint chips will be investigated as part of the proposed sediment and porewater sampling approach.

The investigation of the extent of contamination in the Willamette River will be based on collection of river sediment, primarily in the nearshore areas of each reach. For this study, an elevation of -2 feet MLLW is proposed. Because only limited bathymetric data are available for any given site, it is not currently possible to confirm that all proposed sampling locations are positioned as desired relative to mudline depths. Therefore, final determinations will be made in the field and may require the adjustment of proposed sampling locations (see also Section 4.1.5).

Surface sediment (10 cm; 4 inches) will be collected at 151 locations over the entire study area. Subsurface sediment samples extending up to 60 inches (152 cm) below mudline will also be collected at a subset (40 stations) of the surface sampling locations to assess depth of contamination. Subsurface sediment coring stations will be positioned approximately every 0.5 mile along both sides of the river at distances between 50 and 500 feet from the shoreline, as well as in areas adjacent to more heavily industrialized upland properties.

The five discrete river reaches established for the purposes of the HRS evaluations are delineated in Figure 3-1 and defined as follows:

- Reach A: RM 3.5 - RM 5.0
- Reach B: RM 5.0 - RM 6.0
- Reach C: RM 6.0 - RM 7.0
- Reach D: RM 7.0 - RM 8.0

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- Reach E: RM 8.0 - RM 9.5

River reaches were established based on the boundaries of adjacent upland facilities, adjacent land uses (both current and historical), and areal coverage. The specific sampling locations and rationale for each reach are discussed in the following sections.

3.1.1 River Reach A

3.1.1.1 Surface Sediment Sampling

A total of 35 surface (0 to 10 cm) sediment stations (for a total of 36 samples, including one duplicate) will be sampled within the boundaries of Reach A (RM 3.5 to RM 5; Figure 3-2). All surface sediment samples will be analyzed for Target Analyte List (TAL) metals and BNAs (Table 5-2; Table 3-1). Many bulk petroleum facilities and industrial operations are present throughout Reach A that routinely handle(d) compounds containing BNAs (WESTON, 1997). Consequently, all surface sediment samples collected within this reach will be analyzed for these semivolatile organic compounds. In addition, all surface sediment samples will be analyzed for total organic carbon (TOC) and grain size, which will be used in the interpretation of data. Sediment concentrations for organics are typically normalized to TOC, while sediment concentrations for inorganics can be normalized to grain size, aluminum, or manganese.

A total of eight of the surface sediment stations (for a total of 9 samples, including one duplicate) will also be analyzed for pesticides and PCBs to evaluate the potential distribution of these analytes in river sediment. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile.

This reach of the river also contains shipping facilities. Organotins are a potential contaminant of concern and will be analyzed at eight surface sediment stations (for a total of nine samples, including one duplicate). Similar to pesticides and PCBs, organotin samples will be collected every 0.5 river mile to provide more comprehensive areal distribution of sediment organotin concentrations. Titanium, which forms the pigment base for many newer paints (i.e., paints manufactured since the 1970s), will be analyzed as an indicator of paint chips and their potential contribution to sediment. Nine titanium samples (including one duplicate) at the same eight stations as the organotin analyses will be collected. Additional sediment volume will be collected for eight porewater analyses at these same eight organotin bulk chemistry surface sediment sampling locations within this reach; the porewater samples will be analyzed for TAL metals and organotins.

Table 3-1 summarizes the surface sediment and porewater samples proposed to be collected from Reach A.

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3.1.1.2 Subsurface Sediment Sampling

Subsurface (0 to 152 cm) sediment core samples will be collected from eight of the surface sediment sampling stations within the boundaries of Reach A to evaluate the vertical extent of sediment contamination. All subsurface sediment samples representing the 0 to 90 cm horizon will be analyzed for TAL metals, BNAs, TOC, and grain size. Four subsurface sediment samples will also be analyzed for titanium, PCBs, pesticides, and organotins.

Sediment core samples representing the horizon between 90 and 152 cm will be archived for potential future analysis if the maximum depth of contamination cannot be established based on the upper analytical interval.

Table 3-1 summarizes the subsurface sediment samples proposed to be collected from Reach A.

3.1.2 River Reach B

3.1.2.1 Surface Sediment Sampling

A total of 21 surface (0 to 10 cm) sediment stations (for a total of 22 samples, including one duplicate) will be sampled within the boundaries of Reach B (RM 5.0 to RM 6.0; Figure 3-3). All surface sediment samples will be analyzed for TAL metals and BNAs. Bulk petroleum facilities and industrial shipping operations are present throughout Reach B that routinely handle(d) compounds containing BNAs (WESTON, 1997). Consequently, all surface sediment samples collected within this reach will be analyzed for these semivolatile organic compounds. In addition, all surface sediment samples will be analyzed for TOC and grain size, which will be used in the interpretation of data.

A total of four of the surface sediment stations (for a total of 5 samples, including one duplicate) will also be analyzed for pesticides and PCBs to evaluate the potential distribution of these analytes in river sediment. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile.

In addition, seven of the surface sediment stations (for a total of 8 samples, including one duplicate) will be analyzed for organotins and titanium to evaluate the potential distribution of these compounds in the Willamette River sediment. The analyses for these compounds will be conducted on samples near boat maintenance facilities where painting or hull scraping activities have occurred and on samples collected approximately every 0.5 river mile to evaluate the potential distribution in river sediment (see WESTON, 1997). Additional sediment volume will be collected for seven porewater analyses at these same seven organotin bulk chemistry surface sediment sampling locations within this reach; the porewater samples will be analyzed for TAL metals and organotins.

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Table 3-2 summarizes the surface sediment and porewater samples proposed to be collected from Reach B.

3.1.2.2 Subsurface Sediment Sampling

Subsurface (0 to 152 cm) sediment core samples will be collected from four of the surface sediment sampling stations (for a total of 5 samples, including one duplicate sample) within the boundaries of Reach B to evaluate the vertical extent of sediment contamination. All subsurface sediment samples representing the 0 to 90 cm horizon will be analyzed for TAL metals, titanium, BNAs, PCBs, pesticides, organotins, TOC, and grain size. Sediment core samples representing the horizon between 90 and 152 cm will be archived for potential future analysis if the maximum depth of contamination cannot be established based on the upper analytical interval.

Table 3-2 summarizes the subsurface sediment samples proposed to be collected from Reach B.

3.1.3 River Reach C

3.1.3.1 Surface Sediment Sampling

A total of 22 surface (0 to 10 cm) sediment stations (for a total of 23 samples, including one duplicate) will be sampled within the boundaries of Reach C (RM 6.0 to RM 7.0; Figure 3-4). All surface sediment samples will be analyzed for TAL metals and BNAs. Facilities are present in Reach C that routinely handle(d) compounds containing BNAs (WESTON, 1997). Consequently, all surface sediment samples collected within this reach will be analyzed for these semivolatile organic compounds. In addition, all surface sediment samples will be analyzed for TOC and grain size, which will be used in the interpretation of data.

A total of eight of the surface sediment stations (for a total of 9 samples, including one duplicate) will be analyzed for PCBs, organotins, and titanium. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile to evaluate the potential distribution of these analytes in river sediment, as well as in areas where their handling or use has been documented (see WESTON, 1997). A total of nine of the surface sediment stations (for a total of ten samples, including one duplicate) will also be analyzed for pesticides. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile to evaluate the potential distribution of these analytes in river sediment, as well as in areas where their handling or use has been documented (see WESTON, 1997).

Additional sediment volume will be collected for seven porewater analyses at six organotin bulk chemistry surface sediment sampling locations within this reach; the porewater samples will be analyzed for TAL metals and organotins.

Table 3-3 summarizes the surface sediment and porewater samples proposed to be collected from Reach C.

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3.1.3.2 Subsurface Sediment Sampling

Seven subsurface (0 to 152 cm) sediment core samples will be collected from seven of the surface sediment sampling stations within the boundaries of Reach C to evaluate the vertical extent of sediment contamination. Six of these subsurface sediment samples representing the 0 to 90 cm horizon will be analyzed for TAL metals, titanium, BNAs, PCBs, pesticides, organotins, TOC, and grain size. One of the seven subsurface sediment samples will be analyzed for TAL metals, BNAs, pesticides, TOC, and grain size. Sediment core samples representing the horizon between 90 and 152 cm will be archived for potential future analysis if the maximum depth of contamination cannot be established based on the upper analytical interval.

Table 3-3 summarizes the subsurface sediment samples proposed to be collected from Reach C.

3.1.4 River Reach D

3.1.4.1 Surface Sediment Sampling

A total of 41 surface (0 to 10 cm) sediment stations (for a total of 43 samples, including two duplicates) will be sampled within the boundaries of Reach D (RM 7.0 to RM 8.0; Figure 3-5). All surface sediment samples will be analyzed for TAL metals and BNAs. Facilities are present in Reach D that routinely handle(d) or manufacture(d) compounds containing BNAs, metals, and other organic chemicals (WESTON, 1997). Consequently, all surface sediment samples collected within this reach will be analyzed for these organic and inorganic chemicals. In addition, all surface sediment samples will be analyzed for TOC and grain size, which will be used in the interpretation of data.

A total of 14 of the surface sediment stations (for a total of 16 samples, including 2 duplicates) will be analyzed for pesticides to evaluate the potential distribution of these analytes in river sediment. A total of 12 of the surface sediment stations (for a total of 14 samples, including two duplicates) will also be analyzed for PCBs, and a total of 17 of the surface sediment stations (for a total of 19 samples, including two duplicates) will be analyzed for organotins and titanium. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile, as well as in areas where their handling or use has been documented (see WESTON, 1997).

Additional sediment volume will be collected for five porewater samples at five of the organotin bulk chemistry surface sediment sampling locations within this reach; the porewater samples will be analyzed for TAL metals and organotins.

Table 3-4 summarizes the surface sediment and porewater samples proposed to be collected from Reach D.

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3.1.4.2 Subsurface Sediment Sampling

Subsurface (0 to 152 cm) sediment core samples will be collected from nine of the surface sediment sampling stations (for a total of ten samples, including one duplicate) within the boundaries of Reach D to evaluate the vertical extent of sediment contamination. All subsurface sediment samples representing the 0 to 90 cm horizon will be analyzed for TAL metals, BNAs, TOC, and grain size. Seven subsurface sediment stations (for a total of 8 samples, including one duplicate) will also be analyzed for PCBs and pesticides, while six of the subsurface sediment samples will be analyzed for titanium and organotins. Sediment core samples representing the horizon between 90 and 152 cm will be archived for potential future analysis if the maximum depth of contamination cannot be established based on the upper analytical interval.

Table 3-4 summarizes the subsurface sediment samples proposed to be collected from Reach D.

3.1.5 River Reach E

3.1.5.1 Surface Sediment Sampling

A total of 32 surface (0 to 10 cm) sediment stations (for a total of 35 samples, including 3 duplicates) will be sampled within the boundaries of Reach E (RM 8.0 to RM 9.5; Figure 3-6). All surface sediment samples will be analyzed for TAL metals and BNAs. Facilities are present in Reach E that routinely handle(d) or manufacture(d) compounds containing BNAs and metals (WESTON, 1997). Consequently, all surface sediment samples collected within this reach will be analyzed for these organic and inorganic chemicals. In addition, all surface sediment samples will be analyzed for TOC and grain size, which will be used in the interpretation of data.

A total of five of the surface sediment stations (for a total of 8 samples, including 3 duplicates) will be analyzed for pesticides to evaluate the potential distribution of these analytes in river sediment. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile.

A total of 13 of the surface sediment stations (for a total of 16 samples, including 3 duplicates) will be analyzed for PCBs to evaluate the potential distribution of these analytes in river sediment. The analyses for these compounds will also be conducted on samples collected approximately every 0.5 river mile, as well as in areas where their handling or use has been documented (see WESTON, 1997).

In addition, 19 of the surface sediment stations (for a total of 22 samples, including 3 duplicates) collected near the boat maintenance facilities where painting or hull scraping activities have occurred will be analyzed for organotins and titanium to evaluate the potential distribution of these compounds in the Willamette River sediment. The analyses for these compounds will be conducted on samples collected approximately every 0.5 river mile, as well as in areas where their handling or use has been documented (see WESTON, 1997). Additional sediment volume will be

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collected for porewater analysis at six of these organotin bulk chemistry surface sediment sampling locations (for a total of seven samples, including one duplicate) within this reach; the porewater samples will be analyzed for TAL metals and organotins.

Table 3-5 summarizes the surface sediment and porewater samples proposed to be collected from Reach E.

3.1.5.2 Subsurface Sediment Sampling

Twelve subsurface (0 to 152 cm) sediment core samples will be collected from 12 of the surface sediment sampling locations within the boundaries of Reach E to evaluate the vertical extent of sediment contamination. All subsurface sediment samples representing the 0 to 90 cm horizon will be analyzed for TAL metals, BNAs, TOC, and grain size. Nine of the subsurface sediment samples will be analyzed for organotins and titanium, while eight subsurface samples will be analyzed for PCBs. Four subsurface sediment samples will be analyzed for pesticides. Sediment core samples representing the horizon between 90 and 152 cm will be archived for potential future analysis if the maximum depth of contamination cannot be established based on the upper analytical interval.

Table 3-5 summarizes the subsurface sediment samples proposed to be collected from Reach E.

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SECTION 4

METHODS AND PROCEDURES

4.1 SAMPLING AND ANALYTICAL METHODS

4.1.1 Surface Sediment Sampling

Surface (0 to 10 cm) sediment for chemical testing will be collected in accordance with Puget Sound Estuary Program (PSEP) protocols (PSEP, 1986 with updates). Samples will be collected using a modified 0.1 m^2 van Veen grab sampler. The sampler will be deployed from a sampling vessel of adequate size using a hydraulic winch system rigged to minimize the twisting forces on the sampler during deployment. The descent of the van Veen will be controlled by onboard personnel at a rate of approximately 1 ft/sec to minimize wake and probability of improper orientation upon contact with the bottom. Depth to sediment, station coordinates, and time will be recorded at the moment the grab sampling device contacts the bottom. The grab sampler will be retrieved at a rate of approximately 1 ft/sec to minimize potential disturbance of the sediment surface within the sampler.

Upon retrieval, the van Veen will be braced onboard in an upright position using wooden blocks. The access flaps will be opened and the overlying water will be slowly removed using a siphon. If excessive water leakage is evidenced by lack of an overlying water layer or excessive water turbidity is observed, the sample will be rejected prior to any additional characterization. For grab samples initially accepted based on minimal water leakage and turbidity, the condition of the collected sediment will be visually characterized per the following criteria to determine overall sample acceptability:

- Sediment is not pressed against the inside top of or extruding from the sampler.
- Sediment surface appears to be relatively undisturbed (i.e., flat with minimal winnowing).
- Minimum penetration depths are achieved:

  Medium-coarse sand - 4 to 5 cm
  Fine sand - 6 to 7 cm
  Silts/clays - 10 cm

Samples that do not meet any one of the above criteria will be rejected and the station will be re-sampled. Locations at which a 10-cm penetration depth cannot be consistently obtained due to the physical characteristics of the sediment will be represented by the maximum obtainable depth. Corrective actions that may be employed in the field to address potential sampler overfilling or

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consistent under-penetration include the removal or addition of weights or buoys to the van Veen to address these problems. After a grab sample is deemed acceptable, the following observations will be recorded on the field sample record forms (see Section 4.3):

- Sediment penetration depth (nearest 0.5 cm) based on sediment depth at the center of the grab.
- Physical characteristics of the surface sediment, including color, texture, presence of grit or paint chips, and presence and type of biological structures, other debris, sheens, or odors.
- Physical characteristics of the vertical profile, including changes in sediment characteristics and presence and depth of potential redox layers, or layers of sandblast grit or paint chips.

Sediment will be removed from the van Veen grab sampler using decontaminated stainless-steel spoons or trowels, placed in stainless-steel soup pots, and homogenized using a power drill fitted with a stainless-steel mixing paddle (necessary because of the relatively large volumes of sediment required for analyses and it ensures better mixing). All subsamples for laboratory analysis will be placed in labeled, laboratory-cleaned sample jars. Care will be taken to ensure that sediment in contact with the inside of the van Veen, as well as any large items of debris, are excluded from the samples for laboratory analysis.

At stations at which sediment will be collected for bulk sediment chemistry and conventionals, and porewater for both organotins and metals analyses, approximately four acceptable van Veen grabs (or about 8 liters of sediment) are anticipated to be required. This assumption is based on a collection volume of approximately 2 liters of sediment per grab, with 2 liters required for bulk sediment analyses and 6 liters of sediment required to obtain 1.5 liters of porewater (as a conservative estimate, porewater is assumed to constitute only 25 percent of the sediment volume). Where porewater analyses are limited to organotins, only two sediment grabs (4 liters less of sediment or 1 liter less of porewater) are estimated to be required. The number of van Veen grabs will be adjusted upward if, as previously described, consistent 10-cm grabs cannot be attained due to substrate composition.

4.1.2 Subsurface Sediment Sampling

Subsurface sediment sampling will be conducted using a 3-inch-diameter gravity corer. The gravity corer will be configured with a core barrel capable of recovering 5-foot cores (approximately 152 cm) and will weigh about 500 pounds when empty. The sampler will be deployed from a sampling vessel of adequate size using a hydraulic winch system rigged with swivel tackle to minimize the twisting forces on the sampler during deployment. Once the sampler is deployed, a winch capable of lifting approximately 2,500 pounds will be required to

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overcome the weight of the sediment in the sampler and the friction exerted on the sides of the core barrel.

It should be noted that gravity corer samplers tend to experience greater difficulty penetrating coarser sediment (e.g., sand). Because sediment grain size within the Willamette River tends to become increasingly coarser towards the mouth of the river, the subsurface sediment sampling phase will commence at the farthest downriver sampling locations (i.e., Reach A) to determine the potential limits of adequate sampler penetration and recovery. It is currently proposed that sediment collected from 0 to 90 cm (3.0 feet) be submitted for chemical analysis based on anticipated recovery depths and sediment volume requirements for laboratory analysis, and that the remaining sediment (i.e., 90 to 152 cm [5 feet]) be archived for potential future chemical analysis. However, if limited sediment penetration or recovery is consistently encountered at the downriver locations, then the proposed core interval for chemical analysis may be adjusted downward (e.g., from 0 to 60 cm or 2.0 feet). Such a contingency action would be implemented following consultation with the EPA Work Assignment Manager (WAM).

The descent of the gravity corer will be controlled by an onboard winch operator at a rate of approximately 1 ft/sec to minimize wake and probability of improper orientation upon contact with the bottom. Depth to sediment, station coordinates, and time will be recorded at the moment the gravity core sampling device contacts the bottom. The gravity corer will be retrieved at a rate of approximately 1 ft/sec to preserve the integrity of the sample (i.e., minimize the potential for washout).

Upon retrieval, the gravity core will be braced horizontally onboard by field personnel and stabilized with wooden blocks. The nosepiece and eggshell core catcher will be removed and a polyethylene cap will be placed over the bottom of the acetate core liner and secured with tape. The acetate core liner will then be removed from the core barrel and raised vertically with the bottom-side-down. A second polyethylene cap will be secured over the top of the core liner and the station number will be written on both the top of the cap and the side of the liner. Any overlying water will be drained by drilling a hole in the core liner slightly above the sediment/water interface. The depth to sediment from the top of the coring tube will be measured and recorded. Collected cores will be fixed vertically to a secured point on the sampling vessel (e.g., a railing or bulkhead) with heavy gauge rope for temporary storage until processing.

Core processing will be conducted either onboard the sampling vessel or at an onshore location with adequate facilities. Sediment from each core will be extruded onto a decontaminated 5-foot stainless-steel tray by elevating the tube at an angle. If sediment is seized within the liner due to over-compaction and/or coarse grain size, the liner will be tapped with a rubber mallet to loosen the sediment from the core liner. Care will be taken to ensure that samples are extruded as slowly as possible to maintain the cylindrical form of the core. Once the core sediment is extruded onto the tray, the following observations will be recorded on the field sample record forms (see Section 4.3):

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- Physical characteristics of the subsurface sediment, including color, texture, presence of anthropogenic material (e.g., sandblast grit, paint chips), and presence and type of biological structures, other debris, sheens, or odors.

- Physical characteristics of the vertical profile, including changes in sediment characteristics and presence and depth of potential redox layers or layers of product, sandblast grit, or paint chips.

Sediment will be removed from the stainless steel tray using decontaminated stainless-steel spoons or trowels, placed in 60-quart stainless-steel container, and homogenized using an electric drill fitted with a stainless-steel mixing paddle. All samples will be placed in labeled, laboratory-cleaned sample jars. Care will be taken to ensure that any large items of debris are excluded from all samples.

Sediment collected from the 0- to 90-cm interval with be analyzed for bulk sediment chemistry per Section 3, and conventionals, which will require approximately 2 liters of sediment. It is anticipated that only one core will be required to be collected at each station to meet this volume requirement, as 3 feet of sediment in a 3-inch core provides approximately 5.5 liters of sediment.

4.1.3 Station Positioning Requirements

A differential global positioning system (DGPS) is the preferred surveying system for samples collected from a sampling vessel. The DGPS consists of a GPS receiver mounted at a fixed point (e.g., top of A-frame or sampling platform) on the vessel and a differential receiver located at a horizontal control point. At the control point, the GPS position is compared to the known horizontal location. Offsets or biases are identified and used to develop correction factors, which are sent to the GPS receiver located on the vessel. DGPS is typically accurate to within 1 to 3 meters, depending on satellite position. The GPS provides the operator with a listing of time intervals during the day when accuracies are decreased, so these periods can be avoided, if possible. If DGPS is not available, a hand-held GPS unit (if available from EPA) will be used to document station positions. The accuracy of this system is several hundred feet.

The exact locations of the proposed subtidal sampling locations will be determined in the field based on visual markers, such as shoreline features and channel markers, and depth to bottom (for targeting sideslope and channel stations), which will be measured using an onboard fathometer. Bottom depths will be tidally corrected in the field. Once "on-station," the DGPS will be used to record actual station positions. It is anticipated that these data will be reported in State Plane Coordinates; latitude and longitude will also be reported, if the sampling vessel contractor has this capability.

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4.2 SAMPLE HANDLING, PACKAGING, AND SHIPMENT

4.2.1 Sample Containers

To preserve sample integrity, proper sample containers will be used for parameters designated in this program. Precleaned sample containers will be obtained from the analytical laboratory or a scientific supply vendor. Containers will be precleaned per the requirements in EPA guidance documents (EPA, 1989).

Container requirements vary according to analyte, sample matrix, and hazard classification. It is anticipated that samples collected for the project will be low hazard. Table 4-1 summarizes the type and number of sample containers required for the sampling program.

4.2.2 Sample Packaging

Custody seals and completed EPA sample tags will be placed on each sample container. Sample containers will then be placed in a resealable plastic bag and placed in an appropriate shipping container (steel-belted cooler) lined with a polyethylene bag. Sufficient vermiculite will be added to prevent breakage of sample containers and to absorb spills in the event of breakage. Double-bagged ice will be placed on top of the vermiculite if cooling is required for sample preservation. The polyethylene bag will then be twisted shut and secured. Region X Field Sample Data Sheets, Chain-of-Custody forms, Contract Laboratory Program (CLP) Traffic Report forms, and any other pertinent sample documentation will be placed in a resealable plastic bag and taped to the inside cover of the cooler. Custody seals will be placed on the front and back of the cooler, and the cooler will be taped shut.

4.2.3 Sample Shipment

Shipping and handling of samples will be done in a manner that protects both the sample integrity and shipment handlers from the possible hazardous nature of the samples. Samples will be shipped by Federal Express Priority One air service. Packaging, marking, labeling, and shipping of samples will comply with regulations promulgated by the International Air Transport Association regulations. Detailed requirements are discussed in the CLP User's Guide (EPA, 1991).

WESTON will establish an account to provide return delivery of coolers from the laboratories. Return delivery will be by surface transport, if possible. Written return shipping instructions will be provided to the laboratory when samples are delivered, specifying carrier names and account numbers for return of coolers.

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4.3 DOCUMENTATION

4.3.1 Field Documentation

All pertinent field information will be recorded in ink in a bound logbook. At a minimum, the following information will be recorded in the daily logbook:

- Date and time of entry (24-hour clock)
- Project name and location
- Project number
- Time and duration of daily sampling activities
- Weather conditions
- Variations, if any, from required sampling protocols and reasons for deviations
- Name of person making field entries and other field personnel
- On-site visitors, if any
- General methods of sample collection
- Levels of personal protection
- Any other observations useful in reconstructing field activities.

Field sample records specific to each type of sampling activity will also be maintained by field personnel. An example sediment collection field form is provided in Appendix A. Additional information that will be documented on these field sample records includes sample numbers and station identifiers, and for sediment collected from a sampling vessel, the name of the sampling vessel and subcontractor, actual sample coordinates, tidal information, the depth to sediment (i.e., water depths and tidally corrected mudline elevations), and the observations described in Sections 4.1.1 and 4.1.2.

Sample documentation forms for laboratory analyses will be obtained through the EPA Regional Sample Control Coordinator (RSCC).

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4.3.2 Sample Designation and Labeling

All samples collected will be assigned a unique WESTON identification code based on a consistent sample designation scheme. The sample designation scheme is designed to suit the needs of the field staff, data management and data users.

All samples will consist of four components separated by a dash. These components are site ID, media code, station code, and sample type. The sample designation scheme is as follows:

Site ID		Media Code		Station Code		Sample Type
SS	-	MM	-	SSsss	-	t ddd I

The four components are described in the following sections.

Site ID

The site ID component is a two-letter code that designates the specific Site Investigation sample. The site ID code assigned for this investigation is WR for Willamette River.

Media Code

The media code is a two-character code that defines the media type of the sample. The media codes designated for this project are as follows:

SD - Sediment

PW - Porewater (Note: Porewater will be extracted from surface sediments by the contracted laboratory, but the sediments designated for extraction will be assigned the "PW" media code in the field.)

Station Code

The station code component is a five character code that uniquely identifies the sampling station. The two-character "SS" code assigned for this investigation is "SD," followed by a three-digit "sss" numbering scheme (e.g., 001, 002, etc.).

Sample Type

The sample type component has three parts: a sample type field "t," a sample depth field "ddd, " and a core sample field "i." The single character "t" indicates a sample type having one of the following two values:

0 - Field sample
1 - Field duplicate

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The three-character "ddd" is a depth indicator, where the sample collection depth is represented by the top of the sampling interval in tenths of feet.

The "i" field is a single-digit component that will be used for sediment core samples collected from the same station as surface (0 to 10 cm) sediments. The letter "A" will be assigned to core samples representing the top interval sampled (e.g., 0 to 3 feet).

Examples

Examples of complete sample numbers with descriptions are as follows:

WR-SD-SD004-0000: A surface (0 to 10 cm) sediment sample collected from Station SD014.

WR-SD-SD017-1000: A duplicate surface (0 to 10 cm) sediment sample collected from Station SD017.

WR-PW-SD020-0000: A surface sediment porewater sample collected from Station SD020.

WR-SD-SD004-0000A: A subsurface sediment sample (representing the subsurface horizon starting at 0 foot) collected from Station SD004.

4.3.3 Chain-of-Custody Procedures

Sample custody is a critical aspect of environmental investigations, particularly when the data may be used in litigation. The possession and proper handling of samples must be traceable from the time the samples are collected until the data have been accepted for analysis so that re-analyzes may be conducted without concern for possible introduction of contaminants.

The purpose of custody procedures is to provide a documented, legally defensible record that can be used to follow the possession and handling of a sample from collection through analysis. A sample is in custody if it is:

- In someone's physical possession or view, and/or
- Secured to prevent tampering, and/or
- Secured in an area restricted to authorized personnel.

4.3.3.1 Field Custody Procedures

Sample control and chain-of-custody procedures in the field and during shipment will be performed in accordance with the procedures in the CLP User's Guide (EPA, 1991).

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Each sample will be assigned a unique identifying number. Labels will be filled out in waterproof ink prior to sample collection to minimize container handling. Sample label and chain-of-custody forms will include the following information:

- Name of sampler
- Date and time of sample collection
- Sample number
- Sample matrix and how collected (i.e., grab, composite)
- Preservation method
- Analyses required

Sample documentation forms for laboratory analyses will be obtained through the EPA RSCC. Examples of sample documentation forms were provided in Appendix B of the QAPP (WESTON, 1994). Internal WESTON sample names will not be placed on the chain of custodies or sample bottles.

4.3.3.2 Laboratory Custody Procedures

Laboratories supporting this project shall have custody procedures commensurate with the EPA Region X Manchester Laboratory SOP, the EPA Contract Laboratory Program Statement of Work (CLP SOW), or Special Analytical Services Basic Ordering Agreement (SAS BOA). These procedures document and describe the acceptance, internal transfer, and final reporting of samples.

4.4 EQUIPMENT DECONTAMINATION

Equipment decontamination will be required to prevent contamination of clean areas and cross-contamination of samples, and to maintain the health and safety of field personnel. Decontamination of all sampling equipment will be required.

Dedicated or disposable sampling equipment will be used when feasible to reduce the possibility of sample cross-contamination. WESTON will attempt to have sufficient sampling equipment available to allow for decontamination at the end of each day rather than between individual samples; however, some equipment, such as the van Veen grab sampler, will require decontamination between each sampling location. Equipment that cannot be effectively decontaminated (e.g., siphon tubing) will be disposed of after each sampling event. Equipment that is likely to require field decontamination includes, but is not limited to:

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- Stainless-steel trowels and spoons
- Stainless-steel mixing bowls and soup pots
- van Veen grab sampler
- Acetate core liners
- Stainless-steel mixing paddle

The field decontamination procedure for sampling equipment such as those items listed above will consist of the following steps:

1. Liquinox detergent wash (or some other non-phosphate detergent)
2. Tap or seawater rinse
3. Deionized water rinse
4. Air dry, if possible, away from potential sources of contamination (e.g., splashes)
5. Wrap or cover in aluminum foil (shiny side out)
6. Store in plastic bags (when possible)

Solvents (i.e., methanol and hexane) will be available for use in the decontamination process if sticky residues are encountered. If used, solvent rinses would occur between steps (2) and (3) listed above.

4.5 INVESTIGATION-DERIVED WASTE

All efforts will be made to minimize investigation-derived waste (IDW) that cannot be disposed of as solid waste. Disposal of personal protective equipment and disposable sampling equipment will be double-bagged and treated as solid waste. Decontamination water containing methanol and hexane will be considered hazardous waste. To minimize generation of hazardous decontamination water, it will be used sparingly and separated from non-hazardous decontamination water (e.g., containing only Alconox). All hazardous IDW will be handled and disposed of in an EPA-approved manner.

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SECTION 5

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Field and laboratory quality assurance/quality control (QA/QC) will be based on the EPA-approved QAPP (WESTON, 1994).

5.1 FIELD QA/QC SAMPLES

Field QC samples will consist of sample duplicates. Field duplicate samples are designed to monitor overall sampling and analytical precision. Blind field duplicates will consist of an homogenized sample that is split into two sample aliquots. Field duplicate frequency will be 5 percent of each matrix collected or once per sampling event, whichever is more frequent. Samples will be assigned unique numbers and will not be identified as duplicates to the laboratory. Table 5-1 presents field QA/QC samples to be collected.

5.2 LABORATORY QA/QC SAMPLES

The quality of analytical data is controlled by the frequency and type of internal quality control checks developed for each analysis type. Laboratory results will be evaluated by reviewing results for analysis of method blanks, matrix spikes, duplicate samples, laboratory control samples, calibrations, performance evaluation samples, interference checks, etc., as specified in analytical methods.

5.2.1 Method Blanks

Method blanks usually consist of laboratory reagent-grade water treated in the same manner as the sample (e.g., digested, extracted, distilled, etc.) then analyzed and reported as a standard sample. The analysis of method blanks serves as a check on reagents and equipment to ensure that they are contaminant-free.

5.2.2 Surrogate Compound Recovery

Surrogate compounds are organic compounds similar to the analytes of interest in chemical composition, extraction and chromatographic properties, but are not normally found in environmental samples. These compounds are spiked into laboratory samples for VOC, BNA, and PCB analyses. Percent recoveries are calculated for each surrogate compound in each sample. These recoveries give an indication of the accuracy of the analytical method.

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5.2.3 Matrix Spikes

A matrix spike is an aliquot of a field sample that is fortified (spiked) with the analytes of interest and analyzed with an associated sample batch to monitor the effects of the field sample matrix (matrix effects) on the analytical method.

Samples for matrix spike and matrix spike duplicate analysis will be designated by the WESTON field coordinator. QC samples will be selected based on visual and field monitoring results. An effort will be made to ensure that QC samples are representative of the samples analyzed (i.e., the most contaminated or cleanest samples will not be selected).

5.2.4 Laboratory Duplicate Samples

Duplicate samples are obtained by splitting a field sample into two separate aliquots in the laboratory and performing two separate analyses on the aliquots. The analysis of laboratory duplicates monitors sample precision.

Samples for laboratory duplicate analysis will be designated by the WESTON field coordinator. QC samples will be selected based on visual and field monitoring results. An effort will be made to ensure that QC samples are representative of the samples analyzed (i.e., the most contaminated or cleanest samples will not be selected).

5.2.5 Laboratory Control Samples

A laboratory control sample is identified to the analyst so that it is used to check the accuracy of an analytical procedure. It is particularly applicable when a minor revision or adjustment has been made to the analytical procedure or instrument. Known samples are usually analyzed along with blind samples to monitor performance. Continuing calibration verification analysis may be used as a laboratory control when specified by the analytical method.

5.3 QUANTITATION LIMITS

Quantitation limit goals for the sediment and porewater sampling events are presented in Tables 5-2 and 5-3, respectively. Actual analyte detection limits are matrix- and sample-dependent and may be higher depending upon sample moisture content, analytical interferences, and any required sample dilutions. The laboratories will make best efforts to achieve quantitation limit goals. Additional sample cleanup steps or method modifications may be required in some cases. The quantitation limits were selected to ensure that data could be directly compared with existing sediment and porewater screening values.

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SECTION 6

HEALTH AND SAFETY

Prior to beginning field work for this project, a detailed project-specific Health and Safety Plan (HASP) will be prepared by WESTON. This plan will detail all the chemical, physical, and biological hazards that may be encountered while on-site performing the tasks outlined in this plan.

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SECTION 7

SCHEDULE

Figure 7-1 provides the schedule for the Willamette River SIs.

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SECTION 8

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Table 3-1—Reach A Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
Surface and Subsurface Sediment											
WR-SD-SD001 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD002 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD003 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD004 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD005 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD006 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD007 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD008 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD009 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD010 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD011 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD012 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD013 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD014 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD015 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD016 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD017 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD018 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD019 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD020 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD020 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD021 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD022 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD023 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD024 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD025 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD026 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD027 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD028 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD029 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD030 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD031 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X

Table 3-1—Reach A Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
WR-SD-SD032 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD033 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD034 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD035 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
Subsurface Sediment											
WR-SD-SD001 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD004 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD012 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD015 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD016 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD022 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD031 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD035 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
Sediment Porewater											
WR-PW-SD001 -0000	see SD-SD001	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD004 -0000	see SD-SD004	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD011 -0000	see SD-SD011	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD012 -0000	see SD-SD012	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD020 -0000	see SD-SD020	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD021 -0000	see SD-SD021	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD034 -0000	see SD-SD034	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD035 -0000	see SD-SD035	0 - 10 cm[a]	< -2	X					X		

[a]Sediment sampling depth from which porewater will be extracted.

[b]90-152cm sediment horizon to be archived.

Sample numbers ending in 1000 are duplicate samples.

SCOEPA00028943

Table 3-2—Reach B Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis: TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
Surface Sediment											
WR-SD-SD036 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD037 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD038 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD039 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD040 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD041 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD042 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD043 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD044 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD045 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD046 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD047 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD048 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD048 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD049 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD050 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD051 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD052 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD053 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD054 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD055 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD056 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
Subsurface Sediment											
WR-SD-SD048 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD048 -1000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD049 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD054 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD055 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
Sediment Porewater											
WR-PW-SD048 -0000	see SD-SD048	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD049 -0000	see SD-SD049	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD051 -0000	see SD-SD051	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD053 -0000	see SD-SD053	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD054 -0000	see SD-SD054	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD055 -0000	see SD-SD055	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD056 -0000	see SD-SD056	0 - 10 cm[a]	< -2	X					X		

[a]Sediment sampling depth from which porewater will be extracted.
[b]90-152cm sediment horizon to be archived.
Sample numbers ending in 1000 are duplicate samples.

SCOEPA00028944

Table 3-3—Reach C Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
Surface Sediment											
WR-SD-SD057 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD058 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD059 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD060 -0000	Willamette River	0 - 10 cm	< -2	X		X			X	X	X
WR-SD-SD061 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD062 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD063 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD064 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD065 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD066 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD067 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD068 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD069 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD070 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD070 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD071 -0000	Willamette River	0 - 10 cm	< -2	X		X			X	X	X
WR-SD-SD072 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD073 -0000	Willamette River	0 - 10 cm	< -2	X		X			X	X	X
WR-SD-SD074 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD075 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD076 -0000	Willamette River	0 - 10 cm	< -2	X		X			X	X	X
WR-SD-SD077 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD078 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
Subsurface Sediment											
WR-SD-SD057 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD058 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD066 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD072 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD074 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD077 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD078 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X		X		X	X
Sediment Porewater											
WR-PW-SD057 -0000	see SD-SD057	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD058 -0000	see SD-SD058	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD064 -0000	see SD-SD064	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD070 -0000	see SD-SD070	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD074 -0000	see SD-SD074	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD074 -1000	see SD-SD074	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD077 -0000	see SD-SD077	0 - 10 cm[a]	< -2	X					X		

[a]Sediment sampling depth from which porewater will be extracted.

[b]90-152cm sediment horizon to be archived.

Sample numbers ending in 1000 are duplicate samples.

Table 3-4—Reach D Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
Surface Sediment											
WR-SD-SD079 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD080 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD081 -0000	Willamette River	0 - 10 cm	< -2	X		X	X	X		X	X
WR-SD-SD082 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD083 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD084 -0000	Willamette River	0 - 10 cm	< -2	X		X	X	X		X	X
WR-SD-SD085 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD086 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD087 -0000	Willamette River	0 - 10 cm	< -2	X		X	X	X		X	X
WR-SD-SD088 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD089 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD090 -0000	Willamette River	0 - 10 cm	< -2	X		X	X	X		X	X
WR-SD-SD091 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD092 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD092 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD093 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD094 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD095 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD096 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD097 -0000	Willamette River	0 - 10 cm	< -2	X		X		X		X	X
WR-SD-SD098 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD099 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD100 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD101 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD102 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD103 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD104 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD105 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD106 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD107 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD108 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD109 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD110 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD111 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X

Table 3-4—Reach D Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
WR-SD-SD112 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD113 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD114 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD115 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD116 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD117 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD117 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD118 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD119 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
Subsurface Sediment											
WR-SD-SD084 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X	X	X		X	X
WR-SD-SD084 -1000A	Willamette River	0 - 90 cm[b]	< -2	X		X	X	X		X	X
WR-SD-SD090 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X	X	X		X	X
WR-SD-SD092 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD096 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD100 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD102 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X			X	X	X
WR-SD-SD106 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD116 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD117 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
Sediment Porewater											
WR-PW-SD089 -0000	see SD-SD089	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD096 -0000	see SD-SD096	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD102 -0000	see SD-SD102	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD106 -0000	see SD-SD106	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD116 -0000	see SD-SD116	0 - 10 cm[a]	< -2	X					X		

[a]Sediment sampling depth from which porewater will be extracted.

[b]90-152cm sediment horizon to be archived.

Sample numbers ending in 1000 are duplicate samples.

SCOEPA00028947

Table 3-5—Reach E Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
Surface Sediment											
WR-SD-SD120 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD121 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD122 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD123 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD124 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD125 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD126 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD127 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD128 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD129 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD130 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD131 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD132 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD133 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X		X	X	X
WR-SD-SD134 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD135 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD136 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD137 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD137 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD138 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD139 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD140 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD141 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD141 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD142 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD143 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD144 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD145 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD146 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X
WR-SD-SD147 -0000	Willamette River	0 - 10 cm	< -2	X	X	X			X	X	X

SCOEPA00028948

Table 3-5—Reach E Sampling Locations and Analyses

Sample Number	Location	Sample Depth (bgs)	Elevation (ft MLLW)	Analysis							
				TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size
WR-SD-SD148 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD149 -0000	Willamette River	0 - 10 cm	< -2	X		X				X	X
WR-SD-SD150 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD151 -0000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
WR-SD-SD151 -1000	Willamette River	0 - 10 cm	< -2	X	X	X	X	X	X	X	X
Subsurface Sediment											
WR-SD-SD120 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD122 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X		X	X	X
WR-SD-SD125 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X		X	X	X
WR-SD-SD127 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X		X	X	X
WR-SD-SD133 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X		X	X	X
WR-SD-SD135 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD136 -0000A	Willamette River	0 - 90 cm[b]	< -2	X		X				X	X
WR-SD-SD138 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD141 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD143 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X			X	X	X
WR-SD-SD150 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
WR-SD-SD151 -0000A	Willamette River	0 - 90 cm[b]	< -2	X	X	X	X	X	X	X	X
Sediment Porewater											
WR-PW-SD125 -0000	see SD-SD125	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD128 -0000	see SD-SD128	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD130 -0000	see SD-SD130	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD133 -0000	see SD-SD133	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD143 -0000	see SD-SD143	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD146 -0000	see SD-SD146	0 - 10 cm[a]	< -2	X					X		
WR-PW-SD146 -1000	see SD-SD146	0 - 10 cm[a]	< -2	X					X		

[a]Sediment sampling depth from which porewater will be extracted.

[b]90-152cm sediment horizon to be archived.

Sample numbers ending in 1000 are duplicate samples.

SCOEPA00028949

Table 4-1—Sample Containers, Preservation, and Holding Times

Analysis	Matrix	Containers[a]		Preservation	Holding Time[b]
		Field	Lab		
TAL Metals, Titanium	Sediment	1 - 4 oz. glass	1 - 4 oz. glass	None	6 months (28 days Hg)
	Porewater	2 - 2 gallon HDPE buckets (sediment)	1 - 1 L polyethylene (extracted porewater)	HNO_3 to ph < 2 (lab)	
TCL Semivolatiles, PCBs	Sediment	1 - 8 oz. glass	1 - 8 oz. glass	Cool to 4° C	Extraction = 7 days Analysis = 40 days
Organotins	Sediment	1 - 8 oz. glass	1 - 8 oz. glass	Cool to 4° C	14 days
	Porewater	2 - 2 gallon HDPE buckets (sediment)	1 - 1 L polycarbonate (extracted porewater)	Cool to 4° C	7 days
Total Organic Carbon	Sediment	1 - 4 oz. glass	1 - 4 oz. glass	Cool to 4° C	14 days
Grain Size	Sediment	1 - 16 oz. glass	1 - 16 oz. glass	None	Not specified

[a]All glass containers will be wide-mouth.
[b]Holding times are from date of sample collection.

Table 5-1—QA/QC Sample Types and Analyses

Sample Number	TAL Metals	Titanium	BNAs	PCBs	Pest.	Organo-tins	TOC	Grain Size	Purpose
Surface Sediment									
WR-SD-SD020-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD048-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD070-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD092-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD117-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD137-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD141-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
WR-SD-SD151-1000	X	X	X	X	X	X	X	X	Sediment field duplicate
Subsurface Sediment									
WR-SD-SD048-1000A	X	X	X	X	X	X	X	X	Subsurface sediment field duplicate
WR-SD-SD084-1000A	X		X	X	X		X	X	Subsurface sediment field duplicate
Sediment Porewater									
WR-PW-SD074-1000	X					X			Porewater field duplicate
WR-PW-SD146-1000	X					X			Porewater field duplicate

SCOEPA00028951

Table 5-2–Analytical Methods, Parameters, and Quantitation Limits for Sediment Samples

Analyte	QL Goals	Reference Method
Inorganics (mg/kg dry weight)		
Aluminum	40	6010
Antimony	5	6010
Arsenic	5	6010/7060A
Barium	40	6010
Beryllium	1	6010
Cadmium	0.2	6010
Calcium	1000	6010
Chromium	0.5	6010
Cobalt	10	6010
Copper	0.2	6010
Iron	20	6010
Lead	2	6010
Magnesium	1000	6010
Manganese	5	6010
Mercury	0.05	7471A
Nickel	1	6010
Potassium	1000	6010
Selenium	15	6010/7740
Silver	1	6010/7761
Sodium	1000	6010
Thallium	5	6010/7841
Titanium	1	6010
Vanadium	10	6010
Zinc	5	6010
Semivolatile Organics (µg/kg dry weight)		
PAHs		
phenol	20	8270 - PSEP
bis(2-chloroethyl)ether	40	8270 - PSEP
2-chlorophenol	20	8270 - PSEP
1,3-dichlorobenzene	20	8270 - PSEP
1,4-dichlorobenzene	20	8270 - PSEP
1,2-dichlorobenzene	20	8270 - PSEP
2-methylphenol	20	8270 - PSEP
2,2'-oxybis(1-chloropropane)	40	8270 - PSEP
4-methylphenol	20	8270 - PSEP
N-nitroso-di-n-propylamine	40	8270 - PSEP
hexachloroethane	20	8270 - PSEP
nitrobenzene	20	8270 - PSEP
isophorone	20	8270 - PSEP
2-nitrophenol	20	8270 - PSEP
2,4-dimethylphenol	20	8270 - PSEP
bis(2-chloroethoxy)methane	40	8270 - PSEP
2,4-dichlorophenol	20	8270 - PSEP
1,2,4-trichlorobenzene	20	8270 - PSEP
naphthalene	20	8270 - PSEP
4-chloroaniline	20	8270 - PSEP
hexachlorobutadiene	20	8270 - PSEP
4-chloro-3-methylphenol	20	8270 - PSEP
2-methylnaphthalene	20	8270 - PSEP
hexachlorocyclopentadiene	20	8270 - PSEP
2,4,6-trichlorophenol	20	8270 - PSEP
2,4,5-trichlorophenol	20	8270 - PSEP
2-chloronaphthalene	20	8270 - PSEP

SCOEPA00028952

Table 5-2–Analytical Methods, Parameters, and Quantitation Limits for Sediment Samples

Analyte	QL Goals	Reference Method
2-nitroaniline	20	8270 - PSEP
dimethylphthalate	20	8270 - PSEP
acenaphthylene	20	8270 - PSEP
2,6-dinitrotoluene	20	8270 - PSEP
3-nitroaniline	20	8270 - PSEP
acenaphthene	20	8270 - PSEP
2,4-dinitrophenol	20	8270 - PSEP
4-nitrophenol	20	8270 - PSEP
dibenzofuran	20	8270 - PSEP
2,4-dinitrotoluene	20	8270 - PSEP
diethylphthalate	20	8270 - PSEP
4-chlorophenyl-phenylether	20	8270 - PSEP
fluorene	20	8270 - PSEP
4-nitroaniline	20	8270 - PSEP
4,6-dinitro-2-methylphenol	20	8270 - PSEP
N-nitrosodiphenylamine	40	8270 - PSEP
4-bromophenyl-phenylether	40	8270 - PSEP
hexachlorobenzene	20	8270 - PSEP
pentachlorophenol	20	8270 - PSEP
phenathrene	20	8270 - PSEP
anthracene	20	8270 - PSEP
carbazole	20	8270 - PSEP
di-n-butylphthalate	20	8270 - PSEP
fluoranthene	20	8270 - PSEP
pyrene	20	8270 - PSEP
butylbenzylphthalate	20	8270 - PSEP
3,3'-dichlorobenzidine	40	8270 - PSEP
benzo(a)anthracene	20	8270 - PSEP
chrysene	20	8270 - PSEP
bis(2-ethylhexyl)phthalate	20	8270 - PSEP
di-n-octylphthalate	20	8270 - PSEP
benzo(b)fluoranthene	20	8270 - PSEP
benzo(k)fluoranthene	20	8270 - PSEP
benzo(a)pyrene	20	8270 - PSEP
indeno(1,2,3-cd)pyrene	20	8270 - PSEP
dibenz(a,h)anthracene	20	8270 - PSEP
benzo(g,h,i)perylene	20	8270 - PSEP
PCBS (µg/kg dry weight)		
Aroclor 1016	20	8081 - PSEP
Aroclor 1221	40	8081 - PSEP
Aroclor 1232	20	8081 - PSEP
Aroclor 1242	20	8081 - PSEP
Aroclor 1248	20	8081 - PSEP
Aroclor 1254	20	8081 - PSEP
Aroclor 1260	20	8081 - PSEP
Pesticides (µg/kg dry weight)		
Aldrin	1	8081 - PSEP
a–BHC	1	8081 - PSEP
b–BHC	1	8081 - PSEP
g–BHC (Lindane)	1	8081 - PSEP
alpha-chlordane	1	8081 - PSEP
gamma-chlordane	1	8081 - PSEP
Dieldrin	2	8081 - PSEP

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Table 5-2–Analytical Methods, Parameters, and Quantitation Limits for Sediment Samples

Analyte	QL Goals	Reference Method
Endrin	2	8081 - PSEP
Endosulfan	1	8081 - PSEP
Endosulfan II	2	8081 - PSEP
Endosulfan sulfate	2	8081 - PSEP
Methoxychlor	1	8081 - PSEP
Endrin ketone	2	8081 - PSEP
Endrin aldehyde	2	8081 - PSEP
Toxaphene	10	8081 - PSEP
Hexachlorobenzene	2	8270 - PSEP
Heptachlor	1	8081 - PSEP
Heptachlor epoxide	1	8081 - PSEP
Mirex	2	8081 - PSEP
4,4'-DDT	2	8081 - PSEP
4,4'-DDD	2	8081 - PSEP
4,4'-DDE	2	8081 - PSEP
Organotins (µg/kg dry weight)		
Monobutyltin	10	PSEP
Dibutyltin	10	PSEP
Tributyltin[c]	5	PSEP
Tetrabutyltin	10	PSEP
Physical and Conventional Parameters		
Grain size	0.01%	ASTM D-442-63/PSEP
Total Organic Carbon	200 mg/kg	9060-PSEP mod

QL - Quantitation Limit.

SCOEPA00028954

Table 5-3–Analytical Methods, Parameters, and Quantitation Limits for Porewater Samples

Analyte	QL Goals	Reference Method	US EPA Ambient Water Quality Criteria Freshwater Chronic	Oregon State Ambient Water Quality Criteria Freshwater Chronic
Inorganics (µg/L)				
Aluminum	200	6010 / CLP	--	--
Antimony	60[d]	6010 / CLP	30[c]	1600[b]
Arsenic	10	6010 / CLP	190	190
Barium	200	6010 / CLP	--	--
Beryllium	5	6010 / CLP	5.3[b]	5.3[b]
Cadmium	5[d]	6010 / CLP	1.1+	1.1+
Calcium	5000	6010 / CLP	--	--
Chromium	10	6010 / CLP	210+	210+
Cobalt	50	6010 / CLP	--	--
Copper	2	6010	12+	12+
Lead	3	6010 / CLP	3.2+	3.2+
Magnesium	5000	6010 / CLP	--	--
Manganese	15	6010 / CLP	--	--
Mercury	0.1[d]	7471A	0.012	0.012
Nickel	10	6010	160+	160+
Potassium	5000	6010 / CLP	--	--
Selenium	5	6010 / CLP	5	35
Silver	0.2[d]	7761	0.12	0.12
Sodium	5000	6010 / CLP	--	--
Thallium	40	6010 / CLP	40[b]	40[b]
Vanadium	50	6010 / CLP	--	--
Zinc	20	6010 / CLP	110+	110+
Organotins (µg/L)				
Monobutyltin	0.10	PSEP	--	--
Dibutyltin	0.05	PSEP	--	--
Tributyltin[a]	0.020	PSEP	--	--
Tetrabutyltir	0.05	PSEP	--	--

[a]As described in Section 5.3, proposed lower and upper level screening values for tributyltin are 0.02 ug TBT/L and 0.05 ug TBT/L, respectively.

[b]Insufficient data to develop criterion; value presented is the Lowest Observed Effect Level (LOEL)

[c]Proposed criterion.

+ Hardness dependent criteria (100 mg/l used).

[d]Detection limit exceeds one or more screening criteria.

QL - Quantitation Limit.

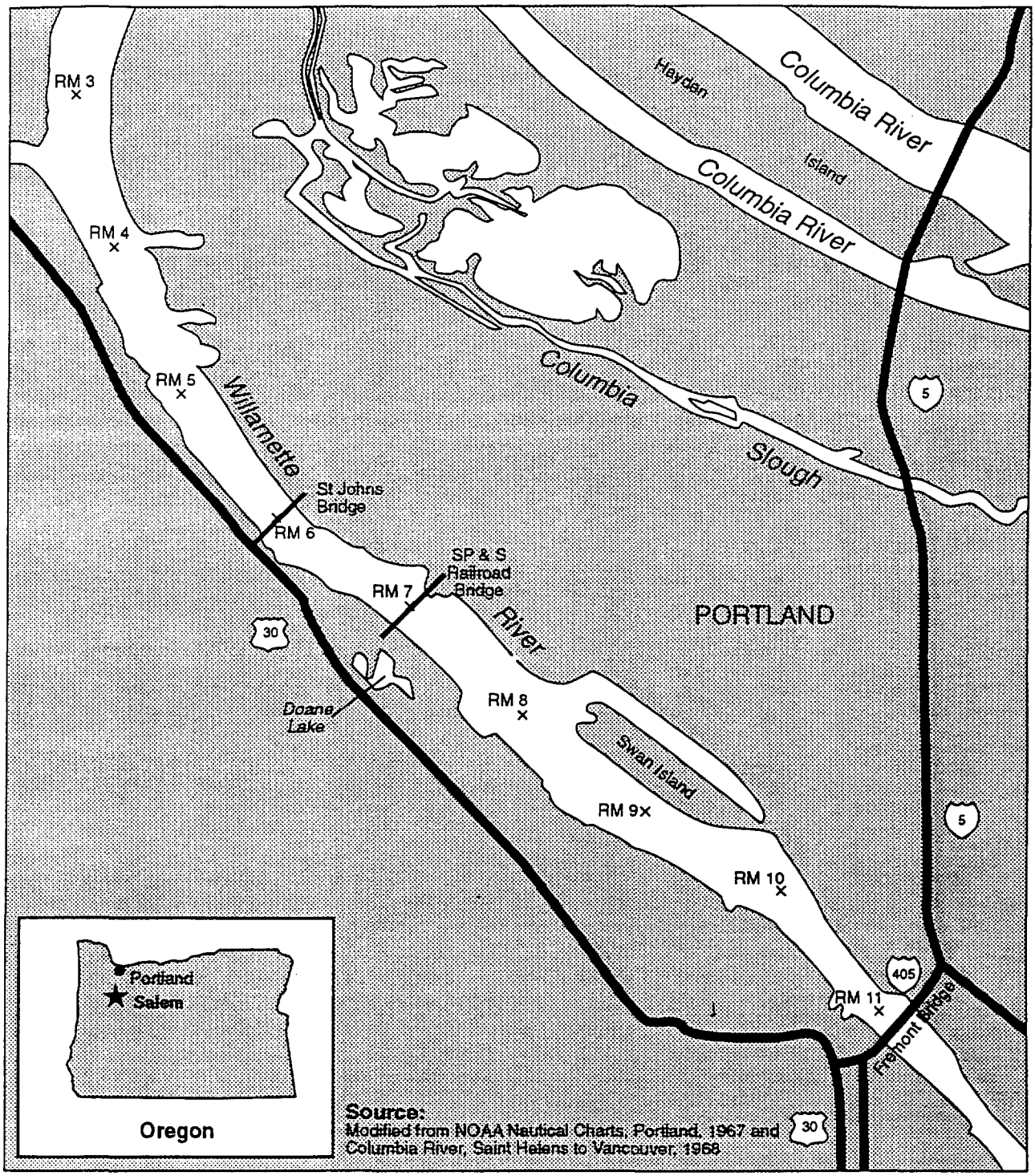
AWQC - Ambient Water Quality Criteria.

-- Not available.

SCOEPA00028955

FIGURES

SCOEPA00028956



EXPLANATION

RM 1 × River Mile Marker with Identification

Willamette River Site Investigation Vicinity Map

N

0 1/2 1

Scale in Miles

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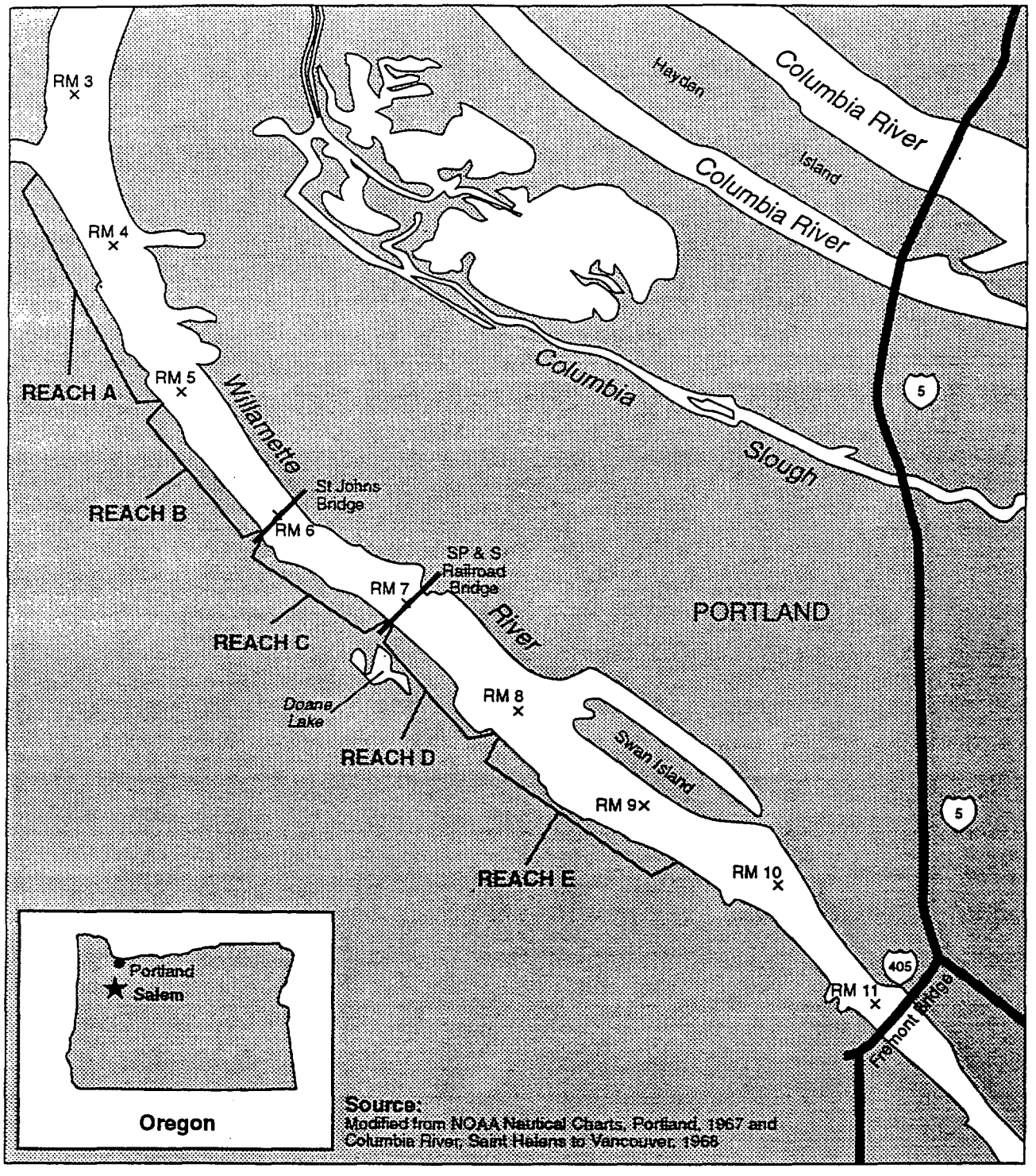
MANAGERS DESIGNERS/CONSULTANTS

97-517 Fig1-1.fh7

FIGURE

1-1

SCOEPA00028957



EXPLANATION

RM 1 × River Mile Marker with Identification

0 1/2 1

Scale in Miles

WESTON

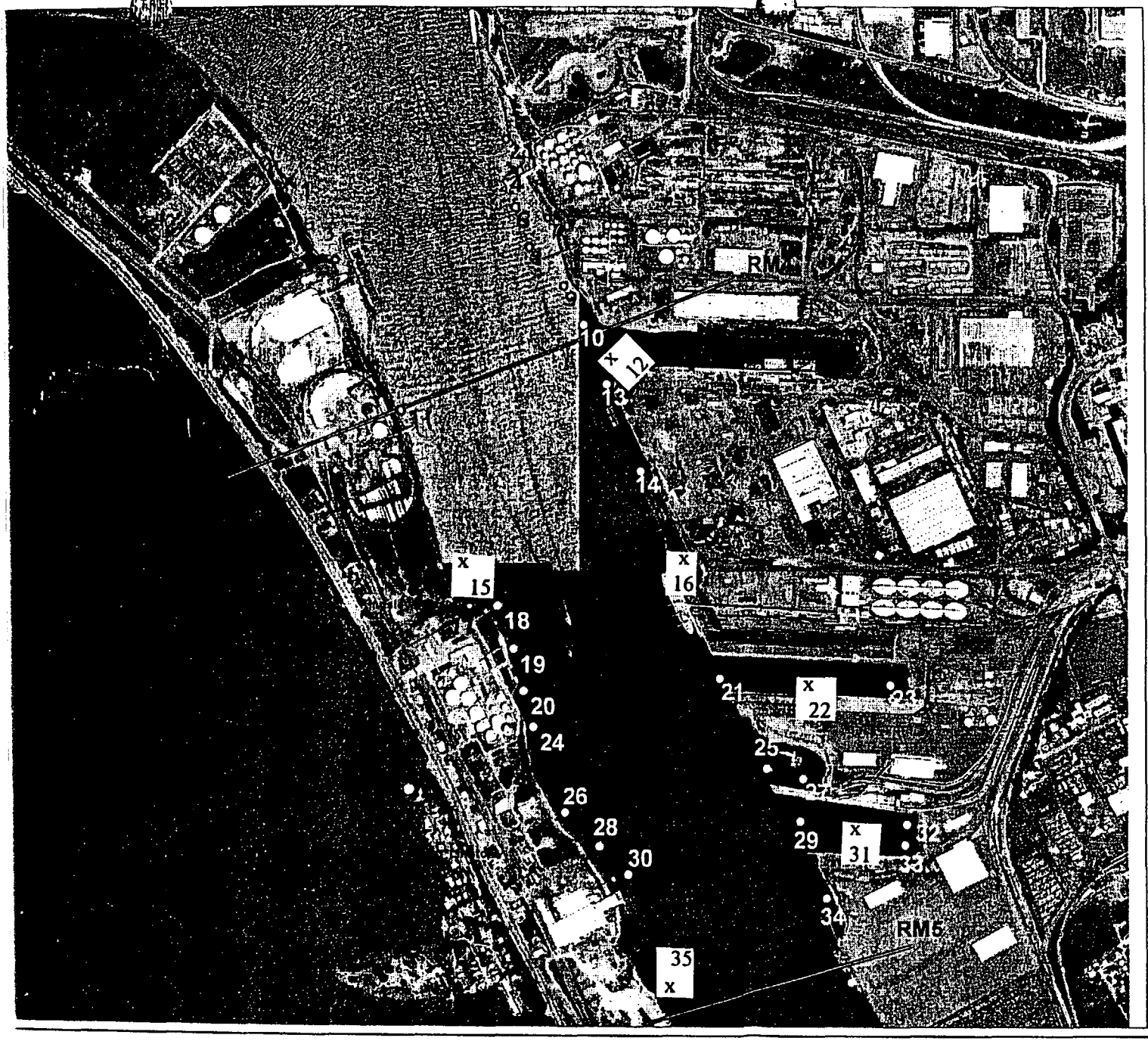
MANAGERS DESIGNERS/CONSULTANTS

97-517 Fig3-1.fh7

Willamette River Site Investigation
River Reaches

FIGURE

3-1



Willamette River Site Investigation Portland, Oregon

Reach A (RM 3.5 - RM 5.0) Surface and Subsurface Sediment Sampling Locations

EXPLANATION:

Sampling Locations

- X Surface and subsurface sediment sampling location
- o Surface sediment sampling location

Note: All locations are approximate. Exact locations to be determined in the field.

N

500 0 500 1000 1500 Feet

WESTON

Figure

3-2

SCOEPA00028959

Willamette River Site Investigation Portland, Oregon

Reach B (RM 5.0 - RM 6.0) Surface and Subsurface Sediment Sampling Locations

EXPLANATION:

Sampling Locations

X Surface and subsurface sediment sampling location

O Surface sediment sampling location

Note: All locations are approximate. Exact locations to be determined in the field.

N

500 0 500 1000 1500 Feet

WESTON

Figure 3-3

SCOEPA00028960

Willamette River Site Investigation Portland, Oregon

Reach C (RM 6.0 - RM 7.0) Surface and Subsurface Sediment Sampling Locations

EXPLANATION:

Sampling Locations

X Surface and subsurface sediment sampling location

o Surface sediment sampling location

Note: All locations are approximate. Exact locations to be determined in the field.

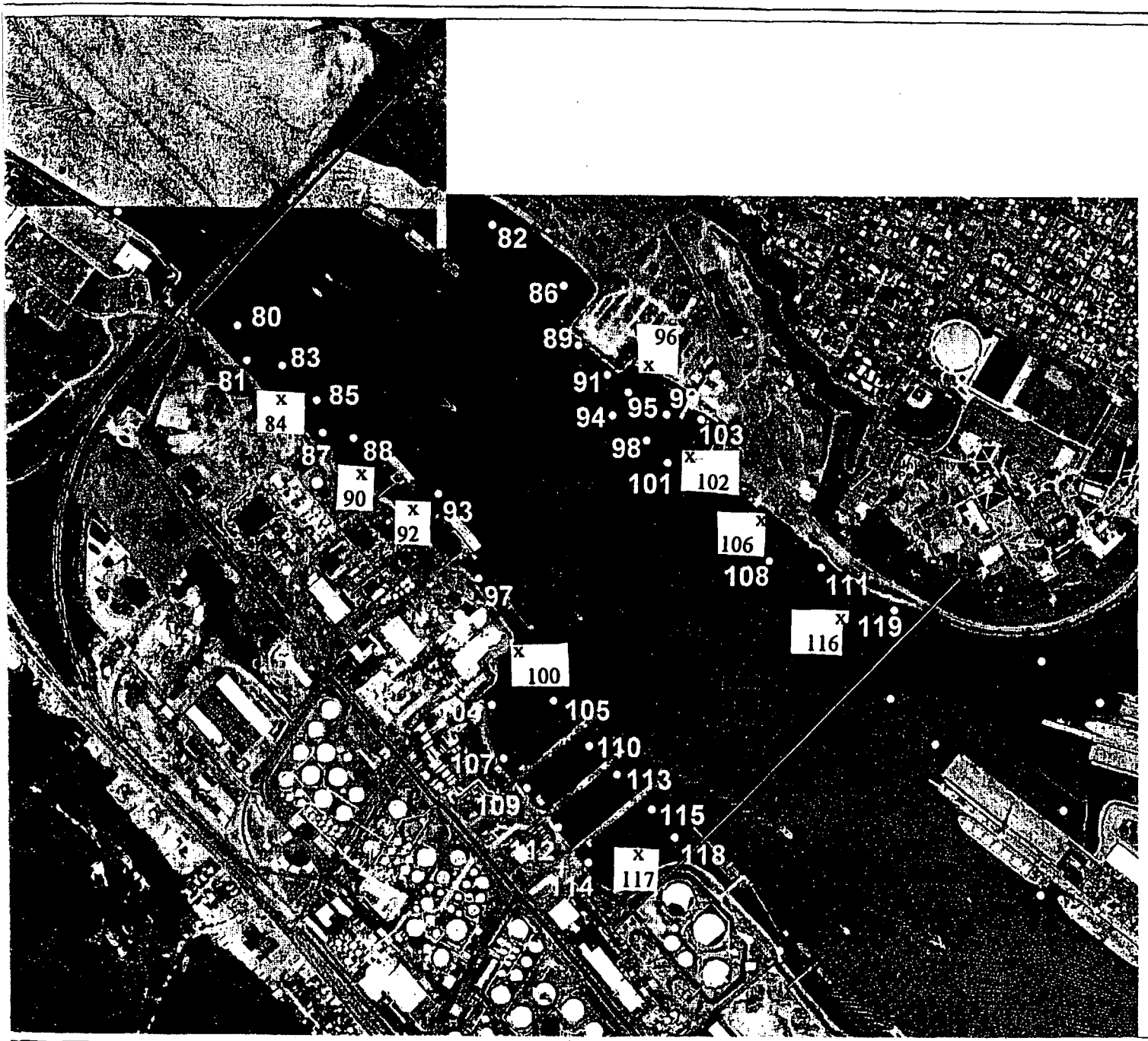
N

500 0 500 1000 1500 Feet

WESTON

Figure 3-4

SCOEPA00028961



Willamette River Site Investigation Portland, Oregon

Reach D (RM 7.0 - RM 8.0) Surface and Subsurface Sediment Sampling Locations

EXPLANATION:

Sampling Locations

X Surface and subsurface sediment sampling location

O Surface sediment sampling location

Note: All locations are approximate. Exact locations to be determined in the field.

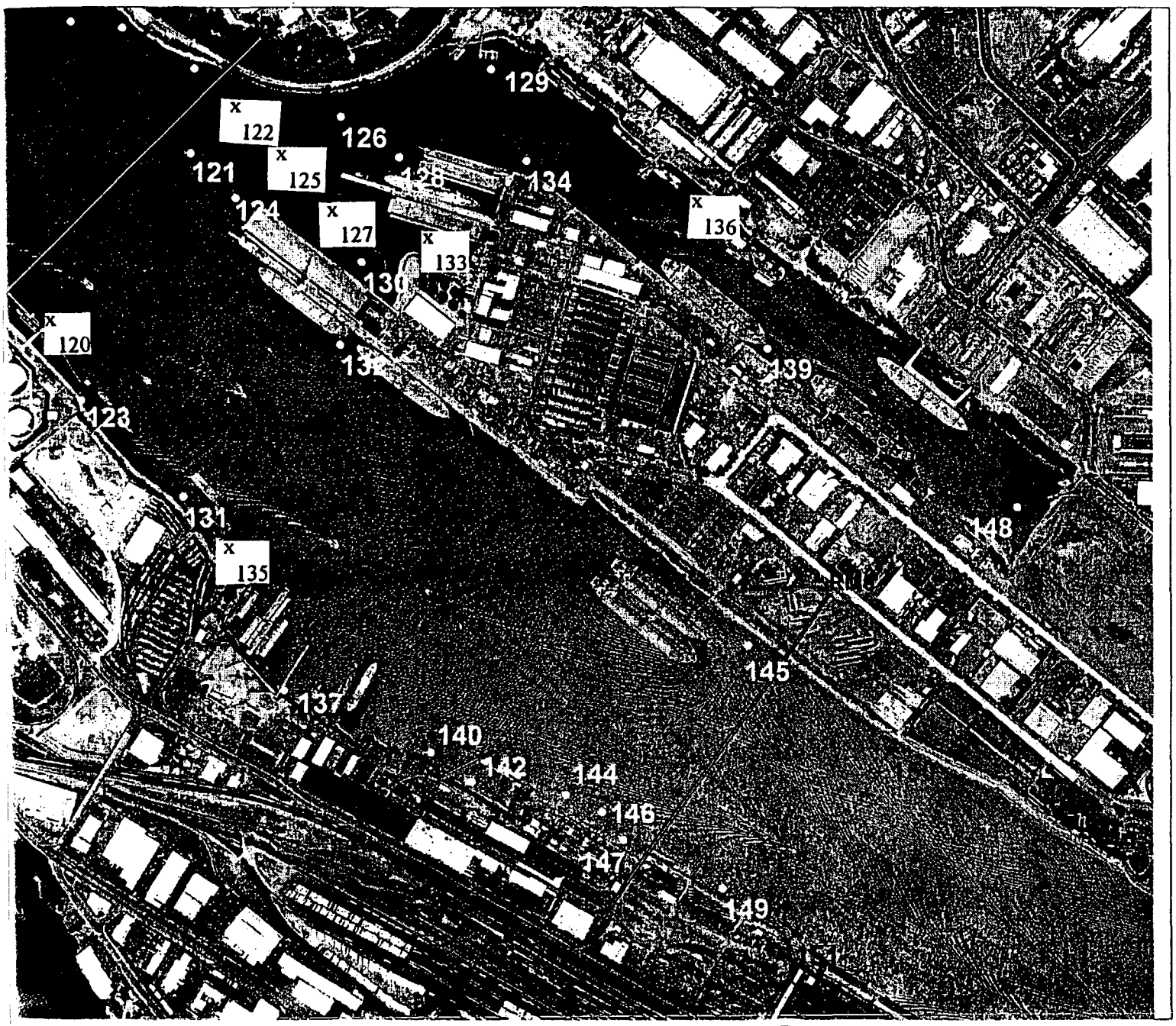
N

500 0 500 1000 1500 Feet

WESTON

Figure 3-5

SCOEPA00028962



Willamette River Site Investigation Portland, Oregon

Reach E (RM 8.0 - RM 9.5) Surface and Subsurface Sediment Sampling Locations

EXPLANATION:

Sampling Locations

- X Surface and subsurface sediment sampling location
- o Surface sediment sampling location

Note: All locations are approximate. Exact locations to be determined in the field.

N

500 0 500 1000 1500 Feet

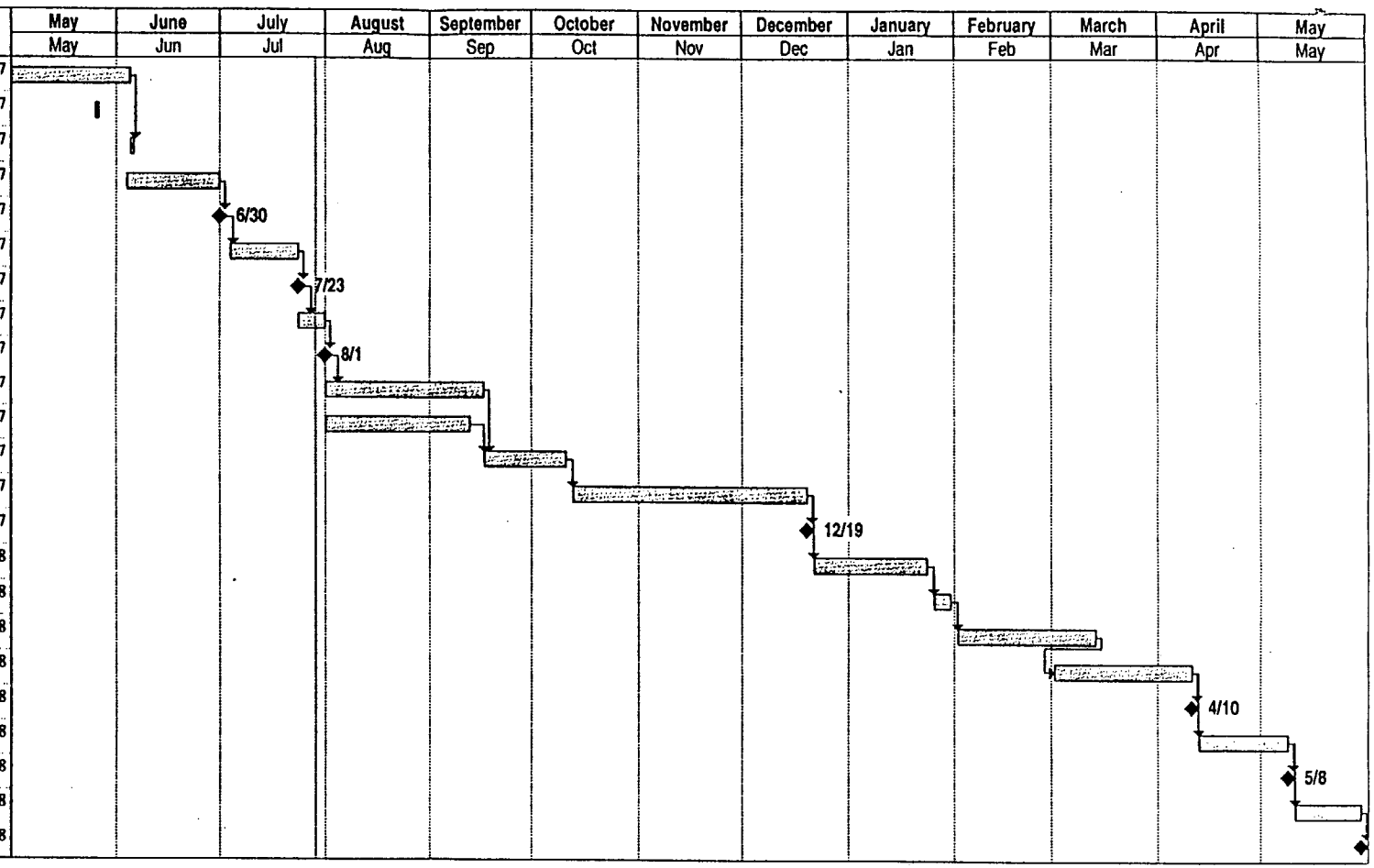
WESTON

Figure 3-6

SCOEPA00028963

WILLAMETTE RIVER SITE INSPECTIONS SCHEDULE

ID	Task Name	Duration	Start	Finish
1	Summary Document Preparation	25d	5/1/97	6/4/97
2	Site Visit	1d	5/26/97	5/26/97
3	Summary Document Submittal	1d	6/5/97	6/5/97
4	Draft SAP Preparation	19d	6/4/97	6/30/97
5	Draft SAP Submittal	0d	6/30/97	6/30/97
6	Agency Review of Draft SAP	14d	7/4/97	7/23/97
7	Agency Comments Received	0d	7/23/97	7/23/97
8	Final SAP Preparation	6d	7/24/97	7/31/97
9	Final SAP Submittal	0d	8/1/97	8/1/97
10	Mobilization	33d	8/1/97	9/16/97
11	Subcontractor Procurement	31d	8/1/97	9/12/97
12	Sampling	18d	9/17/97	10/10/97
13	Sample Analysis	50d	10/13/97	12/19/97
14	Receipt of All Data from Labs	0d	12/19/97	12/19/97
15	Data Validation*	25d	12/22/97	1/23/98
16	Data Entry into Mgt System	5d	1/26/98	1/30/98
17	Data Evaluation	30d	2/2/98	3/13/98
18	Draft SI Report	30d	3/2/98	4/10/98
19	Draft SI Report Submittal	0d	4/10/98	4/10/98
20	Agency Review of Draft SI Rpt	20d	4/13/98	5/8/98
21	Agency Comments Received	0d	5/8/98	5/8/98
22	Final SI Report Preparation	15d	5/11/98	5/29/98
23	Final SI Report Submittal	0d	5/29/98	5/29/98



*The time period for data validation was extended due to the holiday season.

Figure 7-1

APPENDIX A

SEDIMENT FIELD SAMPLE RECORD FORM

SCOEPA00028965

WESTON
MANAGERS DESIGNERS/CONSULTANTS

SEDIMENT FIELD SAMPLE RECORD

Project Name: _____ Sampling Personnel: _____

Project Location: _____ Sampling Vessel: _____

Project No.: _____ Subcontractor(s): _____

Date: _____ Weather: _____

Sample No.: _____ Sampling Method: _____

Sample Location: _____ Analysis: _____

Prop. Coordinates: _____

Grab #	Time	Depth to Sed. (ft/m)	Coordinates		Accpt. ?	Penet. Depth (cm)	Color	Texture	Odor	Sheens	Other
			X	Y							

Color Codes

BR = Brown
BK = Black
GY = Grey
GR = Green
ST = Rust

Texture Codes

SC = Silt/Clay
SD = Sand
GR = Granule
PB = Pebble
GV = Gravel

F = Fine
M = Medium
C = Coarse

Odor Codes

H2S = Sulfide
TPH = Petroleum

SL = Slight
M = Moderate
ST = Strong

Other:

Include presence of biota, debris, or redox layer

Sampler Signature: _____

97-571.FRM(WP5.1)

Corrections to
spreadsheets
& hidden columns
from DEQ
attached
J Clark

Jim Claxton
Environmental Engineer

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Portland OR 97210-3676, USA
Tel. 503-219-7313
Fax 503-219-7599
jim.claxton@siltronic.com

ER: 014.JWC

Dennis Ades
DEQ
Portland, Oregon 97201

2005-April-11

Additional Temperature for Willamette River TMDL project

Dear Mr. Ades,

Thank you for taking the time to answer my questions Wednesday. We have completed your spreadsheet but felt that addition information should be included.

1. Temperature data is collected continuously by strip chart and periodic grab samples. We have been collecting data electronically since Feb 2002, but did not begin reporting the electronic data until after our permit was renewed in May 2004. The following table gives the maximum temperature profile of our discharge for the last six years in degrees C.

   Maximum Effluent Temperatures collected both by grab sampling and electronic collected

	1999	2000	2001	2002	2003	2004	Ave. Max. temp for all 6 yr.	Max. temp seen in 6 yr.	Ave. Max. temp for Electronic data only	Max. Temp seen in Electronic data only
Jan	25.22	21.89	19.28	17.61	20.49	20.56	20.84	25.22	20.53	20.56
Feb	21.22	22.83	19.56	20.93	20.24	20.71	20.92	22.83	20.63	20.93
Mar	21.72	21.00	20.28	21.00	21.16	22.04	21.20	22.04	21.40	22.04
Apr	21.61	21.39	21.33	24.18	21.23	23.24	22.16	**24.18**	22.88	**24.18**
May	21.67	21.72	21.17	23.72	22.50	23.98	22.46	**23.98**	23.40	**23.98**
Jun	23.06	22.78	23.06	23.93	23.38	25.21	23.57	**25.21**	24.17	**25.21**
Jul	24.39	23.06	23.11	25.33	24.33	26.19	24.40	**26.19**	25.28	**26.19**
Aug	21.83	23.72	23.06	25.58	28.31	26.13	24.77	**28.31**	26.67	**28.31**
Sep	24.78	24.22	22.72	25.51	24.68	24.79	24.45	**25.51**	24.99	**25.51**
Oct	24.56	24.39	22.44	24.31	22.53	24.40	23.77	24.56	23.75	24.40
Nov	23.44	22.11	20.56	22.89	20.88	24.61	22.42	24.61	22.79	24.61
Dec	22.28	20.56	17.39	21.37	23.34	24.61	21.59	24.61	23.11	24.61

   The light gray data are from weekly grab samples. The balance of data were obtained electronically. We have seen that temperatures collected electronically are greater than those taken by grab sampling. The maximum effluent temperatures for April though September are in bold. These values are considerably higher than the values published in the DRAFT Willamette Basin TMDL: mainstem temperature tables for Siltronic.

2. Using equation 1, page 4-155 of the DRAFT Willamette Basin TMDL, the change in the river temperature, ΔTR, from the Siltronic discharge can be calculated.

siltronic
perfect silicon solutions

$$\Delta TR = \frac{(Q_{PS} \times T_{PS}) + (Q_R \times T_R)}{(Q_{PS} + Q_R)} - T_R$$

where: Q_{PS} is equal to Siltronic's maximum effluent discharge of 2.71 million gal/day or 4.19 ft^3/sec.
T_{PS} is equal to Siltronic's maximum effluent temperature 28.31°C (from table in section 1).
Q_R is equal to 7Q10 for river or 6000 ft^3/sec.
T_R is equal to 20.00°C.

then: ΔTR equals 0.006°C based on the maximum effluent temperature measured.
Using the maximum 7DADM temperature for 2004, 24.9°C from your spreadsheet, ΔTR equals 0.003°C.

3. As we discussed in our telephone call, the worksheet tab labeled 2003 contains the wrong data label for the date function in column A of the worksheet. It reads 1999 but should be 2003.

4. The Siltronic discharge to the Willamette River is composed of three outfalls. 001: Treated process waste water, 002: non-contact cooling water and boiler blowdown, and 004 Storm water from a portion of site. These three outfalls combine and the temperature of the combination is measured at the discharge point to the river (river mile 6.6).

5. One concern that Siltronic had with the DRAFT was how to apply the seven day maximum average temperature in the calculations. And, if the seven day maximum effluent flow was to be used in the calculations. It's good to see that you have included both of these in your spreadsheet.

6. Siltronic has an very active water conservation program. Water usage and waste water discharge have decreased 25% to 30% in the last four years. However, Siltronic feels that the calculated Net Effluent Heat Limits for Siltronic should be based on the Effluent Design Maximum of 2.71 million gallons/day since we are planning for expansion of existing facilities in the future.

If you have any questions, please contact Jim Claxton.

Regards,
Siltronic Corporation

Jim Claxton
Environmental Engineer

cc: Tom McCue
NPDES Permit file

N:\Environmental\Enviromental Affairs\Enviromental Affairs Folders\Temp Mgt Plan\Temp Measurment\DEQ\DEQ Request of additional temp data 050411.doc

Thank you for your interest in the Willamette temperature TMDL. After review of comments received from many stakeholders about the draft TMDL, DEQ is moving forward with development of the final temperature TMDL. However, before we do so we would like to offer stakeholders an opportunity to provide additional information so we may strengthen the analysis on which this plan is based.

Comments received on the draft TMDL include concerns that data used to develop and calibrate the temperature model and subsequently to establish waste load allocations were not representative of typical effluent flows at several waste water treatment facilities. As a result DEQ is providing an opportunity for stakeholders to supplement the 2001 and 2002 effluent data used in the TMDL with additional information. We encourage stakeholders to submit temperature and effluent flow data for the five year period ending 31 December 2004.

To ensure that data meet DEQ needs we request that data be submitted using the Microsoft Excel template provided. In the template there is an overview sheet that can be used to describe the nature of the effluent as well as design characteristics of the treatment facility. An example overview sheet for a facility with three waste water streams is attached to this memo.

A separate worksheet is provided for each year of interest. Effluent data can be entered for each outfall for those facilities with multiple effluent streams. Data under the primary column will be the same as 001 data if your facility has a single effluent flow. Data for multiple effluent streams that discharge through a common point of discharge will be reported as the primary data set and if possible separately by outfall (e.g. 001 and 002).

Daily maximum and average effluent temperature data may be submitted for each outfall. Continuous monitoring data will be necessary for the determination of maximum daily effluent temperatures. Unless otherwise documented and justified, grab sample data should be reported as average effluent temperatures. Data should represent effluent temperatures near the point of discharge to the receiving stream. All temperature data should be reported in degrees Celsius.

Daily maximum and average flow data may be submitted if available. Flows should be reported in million gallons per day (MGD). Leave the corresponding cells blank in the data submittal spreadsheet if flow or temperature data are unavailable for a specific date.

Data submitted should be of similar or better quality than that used to develop the draft waste load allocations (specifically data collected in 2001 and 2002). With assistance of DEQ permit program staff, TMDL staff will review and develop new effluent flow and temperature inputs for the temperature model as appropriate. Refinements to the TMDL will be based on the heat load allocation framework agreed upon by the Willamette TMDL Council in spring of 2004. In other words, large increases in summer waste load allocations are unlikely, but there is additional heat load capacity during periods of greater river flow. It is our intent to develop waste load allocations that are protective of beneficial uses during all flow regimes but also provide flexibility to permitted sources during periods of higher flow. Your assistance will better enable us to meet these goals. If you have any questions please contact Dennis Ades (503 229-6351) or Ryan Michie (503 229-6162) at DEQ.

Facility Name	Your Facility Name Here	
Permitted Maximum Flow (Industrials)	5.0	MGD
Permitted Average Dry Weather Design Flow (Domestics)		MGD
Permitted Average Wet Weather Design Flow (Domestics)		MGD

	Data Set	Outfall/s included in Data Set	Monitoring Location for this Data Set	QA/QC Procedure for this data
This is the data set ODEQ will review for use in the modeling. For some facilities the primary data set is a combination of one or more outfalls. Describe the data here and enter data in the appropriate workbooks.	Primary	001 and 002	At point of discharge (rm 13.2)	001 is a discharge of process water. 002 is boiler blowdown to lagoon in dry period and wet weather discharge to stream
If the "Primary" data set is compiled from two or more outfalls, please describe each outfall separately here. Enter outfall data in the appropriate workbooks.	001	001	point of discharge	thermister data following DEQ QA/QC protocol
	002	002	diversion point	wet weather discharge begin Nov 1 and ends April 30, weekly grab data collected with digital thermometer
	003	003	NA	storm water, no temperature data
	004			

Facility Name	Siltronic Coporation

Permitted Maximum Flow (Industrials)	2.7	MGD
Permitted Average Dry Weather Design Flow (Domestics)		MGD
Permitted Average Wet Weather Design Flow (Domestics)		MGD

	Data Set	Outfall/s included in Data Set	Monitoring Location for this Data Set	QA/QC Procedure for this data
This is the data set ODEQ will review for use in the modeling. For some facilities the primary data set is a combination of one or more outfalls. Describe the data here and enter data in the appropriate workbooks.	Primary	001, 002, 003 & 004	at point of discharge (rm 6.6)	Outfall 003 is the combined outfall discharge of three outfalls: 001 is Treated Process Waste Water; 002 is cooling water and boiler blowdown; and 004 is storm water.
If the "Primary" data set is compiled from two or more outfalls, please describe each outfall separately here. Enter outfall data in the appropriate workbooks.	001	003	point of discharge	thermocouple data following DEQ QA/QC protcol
	002	002	NA	Cooling water and boiler blow down, no temperature data
	003	004	NA	Storm water, no temperature data.
	004	001	NA	Treated process waste water, no temperature data.

SPAWNING PERIOD (for ODEQ use)

October 15 - May 15

Template V1.1

This sheet is for ODEQ use

		7DADM TEMPERATURE (Celsius) Primary						7DADM TEMPERATURE 001			
		1999	2000	2001	2002	2003	2004	1999	2000	2001	2002
20.2	January	0.0	0.0	0.0	0.0	20.2	19.4	0.0	0.0	0.0	0.0
20.4	February	0.0	0.0	0.0	20.4	20.1	20.4	0.0	0.0	0.0	0.0
21.6	March	0.0	0.0	0.0	20.8	20.1	21.6	0.0	0.0	0.0	0.0
22.8	April	0.0	0.0	0.0	21.9	20.9	22.8	0.0	0.0	0.0	0.0
23.3	May	0.0	0.0	0.0	22.2	21.8	23.3	0.0	0.0	0.0	0.0
24.9	June	0.0	0.0	0.0	23.3	23.0	24.9	0.0	0.0	0.0	0.0
24.9	July	0.0	0.0	0.0	24.3	23.9	24.9	0.0	0.0	0.0	0.0
24.7	August	0.0	0.0	0.0	24.7	23.6	24.7	0.0	0.0	0.0	0.0
24.4	September	0.0	0.0	0.0	24.3	23.8	24.4	0.0	0.0	0.0	0.0
23.8	October	0.0	0.0	0.0	23.0	22.3	23.8	0.0	0.0	0.0	0.0
22.6	November	0.0	0.0	0.0	22.5	20.9	22.6	0.0	0.0	0.0	0.0
22.7	December	0.0	0.0	0.0	21.5	20.2	22.7	0.0	0.0	0.0	0.0
0.0	Non-Spawning Period										
0.0	Spawning Period										

		7DADM FLOW (cms) Primary						7DADM FLOW (cm 001			
		1999	2000	2001	2002	2003	2004	1999	2000	2001	2002
0.0572	January	0.0000	0.0000	0.0000	0.0000	0.0488	0.0572	0.0000	0.0000	0.0000	0.0000
0.0574	February	0.0000	0.0000	0.0000	0.0474	0.0460	0.0574	0.0000	0.0000	0.0000	0.0000
0.0546	March	0.0000	0.0000	0.0000	0.0449	0.0482	0.0546	0.0000	0.0000	0.0000	0.0000
0.0538	April	0.0000	0.0000	0.0000	0.0502	0.0506	0.0538	0.0000	0.0000	0.0000	0.0000
0.0490	May	0.0000	0.0000	0.0000	0.0457	0.0490	0.0452	0.0000	0.0000	0.0000	0.0000
0.0486	June	0.0000	0.0000	0.0000	0.0462	0.0486	0.0459	0.0000	0.0000	0.0000	0.0000
0.0548	July	0.0000	0.0000	0.0000	0.0438	0.0548	0.0443	0.0000	0.0000	0.0000	0.0000
0.0552	August	0.0000	0.0000	0.0000	0.0435	0.0552	0.0452	0.0000	0.0000	0.0000	0.0000
0.0614	September	0.0000	0.0000	0.0000	0.0425	0.0614	0.0437	0.0000	0.0000	0.0000	0.0000
0.0608	October	0.0000	0.0000	0.0000	0.0436	0.0608	0.0443	0.0000	0.0000	0.0000	0.0000
0.0569	November	0.0000	0.0000	0.0000	0.0488	0.0569	0.0462	0.0000	0.0000	0.0000	0.0000
0.0559	December	0.0000	0.0000	0.0000	0.0442	0.0559	0.0460	0.0000	0.0000	0.0000	0.0000
0.0000	Non-Spawning Period										
0.0000	Spawning Period										

Go!

7DAD AVERAGE

Data Set	Primary				001				
Miscellaneous Information									
	TEMP (Celsius)		FLOW (MGD)		TEMP (Celsius)		FLOW (MGD)		TEMP (
DATE	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max
1/1/2002									
1/2/2002									
1/3/2002									
1/4/2002									
1/5/2002									
1/6/2002									
1/7/2002									
1/8/2002									
1/9/2002									
1/10/2002									
1/11/2002									
1/12/2002									
1/13/2002									
1/14/2002									
1/15/2002									
1/16/2002									
1/17/2002									
1/18/2002									
1/19/2002									
1/20/2002									
1/21/2002									
1/22/2002									
1/23/2002									
1/24/2002									
1/25/2002									
1/26/2002									
1/27/2002									
1/28/2002									
1/29/2002									
1/30/2002									
1/31/2002									
2/1/2002									
2/2/2002									
2/3/2002									
2/4/2002									
2/5/2002									
2/6/2002									
2/7/2002									
2/8/2002									
2/9/2002	19.7	18.3		1.097					
2/10/2002	19.7	18.4		1.033					
2/11/2002	19.3	17.1		1.028					
2/12/2002	19.2	18.0		1.027					
2/13/2002	19.8	18.1		1.095					
2/14/2002	19.6	18.6		1.088					
2/15/2002	19.7	18.4		1.088					
2/16/2002	19.6	17.8		1.031					
2/17/2002	19.7	17.8		0.965					
2/18/2002	19.6	18.0		1.277					

2/19/2002	19.5	17.1	0.987
2/20/2002	19.3	18.0	1.039
2/21/2002	20.1	18.2	1.072
2/22/2002	20.2	19.0	0.948
2/23/2002	20.4	16.5	1.066
2/24/2002	20.9	18.6	1.089
2/25/2002	20.0	18.7	1.016
2/26/2002			1.011
2/27/2002			1.060
2/28/2002	20.3	18.9	1.052
3/1/2002	20.4	19.1	0.936
3/2/2002	20.3	18.7	0.961
3/3/2002	20.6	19.2	0.950
3/4/2002	20.9	20.0	1.124
3/5/2002	20.6	19.4	1.080
3/6/2002	19.6	15.6	1.018
3/7/2002	19.9	18.7	0.893
3/8/2002	19.5	18.3	0.906
3/9/2002	19.7	17.9	0.951
3/10/2002	20.2	18.5	0.964
3/11/2002	19.6	16.1	0.922
3/12/2002	19.5	17.2	0.956
3/13/2002	19.7	17.8	0.959
3/14/2002	20.5	18.9	0.986
3/15/2002	19.5	17.9	1.012
3/16/2002	19.9	18.5	0.978
3/17/2002	19.8	18.0	0.938
3/18/2002	19.5	17.3	0.938
3/19/2002	19.4	16.2	1.030
3/20/2002	19.9	18.4	0.946
3/21/2002	19.4	17.8	0.952
3/22/2002	20.0	18.9	0.924
3/23/2002	20.6	19.3	0.931
3/24/2002	20.2	19.3	0.981
3/25/2002	20.6	19.2	0.987
3/26/2002	20.4	18.6	0.870
3/27/2002	20.0	19.0	1.020
3/28/2002	20.4	19.7	0.981
3/29/2002	20.5	19.7	0.924
3/30/2002	21.0	19.7	0.972
3/31/2002	20.8	19.2	0.963
4/1/2002	21.0	20.1	1.158
4/2/2002	20.7	19.2	1.104
4/3/2002	21.4	20.2	1.073
4/4/2002	21.4	19.8	1.063
4/5/2002	20.9	19.3	1.101
4/6/2002	21.1	20.2	1.140
4/7/2002	21.8	20.1	1.051
4/8/2002	20.5	19.4	1.031
4/9/2002	20.6	18.9	1.015
4/10/2002	20.9	18.6	1.021
4/11/2002	20.8	19.9	1.162
4/12/2002	21.2	20.4	1.078
4/13/2002	21.6	19.9	1.013
4/14/2002	20.7	19.7	1.091
4/15/2002	20.6	20.0	1.220
4/16/2002	20.4	19.3	1.084

4/17/2002	22.0	20.0	1.092
4/18/2002	21.3	19.8	1.041
4/19/2002	21.1	20.2	1.126
4/20/2002	21.7	20.6	1.109
4/21/2002	21.0	20.4	1.097
4/22/2002	21.3	20.0	1.052
4/23/2002	21.2	20.1	1.084
4/24/2002	21.0	19.7	1.175
4/25/2002	21.0	19.4	1.150
4/26/2002	21.0	19.8	1.219
4/27/2002	21.4	20.5	1.129
4/28/2002	21.6	20.3	1.089
4/29/2002	24.2	21.7	1.147
4/30/2002	22.6	21.3	1.104
5/1/2002	21.4	20.6	0.950
5/2/2002	20.7	19.6	1.016
5/3/2002	20.8	19.2	0.932
5/4/2002	20.7	19.5	1.071
5/5/2002	21.0	19.2	1.003
5/6/2002	20.2	19.5	0.924
5/7/2002	20.3	19.6	0.904
5/8/2002	20.6	19.6	1.017
5/9/2002	20.5	19.4	1.014
5/10/2002	21.1	19.9	0.989
5/11/2002	20.8	20.0	0.926
5/12/2002	21.8	19.9	0.973
5/13/2002	21.3	20.0	0.950
5/14/2002	22.4	20.1	0.961
5/15/2002	20.9	20.1	0.989
5/16/2002	21.6	20.0	0.995
5/17/2002	23.7	21.2	1.050
5/18/2002	21.9	21.0	0.971
5/19/2002	22.2	19.7	0.999
5/20/2002	21.3	20.3	1.031
5/21/2002	21.5	21.0	1.010
5/22/2002	21.5	20.9	0.965
5/23/2002	21.6	20.2	0.980
5/24/2002	22.0	20.5	0.972
5/25/2002	21.9	21.3	0.979
5/26/2002	22.7	21.5	0.953
5/27/2002	22.1	20.8	1.018
5/28/2002	22.1	20.8	1.043
5/29/2002	21.9	20.9	1.037
5/30/2002	22.3	20.8	0.952
5/31/2002	21.9	21.2	0.936
6/1/2002	22.3	21.0	0.993
6/2/2002	22.4	21.2	0.922
6/3/2002	22.5	21.1	0.981
6/4/2002	22.6	21.5	1.009
6/5/2002	23.9	22.4	1.093
6/6/2002	21.8	21.0	1.031
6/7/2002	21.8	20.4	0.778
6/8/2002	21.9	21.0	1.144
6/9/2002	22.5	21.5	1.028
6/10/2002	22.3	21.7	1.053
6/11/2002	22.4	20.9	1.049
6/12/2002	23.2	22.2	0.988

6/13/2002	23.6	22.3	1.038
6/14/2002	22.9	22.0	1.078
6/15/2002	22.6	21.4	1.045
6/16/2002	22.1	21.5	1.041
6/17/2002	22.2	21.3	1.042
6/18/2002	22.7	21.9	1.090
6/19/2002	22.7	21.7	0.952
6/20/2002	22.4	21.3	0.925
6/21/2002	23.8	22.4	1.051
6/22/2002	23.1	22.2	1.052
6/23/2002	22.5	21.7	1.081
6/24/2002	23.2	21.6	1.039
6/25/2002	23.3	22.0	1.040
6/26/2002	23.4	22.2	1.025
6/27/2002	23.7	22.4	1.031
6/28/2002	22.3	20.8	1.095
6/29/2002	22.9	21.8	0.994
6/30/2002	22.9	21.6	1.032
7/1/2002	22.8	21.1	0.943
7/2/2002	22.1	21.1	0.988
7/3/2002	21.8	20.2	1.009
7/4/2002	21.1	19.6	0.944
7/5/2002	23.4	20.8	0.949
7/6/2002	23.9	21.9	0.988
7/7/2002	22.8	22.1	0.950
7/8/2002	22.9	21.8	0.858
7/9/2002	23.8	21.3	0.945
7/10/2002	24.0	23.0	0.942
7/11/2002	23.8	22.8	0.997
7/12/2002	23.4	22.3	0.973
7/13/2002	23.7	22.4	0.964
7/14/2002	23.4	21.8	0.951
7/15/2002	23.8	22.2	0.920
7/16/2002	24.1	22.7	0.937
7/17/2002	23.8	22.6	0.938
7/18/2002	23.5	22.2	0.925
7/19/2002	23.5	22.5	0.911
7/20/2002	23.5	22.9	0.939
7/21/2002	24.1	23.0	0.935
7/22/2002	25.3	23.5	1.005
7/23/2002	24.3	22.9	1.030
7/24/2002	24.9	23.3	0.970
7/25/2002	24.1	22.6	1.011
7/26/2002	23.4	22.4	0.960
7/27/2002	23.2	22.0	0.966
7/28/2002	23.7	22.5	0.982
7/29/2002	23.7	22.5	1.010
7/30/2002	24.0	22.0	1.000
7/31/2002	23.0	21.7	0.962
8/1/2002	23.5	22.3	0.871
8/2/2002	23.2	22.0	0.687
8/3/2002	23.6	22.0	0.671
8/4/2002	23.3	22.4	0.859
8/5/2002	23.8	22.4	0.887
8/6/2002	23.6	22.6	0.920
8/7/2002	23.7	22.6	1.020
8/8/2002	23.6	22.4	0.930

8/9/2002	24.4	22.3	0.891
8/10/2002	23.7	22.5	0.927
8/11/2002	24.0	22.5	1.103
8/12/2002	24.6	22.9	0.993
8/13/2002	25.3	23.6	1.001
8/14/2002	25.1	23.5	0.979
8/15/2002	24.4	22.7	0.902
8/16/2002	24.8	23.1	1.013
8/17/2002	24.3	23.1	0.961
8/18/2002	24.2	22.5	0.869
8/19/2002	24.0	22.6	1.037
8/20/2002	23.8	22.6	0.999
8/21/2002	23.5	22.2	0.901
8/22/2002	23.5	22.2	0.982
8/23/2002	23.8	22.8	0.974
8/24/2002	24.3	22.5	0.933
8/25/2002	23.8	22.5	1.066
8/26/2002	23.8	22.5	0.861
8/27/2002	24.7	22.5	1.061
8/28/2002	25.6	23.4	0.920
8/29/2002	23.9	22.8	0.941
8/30/2002	23.4	22.4	1.107
8/31/2002	24.0	22.5	0.950
9/1/2002	23.8	22.7	0.965
9/2/2002	24.3	22.8	0.915
9/3/2002	23.3	22.5	0.953
9/4/2002	23.1	22.0	0.957
9/5/2002	23.6	22.6	0.921
9/6/2002	23.3	22.2	1.051
9/7/2002	23.4	21.7	0.948
9/8/2002	23.1	22.0	0.928
9/9/2002	24.1	22.5	0.966
9/10/2002	24.0	22.7	0.955
9/11/2002	23.8	22.6	0.995
9/12/2002	24.5	22.5	0.900
9/13/2002	24.4	23.0	0.933
9/14/2002	24.3	23.2	0.849
9/15/2002	24.0	22.9	1.003
9/16/2002	23.5	22.5	0.887
9/17/2002	23.5	22.3	0.907
9/18/2002	24.0	22.5	0.922
9/19/2002	24.0	22.6	0.929
9/20/2002	23.2	21.9	0.896
9/21/2002	24.2	22.4	0.739
9/22/2002	24.5	23.1	0.852
9/23/2002	24.3	23.2	0.770
9/24/2002	25.5	23.7	0.876
9/25/2002	23.5	22.1	0.903
9/26/2002	23.5	21.7	0.755
9/27/2002	24.5	21.7	0.604
9/28/2002	23.8	22.2	0.709
9/29/2002	23.4	21.7	0.794
9/30/2002	22.7	20.7	0.746
10/1/2002	23.0	21.5	0.724
10/2/2002	22.7	21.5	0.841
10/3/2002	22.0	20.7	0.958
10/4/2002			0.899

10/5/2002	24.3	22.5	0.939
10/6/2002	22.8	21.7	0.967
10/7/2002	23.0	21.7	0.939
10/8/2002	22.3	21.5	0.906
10/9/2002	22.3	20.9	0.924
10/10/2002	22.2	20.9	0.897
10/11/2002	21.8	20.9	0.973
10/12/2002	21.9	20.8	0.957
10/13/2002	21.7	20.5	0.880
10/14/2002	22.4	20.9	0.892
10/15/2002	22.1	20.9	0.933
10/16/2002	22.6	21.4	0.916
10/17/2002	22.3	21.0	0.883
10/18/2002	21.8	20.7	0.889
10/19/2002	22.0	20.9	0.943
10/20/2002	21.9	21.1	0.944
10/21/2002	21.4	21.0	0.935
10/22/2002			0.916
10/23/2002	21.2	20.5	0.997
10/24/2002	21.1	20.4	0.942
10/25/2002	21.5	20.2	0.924
10/26/2002	21.2	20.4	0.838
10/27/2002	21.7	20.5	1.024
10/28/2002	21.3	20.6	0.894
10/29/2002	21.7	20.5	0.942
10/30/2002	20.8	19.9	0.947
10/31/2002	21.0	20.0	0.877
11/1/2002	20.4	19.0	1.053
11/2/2002	21.5	19.9	1.236
11/3/2002	20.6	19.8	0.978
11/4/2002	20.9	19.7	1.082
11/5/2002	21.0	19.5	1.016
11/6/2002	21.7	20.0	1.078
11/7/2002	21.4	19.6	1.126
11/8/2002	20.2	19.1	1.063
11/9/2002	20.8	18.4	1.070
11/10/2002	20.6	19.3	0.992
11/11/2002	20.8	19.3	1.047
11/12/2002	22.5	19.7	1.133
11/13/2002	22.0	20.5	1.109
11/14/2002	21.8	20.9	1.131
11/15/2002	21.4	20.2	0.932
11/16/2002	20.9	19.9	1.103
11/17/2002	21.4	20.3	1.095
11/18/2002	21.4	19.7	1.078
11/19/2002	22.0	20.8	1.061
11/20/2002			1.116
11/21/2002	21.8	20.9	0.999
11/22/2002	21.6	20.4	1.119
11/23/2002	22.8	20.7	1.142
11/24/2002	22.8	21.1	1.029
11/25/2002	22.3	20.7	1.080
11/26/2002	21.7	20.1	1.042
11/27/2002	22.6	20.1	1.188
11/28/2002	22.6	20.1	1.200
11/29/2002	22.9	19.6	1.036
11/30/2002	22.9	19.4	1.148

12/1/2002	21.1	19.5	0.987						
12/2/2002	20.7	19.6	0.913						
12/3/2002	20.4	19.4	0.871						
12/4/2002	20.0	19.0	0.911						
12/5/2002	20.1	18.9	1.021						
12/6/2002	20.7	19.4	0.919						
12/7/2002	20.7	19.7	1.011						
12/8/2002	20.7	19.5	0.925						
12/9/2002	20.7	19.1	0.857						
12/10/2002	20.7	18.5	0.965						
12/11/2002	20.5	17.6	0.977						
12/12/2002	21.4	17.3	0.823						
12/13/2002	21.4	17.9	0.938						
12/14/2002	20.0	17.5	0.973						
12/15/2002	20.3	17.2	0.962						
12/16/2002	20.4	17.1	1.050						
12/17/2002	20.4	17.1	0.883						
12/18/2002	20.0	17.4	0.882						
12/19/2002	20.8	18.2	1.125						
12/20/2002	20.8	19.0	0.930						
12/21/2002	20.5	18.4	0.914						
12/22/2002	19.8	17.6	0.818						
12/23/2002	19.5	17.1	0.517						
12/24/2002	19.3	16.3	0.485						
12/25/2002	19.0	15.3	0.560						
12/26/2002	19.4	14.7	0.472						
12/27/2002	19.4	14.6	0.500						
12/28/2002	19.0	14.7	0.521						
12/29/2002	19.3	15.2	0.472						
12/30/2002	19.3	13.6	0.483						
12/31/2002	18.9	13.3	0.547						

NOTE / Should read 2003 under Date

Data Set	Primary				001				
Miscellaneous Information					J Claxton 4/11/05				
	TEMP (Celsius)		FLOW (MGD)		TEMP (Celsius)		FLOW (MGD)		TEMP (
DATE	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max
1/1/1999	18.9	15.1		1.1					
1/2/1999	18.4	15.4		1.1					
1/3/1999	20.2	16.8		1.0					
1/4/1999	20.2	17.1		1.0					
1/5/1999	20.5	17.1		1.2					
1/6/1999	20.5	18.3		1.1					
1/7/1999	20.0			1.1					
1/8/1999	20.1			1.1					
1/9/1999	19.9			1.1					
1/10/1999	20.0			1.1					
1/11/1999	15.2			1.1					
1/12/1999	19.0			1.0					
1/13/1999	19.4			1.1					
1/14/1999	19.8			1.1					
1/15/1999	19.2			1.2					
1/16/1999	18.8			1.2					
1/17/1999	18.6			1.0					
1/18/1999	18.7			1.0					
1/19/1999	19.1			1.2					
1/20/1999	18.4			1.1					
1/21/1999	19.4			1.0					
1/22/1999	19.8			0.9					
1/23/1999	19.4			0.6					
1/24/1999	18.2			0.6					
1/25/1999	20.1			0.7					
1/26/1999	19.6			0.6					
1/27/1999	20.0			0.7					
1/28/1999	19.8			0.6					
1/29/1999	15.7	13.7		0.6					
1/30/1999	17.8	16.4		0.6					
1/31/1999	18.5	15.5		0.7					
2/1/1999	19.2	17.8		1.2					
2/2/1999	19.4	18.1		1.0					
2/3/1999	19.5	18.7		1.0					
2/4/1999	20.0	18.4		0.9					
2/5/1999	19.2	18.2		1.1					
2/6/1999	20.2	18.9		1.1					
2/7/1999	19.5	17.7		1.1					
2/8/1999	19.0	18.1		1.0					
2/9/1999	19.4	18.3		1.0					
2/10/1999	19.6	18.2		1.0					
2/11/1999	19.5	18.4		1.0					
2/12/1999	20.0	18.8		0.8					
2/13/1999	19.8	18.3		1.0					
2/14/1999	19.9	18.7		1.0					
2/15/1999	14.7	14.1		1.0					
2/16/1999	19.3	16.7		1.1					
2/17/1999	18.8	15.6		1.0					
2/18/1999	19.9	18.4		1.1					

2/19/1999	20.0	18.5	1.0					
2/20/1999	20.1	18.2	0.9					
2/21/1999	19.9	19.3	1.1					
2/22/1999	19.9	18.7	1.0					
2/23/1999	19.3	18.2	1.0					
2/24/1999	19.6	18.5	1.1					
2/25/1999	19.8	19.3	1.1					
2/26/1999	19.5	18.7	1.1					
2/27/1999	19.6	18.5	0.9					
2/28/1999	19.5	17.5	1.0					
3/1/1999	20.5	19.2	1.1					
3/2/1999	20.5	18.3	1.1					
3/3/1999	21.2	19.7	1.1					
3/4/1999	20.2	18.8	1.1					
3/5/1999	19.2	17.9	1.0					
3/6/1999	19.4	16.7	0.9					
3/7/1999	17.7	13.6	1.1					
3/8/1999			1.2					
3/9/1999	19.1	16.2	1.0					
3/10/1999	19.3	18.2	1.0					
3/11/1999	20.1	18.9	1.1					
3/12/1999	-17.8	-17.8	1.2					
3/13/1999	19.7	17.9	1.1					
3/14/1999	19.1	17.6	1.0					
3/15/1999			1.1					
3/16/1999			1.0					
3/17/1999	19.3	18.8	1.0					
3/18/1999	19.3	17.3	1.0					
3/19/1999	19.5	17.4	1.1					
3/20/1999	19.4	18.5	1.0					
3/21/1999	19.4	17.3	1.0					
3/22/1999	19.4	17.6	1.1					
3/23/1999	19.0	17.8	1.0					
3/24/1999	18.8	17.5	1.0					
3/25/1999	19.3	18.0	1.0					
3/26/1999	19.6	17.2	1.1					
3/27/1999	19.5	18.3	1.0					
3/28/1999	19.9	18.3	1.0					
3/29/1999			1.1					
3/30/1999			0.9					
3/31/1999	19.7	18.3	1.0					
4/1/1999	19.4	17.4	0.9					
4/2/1999	19.4	17.3	1.1					
4/3/1999	19.8	17.6	1.0					
4/4/1999	20.7	17.9	1.0					
4/5/1999	18.9	17.0	1.2					
4/6/1999	19.7	17.9	1.1					
4/7/1999	20.4	18.4	1.3					
4/8/1999	20.2	13.7	1.0					
4/9/1999	20.1	18.4	1.1					
4/10/1999	20.6	19.1	1.3					
4/11/1999	20.5	19.4	1.1					
4/12/1999	20.1	17.5	1.1					
4/13/1999	20.0	17.9	1.1					
4/14/1999	20.0	19.1	1.1					
4/15/1999	20.1	18.7	1.0					
4/16/1999	20.2	18.2	1.1					

4/17/1999	20.8	18.4	1.1					
4/18/1999	20.4	19.1	1.0					
4/19/1999	21.2	19.5	1.1					
4/20/1999	20.9	20.1	1.1					
4/21/1999	20.4	18.9	1.1					
4/22/1999	20.6	19.2	1.1					
4/23/1999	19.9	16.9	1.2					
4/24/1999	20.6	18.4	1.2					
4/25/1999	20.7	18.9	1.1					
4/26/1999	20.4	19.4	1.1					
4/27/1999	20.6	19.7	1.1					
4/28/1999	20.9	20.0	1.0					
4/29/1999	21.2	20.2	1.1					
4/30/1999	20.8	19.8	1.1					
5/1/1999	20.9	18.1	1.1					
5/2/1999	21.1	18.6	1.2					
5/3/1999	20.7	19.3	1.2					
5/4/1999	20.8	19.4	1.1					
5/5/1999	21.2	19.7	1.1					
5/6/1999	21.2	20.2	1.0					
5/7/1999	21.1	19.9	1.0					
5/8/1999	20.7	19.9	1.1					
5/9/1999	21.1	19.0	1.1					
5/10/1999	21.0	19.9	1.2					
5/11/1999	21.6	20.3	1.0					
5/12/1999	21.2	20.1	1.0					
5/13/1999	21.6	20.3	1.1					
5/14/1999	20.6	19.8	1.1					
5/15/1999	20.4	19.2	1.1					
5/16/1999	20.2	18.7	1.0					
5/17/1999	20.3	18.4	1.1					
5/18/1999	21.0	19.6	1.1					
5/19/1999	20.8	19.8	1.1					
5/20/1999	20.9	19.9	1.0					
5/21/1999	21.0	20.1	1.1					
5/22/1999	21.2	20.1	1.1					
5/23/1999	21.8	20.5	1.0					
5/24/1999	21.1	19.7	1.2					
5/25/1999	21.1	20.1	1.0					
5/26/1999	21.2	20.0	0.9					
5/27/1999	21.7	20.6	1.0					
5/28/1999	22.5	21.2	1.0					
5/29/1999	21.9	20.8	1.1					
5/30/1999	21.2	19.3	1.1					
5/31/1999	21.4	20.3	1.2					
6/1/1999	21.7	20.6	1.0					
6/2/1999	21.4	20.7	1.1					
6/3/1999	22.2	21.1	1.2					
6/4/1999	22.2	21.0	1.0					
6/5/1999	22.1	20.7	1.1					
6/6/1999	22.2	21.1	1.1					
6/7/1999	21.6	20.6	1.0					
6/8/1999	21.6	20.5	0.9					
6/9/1999	21.3	20.1	1.1					
6/10/1999	21.5	20.7	1.0					
6/11/1999	21.7	20.4	1.0					
6/12/1999	21.4	20.9	1.1					

6/13/1999	21.7	20.8	1.0					
6/14/1999	22.2	21.1	1.0					
6/15/1999	22.2	21.1	1.0					
6/16/1999	23.3	21.3	1.1					
6/17/1999	22.1	21.2	1.0					
6/18/1999	21.7	21.0	1.0					
6/19/1999	20.7	20.2	1.0					
6/20/1999	21.1	19.9	1.1					
6/21/1999	22.1	20.8	1.1					
6/22/1999	21.6	20.9	1.0					
6/23/1999	22.2	21.1	1.1					
6/24/1999	22.0	21.1	1.0					
6/25/1999	23.2	21.5	1.0					
6/26/1999	23.1	22.0	1.0					
6/27/1999	22.9	21.7	1.1					
6/28/1999	23.3	21.7	1.1					
6/29/1999	23.4	22.4	1.1					
6/30/1999	22.8	21.8	1.1					
7/1/1999	22.7	22.0	0.8					
7/2/1999	22.6	21.6	1.1					
7/3/1999	23.0	21.6	1.1					
7/4/1999	23.4	21.9	1.1					
7/5/1999	23.0	21.6	1.2					
7/6/1999	22.9	21.8	1.0					
7/7/1999	23.1	22.0	0.6					
7/8/1999	22.7	21.9	1.2					
7/9/1999	23.1	21.9	0.9					
7/10/1999	23.4	22.0	1.1					
7/11/1999	23.1	21.9	1.0					
7/12/1999	22.6	22.1	1.2					
7/13/1999	22.3	21.6	1.1					
7/14/1999	22.3	21.2	1.2					
7/15/1999	22.6	21.5	1.3					
7/16/1999	23.0	22.2	1.3					
7/17/1999	23.3	22.5	1.4					
7/18/1999	23.9	22.8	1.3					
7/19/1999	23.7	22.6	1.0					
7/20/1999	23.8	22.4	0.9					
7/21/1999	24.3	22.9	1.1					
7/22/1999	23.8	22.7	1.7					
7/23/1999	24.2	22.5	1.0					
7/24/1999	22.5	21.4	1.2					
7/25/1999	22.1	20.8	1.0					
7/26/1999	22.2	20.6	1.1					
7/27/1999	21.7	20.9	1.3					
7/28/1999	22.3	21.0	1.1					
7/29/1999	23.5	21.7	1.1					
7/30/1999	23.0	21.6	1.1					
7/31/1999	23.4	21.8	1.1					
8/1/1999	22.9	20.8	1.1					
8/2/1999	22.5	20.9	1.2					
8/3/1999	21.6	20.7	0.9					
8/4/1999	23.0	20.9	1.1					
8/5/1999	23.6	21.2	1.0					
8/6/1999	22.6	21.1	1.1					
8/7/1999	22.9	21.3	1.1					
8/8/1999	22.5	20.7	1.0					

8/9/1999	22.0	21.0	1.4					
8/10/1999	22.7	21.0	1.1					
8/11/1999	22.7	21.4	1.2					
8/12/1999	22.8	21.8	1.3					
8/13/1999	22.7	21.9	1.0					
8/14/1999	28.3	21.4	1.2					
8/15/1999	22.6	21.1	1.2					
8/16/1999	22.4	21.3	1.2					
8/17/1999	22.6	21.3	1.1					
8/18/1999	23.6	22.0	1.2					
8/19/1999	23.0	21.8	1.1					
8/20/1999	22.9	21.7	1.0					
8/21/1999	23.7	21.6	1.0					
8/22/1999	22.7	21.8	1.2					
8/23/1999	22.4	21.3	1.1					
8/24/1999	22.3	20.9	1.1					
8/25/1999	22.6	21.2	1.1					
8/26/1999	22.3	21.2	1.1					
8/27/1999	22.4	21.6	1.2					
8/28/1999	23.3	21.7	1.2					
8/29/1999	23.1	22.1	1.2					
8/30/1999	23.0	22.0	1.4					
8/31/1999	23.0	21.8	1.3					
9/1/1999	22.7	22.0	1.3					
9/2/1999	23.6	22.2	1.3					
9/3/1999	23.9	22.7	1.2					
9/4/1999	24.5	23.0	1.3					
9/5/1999	23.5	22.6	1.3					
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9/7/1999	22.9	22.0	1.4					
9/8/1999	23.5	21.7	1.2					
9/9/1999	24.5	20.8	1.2					
9/10/1999	22.7	21.9	1.2					
9/11/1999	22.6	21.8	1.2					
9/12/1999	24.7	21.9	1.2					
9/13/1999	22.5	21.5	1.2					
9/14/1999	22.3	21.2	1.2					
9/15/1999	21.9	20.8	1.1					
9/16/1999	21.4	20.5	1.3					
9/17/1999	21.2	20.5	1.2					
9/18/1999	21.4	20.6	1.4					
9/19/1999	21.7	20.7	1.2					
9/20/1999	21.5	20.8	1.4					
9/21/1999	22.6	21.4	1.2					
9/22/1999	22.0	20.9	1.4					
9/23/1999	21.7	20.8	1.4					
9/24/1999	21.9	20.9	1.4					
9/25/1999	22.0	21.3	1.8					
9/26/1999	22.3	21.5	1.2					
9/27/1999	22.9	21.6	1.2					
9/28/1999	22.4	21.3	1.1					
9/29/1999	22.0	21.3	1.4					
9/30/1999	22.6	21.6	1.2					
10/1/1999	22.4	21.7	1.2					
10/2/1999	22.1	21.5	1.2					
10/3/1999	22.2	21.5	1.2					
10/4/1999	22.0	21.2	1.3					

10/5/1999	22.5	21.8	1.3					
10/6/1999	22.2	21.5	1.2					
10/7/1999	22.3	21.5	1.1					
10/8/1999	22.2	21.4	1.2					
10/9/1999	21.8	20.2	1.1					
10/10/1999	21.4	20.7	1.5					
10/11/1999	21.4	19.9	1.3					
10/12/1999	21.6	20.8	1.4					
10/13/1999	21.0	20.6	1.5					
10/14/1999	21.2	20.5	1.5					
10/15/1999	20.6	19.4	1.2					
10/16/1999	21.0	19.6	1.3					
10/17/1999	21.2	20.2	1.3					
10/18/1999	21.4	20.5	1.3					
10/19/1999	20.9	19.8	1.3					
10/20/1999	21.3	20.2	1.3					
10/21/1999	21.0	20.3	1.3					
10/22/1999	20.8	19.8	1.3					
10/23/1999	20.4	19.8	1.2					
10/24/1999	20.5	19.8	1.3					
10/25/1999	20.6	19.9	1.3					
10/26/1999	20.7	20.0	1.4					
10/27/1999	20.5	19.9	1.3					
10/28/1999	20.9	20.0	1.1					
10/29/1999	20.2	19.2	1.2					
10/30/1999	21.1	20.0	1.3					
10/31/1999	21.6	19.9	1.3					
11/1/1999	20.8	19.8	1.1					
11/2/1999	20.9	19.6	1.2					
11/3/1999	20.5	19.7	1.3					
11/4/1999	20.8	19.9	1.2					
11/5/1999	20.8	19.7	1.3					
11/6/1999	20.3	19.3	1.3					
11/7/1999	20.4	19.1	1.3					
11/8/1999	20.3	19.2	1.2					
11/9/1999	20.5	19.1	1.4					
11/10/1999	20.5	19.2	1.3					
11/11/1999	20.1	18.7	1.3					
11/12/1999	19.7	18.7	1.2					
11/13/1999	19.7	18.8	1.3					
11/14/1999	20.1	19.0	1.3					
11/15/1999	19.7	18.3	1.3					
11/16/1999	20.1	17.8	1.4					
11/17/1999	19.7	18.0	1.2					
11/18/1999	19.4	17.9	1.1					
11/19/1999	19.1	15.0	1.3					
11/20/1999	19.1	17.1	1.1					
11/21/1999	19.4	18.1	1.2					
11/22/1999	19.4	18.4	1.6					
11/23/1999	19.4	17.5	1.4					
11/24/1999	19.2	18.2	0.2					
11/25/1999	19.4	16.4	0.3					
11/26/1999	19.5	17.5	0.5					
11/27/1999	19.4	18.5	0.6					
11/28/1999	19.4	16.9	0.4					
11/29/1999	19.3	17.2	0.6					
11/30/1999	19.0	17.9	0.6					

12/1/1999	19.4	17.7		1.3						
12/2/1999	19.5	17.2		1.2						
12/3/1999	19.3	17.6		1.3						
12/4/1999	18.7	16.9		1.3						
12/5/1999	18.8	14.9		1.3						
12/6/1999	19.3	17.6		1.3						
12/7/1999	18.6	16.5		1.2						
12/8/1999	23.3	18.3		1.2						
12/9/1999	23.2	17.9		1.3						
12/10/1999	17.9	15.7		1.2						
12/11/1999	19.1	16.4		1.2						
12/12/1999	18.2	16.6		1.3						
12/13/1999	18.4	13.4		1.1						
12/14/1999	18.6	15.4		1.2						
12/15/1999	18.7	17.4		1.2						
12/16/1999	18.3	16.7		1.3						
12/17/1999	19.1	17.4		1.3						
12/18/1999	19.9	18.6		1.3						
12/19/1999	19.2	17.8		1.2						
12/20/1999	18.9	16.7		1.2						
12/21/1999	19.2	17.1		1.1						
12/22/1999	18.8	17.5		1.2						
12/23/1999	19.0	17.3		1.1						
12/24/1999				1.2						
12/25/1999				1.1						
12/26/1999				1.1						
12/27/1999				1.3						
12/28/1999				1.1						
12/29/1999				1.2						
12/30/1999	18.1	16.8		1.2						
12/31/1999	18.4	15.7		1.2						

Data Set	Primary				001				
Miscellaneous Information									
	TEMP (Celsius)		FLOW (MGD)		TEMP (Celsius)		FLOW (MGD)		TEMP (
DATE	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max	Daily Average	Daily Max
1/1/2004	18.7	17.4		1.2					
1/2/2004	17.0	11.5		1.0					
1/3/2004	18.3	15.3		1.6					
1/4/2004	18.5	17.2		1.4					
1/5/2004	17.3	15.6		1.0					
1/6/2004	16.1	14.4		1.2					
1/7/2004	14.9	13.7		1.1					
1/8/2004	15.4	13.7		0.9					
1/9/2004	15.7	13.4		1.0					
1/10/2004	17.4	15.1		1.3					
1/11/2004	17.5	15.8		1.3					
1/12/2004	17.1	14.5		1.2					
1/13/2004	18.0	16.4		1.4					
1/14/2004	17.5	14.8		1.3					
1/15/2004	18.3	16.3		1.3					
1/16/2004				1.3					
1/17/2004				1.3					
1/18/2004	17.8	17.2		1.3					
1/19/2004	18.7	18.0		1.3					
1/20/2004	18.9	17.7		1.3					
1/21/2004	18.7	16.7		1.3					
1/22/2004	20.6	18.4		1.4					
1/23/2004	17.6	14.5		1.0					
1/24/2004	18.1	16.1		1.4					
1/25/2004	18.2	16.8		1.3					
1/26/2004	18.5	15.6		1.3					
1/27/2004	19.3	18.7		1.4					
1/28/2004	19.2	16.9		1.3					
1/29/2004	19.5	17.6		1.2					
1/30/2004	19.2	17.3		1.3					
1/31/2004	18.9	16.2		1.3					
2/1/2004	19.1	18.0		1.4					
2/2/2004	19.3	17.1		1.4					
2/3/2004	20.4	18.9		1.3					
2/4/2004	19.9	18.9		1.3					
2/5/2004	19.9	19.0		1.3					
2/6/2004	19.4	17.0		1.1					
2/7/2004	19.7	18.6		1.1					
2/8/2004	19.7	18.5		1.3					
2/9/2004	20.7	19.3		1.3					
2/10/2004	19.8	18.5		1.2					
2/11/2004	20.1	18.9		1.2					
2/12/2004	20.0	17.6		1.3					
2/13/2004	20.0	18.8		1.3					
2/14/2004	19.6	18.0		1.3					
2/15/2004	20.1	18.6		1.1					
2/16/2004	19.6	16.8		1.3					
2/17/2004	19.2	16.1		1.3					
2/18/2004	20.0	17.8		1.1					

2/19/2004	19.4	18.5	1.3					
2/20/2004	19.3	18.0	1.3					
2/21/2004	20.1	18.1	1.3					
2/22/2004	20.4	18.8	1.4					
2/23/2004	20.3	19.0	1.2					
2/24/2004	19.4	18.1	1.3					
2/25/2004	19.4	18.0	1.1					
2/26/2004	20.2	17.8	1.0					
2/27/2004	20.7	18.6	1.2					
2/28/2004	20.5	18.8	1.1					
2/29/2004	20.3	19.0	1.2					
3/1/2004	20.7	19.2	1.1					
3/2/2004	20.6	19.4	1.2					
3/3/2004	20.0	18.1	1.1					
3/4/2004	20.7	19.5	1.2					
3/5/2004	20.3	19.0	1.2					
3/6/2004	20.3	18.1	1.6					
3/7/2004			1.3					
3/8/2004			1.1					
3/9/2004	21.2	20.7	1.1					
3/10/2004	20.5	19.7	1.2					
3/11/2004	20.6	19.8	1.2					
3/12/2004	20.7	18.9	1.2					
3/13/2004	20.7	19.6	1.4					
3/14/2004	21.1	19.8	1.1					
3/15/2004	21.1	20.0	1.2					
3/16/2004	20.6	19.8	1.2					
3/17/2004	21.4	20.8	1.1					
3/18/2004	21.3	20.4	1.1					
3/19/2004	21.2	19.7	1.0					
3/20/2004	21.3	20.7	1.1					
3/21/2004	22.0	21.4	1.1					
3/22/2004	22.0	21.2	1.2					
3/23/2004	21.7	21.0	1.1					
3/24/2004	21.2	18.3	1.1					
3/25/2004	21.3	19.0	1.3					
3/26/2004	20.6	18.6	1.1					
3/27/2004	20.7	19.9	1.3					
3/28/2004	20.8	19.5	1.2					
3/29/2004	21.6	20.2	1.3					
3/30/2004	21.2	20.2	1.3					
3/31/2004	21.4	20.6	1.1					
4/1/2004	21.2	19.8	1.1					
4/2/2004	21.4	19.9	1.3					
4/3/2004	22.2	21.4	1.3					
4/4/2004	21.9	21.1	1.2					
4/5/2004	21.6	21.0	1.1					
4/6/2004	21.7	20.5	1.2					
4/7/2004	21.6	21.1	1.2					
4/8/2004	22.1	21.3	1.2					
4/9/2004	22.0	21.5	1.2					
4/10/2004	22.4	21.3	1.1					
4/11/2004	23.2	21.9	1.2					
4/12/2004	22.6	21.3	1.3					
4/13/2004	23.0	21.7	1.2					
4/14/2004	21.8	20.3	1.3					
4/15/2004	21.5	19.2	1.1					

4/16/2004	21.8	21.1	1.1					
4/17/2004	22.0	21.5	1.5					
4/18/2004	21.6	20.7	1.0					
4/19/2004	21.6	20.1	0.9					
4/20/2004	21.4	19.9	1.0					
4/21/2004	21.7	19.8	1.1					
4/22/2004	22.2	21.5	1.5					
4/23/2004	22.0	20.9	1.0					
4/24/2004	21.9	21.2	1.0					
4/25/2004	22.7	21.6	1.0					
4/26/2004	22.8	22.0	1.0					
4/27/2004	22.6	21.3	1.1					
4/28/2004	22.4	21.5	1.0					
4/29/2004	22.8	21.8	1.0					
4/30/2004	22.7	21.8	1.0					
5/1/2004	23.0	21.5	1.0					
5/2/2004	23.0	22.2	1.0					
5/3/2004	23.2	22.4	1.0					
5/4/2004	22.9	22.2	1.0					
5/5/2004	22.3	21.1	1.0					
5/6/2004	22.6	22.0	1.0					
5/7/2004	22.5	21.5	0.9					
5/8/2004	22.7	21.4	1.0					
5/9/2004	22.9	22.3	1.1					
5/10/2004	22.4	21.6	1.0					
5/11/2004	22.6	21.9	1.0					
5/12/2004	22.6	21.1	0.9					
5/13/2004	23.0	21.8	1.1					
5/14/2004	22.8	22.1	1.0					
5/15/2004	22.7	22.2	1.0					
5/16/2004	23.3	22.6	0.9					
5/17/2004	23.5	21.9	0.9					
5/18/2004	22.6	22.0	0.9					
5/19/2004	23.0	21.7	0.9					
5/20/2004	22.7	22.2	1.0					
5/21/2004	22.5	21.4	1.1					
5/22/2004	22.8	22.1	1.0					
5/23/2004	22.9	22.4	0.9					
5/24/2004	23.7	22.5	0.9					
5/25/2004	24.0	23.0	0.8					
5/26/2004	23.7	22.3	1.0					
5/27/2004	22.6	21.2	1.0					
5/28/2004	22.1	20.7	1.1					
5/29/2004	23.7	21.5	1.0					
5/30/2004	23.2	22.0	0.9					
5/31/2004	22.9	22.0	1.2					
6/1/2004	24.1	22.0	0.9					
6/2/2004	23.5	22.3	1.1					
6/3/2004	23.6	21.5	1.0					
6/4/2004	23.6	22.4	1.2					
6/5/2004	23.6	22.1	1.0					
6/6/2004	23.0	21.9	1.0					
6/7/2004	23.1	21.7	1.0					
6/8/2004	23.7	21.5	1.1					
6/9/2004	23.1	21.2	0.9					
6/10/2004	22.6	21.9	0.8					
6/11/2004	22.9	21.9	0.9					

6/12/2004	23.1	21.7	0.9					
6/13/2004	23.3	22.7	0.9					
6/14/2004	23.2	22.6	1.0					
6/15/2004	22.6	21.8	1.0					
6/16/2004	23.8	22.5	1.0					
6/17/2004	24.7	23.2	1.0					
6/18/2004	25.1	24.2	0.8					
6/19/2004	24.6	23.4	1.0					
6/20/2004	24.7	23.9	0.8					
6/21/2004	25.2	23.8	1.0					
6/22/2004	25.1	23.9	1.0					
6/23/2004	25.2	24.0	0.9					
6/24/2004	24.6	22.7	0.9					
6/25/2004	23.7	22.9	1.0					
6/26/2004	23.5	22.8	1.0					
6/27/2004	24.2	23.0	1.0					
6/28/2004	23.6	22.7	0.9					
6/29/2004	23.5	23.0	0.8					
6/30/2004	22.8	22.6	0.9					
7/1/2004	23.4	22.3	0.9					
7/2/2004	23.5	23.3	0.9					
7/3/2004	22.6	22.4	1.0					
7/4/2004	23.4	22.9	0.9					
7/5/2004	23.2	22.9	1.0					
7/6/2004	23.7	22.9	0.9					
7/7/2004	22.5	20.5	0.9					
7/8/2004	22.9	22.3	1.0					
7/9/2004	23.4		0.8					
7/10/2004	23.3	22.5	0.9					
7/11/2004	23.1	22.8	1.0					
7/12/2004	23.7	22.8	0.9					
7/13/2004	24.6	23.0	1.0					
7/14/2004	23.6	22.6	1.0					
7/15/2004	24.1	22.7	1.0					
7/16/2004	24.7	22.9	1.0					
7/17/2004	24.4	23.4	1.2					
7/18/2004	24.4	23.2	0.9					
7/19/2004	24.5	23.6	0.7					
7/20/2004	24.7	23.5	0.9					
7/21/2004	24.0	22.9	0.8					
7/22/2004	24.3	22.9	0.8					
7/23/2004	24.6	23.2	0.8					
7/24/2004	26.2	24.1	1.0					
7/25/2004	24.8	23.9	0.9					
7/26/2004	24.5	23.4	0.9					
7/27/2004	24.9	23.4	0.8					
7/28/2004	25.0	23.9	0.8					
7/29/2004	24.6	23.9	0.8					
7/30/2004	23.6	22.7	0.9					
7/31/2004	24.4	23.0	0.9					
8/1/2004	25.1	23.4	0.9					
8/2/2004	26.1	24.1	0.8					
8/3/2004	24.3	23.4	0.8					
8/4/2004	24.2	23.1	0.9					
8/5/2004	23.7	23.0	0.9					
8/6/2004	24.6	23.1	0.9					
8/7/2004	24.6	23.6	0.9					

8/8/2004	24.4	23.5	0.9						
8/9/2004	25.5	23.8	0.8						
8/10/2004	24.0	23.2	0.9						
8/11/2004	24.9	23.8	0.9						
8/12/2004	23.9	23.4	0.9						
8/13/2004	23.5	22.6	1.0						
8/14/2004	24.6	23.2	0.9						
8/15/2004	24.4	23.2	0.9						
8/16/2004	23.8	23.1	1.0						
8/17/2004	24.4	23.0	0.9						
8/18/2004	23.9	22.7	0.8						
8/19/2004	24.3	23.7	0.8						
8/20/2004	25.8	24.2	0.9						
8/21/2004	24.2	23.2	0.9						
8/22/2004	24.3	23.1	0.9						
8/23/2004	23.7	23.1	0.9						
8/24/2004	23.3	22.5	0.9						
8/25/2004	23.0	21.4	0.9						
8/26/2004	23.9	23.9	1.1						
8/27/2004	24.4	23.4	1.2						
8/28/2004	25.6	23.4	1.0						
8/29/2004	24.8	23.8	1.0						
8/30/2004	25.1	23.7	1.1						
8/31/2004	24.3	23.5	0.9						
9/1/2004	24.5	23.7	1.0						
9/2/2004	24.0	23.2	1.0						
9/3/2004	23.9	23.5	1.0						
9/4/2004	24.3	23.6	1.0						
9/5/2004			1.0						
9/6/2004			1.0						
9/7/2004	24.8	23.8	0.9						
9/8/2004	24.4	23.8	1.0						
9/9/2004	24.4	23.5	0.9						
9/10/2004	24.0	23.3	0.9						
9/11/2004	24.6	23.7	1.0						
9/12/2004	24.4	23.7	0.9						
9/13/2004	24.5	23.4	1.1						
9/14/2004	23.8	23.4	1.0						
9/15/2004	24.1	23.1	1.0						
9/16/2004	24.3	23.7	1.0						
9/17/2004	23.5	22.1	0.9						
9/18/2004	24.1	22.7	1.0						
9/19/2004	23.5	22.9	0.9						
9/20/2004	23.8	23.3	0.9						
9/21/2004	23.7	23.0	1.0						
9/22/2004	23.6	22.8	1.0						
9/23/2004	23.6	22.9	1.1						
9/24/2004	23.6	22.7	0.9						
9/25/2004	23.7	22.9	0.9						
9/26/2004	23.8	22.8	0.9						
9/27/2004	23.4	22.6	1.0						
9/28/2004	23.5	22.9	0.9						
9/29/2004	24.4	22.9	1.0						
9/30/2004	23.1	22.6	0.9						
10/1/2004	23.2	22.1	1.1						
10/2/2004	24.4	22.7	1.1						
10/3/2004	23.6	22.8	0.9						

10/4/2004	24.0	22.8	1.0					
10/5/2004	23.7	22.9	1.0					
10/6/2004	23.0	21.8	1.0					
10/7/2004	23.0	22.4	1.0					
10/8/2004	23.0	21.1	1.0					
10/9/2004	23.1	22.3	1.0					
10/10/2004	23.0	22.3	0.9					
10/11/2004	23.6	22.4	1.0					
10/12/2004	23.1	22.2	1.0					
10/13/2004	23.0	21.9	1.0					
10/14/2004	22.9	22.0	1.0					
10/15/2004	22.8	22.0	1.0					
10/16/2004	22.6	21.7	0.9					
10/17/2004	22.6	20.7	1.0					
10/18/2004	22.1	21.0	1.0					
10/19/2004	22.6	21.0	0.9					
10/20/2004	22.9	21.8	1.0					
10/21/2004	22.5	22.0	1.0					
10/22/2004	22.8	21.6	1.0					
10/23/2004	21.8	20.9	1.0					
10/24/2004	21.9	21.0	0.9					
10/25/2004	21.0	18.7	1.0					
10/26/2004	21.9	20.4	0.9					
10/27/2004	22.0	21.4	1.0					
10/28/2004	22.2	20.9	0.9					
10/29/2004	21.9	21.3	1.0					
10/30/2004	21.6	20.6	1.0					
10/31/2004	21.3	20.0	1.1					
11/1/2004	21.4	20.2	1.1					
11/2/2004	21.2	19.0	1.0					
11/3/2004	22.2	20.8	1.0					
11/4/2004	21.3	20.3	1.0					
11/5/2004	22.2	20.6	1.1					
11/6/2004	22.4	21.8	1.1					
11/7/2004	21.4	20.7	0.9					
11/8/2004	21.6	20.8	1.0					
11/9/2004	22.2	20.8	1.0					
11/10/2004	21.8	21.0	1.0					
11/11/2004	22.0	21.3	0.9					
11/12/2004	21.8	20.7	0.9					
11/13/2004	22.3	21.4	1.0					
11/14/2004	21.9	20.7	0.9					
11/15/2004	22.6	20.7	1.0					
11/16/2004	22.2	21.0	1.0					
11/17/2004	22.2	21.1	1.0					
11/18/2004	23.3	21.2	1.0					
11/19/2004	22.8	21.3	1.0					
11/20/2004	22.7	21.7	0.9					
11/21/2004	22.5	21.5	1.0					
11/22/2004	22.2	21.1	1.0					
11/23/2004	21.8	21.1	1.0					
11/24/2004	21.9	21.5	1.0					
11/25/2004	21.7	20.1	1.0					
11/26/2004	23.1	21.5	0.9					
11/27/2004	23.5	21.1	1.0					
11/28/2004	22.0	21.4	1.0					
11/29/2004	21.5	20.7	0.9					

11/30/2004	24.6	19.3	1.0						
12/1/2004	21.6	20.0	0.9						
12/2/2004	21.6	21.0	1.0						
12/3/2004	21.7	20.1	1.0						
12/4/2004	21.7	20.6	1.1						
12/5/2004	21.3	20.0	0.8						
12/6/2004	21.4	19.5	1.0						
12/7/2004	21.2	17.6	1.3						
12/8/2004	22.1	18.8	1.1						
12/9/2004	23.8	20.1	1.0						
12/10/2004	22.4	20.6	1.0						
12/11/2004	21.6	19.8	1.0						
12/12/2004	21.7	20.6	1.0						
12/13/2004	21.6	19.2	0.9						
12/14/2004	22.0	21.0	1.0						
12/15/2004	21.6	20.3	1.0						
12/16/2004	21.9	21.1	1.1						
12/17/2004	22.0	20.4	1.0						
12/18/2004	22.6	21.8	1.1						
12/19/2004	21.9	20.4	1.0						
12/20/2004	21.8	21.2	1.1						
12/21/2004	21.4	19.6	1.0						
12/22/2004	23.8	21.7	0.9						
12/23/2004	22.9	21.1	1.3						
12/24/2004	22.6	21.7	1.0						
12/25/2004	22.4	19.8	0.9						
12/26/2004	22.2	20.4	0.9						
12/27/2004	22.7	21.4	0.9						
12/28/2004	22.2	20.0	0.9						
12/29/2004	22.1	21.0	1.0						
12/30/2004	22.4	21.1	0.9						
12/31/2004	22.0	18.3	1.1						

Facility Name	Siltronic Coporation

Permitted Maximum Flow (Industrials)	2.7	MGD
Permitted Average Dry Weather Design Flow (Domestics)		MGD
Permitted Average Wet Weather Design Flow (Domestics)		MGD

	Data Set	Outfall/s included in Data Set	Monitoring Location for this Data Set	QA/QC Procedure for this data
This is the data set ODEQ will review for use in the modeling. For some facilities the primary data set is a combination of one or more outfalls. Describe the data here and enter data in the appropriate workbooks.	Primary	001, 002, 003 & 004	at point of discharge (rm 6.6)	Outfall 003 is the combined outfall discharge of three outfalls: 001 is Treated Process Waste Water; 002 is cooling water and boiler blowdown; and 004 is storm water.
If the "Primary" data set is compiled from two or more outfalls, please describe each outfall separately here. Enter outfall data in the appropriate workbooks.	001	003	point of discharge	thermocouple data following DEQ QA/QC protcol
	002	002	NA	Cooling water and boiler blow down, no temperature data
	003	004	NA	Storm water, no temperature data.
	004	001	NA	Treated process waste water, no temperature data.

SPAWNING PERIOD (for ODEQ use)

October 15 - May 15

Template V1.1

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This sheet is for ODEQ use

		7DADM TEMPERATURE (Celsius)					
		Primary					
		1999	2000	2001	2002	2003	2004
20.2	January	0.0	0.0	0.0	0.0	20.2	19.4
20.4	February	0.0	0.0	0.0	20.4	20.1	20.4
21.6	March	0.0	0.0	0.0	20.8	20.1	21.6
22.8	April	0.0	0.0	0.0	21.9	20.9	22.8
23.3	May	0.0	0.0	0.0	22.2	21.8	23.3
24.9	June	0.0	0.0	0.0	23.3	23.0	24.9
24.9	July	0.0	0.0	0.0	24.3	23.9	24.9
24.7	August	0.0	0.0	0.0	24.7	23.6	24.7
24.4	September	0.0	0.0	0.0	24.3	23.8	24.4
23.8	October	0.0	0.0	0.0	23.0	22.3	23.8
22.6	November	0.0	0.0	0.0	22.5	20.9	22.6
22.7	December	0.0	0.0	0.0	21.5	20.2	22.7
24.9	Non-Spawning Period	0	0	0	24.7	23.9	24.9
0.0	Spawning Period						

		7DADM FLOW (cms)					
		Primary					
		1999	2000	2001	2002	2003	2004
0.0570	January	0.0000	0.0000	0.0000	0.0000	0.0482	0.0570
0.0570	February	0.0000	0.0000	0.0000	0.0482	0.0482	0.0570
0.0526	March	0.0000	0.0000	0.0000	0.0438	0.0482	0.0526
0.0526	April	0.0000	0.0000	0.0000	0.0482	0.0526	0.0526
0.0482	May	0.0000	0.0000	0.0000	0.0438	0.0482	0.0438
0.0482	June	0.0000	0.0000	0.0000	0.0482	0.0482	0.0438
0.0570	July	0.0000	0.0000	0.0000	0.0438	0.0570	0.0438
0.0570	August	0.0000	0.0000	0.0000	0.0438	0.0570	0.0438
0.0613	September	0.0000	0.0000	0.0000	0.0438	0.0613	0.0438
0.0613	October	0.0000	0.0000	0.0000	0.0438	0.0613	0.0438
0.0570	November	0.0000	0.0000	0.0000	0.0482	0.0570	0.0482
0.0570	December	0.0000	0.0000	0.0000	0.0438	0.0570	0.0482
0.0613	Non-Spawning Period	0.0000	0.0000	0.0000	0.0482	0.0613	0.0438
0.0000	Spawning Period						

Data Set	Primary					
Miscellaneous Information						
	TEMP (Celsius)			FLOW (MGD)		
DATE	Daily Max	Daily Average	7dadm	Daily Flow	Daily Average	7dadm
1/1/2002						
1/2/2002						
1/3/2002						
1/4/2002			0.0			0.0
1/5/2002			0.0			0.0
1/6/2002			0.0			0.0
1/7/2002			0.0			0.0
1/8/2002			0.0			0.0
1/9/2002			0.0			0.0
1/10/2002			0.0			0.0
1/11/2002			0.0			0.0
1/12/2002			0.0			0.0
1/13/2002			0.0			0.0
1/14/2002			0.0			0.0
1/15/2002			0.0			0.0
1/16/2002			0.0			0.0
1/17/2002			0.0			0.0
1/18/2002			0.0			0.0
1/19/2002			0.0			0.0
1/20/2002			0.0			0.0
1/21/2002			0.0			0.0
1/22/2002			0.0			0.0
1/23/2002			0.0			0.0
1/24/2002			0.0			0.0
1/25/2002			0.0			0.0
1/26/2002			0.0			0.0
1/27/2002			0.0			0.0
1/28/2002			0.0			0.0
1/29/2002			0.0			0.0
1/30/2002			0.0			0.0
1/31/2002			0.0			0.0
2/1/2002			0.0			0.0
2/2/2002			0.0			0.0
2/3/2002			0.0			0.0
2/4/2002			0.0			0.0
2/5/2002			0.0			0.0
2/6/2002			19.7			1.1
2/7/2002			19.7			1.1
2/8/2002			19.6			1.1
2/9/2002	19.7	18.3	19.5	1.1		1.0
2/10/2002	19.7	18.4	19.5	1.0		1.1
2/11/2002	19.3	17.1	19.5	1.0		1.1
2/12/2002	19.2	18.0	19.6	1.0		1.1
2/13/2002	19.8	18.1	19.6	1.1		1.1
2/14/2002	19.6	18.6	19.5	1.1		1.0
2/15/2002	19.7	18.4	19.6	1.1		1.1
2/16/2002	19.6	17.8	19.6	1.0		1.1
2/17/2002	19.7	17.8	19.6	1.0		1.1
2/18/2002	19.6	18.0	19.6	1.3		1.1

2/19/2002	19.5	17.1	19.7	1.0	1.0
2/20/2002	19.3	18.0	19.8	1.0	1.1
2/21/2002	20.1	18.2	20.0	1.1	1.1
2/22/2002	20.2	19.0	20.1	0.9	1.0
2/23/2002	20.4	16.5	20.2	1.1	1.0
2/24/2002	20.9	18.6	20.3	1.1	1.0
2/25/2002	20.0	18.7	20.4	1.0	1.0
2/26/2002			20.4	1.0	1.0
2/27/2002			20.4	1.1	1.0
2/28/2002	20.3	18.9	20.3	1.1	1.0
3/1/2002	20.4	19.1	20.5	0.9	1.0
3/2/2002	20.3	18.7	20.5	1.0	1.0
3/3/2002	20.6	19.2	20.4	1.0	1.0
3/4/2002	20.9	20.0	20.3	1.1	1.0
3/5/2002	20.6	19.4	20.2	1.1	1.0
3/6/2002	19.6	15.6	20.1	1.0	1.0
3/7/2002	19.9	18.7	20.0	0.9	1.0
3/8/2002	19.5	18.3	19.9	0.9	1.0
3/9/2002	19.7	17.9	19.7	1.0	0.9
3/10/2002	20.2	18.5	19.7	1.0	0.9
3/11/2002	19.6	16.1	19.8	0.9	0.9
3/12/2002	19.5	17.2	19.8	1.0	1.0
3/13/2002	19.7	17.8	19.8	1.0	1.0
3/14/2002	20.5	18.9	19.8	1.0	1.0
3/15/2002	19.5	17.9	19.8	1.0	1.0
3/16/2002	19.9	18.5	19.7	1.0	1.0
3/17/2002	19.8	18.0	19.8	0.9	1.0
3/18/2002	19.5	17.3	19.6	0.9	1.0
3/19/2002	19.4	16.2	19.7	1.0	1.0
3/20/2002	19.9	18.4	19.8	0.9	1.0
3/21/2002	19.4	17.8	19.9	1.0	1.0
3/22/2002	20.0	18.9	20.0	0.9	1.0
3/23/2002	20.6	19.3	20.2	0.9	0.9
3/24/2002	20.2	19.3	20.2	1.0	1.0
3/25/2002	20.6	19.2	20.3	1.0	1.0
3/26/2002	20.4	18.6	20.4	0.9	1.0
3/27/2002	20.0	19.0	20.4	1.0	1.0
3/28/2002	20.4	19.7	20.5	1.0	1.0
3/29/2002	20.5	19.7	20.6	0.9	1.0
3/30/2002	21.0	19.7	20.6	1.0	1.0
3/31/2002	20.8	19.2	20.8	1.0	1.0
4/1/2002	21.0	20.1	21.0	1.2	1.0
4/2/2002	20.7	19.2	21.0	1.1	1.1
4/3/2002	21.4	20.2	21.0	1.1	1.1
4/4/2002	21.4	19.8	21.2	1.1	1.1
4/5/2002	20.9	19.3	21.1	1.1	1.1
4/6/2002	21.1	20.2	21.1	1.1	1.1
4/7/2002	21.8	20.1	21.0	1.1	1.1
4/8/2002	20.5	19.4	20.9	1.0	1.1
4/9/2002	20.6	18.9	21.0	1.0	1.1
4/10/2002	20.9	18.6	21.0	1.0	1.1
4/11/2002	20.8	19.9	20.9	1.2	1.1
4/12/2002	21.2	20.4	20.9	1.1	1.1
4/13/2002	21.6	19.9	20.9	1.0	1.1
4/14/2002	20.7	19.7	21.0	1.1	1.1
4/15/2002	20.6	20.0	21.1	1.2	1.1
4/16/2002	20.4	19.3	21.1	1.1	1.1

4/17/2002	22.0	20.0	21.1	1.1	1.1
4/18/2002	21.3	19.8	21.2	1.0	1.1
4/19/2002	21.1	20.2	21.3	1.1	1.1
4/20/2002	21.7	20.6	21.4	1.1	1.1
4/21/2002	21.0	20.4	21.2	1.1	1.1
4/22/2002	21.3	20.0	21.2	1.1	1.1
4/23/2002	21.2	20.1	21.2	1.1	1.1
4/24/2002	21.0	19.7	21.1	1.2	1.1
4/25/2002	21.0	19.4	21.2	1.2	1.1
4/26/2002	21.0	19.8	21.6	1.2	1.1
4/27/2002	21.4	20.5	21.8	1.1	1.1
4/28/2002	21.6	20.3	21.9	1.1	1.1
4/29/2002	24.2	21.7	21.8	1.1	1.1
4/30/2002	22.6	21.3	21.8	1.1	1.1
5/1/2002	21.4	20.6	21.7	1.0	1.0
5/2/2002	20.7	19.6	21.6	1.0	1.0
5/3/2002	20.8	19.2	21.1	0.9	1.0
5/4/2002	20.7	19.5	20.7	1.1	1.0
5/5/2002	21.0	19.2	20.6	1.0	1.0
5/6/2002	20.2	19.5	20.6	0.9	1.0
5/7/2002	20.3	19.6	20.6	0.9	1.0
5/8/2002	20.6	19.6	20.6	1.0	1.0
5/9/2002	20.5	19.4	20.7	1.0	1.0
5/10/2002	21.1	19.9	20.9	1.0	1.0
5/11/2002	20.8	20.0	21.2	0.9	1.0
5/12/2002	21.8	19.9	21.2	1.0	1.0
5/13/2002	21.3	20.0	21.4	1.0	1.0
5/14/2002	22.4	20.1	21.8	1.0	1.0
5/15/2002	20.9	20.1	21.9	1.0	1.0
5/16/2002	21.6	20.0	22.0	1.0	1.0
5/17/2002	23.7	21.2	22.0	1.1	1.0
5/18/2002	21.9	21.0	21.9	1.0	1.0
5/19/2002	22.2	19.7	22.0	1.0	1.0
5/20/2002	21.3	20.3	22.0	1.0	1.0
5/21/2002	21.5	21.0	21.7	1.0	1.0
5/22/2002	21.5	20.9	21.7	1.0	1.0
5/23/2002	21.6	20.2	21.8	1.0	1.0
5/24/2002	22.0	20.5	21.9	1.0	1.0
5/25/2002	21.9	21.3	22.0	1.0	1.0
5/26/2002	22.7	21.5	22.1	1.0	1.0
5/27/2002	22.1	20.8	22.2	1.0	1.0
5/28/2002	22.1	20.8	22.1	1.0	1.0
5/29/2002	21.9	20.9	22.2	1.0	1.0
5/30/2002	22.3	20.8	22.1	1.0	1.0
5/31/2002	21.9	21.2	22.2	0.9	1.0
6/1/2002	22.3	21.0	22.3	1.0	1.0
6/2/2002	22.4	21.2	22.6	0.9	1.0
6/3/2002	22.5	21.1	22.5	1.0	1.0
6/4/2002	22.6	21.5	22.5	1.0	1.0
6/5/2002	23.9	22.4	22.4	1.1	1.0
6/6/2002	21.8	21.0	22.4	1.0	1.0
6/7/2002	21.8	20.4	22.4	0.8	1.0
6/8/2002	21.9	21.0	22.4	1.1	1.0
6/9/2002	22.5	21.5	22.3	1.0	1.0
6/10/2002	22.3	21.7	22.5	1.1	1.0
6/11/2002	22.4	20.9	22.7	1.0	1.1
6/12/2002	23.2	22.2	22.8	1.0	1.0

6/13/2002	23.6	22.3	22.7	1.0	1.0
6/14/2002	22.9	22.0	22.7	1.1	1.0
6/15/2002	22.6	21.4	22.8	1.0	1.0
6/16/2002	22.1	21.5	22.7	1.0	1.0
6/17/2002	22.2	21.3	22.5	1.0	1.0
6/18/2002	22.7	21.9	22.6	1.1	1.0
6/19/2002	22.7	21.7	22.7	1.0	1.0
6/20/2002	22.4	21.3	22.8	0.9	1.0
6/21/2002	23.8	22.4	22.9	1.1	1.0
6/22/2002	23.1	22.2	23.0	1.1	1.0
6/23/2002	22.5	21.7	23.1	1.1	1.0
6/24/2002	23.2	21.6	23.3	1.0	1.0
6/25/2002	23.3	22.0	23.1	1.0	1.1
6/26/2002	23.4	22.2	23.1	1.0	1.0
6/27/2002	23.7	22.4	23.1	1.0	1.0
6/28/2002	22.3	20.8	23.0	1.1	1.0
6/29/2002	22.9	21.8	22.9	1.0	1.0
6/30/2002	22.9	21.6	22.6	1.0	1.0
7/1/2002	22.8	21.1	22.3	0.9	1.0
7/2/2002	22.1	21.1	22.4	1.0	1.0
7/3/2002	21.8	20.2	22.6	1.0	1.0
7/4/2002	21.1	19.6	22.6	0.9	1.0
7/5/2002	23.4	20.8	22.6	0.9	1.0
7/6/2002	23.9	21.9	22.8	1.0	0.9
7/7/2002	22.8	22.1	23.1	1.0	0.9
7/8/2002	22.9	21.8	23.5	0.9	0.9
7/9/2002	23.8	21.3	23.5	0.9	1.0
7/10/2002	24.0	23.0	23.5	0.9	0.9
7/11/2002	23.8	22.8	23.6	1.0	0.9
7/12/2002	23.4	22.3	23.7	1.0	1.0
7/13/2002	23.7	22.4	23.8	1.0	1.0
7/14/2002	23.4	21.8	23.7	1.0	1.0
7/15/2002	23.8	22.2	23.7	0.9	0.9
7/16/2002	24.1	22.7	23.7	0.9	0.9
7/17/2002	23.8	22.6	23.7	0.9	0.9
7/18/2002	23.5	22.2	23.8	0.9	0.9
7/19/2002	23.5	22.5	24.0	0.9	0.9
7/20/2002	23.5	22.9	24.0	0.9	1.0
7/21/2002	24.1	23.0	24.2	0.9	1.0
7/22/2002	25.3	23.5	24.3	1.0	1.0
7/23/2002	24.3	22.9	24.2	1.0	1.0
7/24/2002	24.9	23.3	24.2	1.0	1.0
7/25/2002	24.1	22.6	24.1	1.0	1.0
7/26/2002	23.4	22.4	23.9	1.0	1.0
7/27/2002	23.2	22.0	23.9	1.0	1.0
7/28/2002	23.7	22.5	23.6	1.0	1.0
7/29/2002	23.7	22.5	23.5	1.0	1.0
7/30/2002	24.0	22.0	23.5	1.0	0.9
7/31/2002	23.0	21.7	23.5	1.0	0.9
8/1/2002	23.5	22.3	23.5	0.9	0.9
8/2/2002	23.2	22.0	23.5	0.7	0.8
8/3/2002	23.6	22.0	23.4	0.7	0.8
8/4/2002	23.3	22.4	23.5	0.9	0.8
8/5/2002	23.8	22.4	23.5	0.9	0.9
8/6/2002	23.6	22.6	23.7	0.9	0.9
8/7/2002	23.7	22.6	23.7	1.0	0.9
8/8/2002	23.6	22.4	23.8	0.9	1.0

8/9/2002	24.4	22.3	23.9	0.9	1.0
8/10/2002	23.7	22.5	24.2	0.9	1.0
8/11/2002	24.0	22.5	24.4	1.1	1.0
8/12/2002	24.6	22.9	24.5	1.0	1.0
8/13/2002	25.3	23.6	24.6	1.0	1.0
8/14/2002	25.1	23.5	24.7	1.0	1.0
8/15/2002	24.4	22.7	24.7	0.9	1.0
8/16/2002	24.8	23.1	24.6	1.0	1.0
8/17/2002	24.3	23.1	24.4	1.0	1.0
8/18/2002	24.2	22.5	24.2	0.9	1.0
8/19/2002	24.0	22.6	24.0	1.0	1.0
8/20/2002	23.8	22.6	23.9	1.0	1.0
8/21/2002	23.5	22.2	23.9	0.9	1.0
8/22/2002	23.5	22.2	23.8	1.0	1.0
8/23/2002	23.8	22.8	23.8	1.0	1.0
8/24/2002	24.3	22.5	23.9	0.9	1.0
8/25/2002	23.8	22.5	24.2	1.1	1.0
8/26/2002	23.8	22.5	24.3	0.9	1.0
8/27/2002	24.7	22.5	24.2	1.1	1.0
8/28/2002	25.6	23.4	24.2	0.9	1.0
8/29/2002	23.9	22.8	24.2	0.9	1.0
8/30/2002	23.4	22.4	24.2	1.1	1.0
8/31/2002	24.0	22.5	24.0	1.0	1.0
9/1/2002	23.8	22.7	23.7	1.0	1.0
9/2/2002	24.3	22.8	23.6	0.9	1.0
9/3/2002	23.3	22.5	23.6	1.0	1.0
9/4/2002	23.1	22.0	23.5	1.0	1.0
9/5/2002	23.6	22.6	23.4	0.9	1.0
9/6/2002	23.3	22.2	23.4	1.1	1.0
9/7/2002	23.4	21.7	23.5	0.9	1.0
9/8/2002	23.1	22.0	23.6	0.9	1.0
9/9/2002	24.1	22.5	23.7	1.0	1.0
9/10/2002	24.0	22.7	23.9	1.0	0.9
9/11/2002	23.8	22.6	24.0	1.0	0.9
9/12/2002	24.5	22.5	24.1	0.9	0.9
9/13/2002	24.4	23.0	24.1	0.9	0.9
9/14/2002	24.3	23.2	24.0	0.8	0.9
9/15/2002	24.0	22.9	24.0	1.0	0.9
9/16/2002	23.5	22.5	23.9	0.9	0.9
9/17/2002	23.5	22.3	23.8	0.9	0.9
9/18/2002	24.0	22.5	23.8	0.9	0.9
9/19/2002	24.0	22.6	23.8	0.9	0.9
9/20/2002	23.2	21.9	23.9	0.9	0.9
9/21/2002	24.2	22.4	24.2	0.7	0.9
9/22/2002	24.5	23.1	24.2	0.9	0.9
9/23/2002	24.3	23.2	24.1	0.8	0.8
9/24/2002	25.5	23.7	24.3	0.9	0.8
9/25/2002	23.5	22.1	24.2	0.9	0.8
9/26/2002	23.5	21.7	24.1	0.8	0.8
9/27/2002	24.5	21.7	23.8	0.6	0.8
9/28/2002	23.8	22.2	23.5	0.7	0.7
9/29/2002	23.4	21.7	23.4	0.8	0.7
9/30/2002	22.7	20.7	23.2	0.7	0.8
10/1/2002	23.0	21.5	22.9	0.7	0.8
10/2/2002	22.7	21.5	23.0	0.8	0.8
10/3/2002	22.0	20.7	22.9	1.0	0.9
10/4/2002			23.0	0.9	0.9

10/5/2002	24.3	22.5	22.9	0.9	0.9
10/6/2002	22.8	21.7	22.8	1.0	0.9
10/7/2002	23.0	21.7	22.8	0.9	0.9
10/8/2002	22.3	21.5	22.7	0.9	0.9
10/9/2002	22.3	20.9	22.3	0.9	0.9
10/10/2002	22.2	20.9	22.1	0.9	0.9
10/11/2002	21.8	20.9	22.1	1.0	0.9
10/12/2002	21.9	20.8	22.0	1.0	0.9
10/13/2002	21.7	20.5	22.1	0.9	0.9
10/14/2002	22.4	20.9	22.1	0.9	0.9
10/15/2002	22.1	20.9	22.1	0.9	0.9
10/16/2002	22.6	21.4	22.1	0.9	0.9
10/17/2002	22.3	21.0	22.1	0.9	0.9
10/18/2002	21.8	20.7	22.0	0.9	0.9
10/19/2002	22.0	20.9	22.0	0.9	0.9
10/20/2002	21.9	21.1	21.8	0.9	0.9
10/21/2002	21.4	21.0	21.6	0.9	0.9
10/22/2002			21.5	0.9	0.9
10/23/2002	21.2	20.5	21.4	1.0	0.9
10/24/2002	21.1	20.4	21.4	0.9	0.9
10/25/2002	21.5	20.2	21.3	0.9	0.9
10/26/2002	21.2	20.4	21.4	0.8	0.9
10/27/2002	21.7	20.5	21.3	1.0	0.9
10/28/2002	21.3	20.6	21.3	0.9	0.9
10/29/2002	21.7	20.5	21.1	0.9	0.9
10/30/2002	20.8	19.9	21.2	0.9	1.0
10/31/2002	21.0	20.0	21.0	0.9	1.0
11/1/2002	20.4	19.0	21.0	1.1	1.0
11/2/2002	21.5	19.9	20.9	1.2	1.0
11/3/2002	20.6	19.8	21.0	1.0	1.0
11/4/2002	20.9	19.7	21.1	1.1	1.1
11/5/2002	21.0	19.5	21.0	1.0	1.1
11/6/2002	21.7	20.0	20.9	1.1	1.1
11/7/2002	21.4	19.6	20.9	1.1	1.1
11/8/2002	20.2	19.1	20.9	1.1	1.1
11/9/2002	20.8	18.4	21.1	1.1	1.1
11/10/2002	20.6	19.3	21.2	1.0	1.1
11/11/2002	20.8	19.3	21.3	1.0	1.1
11/12/2002	22.5	19.7	21.4	1.1	1.1
11/13/2002	22.0	20.5	21.4	1.1	1.1
11/14/2002	21.8	20.9	21.6	1.1	1.1
11/15/2002	21.4	20.2	21.6	0.9	1.1
11/16/2002	20.9	19.9	21.6	1.1	1.1
11/17/2002	21.4	20.3	21.5	1.1	1.1
11/18/2002	21.4	19.7	21.5	1.1	1.1
11/19/2002	22.0	20.8	21.5	1.1	1.1
11/20/2002			21.8	1.1	1.1
11/21/2002	21.8	20.9	22.1	1.0	1.1
11/22/2002	21.6	20.4	22.2	1.1	1.1
11/23/2002	22.8	20.7	22.2	1.1	1.1
11/24/2002	22.8	21.1	22.2	1.0	1.1
11/25/2002	22.3	20.7	22.3	1.1	1.1
11/26/2002	21.7	20.1	22.5	1.0	1.1
11/27/2002	22.6	20.1	22.5	1.2	1.1
11/28/2002	22.6	20.1	22.3	1.2	1.1
11/29/2002	22.9	19.6	22.1	1.0	1.1
11/30/2002	22.9	19.4	21.9	1.1	1.0

12/1/2002	21.1	19.5	21.5	1.0	1.0
12/2/2002	20.7	19.6	21.2	0.9	1.0
12/3/2002	20.4	19.4	20.9	0.9	1.0
12/4/2002	20.0	19.0	20.6	0.9	0.9
12/5/2002	20.1	18.9	20.5	1.0	0.9
12/6/2002	20.7	19.4	20.5	0.9	0.9
12/7/2002	20.7	19.7	20.5	1.0	0.9
12/8/2002	20.7	19.5	20.6	0.9	1.0
12/9/2002	20.7	19.1	20.8	0.9	0.9
12/10/2002	20.7	18.5	20.9	1.0	0.9
12/11/2002	20.5	17.6	20.8	1.0	0.9
12/12/2002	21.4	17.3	20.7	0.8	0.9
12/13/2002	21.4	17.9	20.7	0.9	1.0
12/14/2002	20.0	17.5	20.6	1.0	0.9
12/15/2002	20.3	17.2	20.6	1.0	0.9
12/16/2002	20.4	17.1	20.5	1.1	1.0
12/17/2002	20.4	17.1	20.4	0.9	1.0
12/18/2002	20.0	17.4	20.5	0.9	1.0
12/19/2002	20.8	18.2	20.4	1.1	0.9
12/20/2002	20.8	19.0	20.3	0.9	0.9
12/21/2002	20.5	18.4	20.1	0.9	0.8
12/22/2002	19.8	17.6	20.0	0.8	0.8
12/23/2002	19.5	17.1	19.8	0.5	0.7
12/24/2002	19.3	16.3	19.6	0.5	0.6
12/25/2002	19.0	15.3	19.3	0.6	0.6
12/26/2002	19.4	14.7	19.3	0.5	0.5
12/27/2002	19.4	14.6	19.2	0.5	0.5
12/28/2002	19.0	14.7	19.2	0.5	0.5
12/29/2002	19.3	15.2		0.5	
12/30/2002	19.3	13.6		0.5	
12/31/2002	18.9	13.3		0.5	

Data Set	Primary				
Miscellaneous Information					
	TEMP (Celsius)		FLOW (MGD)		
DATE	Daily Max	Daily Average	Daily Flow	Daily Average	7dadm
1/1/2003	18.9	15.1	1.1		
1/2/2003	18.4	15.4	1.1		
1/3/2003	20.2	16.8	1.0		
1/4/2003	20.2	17.1	1.0		1.1
1/5/2003	20.5	17.1	1.2		1.1
1/6/2003	20.5	18.3	1.1		1.1
1/7/2003	20.0		1.1		1.1
1/8/2003	20.1		1.1		1.1
1/9/2003	19.9		1.1		1.1
1/10/2003	20.0		1.1		1.1
1/11/2003	15.2		1.1		1.1
1/12/2003	19.0		1.0		1.1
1/13/2003	19.4		1.1		1.1
1/14/2003	19.8		1.1		1.1
1/15/2003	19.2		1.2		1.1
1/16/2003	18.8		1.2		1.1
1/17/2003	18.6		1.0		1.1
1/18/2003	18.7		1.0		1.1
1/19/2003	19.1		1.2		1.0
1/20/2003	18.4		1.1		1.0
1/21/2003	19.4		1.0		0.9
1/22/2003	19.8		0.9		0.9
1/23/2003	19.4		0.6		0.8
1/24/2003	18.2		0.6		0.7
1/25/2003	20.1		0.7		0.7
1/26/2003	19.6		0.6		0.6
1/27/2003	20.0		0.7		0.6
1/28/2003	19.8		0.6		0.7
1/29/2003	15.7	13.7	0.6		0.7
1/30/2003	17.8	16.4	0.6		0.8
1/31/2003	18.5	15.5	0.7		0.8
2/1/2003	19.2	17.8	1.2		0.9
2/2/2003	19.4	18.1	1.0		0.9
2/3/2003	19.5	18.7	1.0		1.0
2/4/2003	20.0	18.4	0.9		1.0
2/5/2003	19.2	18.2	1.1		1.0
2/6/2003	20.2	18.9	1.1		1.0
2/7/2003	19.5	17.7	1.1		1.0
2/8/2003	19.0	18.1	1.0		1.0
2/9/2003	19.4	18.3	1.0		1.0
2/10/2003	19.6	18.2	1.0		1.0
2/11/2003	19.5	18.4	1.0		1.0
2/12/2003	20.0	18.8	0.8		1.0
2/13/2003	19.8	18.3	1.0		1.0
2/14/2003	19.9	18.7	1.0		1.0
2/15/2003	14.7	14.1	1.0		1.0
2/16/2003	19.3	16.7	1.1		1.0
2/17/2003	18.8	15.6	1.0		1.0
2/18/2003	19.9	18.4	1.1		1.0

2/19/2003	20.0	18.5	1.0		1.0
2/20/2003	20.1	18.2	0.9		1.0
2/21/2003	19.9	19.3	1.1		1.0
2/22/2003	19.9	18.7	1.0		1.0
2/23/2003	19.3	18.2	1.0		1.0
2/24/2003	19.6	18.5	1.1		1.0
2/25/2003	19.8	19.3	1.1		1.0
2/26/2003	19.5	18.7	1.1		1.0
2/27/2003	19.6	18.5	0.9		1.1
2/28/2003	19.5	17.5	1.0		1.0
3/1/2003	20.5	19.2	1.1		1.1
3/2/2003	20.5	18.3	1.1		1.0
3/3/2003	21.2	19.7	1.1		1.0
3/4/2003	20.2	18.8	1.1		1.0
3/5/2003	19.2	17.9	1.0		1.1
3/6/2003	19.4	16.7	0.9		1.0
3/7/2003	17.7	13.6	1.1		1.0
3/8/2003			1.2		1.0
3/9/2003	19.1	16.2	1.0		1.1
3/10/2003	19.3	18.2	1.0		1.1
3/11/2003	20.1	18.9	1.1		1.1
3/12/2003	-17.8	-17.8	1.2		1.1
3/13/2003	19.7	17.9	1.1		1.1
3/14/2003	19.1	17.6	1.0		1.1
3/15/2003			1.1		1.1
3/16/2003			1.0		1.0
3/17/2003	19.3	18.8	1.0		1.0
3/18/2003	19.3	17.3	1.0		1.0
3/19/2003	19.5	17.4	1.1		1.0
3/20/2003	19.4	18.5	1.0		1.0
3/21/2003	19.4	17.3	1.0		1.0
3/22/2003	19.4	17.6	1.1		1.0
3/23/2003	19.0	17.8	1.0		1.0
3/24/2003	18.8	17.5	1.0		1.0
3/25/2003	19.3	18.0	1.0		1.0
3/26/2003	19.6	17.2	1.1		1.0
3/27/2003	19.5	18.3	1.0		1.0
3/28/2003	19.9	18.3	1.0		1.0
3/29/2003			1.1		1.0
3/30/2003			0.9		1.0
3/31/2003	19.7	18.3	1.0		1.0
4/1/2003	19.4	17.4	0.9		1.0
4/2/2003	19.4	17.3	1.1		1.0
4/3/2003	19.8	17.6	1.0		1.1
4/4/2003	20.7	17.9	1.0		1.1
4/5/2003	18.9	17.0	1.2		1.1
4/6/2003	19.7	17.9	1.1		1.1
4/7/2003	20.4	18.4	1.3		1.1
4/8/2003	20.2	13.7	1.0		1.2
4/9/2003	20.1	18.4	1.1		1.1
4/10/2003	20.6	19.1	1.3		1.1
4/11/2003	20.5	19.4	1.1		1.1
4/12/2003	20.1	17.5	1.1		1.1
4/13/2003	20.0	17.9	1.1		1.1
4/14/2003	20.0	19.1	1.1		1.1
4/15/2003	20.1	18.7	1.0		1.1
4/16/2003	20.2	18.2	1.1		1.1

4/17/2003	20.8	18.4	1.1		1.1
4/18/2003	20.4	19.1	1.0		1.1
4/19/2003	21.2	19.5	1.1		1.1
4/20/2003	20.9	20.1	1.1		1.1
4/21/2003	20.4	18.9	1.1		1.1
4/22/2003	20.6	19.2	1.1		1.1
4/23/2003	19.9	16.9	1.2		1.1
4/24/2003	20.6	18.4	1.2		1.1
4/25/2003	20.7	18.9	1.1		1.1
4/26/2003	20.4	19.4	1.1		1.1
4/27/2003	20.6	19.7	1.1		1.1
4/28/2003	20.9	20.0	1.0		1.1
4/29/2003	21.2	20.2	1.1		1.1
4/30/2003	20.8	19.8	1.1		1.1
5/1/2003	20.9	18.1	1.1		1.1
5/2/2003	21.1	18.6	1.2		1.1
5/3/2003	20.7	19.3	1.2		1.1
5/4/2003	20.8	19.4	1.1		1.1
5/5/2003	21.2	19.7	1.1		1.1
5/6/2003	21.2	20.2	1.0		1.1
5/7/2003	21.1	19.9	1.0		1.1
5/8/2003	20.7	19.9	1.1		1.1
5/9/2003	21.1	19.0	1.1		1.1
5/10/2003	21.0	19.9	1.2		1.1
5/11/2003	21.6	20.3	1.0		1.1
5/12/2003	21.2	20.1	1.0		1.1
5/13/2003	21.6	20.3	1.1		1.1
5/14/2003	20.6	19.8	1.1		1.0
5/15/2003	20.4	19.2	1.1		1.1
5/16/2003	20.2	18.7	1.0		1.1
5/17/2003	20.3	18.4	1.1		1.1
5/18/2003	21.0	19.6	1.1		1.1
5/19/2003	20.8	19.8	1.1		1.1
5/20/2003	20.9	19.9	1.0		1.1
5/21/2003	21.0	20.1	1.1		1.1
5/22/2003	21.2	20.1	1.1		1.1
5/23/2003	21.8	20.5	1.0		1.1
5/24/2003	21.1	19.7	1.2		1.1
5/25/2003	21.1	20.1	1.0		1.1
5/26/2003	21.2	20.0	0.9		1.0
5/27/2003	21.7	20.6	1.0		1.1
5/28/2003	22.5	21.2	1.0		1.1
5/29/2003	21.9	20.8	1.1		1.1
5/30/2003	21.2	19.3	1.1		1.1
5/31/2003	21.4	20.3	1.2		1.1
6/1/2003	21.7	20.6	1.0		1.1
6/2/2003	21.4	20.7	1.1		1.1
6/3/2003	22.2	21.1	1.2		1.1
6/4/2003	22.2	21.0	1.0		1.1
6/5/2003	22.1	20.7	1.1		1.1
6/6/2003	22.2	21.1	1.1		1.1
6/7/2003	21.6	20.6	1.0		1.0
6/8/2003	21.6	20.5	0.9		1.0
6/9/2003	21.3	20.1	1.1		1.0
6/10/2003	21.5	20.7	1.0		1.0
6/11/2003	21.7	20.4	1.0		1.0
6/12/2003	21.4	20.9	1.1		1.0

6/13/2003	21.7	20.8	1.0		1.0
6/14/2003	22.2	21.1	1.0		1.0
6/15/2003	22.2	21.1	1.0		1.0
6/16/2003	23.3	21.3	1.1		1.0
6/17/2003	22.1	21.2	1.0		1.0
6/18/2003	21.7	21.0	1.0		1.0
6/19/2003	20.7	20.2	1.0		1.0
6/20/2003	21.1	19.9	1.1		1.0
6/21/2003	22.1	20.8	1.1		1.0
6/22/2003	21.6	20.9	1.0		1.0
6/23/2003	22.2	21.1	1.1		1.0
6/24/2003	22.0	21.1	1.0		1.1
6/25/2003	23.2	21.5	1.0		1.0
6/26/2003	23.1	22.0	1.0		1.0
6/27/2003	22.9	21.7	1.1		1.1
6/28/2003	23.3	21.7	1.1		1.0
6/29/2003	23.4	22.4	1.1		1.0
6/30/2003	22.8	21.8	1.1		1.0
7/1/2003	22.7	22.0	0.8		1.1
7/2/2003	22.6	21.6	1.1		1.1
7/3/2003	23.0	21.6	1.1		1.1
7/4/2003	23.4	21.9	1.1		1.0
7/5/2003	23.0	21.6	1.2		1.0
7/6/2003	22.9	21.8	1.0		1.0
7/7/2003	23.1	22.0	0.6		1.0
7/8/2003	22.7	21.9	1.2		1.0
7/9/2003	23.1	21.9	0.9		1.0
7/10/2003	23.4	22.0	1.1		1.0
7/11/2003	23.1	21.9	1.0		1.1
7/12/2003	22.6	22.1	1.2		1.1
7/13/2003	22.3	21.6	1.1		1.2
7/14/2003	22.3	21.2	1.2		1.2
7/15/2003	22.6	21.5	1.3		1.2
7/16/2003	23.0	22.2	1.3		1.2
7/17/2003	23.3	22.5	1.4		1.2
7/18/2003	23.9	22.8	1.3		1.2
7/19/2003	23.7	22.6	1.0		1.3
7/20/2003	23.8	22.4	0.9		1.2
7/21/2003	24.3	22.9	1.1		1.2
7/22/2003	23.8	22.7	1.7		1.1
7/23/2003	24.2	22.5	1.0		1.2
7/24/2003	22.5	21.4	1.2		1.2
7/25/2003	22.1	20.8	1.0		1.2
7/26/2003	22.2	20.6	1.1		1.1
7/27/2003	21.7	20.9	1.3		1.2
7/28/2003	22.3	21.0	1.1		1.1
7/29/2003	23.5	21.7	1.1		1.1
7/30/2003	23.0	21.6	1.1		1.2
7/31/2003	23.4	21.8	1.1		1.1
8/1/2003	22.9	20.8	1.1		1.1
8/2/2003	22.5	20.9	1.2		1.1
8/3/2003	21.6	20.7	0.9		1.1
8/4/2003	23.0	20.9	1.1		1.1
8/5/2003	23.6	21.2	1.0		1.1
8/6/2003	22.6	21.1	1.1		1.1
8/7/2003	22.9	21.3	1.1		1.1
8/8/2003	22.5	20.7	1.0		1.1

8/9/2003	22.0	21.0	1.4		1.2
8/10/2003	22.7	21.0	1.1		1.2
8/11/2003	22.7	21.4	1.2		1.2
8/12/2003	22.8	21.8	1.3		1.2
8/13/2003	22.7	21.9	1.0		1.2
8/14/2003	28.3	21.4	1.2		1.2
8/15/2003	22.6	21.1	1.2		1.2
8/16/2003	22.4	21.3	1.2		1.2
8/17/2003	22.6	21.3	1.1		1.2
8/18/2003	23.6	22.0	1.2		1.1
8/19/2003	23.0	21.8	1.1		1.1
8/20/2003	22.9	21.7	1.0		1.1
8/21/2003	23.7	21.6	1.0		1.1
8/22/2003	22.7	21.8	1.2		1.1
8/23/2003	22.4	21.3	1.1		1.1
8/24/2003	22.3	20.9	1.1		1.1
8/25/2003	22.6	21.2	1.1		1.1
8/26/2003	22.3	21.2	1.1		1.2
8/27/2003	22.4	21.6	1.2		1.2
8/28/2003	23.3	21.7	1.2		1.2
8/29/2003	23.1	22.1	1.2		1.2
8/30/2003	23.0	22.0	1.4		1.3
8/31/2003	23.0	21.8	1.3		1.3
9/1/2003	22.7	22.0	1.3		1.3
9/2/2003	23.6	22.2	1.3		1.3
9/3/2003	23.9	22.7	1.2		1.3
9/4/2003	24.5	23.0	1.3		1.3
9/5/2003	23.5	22.6	1.3		1.3
9/6/2003	23.7	22.2	1.3		1.2
9/7/2003	22.9	22.0	1.4		1.2
9/8/2003	23.5	21.7	1.2		1.2
9/9/2003	24.5	20.8	1.2		1.2
9/10/2003	22.7	21.9	1.2		1.2
9/11/2003	22.6	21.8	1.2		1.2
9/12/2003	24.7	21.9	1.2		1.2
9/13/2003	22.5	21.5	1.2		1.2
9/14/2003	22.3	21.2	1.2		1.2
9/15/2003	21.9	20.8	1.1		1.2
9/16/2003	21.4	20.5	1.3		1.2
9/17/2003	21.2	20.5	1.2		1.3
9/18/2003	21.4	20.6	1.4		1.2
9/19/2003	21.7	20.7	1.2		1.3
9/20/2003	21.5	20.8	1.4		1.3
9/21/2003	22.6	21.4	1.2		1.3
9/22/2003	22.0	20.9	1.4		1.4
9/23/2003	21.7	20.8	1.4		1.4
9/24/2003	21.9	20.9	1.4		1.4
9/25/2003	22.0	21.3	1.8		1.4
9/26/2003	22.3	21.5	1.2		1.4
9/27/2003	22.9	21.6	1.2		1.3
9/28/2003	22.4	21.3	1.1		1.3
9/29/2003	22.0	21.3	1.4		1.2
9/30/2003	22.6	21.6	1.2		1.2
10/1/2003	22.4	21.7	1.2		1.2
10/2/2003	22.1	21.5	1.2		1.3
10/3/2003	22.2	21.5	1.2		1.2
10/4/2003	22.0	21.2	1.3		1.2

10/5/2003	22.5	21.8	1.3		1.2
10/6/2003	22.2	21.5	1.2		1.2
10/7/2003	22.3	21.5	1.1		1.2
10/8/2003	22.2	21.4	1.2		1.2
10/9/2003	21.8	20.2	1.1		1.3
10/10/2003	21.4	20.7	1.5		1.3
10/11/2003	21.4	19.9	1.3		1.4
10/12/2003	21.6	20.8	1.4		1.4
10/13/2003	21.0	20.6	1.5		1.4
10/14/2003	21.2	20.5	1.5		1.4
10/15/2003	20.6	19.4	1.2		1.4
10/16/2003	21.0	19.6	1.3		1.4
10/17/2003	21.2	20.2	1.3		1.3
10/18/2003	21.4	20.5	1.3		1.3
10/19/2003	20.9	19.8	1.3		1.3
10/20/2003	21.3	20.2	1.3		1.3
10/21/2003	21.0	20.3	1.3		1.3
10/22/2003	20.8	19.8	1.3		1.3
10/23/2003	20.4	19.8	1.2		1.3
10/24/2003	20.5	19.8	1.3		1.3
10/25/2003	20.6	19.9	1.3		1.3
10/26/2003	20.7	20.0	1.4		1.3
10/27/2003	20.5	19.9	1.3		1.3
10/28/2003	20.9	20.0	1.1		1.3
10/29/2003	20.2	19.2	1.2		1.3
10/30/2003	21.1	20.0	1.3		1.2
10/31/2003	21.6	19.9	1.3		1.2
11/1/2003	20.8	19.8	1.1		1.2
11/2/2003	20.9	19.6	1.2		1.2
11/3/2003	20.5	19.7	1.3		1.3
11/4/2003	20.8	19.9	1.2		1.2
11/5/2003	20.8	19.7	1.3		1.3
11/6/2003	20.3	19.3	1.3		1.3
11/7/2003	20.4	19.1	1.3		1.3
11/8/2003	20.3	19.2	1.2		1.3
11/9/2003	20.5	19.1	1.4		1.3
11/10/2003	20.5	19.2	1.3		1.3
11/11/2003	20.1	18.7	1.3		1.3
11/12/2003	19.7	18.7	1.2		1.3
11/13/2003	19.7	18.8	1.3		1.3
11/14/2003	20.1	19.0	1.3		1.3
11/15/2003	19.7	18.3	1.3		1.3
11/16/2003	20.1	17.8	1.4		1.3
11/17/2003	19.7	18.0	1.2		1.2
11/18/2003	19.4	17.9	1.1		1.2
11/19/2003	19.1	15.0	1.3		1.3
11/20/2003	19.1	17.1	1.1		1.3
11/21/2003	19.4	18.1	1.2		1.1
11/22/2003	19.4	18.4	1.6		1.0
11/23/2003	19.4	17.5	1.4		0.9
11/24/2003	19.2	18.2	0.2		0.8
11/25/2003	19.4	16.4	0.3		0.7
11/26/2003	19.5	17.5	0.5		0.6
11/27/2003	19.4	18.5	0.6		0.5
11/28/2003	19.4	16.9	0.4		0.6
11/29/2003	19.3	17.2	0.6		0.7
11/30/2003	19.0	17.9	0.6		0.9

12/1/2003	19.4	17.7	1.3		1.0
12/2/2003	19.5	17.2	1.2		1.1
12/3/2003	19.3	17.6	1.3		1.2
12/4/2003	18.7	16.9	1.3		1.3
12/5/2003	18.8	14.9	1.3		1.3
12/6/2003	19.3	17.6	1.3		1.3
12/7/2003	18.6	16.5	1.2		1.3
12/8/2003	23.3	18.3	1.2		1.2
12/9/2003	23.2	17.9	1.3		1.2
12/10/2003	17.9	15.7	1.2		1.2
12/11/2003	19.1	16.4	1.2		1.2
12/12/2003	18.2	16.6	1.3		1.2
12/13/2003	18.4	13.4	1.1		1.2
12/14/2003	18.6	15.4	1.2		1.2
12/15/2003	18.7	17.4	1.2		1.2
12/16/2003	18.3	16.7	1.3		1.2
12/17/2003	19.1	17.4	1.3		1.2
12/18/2003	19.9	18.6	1.3		1.2
12/19/2003	19.2	17.8	1.2		1.2
12/20/2003	18.9	16.7	1.2		1.2
12/21/2003	19.2	17.1	1.1		1.2
12/22/2003	18.8	17.5	1.2		1.2
12/23/2003	19.0	17.3	1.1		1.2
12/24/2003			1.2		1.2
12/25/2003			1.1		1.2
12/26/2003			1.1		1.2
12/27/2003			1.3		1.2
12/28/2003			1.1		1.2
12/29/2003			1.2		
12/30/2003	18.1	16.8	1.2		
12/31/2003	18.4	15.7	1.2		

Data Set	Primary				
Miscellaneous Information					
	TEMP (Celsius)		FLOW (MGD)		
DATE	Daily Max	Daily Average	Daily Flow	Daily Average	7dadm
1/1/2004	18.7	17.4	1.2		
1/2/2004	17.0	11.5	1.0		
1/3/2004	18.3	15.3	1.6		
1/4/2004	18.5	17.2	1.4		1.2
1/5/2004	17.3	15.6	1.0		1.2
1/6/2004	16.1	14.4	1.2		1.2
1/7/2004	14.9	13.7	1.1		1.1
1/8/2004	15.4	13.7	0.9		1.1
1/9/2004	15.7	13.4	1.0		1.1
1/10/2004	17.4	15.1	1.3		1.2
1/11/2004	17.5	15.8	1.3		1.2
1/12/2004	17.1	14.5	1.2		1.2
1/13/2004	18.0	16.4	1.4		1.3
1/14/2004	17.5	14.8	1.3		1.3
1/15/2004	18.3	16.3	1.3		1.3
1/16/2004			1.3		1.3
1/17/2004			1.3		1.3
1/18/2004	17.8	17.2	1.3		1.3
1/19/2004	18.7	18.0	1.3		1.3
1/20/2004	18.9	17.7	1.3		1.3
1/21/2004	18.7	16.7	1.3		1.3
1/22/2004	20.6	18.4	1.4		1.3
1/23/2004	17.6	14.5	1.0		1.3
1/24/2004	18.1	16.1	1.4		1.3
1/25/2004	18.2	16.8	1.3		1.3
1/26/2004	18.5	15.6	1.3		1.3
1/27/2004	19.3	18.7	1.4		1.3
1/28/2004	19.2	16.9	1.3		1.3
1/29/2004	19.5	17.6	1.2		1.3
1/30/2004	19.2	17.3	1.3		1.3
1/31/2004	18.9	16.2	1.3		1.3
2/1/2004	19.1	18.0	1.4		1.3
2/2/2004	19.3	17.1	1.4		1.3
2/3/2004	20.4	18.9	1.3		1.3
2/4/2004	19.9	18.9	1.3		1.3
2/5/2004	19.9	19.0	1.3		1.3
2/6/2004	19.4	17.0	1.1		1.2
2/7/2004	19.7	18.6	1.1		1.2
2/8/2004	19.7	18.5	1.3		1.2
2/9/2004	20.7	19.3	1.3		1.2
2/10/2004	19.8	18.5	1.2		1.2
2/11/2004	20.1	18.9	1.2		1.3
2/12/2004	20.0	17.6	1.3		1.2
2/13/2004	20.0	18.8	1.3		1.2
2/14/2004	19.6	18.0	1.3		1.2
2/15/2004	20.1	18.6	1.1		1.2
2/16/2004	19.6	16.8	1.3		1.2
2/17/2004	19.2	16.1	1.3		1.2
2/18/2004	20.0	17.8	1.1		1.2

2/19/2004	19.4	18.5	1.3		1.3
2/20/2004	19.3	18.0	1.3		1.3
2/21/2004	20.1	18.1	1.3		1.3
2/22/2004	20.4	18.8	1.4		1.3
2/23/2004	20.3	19.0	1.2		1.2
2/24/2004	19.4	18.1	1.3		1.2
2/25/2004	19.4	18.0	1.1		1.2
2/26/2004	20.2	17.8	1.0		1.1
2/27/2004	20.7	18.6	1.2		1.1
2/28/2004	20.5	18.8	1.1		1.1
2/29/2004	20.3	19.0	1.2		1.1
3/1/2004	20.7	19.2	1.1		1.2
3/2/2004	20.6	19.4	1.2		1.2
3/3/2004	20.0	18.1	1.1		1.2
3/4/2004	20.7	19.5	1.2		1.2
3/5/2004	20.3	19.0	1.2		1.2
3/6/2004	20.3	18.1	1.6		1.2
3/7/2004			1.3		1.2
3/8/2004			1.1		1.2
3/9/2004	21.2	20.7	1.1		1.2
3/10/2004	20.5	19.7	1.2		1.2
3/11/2004	20.6	19.8	1.2		1.2
3/12/2004	20.7	18.9	1.2		1.2
3/13/2004	20.7	19.6	1.4		1.2
3/14/2004	21.1	19.8	1.1		1.2
3/15/2004	21.1	20.0	1.2		1.2
3/16/2004	20.6	19.8	1.2		1.1
3/17/2004	21.4	20.8	1.1		1.1
3/18/2004	21.3	20.4	1.1		1.1
3/19/2004	21.2	19.7	1.0		1.1
3/20/2004	21.3	20.7	1.1		1.1
3/21/2004	22.0	21.4	1.1		1.1
3/22/2004	22.0	21.2	1.2		1.1
3/23/2004	21.7	21.0	1.1		1.2
3/24/2004	21.2	18.3	1.1		1.2
3/25/2004	21.3	19.0	1.3		1.2
3/26/2004	20.6	18.6	1.1		1.2
3/27/2004	20.7	19.9	1.3		1.2
3/28/2004	20.8	19.5	1.2		1.2
3/29/2004	21.6	20.2	1.3		1.2
3/30/2004	21.2	20.2	1.3		1.2
3/31/2004	21.4	20.6	1.1		1.2
4/1/2004	21.2	19.8	1.1		1.2
4/2/2004	21.4	19.9	1.3		1.2
4/3/2004	22.2	21.4	1.3		1.2
4/4/2004	21.9	21.1	1.2		1.2
4/5/2004	21.6	21.0	1.1		1.2
4/6/2004	21.7	20.5	1.2		1.2
4/7/2004	21.6	21.1	1.2		1.2
4/8/2004	22.1	21.3	1.2		1.2
4/9/2004	22.0	21.5	1.2		1.2
4/10/2004	22.4	21.3	1.1		1.2
4/11/2004	23.2	21.9	1.2		1.2
4/12/2004	22.6	21.3	1.3		1.2
4/13/2004	23.0	21.7	1.2		1.2
4/14/2004	21.8	20.3	1.3		1.2
4/15/2004	21.5	19.2	1.1		1.2

4/16/2004	21.8	21.1	1.1		1.2
4/17/2004	22.0	21.5	1.5		1.1
4/18/2004	21.6	20.7	1.0		1.1
4/19/2004	21.6	20.1	0.9		1.2
4/20/2004	21.4	19.9	1.0		1.2
4/21/2004	21.7	19.8	1.1		1.1
4/22/2004	22.2	21.5	1.5		1.1
4/23/2004	22.0	20.9	1.0		1.1
4/24/2004	21.9	21.2	1.0		1.1
4/25/2004	22.7	21.6	1.0		1.1
4/26/2004	22.8	22.0	1.0		1.0
4/27/2004	22.6	21.3	1.1		1.0
4/28/2004	22.4	21.5	1.0		1.0
4/29/2004	22.8	21.8	1.0		1.0
4/30/2004	22.7	21.8	1.0		1.0
5/1/2004	23.0	21.5	1.0		1.0
5/2/2004	23.0	22.2	1.0		1.0
5/3/2004	23.2	22.4	1.0		1.0
5/4/2004	22.9	22.2	1.0		1.0
5/5/2004	22.3	21.1	1.0		1.0
5/6/2004	22.6	22.0	1.0		1.0
5/7/2004	22.5	21.5	0.9		1.0
5/8/2004	22.7	21.4	1.0		1.0
5/9/2004	22.9	22.3	1.1		1.0
5/10/2004	22.4	21.6	1.0		1.0
5/11/2004	22.6	21.9	1.0		1.0
5/12/2004	22.6	21.1	0.9		1.0
5/13/2004	23.0	21.8	1.1		1.0
5/14/2004	22.8	22.1	1.0		1.0
5/15/2004	22.7	22.2	1.0		1.0
5/16/2004	23.3	22.6	0.9		1.0
5/17/2004	23.5	21.9	0.9		1.0
5/18/2004	22.6	22.0	0.9		1.0
5/19/2004	23.0	21.7	0.9		1.0
5/20/2004	22.7	22.2	1.0		1.0
5/21/2004	22.5	21.4	1.1		1.0
5/22/2004	22.8	22.1	1.0		1.0
5/23/2004	22.9	22.4	0.9		1.0
5/24/2004	23.7	22.5	0.9		1.0
5/25/2004	24.0	23.0	0.8		1.0
5/26/2004	23.7	22.3	1.0		1.0
5/27/2004	22.6	21.2	1.0		1.0
5/28/2004	22.1	20.7	1.1		1.0
5/29/2004	23.7	21.5	1.0		1.0
5/30/2004	23.2	22.0	0.9		1.0
5/31/2004	22.9	22.0	1.2		1.0
6/1/2004	24.1	22.0	0.9		1.0
6/2/2004	23.5	22.3	1.1		1.0
6/3/2004	23.6	21.5	1.0		1.0
6/4/2004	23.6	22.4	1.2		1.0
6/5/2004	23.6	22.1	1.0		1.0
6/6/2004	23.0	21.9	1.0		1.0
6/7/2004	23.1	21.7	1.0		1.0
6/8/2004	23.7	21.5	1.1		1.0
6/9/2004	23.1	21.2	0.9		1.0
6/10/2004	22.6	21.9	0.8		0.9
6/11/2004	22.9	21.9	0.9		0.9

6/12/2004	23.1	21.7	0.9		0.9
6/13/2004	23.3	22.7	0.9		0.9
6/14/2004	23.2	22.6	1.0		0.9
6/15/2004	22.6	21.8	1.0		0.9
6/16/2004	23.8	22.5	1.0		0.9
6/17/2004	24.7	23.2	1.0		0.9
6/18/2004	25.1	24.2	0.8		0.9
6/19/2004	24.6	23.4	1.0		0.9
6/20/2004	24.7	23.9	0.8		0.9
6/21/2004	25.2	23.8	1.0		0.9
6/22/2004	25.1	23.9	1.0		0.9
6/23/2004	25.2	24.0	0.9		0.9
6/24/2004	24.6	22.7	0.9		1.0
6/25/2004	23.7	22.9	1.0		1.0
6/26/2004	23.5	22.8	1.0		0.9
6/27/2004	24.2	23.0	1.0		0.9
6/28/2004	23.6	22.7	0.9		0.9
6/29/2004	23.5	23.0	0.8		0.9
6/30/2004	22.8	22.6	0.9		0.9
7/1/2004	23.4	22.3	0.9		0.9
7/2/2004	23.5	23.3	0.9		0.9
7/3/2004	22.6	22.4	1.0		0.9
7/4/2004	23.4	22.9	0.9		0.9
7/5/2004	23.2	22.9	1.0		1.0
7/6/2004	23.7	22.9	0.9		0.9
7/7/2004	22.5	20.5	0.9		0.9
7/8/2004	22.9	22.3	1.0		0.9
7/9/2004	23.4		0.8		0.9
7/10/2004	23.3	22.5	0.9		0.9
7/11/2004	23.1	22.8	1.0		0.9
7/12/2004	23.7	22.8	0.9		0.9
7/13/2004	24.6	23.0	1.0		1.0
7/14/2004	23.6	22.6	1.0		1.0
7/15/2004	24.1	22.7	1.0		1.0
7/16/2004	24.7	22.9	1.0		1.0
7/17/2004	24.4	23.4	1.2		1.0
7/18/2004	24.4	23.2	0.9		0.9
7/19/2004	24.5	23.6	0.7		0.9
7/20/2004	24.7	23.5	0.9		0.9
7/21/2004	24.0	22.9	0.8		0.9
7/22/2004	24.3	22.9	0.8		0.8
7/23/2004	24.6	23.2	0.8		0.9
7/24/2004	26.2	24.1	1.0		0.9
7/25/2004	24.8	23.9	0.9		0.9
7/26/2004	24.5	23.4	0.9		0.9
7/27/2004	24.9	23.4	0.8		0.9
7/28/2004	25.0	23.9	0.8		0.9
7/29/2004	24.6	23.9	0.8		0.9
7/30/2004	23.6	22.7	0.9		0.9
7/31/2004	24.4	23.0	0.9		0.8
8/1/2004	25.1	23.4	0.9		0.8
8/2/2004	26.1	24.1	0.8		0.9
8/3/2004	24.3	23.4	0.8		0.9
8/4/2004	24.2	23.1	0.9		0.9
8/5/2004	23.7	23.0	0.9		0.9
8/6/2004	24.6	23.1	0.9		0.9
8/7/2004	24.6	23.6	0.9		0.9

8/8/2004	24.4	23.5	0.9		0.9
8/9/2004	25.5	23.8	0.8		0.9
8/10/2004	24.0	23.2	0.9		0.9
8/11/2004	24.9	23.8	0.9		0.9
8/12/2004	23.9	23.4	0.9		0.9
8/13/2004	23.5	22.6	1.0		0.9
8/14/2004	24.6	23.2	0.9		0.9
8/15/2004	24.4	23.2	0.9		0.9
8/16/2004	23.8	23.1	1.0		0.9
8/17/2004	24.4	23.0	0.9		0.9
8/18/2004	23.9	22.7	0.8		0.9
8/19/2004	24.3	23.7	0.8		0.9
8/20/2004	25.8	24.2	0.9		0.9
8/21/2004	24.2	23.2	0.9		0.9
8/22/2004	24.3	23.1	0.9		0.9
8/23/2004	23.7	23.1	0.9		0.9
8/24/2004	23.3	22.5	0.9		1.0
8/25/2004	23.0	21.4	0.9		1.0
8/26/2004	23.9	23.9	1.1		1.0
8/27/2004	24.4	23.4	1.2		1.0
8/28/2004	25.6	23.4	1.0		1.0
8/29/2004	24.8	23.8	1.0		1.0
8/30/2004	25.1	23.7	1.1		1.0
8/31/2004	24.3	23.5	0.9		1.0
9/1/2004	24.5	23.7	1.0		1.0
9/2/2004	24.0	23.2	1.0		1.0
9/3/2004	23.9	23.5	1.0		1.0
9/4/2004	24.3	23.6	1.0		1.0
9/5/2004			1.0		1.0
9/6/2004			1.0		1.0
9/7/2004	24.8	23.8	0.9		1.0
9/8/2004	24.4	23.8	1.0		1.0
9/9/2004	24.4	23.5	0.9		1.0
9/10/2004	24.0	23.3	0.9		1.0
9/11/2004	24.6	23.7	1.0		1.0
9/12/2004	24.4	23.7	0.9		1.0
9/13/2004	24.5	23.4	1.1		1.0
9/14/2004	23.8	23.4	1.0		1.0
9/15/2004	24.1	23.1	1.0		1.0
9/16/2004	24.3	23.7	1.0		1.0
9/17/2004	23.5	22.1	0.9		1.0
9/18/2004	24.1	22.7	1.0		1.0
9/19/2004	23.5	22.9	0.9		1.0
9/20/2004	23.8	23.3	0.9		1.0
9/21/2004	23.7	23.0	1.0		1.0
9/22/2004	23.6	22.8	1.0		1.0
9/23/2004	23.6	22.9	1.1		1.0
9/24/2004	23.6	22.7	0.9		1.0
9/25/2004	23.7	22.9	0.9		1.0
9/26/2004	23.8	22.8	0.9		1.0
9/27/2004	23.4	22.6	1.0		0.9
9/28/2004	23.5	22.9	0.9		1.0
9/29/2004	24.4	22.9	1.0		1.0
9/30/2004	23.1	22.6	0.9		1.0
10/1/2004	23.2	22.1	1.1		1.0
10/2/2004	24.4	22.7	1.1		1.0
10/3/2004	23.6	22.8	0.9		1.0

10/4/2004	24.0	22.8	1.0		1.0
10/5/2004	23.7	22.9	1.0		1.0
10/6/2004	23.0	21.8	1.0		1.0
10/7/2004	23.0	22.4	1.0		1.0
10/8/2004	23.0	21.1	1.0		1.0
10/9/2004	23.1	22.3	1.0		1.0
10/10/2004	23.0	22.3	0.9		1.0
10/11/2004	23.6	22.4	1.0		1.0
10/12/2004	23.1	22.2	1.0		1.0
10/13/2004	23.0	21.9	1.0		1.0
10/14/2004	22.9	22.0	1.0		1.0
10/15/2004	22.8	22.0	1.0		1.0
10/16/2004	22.6	21.7	0.9		1.0
10/17/2004	22.6	20.7	1.0		1.0
10/18/2004	22.1	21.0	1.0		1.0
10/19/2004	22.6	21.0	0.9		1.0
10/20/2004	22.9	21.8	1.0		1.0
10/21/2004	22.5	22.0	1.0		1.0
10/22/2004	22.8	21.6	1.0		1.0
10/23/2004	21.8	20.9	1.0		1.0
10/24/2004	21.9	21.0	0.9		1.0
10/25/2004	21.0	18.7	1.0		1.0
10/26/2004	21.9	20.4	0.9		1.0
10/27/2004	22.0	21.4	1.0		1.0
10/28/2004	22.2	20.9	0.9		1.0
10/29/2004	21.9	21.3	1.0		1.0
10/30/2004	21.6	20.6	1.0		1.0
10/31/2004	21.3	20.0	1.1		1.0
11/1/2004	21.4	20.2	1.1		1.0
11/2/2004	21.2	19.0	1.0		1.0
11/3/2004	22.2	20.8	1.0		1.1
11/4/2004	21.3	20.3	1.0		1.0
11/5/2004	22.2	20.6	1.1		1.0
11/6/2004	22.4	21.8	1.1		1.0
11/7/2004	21.4	20.7	0.9		1.0
11/8/2004	21.6	20.8	1.0		1.0
11/9/2004	22.2	20.8	1.0		1.0
11/10/2004	21.8	21.0	1.0		0.9
11/11/2004	22.0	21.3	0.9		0.9
11/12/2004	21.8	20.7	0.9		0.9
11/13/2004	22.3	21.4	1.0		0.9
11/14/2004	21.9	20.7	0.9		0.9
11/15/2004	22.6	20.7	1.0		1.0
11/16/2004	22.2	21.0	1.0		1.0
11/17/2004	22.2	21.1	1.0		1.0
11/18/2004	23.3	21.2	1.0		1.0
11/19/2004	22.8	21.3	1.0		1.0
11/20/2004	22.7	21.7	0.9		1.0
11/21/2004	22.5	21.5	1.0		1.0
11/22/2004	22.2	21.1	1.0		1.0
11/23/2004	21.8	21.1	1.0		1.0
11/24/2004	21.9	21.5	1.0		1.0
11/25/2004	21.7	20.1	1.0		1.0
11/26/2004	23.1	21.5	0.9		1.0
11/27/2004	23.5	21.1	1.0		1.0
11/28/2004	22.0	21.4	1.0		1.0
11/29/2004	21.5	20.7	0.9		1.0

11/30/2004	24.6	19.3	1.0		1.0
12/1/2004	21.6	20.0	0.9		1.0
12/2/2004	21.6	21.0	1.0		1.0
12/3/2004	21.7	20.1	1.0		1.0
12/4/2004	21.7	20.6	1.1		1.0
12/5/2004	21.3	20.0	0.8		1.0
12/6/2004	21.4	19.5	1.0		1.0
12/7/2004	21.2	17.6	1.3		1.0
12/8/2004	22.1	18.8	1.1		1.0
12/9/2004	23.8	20.1	1.0		1.0
12/10/2004	22.4	20.6	1.0		1.0
12/11/2004	21.6	19.8	1.0		1.0
12/12/2004	21.7	20.6	1.0		1.0
12/13/2004	21.6	19.2	0.9		1.0
12/14/2004	22.0	21.0	1.0		1.0
12/15/2004	21.6	20.3	1.0		1.0
12/16/2004	21.9	21.1	1.1		1.0
12/17/2004	22.0	20.4	1.0		1.0
12/18/2004	22.6	21.8	1.1		1.0
12/19/2004	21.9	20.4	1.0		1.0
12/20/2004	21.8	21.2	1.1		1.0
12/21/2004	21.4	19.6	1.0		1.1
12/22/2004	23.8	21.7	0.9		1.0
12/23/2004	22.9	21.1	1.3		1.0
12/24/2004	22.6	21.7	1.0		1.0
12/25/2004	22.4	19.8	0.9		1.0
12/26/2004	22.2	20.4	0.9		1.0
12/27/2004	22.7	21.4	0.9		0.9
12/28/2004	22.2	20.0	0.9		0.9
12/29/2004	22.1	21.0	1.0		
12/30/2004	22.4	21.1	0.9		
12/31/2004	22.0	18.3	1.1		

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	2732	
CONNECTION TEL		95032296957
CONNECTION ID		
ST. TIME	08/10 12:11	
USAGE T	02'30	
PGS. SENT	13	
RESULT	OK	

Wacker Siltronic Corporation

7200 NW Front Avenue
Portland, Oregon 97210-3676
Phone: (503) 243-2020

☐ Fax: (503) 219-7599 Environmental Department

FACSIMILE TRANSMITTAL SHEET

TO: Dr. Elliot Zais

FROM: Tom McCue

FAX No: (503)229-6957

DATE: Aug 10, 2001

NUMBER OF PAGES (including this page): 13

MESSAGE/SPECIAL INSTRUCTIONS:

Dear Dr. Zais,

Attached are the analysis results from samples taken for the Water Quality inspection May 4, 2001. No split sample form was used because split samples were not taken. We had sampled the same composite wastewater for the same parameters May 3, 2001 and we have included the chain of custody form for that analysis. These results were submitted previously as part of the monthly discharge monitoring report for the month of

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TTY (503) 229-6993

April 12, 2001

Re: Drought Conditions

Dear NPDES Permittee:

Oregon is experiencing a period of abnormally low rainfall and snowfall creating extremely low stream flows in many parts of the state. With low stream flows, water quality in a stream may deteriorate to a point that fish and other aquatic life and other beneficial uses are threatened. We need your help in protecting water quality in streams which may be impacted by your operation.

Under normal winter and spring rainfall conditions, there is usually enough dilution in the receiving stream to assimilate the wastes discharged from your facility. With the very low flows this winter and the expected low flows this spring and summer, we anticipate that some streams may not have enough dilution to assimilate the wastes that are discharged. We are asking for your help to minimize the impact of your wastewater discharge on the receiving stream and suggest the following:

- **If your facility does not discharge to the Willamette River, Columbia River, or Pacific Ocean and has higher winter limits than summer limits, try to achieve the summer limits prior to the date that these limits normally go into effect, which is usually May 1 or June 1.** Current modeling of low river flow conditions for the Willamette River indicates that flows should be sufficient to protect water quality until June 1. Flow conditions in the Columbia River and the Pacific Ocean also are adequate to provide enough dilution. The Department is currently evaluating other projected river flows and what impacts these flows could have on water quality. If drought conditions continue into the fall and winter seasons, the Department may require that you maintain summer limits until winter rains set in and stream flows increase.

- **If you operate a lagoon treatment system and have a non-discharge period for summer, you should evaluate your operations to ensure that adequate storage will be available if drought conditions continue into the fall season.** Care needs to be taken to ensure that the lagoon system will not be structurally jeopardized with higher storage levels, or that irrigation does not run off or cause other environmental problems. If drought conditions continue into the normal discharge period, which usually begins November 1, you may be asked to extend the non-discharge period until winter rains set in and stream flows increase.

- **If your facility uses chlorine for disinfection, or your feed water carries a chlorine residual, please be careful with the amount of chlorine that is discharged.** Chlorine is extremely toxic to fish and other aquatic life. If you are using chlorine for disinfection and no chlorine residual limit has been established in your NPDES permit, you should only maintain a residual sufficient to reduce bacteria levels below permit limits. Control of disinfection processes requires consideration of the chlorine dosage and residual, the detention time in the chlorine contact chamber, the effluent quality, and the bacteria test results. You may wish to increase sampling for bacteria if you make adjustments in the chlorine feed rate.

- **Review all outstanding maintenance needs to ensure that wastewater control facilities are operating as efficiently as possible so as to prevent overflows, bypassing and other problems due to breakdowns of equipment.** Under Schedule F of your NPDES permit, you are required to properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) at all times.

- **Consideration should be given to preparations for possible power outages affecting the treatment and collection systems, in order to maintain treatment system effectiveness and to avoid sewer overflows.** Besides the drought conditions, power outages are also of major concern. Please ensure that back-up or auxiliary systems are operational if needed to achieve compliance with permit conditions.

The Department will continue to evaluate the drought conditions and work with other state and federal agencies. We will be reviewing basin specific information to identify potentially critical locations. You will be notified of further drought management planning updates that may affect your operations.

Thank you for your continued efforts in protecting Oregon's streams and rivers. We hope that these voluntary measures will allow us to get through this critical time without damaging our valuable natural resources. If the drought conditions continue past the summer months, it may be necessary to take additional steps to protect our water quality.

If you have any questions, please contact your DEQ regional office.

Sincerely,

Michael T. Llewelyn, Administrator
Water Quality Division

drought.doc

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TTY (503) 229-6993

December 6, 2001

Re: Drought Conditions Update

Dear NPDES Permittee:

This last April and October, the Department notified you of the serious drought conditions throughout the state and asked for your help to minimize impacts from your wastewater discharge on the receiving stream. In October, the Department asked that you voluntarily comply with conditions outlined in the letter, and set forth a DEQ Internal Management Directive under which the Department would consider offering conditional civil penalty amnesty for certain water quality standards violations due to the drought. The Directive and offer of amnesty from civil penalty is effective until December 31, 2001.

Fortunately, the fall weather precipitation amounts are resulting in normal stream flows for this time of year throughout most of the state. If the receiving stream you discharge to is at normal flow, then you should comply with the winter season limitations stated in your permit. Some parts of the state though may still be experiencing below normal stream flows as streams continue to recover from record low or near record low flows. If your facility does discharge to a receiving stream that is still impacted due to low stream flows, please continue to comply with the conditions that were set forth in the October 2, 2001 letter.

Thank you for your continued efforts and cooperation to minimize your discharge during the critical drought period that was recorded as one of the worst on record in Oregon. Your staff are to be commended as they work towards achieving high standards of operation to lessen impacts of wastewater discharge on streams, especially during critical times of low stream flow.

Sincerely,

Michael T. Llewelyn, Administrator
Water Quality Division

DEQ-1

WACKER
Wacker Siltronic Corporation

September 4, 2001 ER: 045JWC

Dr. Elliot Zais
Water Quality Source Control
Department of Environmental Quality
State of Oregon, NW Region
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Dear Dr. Zais

Wacker Siltronic Corporation will be limiting manufacturing for one week beginning 9/8/01 and ending 9/16/01.

During this time, all production activities in FAB 1 will stop. All production baths will be emptied and all manufacturing equipment will be placed in a stand-by mode. There will be some limited production in FAB 2.

All pollution equipment will be operational in both FABs during this time. This includes all air scrubbers, Wacker's Wastewater Treatment Plant and sewer system.

If you have any questions, please contact Jim Claxton @ 503-219-7313

Regards,

WACKER SILTRONIC CORPORATION

Thomas C. McCue

Thomas C. McCue
Environmental Manager

Wacker Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210-3676
Phone (503) 243-2020
TDD (503) 241-7519

A QS-9000 and ISO 14001 Certified Corporation

WACKER
Wacker Siltronic Corpora

April 11, 2001

Dr. Elliot Zais
Water Quality Source Control
Dept. of Environmental Quality
State of Oregon, NW Region
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

ER:014TM

RE: Annual Bioassay Results

Dear Dr. Zais:

Previously reported evaluations of bioassay test results submitted in our October 2000 DMR were over-reported and did not take into account the correct dilution data to describe the effluent concentration within the zone of immediate dilution and the dilution at the edge of the mixing zone. This effected the test results and the percent of effluent used to determine the no observable effect concentration (NOEC). Using actual dilution data from three mixing zone studies, Wacker Siltronic Corporation is currently in compliance with all NPDES permit conditions in Schedule D, Section 6, Bioassay requirements.

The error occurred when we failed to take into account the effluent dilution data produced by the mixing zone studies when conducting the bioassay testing. Data used for effluent dilution determination up to this point were early estimated dilution values suggested in 1994 before the ZID was established in the permit.

A total of three mixing zone studies have been performed at the outfall in the years 1994, 1995, and 1999. These studies have been submitted to DEQ in the past. Each of these studies model the dilution conditions within the mixing zone and at the edge of the mixing zone. This data is used to define the pass/fail criteria for bioassay tests.

All mixing zone data that is valid for the existing permit has been used to calculate the average dilution a 5 foot radius for the ZID and at a 50 foot radius for the edge of the mixing zone. All dilution data points are based on 7Q10 worst case low flow conditions at 0.1 feet per second current velocity during both average and maximum permitted discharge volumes. Under these conditions the NOEC test criteria is:

Acute: NOEC $\geq$13.4% effluent (10-17.5% based on ZID dilutions of 5.7-10)

Chronic: NOEC $\geq$1.8% effluent (1.5-3.0% based on mixing zone dilutions of 33-72)

Test results have been re-evaluated based on the above average effluent dilutions:

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7200 NW Front Avenue
Portland, OR 97210-3676
Phone (503) 243-2020
TDD (503) 241-7519

WACKER

Wacker Siltronic Corpora

Test Date (2000)	Test	Ceriodaphnia dubia Survival (% Effluent)	Pimephales promelas Survival (% Effluent)
Aug 8-15	Acute NOEC	17%	100%
	Chronic NOEC	<3%	<3%
Oct 10-17	Acute NOEC	50%	100%
	Chronic NOEC	3%	100%
Dec 5-12	Acute NOEC	50%	100%
	Chronic NOEC	<6.25	100%

The bioassay tests conducted in October and December pass under all mixing zone conditions. The August bioassay test appears to pass but a lack of data at the lower concentration make the results questionable. Future bioassay tests will be conducted at lower effluent concentrations to bracket the test criteria.

A Toxicity Identification Evaluation study has been conducted on the total effluent and upstream from the discharge point to determine the cause for periodic test failures. Testing is ongoing and it is hoped that it will assist in the design of long term solutions.

If you have any questions, please contact me at 503-219-7532

Very truly yours,

Wacker Siltronic Corporation;

Thomas C McCue

Thomas C. McCue
Environmental Manager

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7200 NW Front Avenue
Portland, OR 97210-3676
Phone (503) 243-2020
TDD (503) 241-7519

A QS-9000 and ISO 14001 Certified Corporation

WACKER
Wacker Siltronic Corporation

July 12, 1999

Jack Payne
IDC
2020 SW Fourth Avenue, 3rd Floor
Portland, OR 97201

Dear Jack:

Enclosed are the NPDES monthly reports for 1997, 1998, and 1999 that you requested. If you need further information or have questions, please give me a call at (503) 219-7532.

Sincerely,

Tom McCue

Thomas C. McCue, Manager
Environmental Engineering

TCM:tjw

Enclosures

payneltr.doc

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An ISO 9001 Certified Corporation

Wacker Siltronic Corporation

WACKER

TO: Gary Hickman

FROM: Sandee Archer

SUBJECT: Information Requested

DATE: January 13, 1995

Enclosed is:

Test 357-11	June 1993
Test 357-12	August 1993
Test 357-13	August 1993
Test 357-14	September 1993
Test 357-15	August 1993
Test 357-16	September 1993
Test 357-18	August 1994
Test 357-19	October 1994

Copy of the NPDES permit

MSDS for:
Alum- Aluminum Sulfate Solution 1250 Van Water & Rogers
Polymer- Aquafloc 477 -1400 Dearborn
Surfactant- Stepanol- Ammonium Laurel Sulfate Henkel
Q9
Dearborn 874- WAD system
Dearborn 154- Boiling water treatment
Dearborn 545- Cooling water treatment
Dearcide 735- Biocide
PolyElph 956- Cooling water treatment
Antifoam- SAG 710 VW&R

Drain drawings
MSDS Master List

I still owe you:

WWTP drawing
Chemical use information on ALUM and Polymers
Any other general chemical usage numbers

WASTE TREATMENT OWW SULFATE DATA, 1994

OWW II		
DATE	SO4 mg/L	COMP/G
06-14	280	GRAB
06-15	2100	GRAB
06-23	1000	COMP*
06-30	320	COMP*
07-06	95	GRAB
07-07	262	GRAB
07-08	144	GRAB
07-09	90	GRAB
07-11	76	GRAB
07-12	173	COMP
07-13	203	COMP
07-14	31	GRAB
07-15	5	COMP
07-19	73	COMP
07-20	65	COMP#
07-21	19	COMP
07-22	22	COMP#

FORWARD SUMP		
DATE	SO4 mg/L	COMP/G
07-06	423	GRAB
07-07	165	GRAB
07-08	10	GRAB
07-09	4	GRAB
07-11	2	GRAB
07-12	26	COMP
07-13	1	COMP
07-19	10	COMP

* These samples were also sent to an outside lab for verification result's as follows; 6/23: 1,000 mg/L and 6/30: 230 mg/L.

These samples represent 24 hr composite's taken at the OWW partial flume. Result's are recorded on weekly permit cover sheet.

NUM	Msdsdate	Material	Description
1005		Acculam	
1010	2/13/89	Acid Acetic	GLACIAL, REAGENT GRADE
1020	2/11/92	Vetrified bonded-abrasive products	Norton
1025	4/13/93	Double sided abrasive disks	84514A and 84516A
1030	1/30/92	Acetone	DIMETHYL KETONE
1050	1/23/92	Acetophenetidide(P-), 97%	
1070	5/9/89	Acetylene	GAS FOR CUTTING TORCH; 99.7% PURE
1074*		Acetylene	COMP GAS; PACED IN LIQ ACETONE
1075L	6/1/93	Acid Reagent Powder Pillows	
1090	12/1/91	Acri-Ceal	ACRYLIC FLOOR SEALER
1110	5/5/88	Activated Carbon	NORIT PK1-3
1150	10/1/85	Gas Zero	COMP. AIR; LESS THAN 2PPM OTHER
1170	7/1/90	Ajax	Cleanser
1180	1/31/94	Plastic Welder II (activator)	83854B
1181	1/13/92	Grade D Breathing Air	
1182	1/26/94	Plastic Welder II (adhesive)	83854A
1184	12/10/85	K20 Adhesive Spray	
1186	11/14/88	Adhesive Spray 820	11/14/88
1188	8/31/93	Insti seal	84717
1190	3/9/90	Adhesive	All Purpose KAR #77160
1192	8/18/93	All purpose adhesive/ trim cement	
1194	5/20/94	Perma-fuse instant adhesive	
1196	1/26/94	Plasmetal (activator)	83855B
1198	1/25/94	Plasmetal (adhesive)	83855A
1199	6/9/93	UCD 7949V	
1200L	3/17/92	Aluminum	
1205	5/11/94	Wrought Aluminum Products	
1210	1/1/91	Aluminum Etchant 16:1:1:2 SEMI	
1230	1/4/88	Aluminum Oxide - 15 micron Grade 1	POLISHING ABRASIVE
1234	1/4/88	Aluminum Oxide - 15 micron Grade 2	POLISHING ABRASIVE
1238*		Aluminum Oxide - F90-100; Fujimi #2142	POLISHING ABRASIVE
1242	10/15/90	Aluminum Oxide - Microgrit WCA-30	POLISHING ABRASIVE
1245L	8/28/92	Aluminum Standard Solution, 50.0 mg/L	
1250	5/1/90	Aluminum Sulfate Solution	WWTP
1255	4/6/89	Aluminum trichloride hexahydrate	
1256	5/10/90	Polyaluminum Chloride Solution	
1257	4/1/92	Aluminum Alloy	
1260L	4/22/93	Reagent Aluminum	ALUVER 3
1270L	10/14/87	Reagent Amino Acid F	#22033
1280	8/22/91	Ammonium Fluoride	
1290	1/12/89	Ammonium Hydroxide	28-30% Micro Pr
1310	3/31/92	Ammonium Hydroxide	Gigabit
1330	3/27/91	Ammonium Laurel Sulfate	
1340	9/1/91	Five Anion Standard	
1350	1/22/90	Anti-seize	Hi Temp, PETROLEUM LUBRICANT
1355L	1/22/90	Anti-seize	Industrial Hi Temp #71979
1360	3/31/94	Anti freeze	Shellzone
1370	5/1/88	Antimony, 99.9%	99.9%
1390	6/1/90	Applescent, NI-712 Family	ODOR ELIMINATOR
1400L	3/2/92	Aquafloc 477	Waste water treatment
1402	8/19/92	Aquastar solid water standard	
1405	11/19/94	Arg dri sorbants	
1410*		Argon	COMP GAS
1430	11/1/86	Argon	Bulk (Cryogenic Liquid)
1450*		Argon	Grade 5
1455L	8/9/89	Gas Arsine in Hydrogen	0.01 to 10% Mixture
1460L	4/15/93	Acid Ascrobic	
1470	9/1/91	AS4a Eluent Concentrate	

NUM	Msdsdate	Material	Description
1485L	12/1/92	Battery	ALKALINE 82801--82805
1490	8/1/92	Battery	CALC-LEAD,H115-100KVA;4CELLx30, C&D 4LCY
1494	8/1/92	Battery	CALC-LEAD, A102-300KVA;4CELLx60, C&D XTHL
1498	8/1/92	Battery	CALC-LEAD, H115-100KVA;4CELLx30, C&D 4LCY
1502	8/1/92	Battery	CALC-LEAD, A102-300KVA;4CELLx60, C&D XTHL
1506*		Battery	LEAD, HQBLDG-UPS;4CELLx17
1510*		Battery	LEAD, PRMY SWITCH;1CELLx24
1514*		Battery	LEAD, ISSC/FACBLDG;4CELLx6
1518*		Battery	LEAD, EXIDE 3CC-9,HQBLDG-UPS;4CELLx17
1522*		Battery	LEAD, EXIDE EU-5, PRMY SWITCH;1CELLx24
1526*		Battery	LEAD, PWR BTT PL-15,ISSC/FACBLDG;4CELLx6
1560	5/1/92	Belt dressing	
1570	6/19/91	Betz 35A	CORROSION INHIBITOR
1580	1/9/93	Blazer	
1585	4/1/92	Copper	
1587	4/1/92	Bronze////	
1588	4/1/92	Brass and Leaded Brass	
1590	1/4/87	Bleach (see sodium hyperchlorite)	-5.25%
1595L	4/22/93	Reagent Bleaching	BLEACHING 3 REAGENT
1600L	9/23/92	Buffer	BOD NUTRIENT BUFFER PILLOWS
1635L	7/1/92	Cleaner (brake)	Brake cleaner, kar gold # 84448
1650*		Buffer solution	pH 12.00, RICCA 1615-16
1670	7/21/87	Butyl Acetate	Electronic grade
1680	4/4/90	Butane	12-133,12-140,12-180
1690	5/25/90	Alcohol (butyl)	ELECTRONIC GRADE
1710	1/3/91	Cleaner (butyl)	HILLYARD #3606
1730	4/1/88	Lubricant	Aerosol C R C 3-36, 3004/3005/3005T
1734	11/1/85	Lubricant	Bulk C R C 3-36, 3006/3009/3011
1738L	7/1/92	Cleaner (carpet)	KAR GOLD # 84452
1745	11/23/92	Calcium chloride Flake	
1750	7/21/87	Calcium Chloride 77-80%	77-80% flake BRINING GRADE
1760	1/5/94	Calcium Carbonate	
1765	3/2/93	Calcium hydroxide	
1770*		Ammonia	Probe
1785L	5/29/91	Carbon Activated	Activated
1790	6/15/89	Carbon Dioxide	Liquid
1795	5/2/94	Carbon Monoxide	
1800	4/1/92	Carbon and alloy steels	
1805	8/3/93	Castrol	61-803a
1810L	3/30/93	Caustic Soda	BEADS--"PELS PLUS"
1830	7/1/93	Caustic Soda 50%	Sol`n 50%--Bulk, WWTP and other from vwr
1850	1/7/93	Caustik Soda 50%	Solution 50%, VWR PROD #239280
1860L	4/1/90	Heater	CERAMIC FIBER HEATER
1870	8/3/89	Censor	
1890*	5/16/89	Acid Chromic	50% solution
1910*	8/13/87	Acid Citric	F REAGENT, HACH #22542
1930	10/9/90	Acid Citric	ANHYDROUS
1940L	5/6/93	Acid Citric	Anhydrous
1950	1/1/90	Cleaner	Clean all GEN PURPOSE CLNR
1970	11/1/85	Cleaner	CONTACT CLEANER, CRC #3070
1980	7/25/86	Convert a Rust	79213,79948
1985	2/8/93	Water soluble corrosion inhibitor	
1987	4/1/92	Copper	
1994	3/8/94	Scrubs in a bucket	86247
1998	6/12/92	Burmar glass clean	
2000	2/26/92	Dyclean	
2002	2/26/93	Fluoroclean	
2030	10/15/92	Adhesive	COVE BASE/CEILING ADHES, FRANKLIN #3280

NUM	Msdsdate	Material	Description
2040	8/22/94	Code 416	Water testing reagents
2045	1/31/94	Code 533	Water testing reagents
2047	10/15/93	Code 535	Flamable Liquid
2055	10/15/93	Code 552	Starch acid indicator
2060	11/15/93	Code 567	Neutralizing solution
2065	8/15/94	Code 503	Barium Chloride
2071	10/14/91	Code 541	Sulfuric acid
2075	11/15/93	Code 575	Specific Condutance
2090	1/1/91	Cleaner	CRT TERMINAL, Hydroalcoholic solution
2095L	3/11/91	Coolant	CUTTING TOOL COOLANT KAR # 74996
2097	6/1/93	Cooling Liquid 19	
2098	5/8/90	Silcool-X	Cutting fluid
2105	2/3/92	Cutting fluid	#470
2107*		Wire saw coolant	
2110	5/16/89	Dye Crystal violet	LAB REAGENT
2115	6/1/86	Foray Dry Chemical Ext agent	
2120	4/19/94	Dearborn 19	Boiler water
2122	9/27/93	Dearborn 154 Boilers	
2125	12/29/93	Dearcide 735	Dihalodiakylhydantoin
2127	7/19/83	Dearborn 545 Close Loops	
2145	8/30/93	PolyElpH 956 Cooling Towers	Cooling water treatment
2190L	3/20/92	Dearborn 874 WAO for Scale	COOLING WATER TRTMNT
2210	3/20/92	Aquafloc 477	WASTE WTR TRTMNT
2230	3/31/92	Dearborn WW-1699 Anti foam	ANTIFOAM--SAMPLE FOR TESTING; WWTP
2240L	11/26/91	Defluxer	ENVI-RO-TECH 1676
2250	6/19/92	Reagent Formaldehyde	DEVELOP SOLN/LOW RNG FORMALDEHYDE
2270	6/21/88	Diatomaceous Earth	WWTP(disc); CALCINED
2290	5/7/91	Diatomaceous Earth	FLUX CALCINED
2295L	6/10/93	Degestion solution	FOR COD, 0-150ppm RANGE
2298L	5/5/89	Disinfectant	DISINFECTANT AND DEODORIZER, # 79842
2300L	4/22/93	Acid Disulfuric	DISULFURIC ACID REAGENT
2310	4/1/84	Diborane	50 ppm in Hydrogen
2330	5/22/90	Teflon Lube	Dry, KAR # 79418
2350	7/1/88	Dust off	AIR-CLEAN SPRAY
2370	7/27/92	Fluid (layout)	BRUSH-ON LAYOUT FL. blue, DX 100
2390	12/20/90	Fluid (layout)	BRUSH-ON LAYOUT FL. red, DX 296
2410	7/27/92	Spray(layout)	SPRAY ON LAYOUT FL. blue, SP 1100
2430	3/9/92	EDTA	LAB REAGENT
2445L	4/1/92	Cleaner	ELECTRIC CONTACT CLEANER--# 67952
2450	3/8/90	Cleaner	ELECTRIC MOTOR CLEANER, KAR #65390
2460	10/1/92	Cleaner	ELECTRONIC CLEANER # 80936
2465L	3/21/90	Degreaser	ENGINE DEGREASER,GEL
2468L	2/1/92	Paint Epoxy	GENERAL PURPOSE # 72924
2470	2/5/86	Alcohol (Ethanol)	Vanazol A-1 200 Proof Denaturated
2485	7/1/93	Ethylene Glycol	
2490	1/29/91	Ethylene Glycol	TECH GRADE
2495	4/20/93	ER-2000	
2510	1/4/93	Rust treatment	LOCTITE #75430
2530	12/3/90	Cleaner	F-10 SHAKER POWDERED HAND CLNR
2540	9/16/92	Ferric Nitrate	45% solution
2550	12/14/89	Epoxy Resin	FIVE (5-)MINUTE EPOXY RESIN
2560L	10/1/92	Bug spray	FLYING AND CRAWLING BUG SPRAY
2565	7/6/94	Bug Spray	Wasp and Hornet killer
2570	4/12/90	Soda ahs	SODA ASH & SODA LYE, Formula 12475
2580	7/1/93	Fog Fluid- Rosco	
2590	1/12/88	Freon TE+TF	FREON TE--FREON TF+ETHANOL, azeotropic
2594	6/26/89	Freon TF	
2598	3/6/89	Freon TMC	FREON TMC--FREON TF+METHYLENE CHLORI

NUM	Msdsdate	Material	Description
2602	3/27/90	Defluxer	FreonTF+Meth+NtrMeth
2615L	10/25/90	Gentian violet	
2620	8/23/88	Gold	
2630	3/8/90	Paint Stripper	GASK REMOVER/PNT STRPR, KAR #68823
2640L	3/2/93	Cleaner	GLASS CLEANER, KAR
2650L	7/1/92	Cleaner	GLASS CLEANER, KAR GOLD # 84450
2660	10/14/94	Gel Engine Degreaser	
2670	1/1/91	Cleaner	IN B-125; #GAB20B or #Q22521
2690	1/1/91	Cleaner	HYDROALCOHOLIC SOLUTION
2710*	12/8/89	Glycerine	99.7% SYNTHETIC USP
2715	1/1/94	Torque Seal	
2717	4/1/92	Galvanized	
2720	1/1/92	Grease Buster #115	
2725	5/2/91	Grease Buster ND	
2730*		Grease	BARRIERTA, KLUBER LUBR L55/3
2735	3/23/92	Grease	High temp grease
2750	7/10/91	Grease	EP TYPE, SYNCOLUBE
2770	10/1/89	Grease	FROM GREAT BRITAIN
2790*		Grease	HI VACUMN, DOW CORNING 976-V
2800A	9/27/90	Grease	BR 2 PLUS MULTI PURP E.P. GREASE
2800L	5/23/90	Grease	LUBRIPLATE LOW-TEMP MP GREASE#77349
2810	8/5/91	Grease	MB Litium 2, Shell or exxon ronex mp or equiv
2830	7/1/92	Grease	WHITE, KAR "GOLD" # 84451, airosol Lubricant
2835	5/28/91	Grease	Shell Alvania EP Grease
2836	6/6/94	Grease	Shell Alvania EP LF grease 2
2840	6/1/94	Stepanol AM	
2842	4/16/94	Spartan EP 460	
2844	7/1/91	Tivela SD	
2846	6/27/91	Shell Tivela oil WA	
2848	4/15/94	Poco graphite	
2849	1/1/93	Synthetic Graphite shapes	
2850*	2/3/92	Grinding wheels	DMND OR CU BORON NITRIDE,
2870	2/11/92	Grinding wheels	RESINOID BONDED, NORTON
2890*	2/11/92	Grinding wheels	RUBBER/SHELLAC BND, NORTO
2900	11/15/93	Hach Reagents	
2905	2/13/92	Dowtherm SR-1 heat Transfer Fluid	
2907	6/9/93	Halar	
2910*		Helium	(1%) IN NITROGEN FOR CALIB.
2930	7/7/89	Helium	GRADE 4.5, 50 ppm
2950	7/7/89	Helium	GRADE 6
2970*		Heptane	
2975	9/2/93	HPC 20 Mineral oil	
2980L	4/23/91	Hpr 504	
2990	1/22/93	Acid Hydrochloric	SEMI GRD
2994*		Acid Hydrochloric	31-37% MICRO GRADE
2998*	1/1/92	Acid Hydrochloric	37% PPB GRADE
3002*		Acid Hydrochloric	37% PPB GRADE
3010*		Acid Hydrochloric	49% Cleanroom Gigabit
3014	10/1/90	Acid Hydrofluoric	SEMI GRADE, 500 lb drum 40 lb bottle
3018	10/1/90	Acid Hydrofluoric	SEMI GRADE BULK
3020	9/16/92	Acid Hydrofluoric	
3025	3/30/94	Acid Hydrofluoric	70%
3030*		Hydrogen	1% IN AIR
3050	4/1/86	Hydrogen	BULK
3070	7/10/89	Hydrogen chloride	Liquid gas GRADE 5; EPI
3090	7/13/89	Hydrogen	H2 in Nitrogen 10%; TOTAL CF LOWERED BY RE
3100	7/16/92	Hydrogen peroxide	
3110	1/6/92	Hydrogen peroxide	30% MICRO PROCESS

NUM	Msdsdate	Material	Description
3130	4/1/86	Hydrogen	Grade 5
3190	4/19/89	Stain	LT WALNT, #1600 01
3230	1/1/92	Thinner	THINNER--LACQUER, #1902
3240	1/17/94	Lexel Caulk	87664
3250*		Ink	INK--GREEN
3258*		Ink	INK--RED
3260L	7/13/90	Oil	Inland 19, SOLVENT REFINED NEUTRAL PARAF
3262	8/3/92	Alcohol (Isopropyl)	MICROPROCESS" ISOPROPANOL
3265	6/13/86	JMB-3	
3270	12/1/91	Floor Finish	JUBILATION 2000
3310*	12/1/91	Floor Finish	JUBILATION NO RINSE WAX STRIPPER
3330*	12/1/91	Floor Sealer	JUBILATION URETHANE SEALER
3333	3/29/94	Clean cut EZ cut	
3334	3/12/91	Clean cut EZ cut	
3340L	7/1/92	Drive grip anti cam-out fluid	
3342	11/12/90	Epoxy	
3345	7/1/92	Lube	Gold silicone lube
3350	2/1/92	Superbonder	95-100% ethyl cyanoacrylate solution
3368	7/26/93	Acid methanesulfonc,99%	
3435	3/8/90	Varnish	RED INSULATING VARNISH # 67956
3445	9/13/90	Distributer	78.13% trichloroethane
3450	10/17/85	Kerosene	PETROLEUM HYDROCARBON
3470	11/19/94	Neutralizer (acid)	KOLOR SAFE LIQUID ACID NEUTRALIZER
3474	9/17/90	Neutralizer (base)	KOLOR SAFE LIQUID BASE NEUTRALIZER
3475	1/1/89	Lead	LEAD (FABRICATIONS/FORMS)
3490	5/1/89	Lead	LAB REAGENT
3495L	5/23/90	Leak detector	LEAK DETECTOR # 80925
3510	5/23/90	Leak detector	KAR
3530	11/20/92	Calcium Hydroxide (Lime)	
3540	6/14/93	D-Limonene	
3550	7/1/87	Liqui-nox	LIQUID DETERGENT
3560	5/25/93	Polyglycol	90-100%
3570	1/4/93	Sealant	Polyglycol + bisphenol
3590	1/4/93	LOCTITE	INST GEL ADHES ("SUPERBONDER") #4
3592	11/1/91	Locite bond adhesive	#312
3595	4/30/93	Rust inhibitor	LPS, 3 HEAVY-DUTY RUST INHIBITOR
3600L	3/21/90	Lubricant	HI TEMP MOLY # 80941
3610	2/1/88	Lutensol AP 10	ALKYLPHENOLETHOXYLAT
3630	3/16/90	MBTH	REAGENT
3640	10/1/85	Hard metal, Cemented WC	
3650	1/1/91	Cleaner / remover	SKC-NF, CHLORINATED ALKANE
3654	1/1/91	Developer	SKD-NF, CHLORINATED ALKANE
3658	1/30/92	Spotcheck	SPOTCHECK PENETRANT, SKL-HF/S
3659	6/24/93	Magna Lube	All purpose grease
3660	6/1/93	Metadi	1,11
3665	2/1/92	Meter mist accelerator	
3667	8/23/91	Metal Alloy A-f10	
3668*		Methanesulfonic acid	99%
3670	3/14/89	Alcohol (Methanol)	METHYL ALCOHOL
3675	10/26/92	Magnesium Sterate	
3680	8/1/91	Methylene chloride	
3710	11/22/91	Developer	#JPE838599; POSITIVE RESIST DEVELOPER
3730*		Miller thinner	Enamel paint thinner
3770*		Thinner	VM&P
3780	7/31/92	MIF Developer	
3790	5/9/86	Mira-THANE	WATER-BASE FINISH
3810	6/26/86	Mity DRY	
3815L	5/19/93	Molybdate	MOLYBDATE REAGENT

NUM	Msdsdate	Material	Description
3820	11/1/88	Molecular sieve type 13X	
3830	3/21/90	Lubricant	HI TEMP MOLY LUBRCNT Kar# 80941
3850	9/30/85	Lubricat spray	MOLYKOTE 321R BONDED LUBRICANT SPRAY
3870	3/25/87	Grease	MOLYKOTE BR-2 PLUS GREASE
3880	6/16/93	n-butanol	
3890	6/26/92	Neoprene	NEOPRENE F-1 ADHSVE, CARBOLINE #O28581
3930*		Ammonia	NH3 filling solution, ISE 10-10-01
3960		Nickel shield	
3970	10/31/91	Acid Nitric	Semi grande bulk, REAGENT 69.7%
4010	8/1/85	Nitrogen	(CRYOGENIC LIQUID) BULK
4014	8/1/85	Nitrogen	(CRYOGENIC LIQUID) BULK
4018	8/1/85	Nitrogen	(CRYOGENIC LIQUID) BULK
4030	1/1/99	Nitrogen dioxide	180 PPM IN AIR
4050*		Nitrogen	CRYOGENIC
4070	8/1/85	Nitrogen	GRADE 4.5
4074	8/1/85	Nitrogen	GRADE 5
4110	9/28/90	Nitrous oxide	NO2, COMPRESSED LAUGHING GAS
4120*		Nitric Acid	
4125	8/1/91	Nitric Oxide	
4130*		Oil	OIL--A.C. COMPRESSOR, DEXTRON ATF
4150	6/10/91	Oil Lubricant	Oil--Gear lubricant Mobil Glygoyle
4170	10/6/92	Oil Lubricant	OIL--GEAR LUBRICANT, SHELL OMALA 150
4190	10/14/92	Oil Lubricant	OIL--GEAR LUBRICANT, SHELL OMALA 220
4210	1/31/83	Oil	Tellus Oil 32
4230	2/14/83	Oil	Tellus Oil 46
4250	5/24/83	Oil	Tonna Oil T68
4270	4/30/82	Oil Lubricant	OIL--VAC PUMP LUBRICANT, SHELL TURBO 220
4280L	5/23/90	Lubricant	OIL AND COND.PNEUMSTIC TOOL LUBRICANT
4285	10/25/91	Dow corning Dry Film lubricant	
4287	2/3/93	Pneumatic Tool lubricating Oil	80777
4289	8/30/93	Bull's Eye Oiler	
4290	4/30/82	Oil	Oil-- Vac, Shell Turbo 220
4300	12/13/91	Rigid Dark Thread Cutting Oil	
4310	4/1/92	Oil Lubricant	OPEN CHAIN & SPROCKET LUBE, KAR #65389
4320	9/15/94	Oil Lubricant	Febis K 68
4330	10/1/85	Oxygen	COMP GAS
4350	10/1/85	Oxygen	GRADE 4.3
4370	9/1/85	Oxygen	CRYOGENIC
4375	2/25/94	Bioscan sampling pen	Chemicals, NOI, water testing reagents
4380*		Spraypaint	ivory #110
4385*		Spraypaint	B.I.C. Supercoat #316L
4390		Spraypaint	Almond, #1506
4395		Spraypaint	Brnt org, #2406
4400		Spraypaint	PSL aqua, #2002
4405		Spraypaint	Wh, #1501
4410	1/1/90	Spraypaint	URETHANE CLR, #2049
4415	1/1/90	Spraypaint	URETHANE RED, #2044
4417*		Spraypaint	BBQ/Stove Enamel
4420*		Spraypaint	FED HWY YEL, #2W009B
4425*		Spraypaint	FL BLK, #2X717B
4430*		Spraypaint	GL BLK, #2X711B
4435*		Spraypaint	GL WH, #2X712B
4440	2/3/94	Spraypaint	GY PRMR, #2X982B
4445*		Spraypaint	MACH GRY, #2X710B
4450*		Spraypaint	MED BLUE, #2X731B
4455		Spraypaint	CHRY BL ENG, #69982
4460		Spraypaint	CHV OR ENG, #66563
4465	3/28/90	Spraypaint	FD RD ENG, #66561

NUM	Msdsdate	Material	Description
4470*		Spraypaint	JD GRN, #66566
4475	4/6/90	Spraypaint	NEW WH CEILING, # 77342
4480	4/6/90	Spraypaint	OLD WH CEILING, # 77343, Aerosol
4485	4/3/90	Spraypaint	OSHA ORANGE, #69990
4490	4/1/92	Spraypaint	SPR RUST PENETRANT #78607
4492	3/9/90	Spraypaint	STRIP EPOXY # 78909
4494	2/6/91	Primers, Insulating Varnish	
4496*		Spraypaint	HI HT BLK, #2176
4498*		Spraypaint	TAN, #___
4500*		Spraypaint	VS GRN, 55-306
4502*		Spraypaint	DURO GRAY
4504*		Spraypaint	SHU BLUE, #11
4506	2/1/93	Spray paint	Industrial maintenance touch up spray
4508	2/20/93	Spraypaint	Fluorscent
4510*		Rustoleum Paint	Mtl primer
4515	3/5/91	Rustoleum Paint	
4516	4/1/91	Paint Enamel	SFTY RED, #2084
4517	2/6/91	Acrylic Enamels	
4518	1/14/89	Paint Enamel	WHITE, #2002
4520*		Paint Epoxy	EPXY ENML CNVRTR, #R6A
4521	8/10/92	Epoxy base and activator	
4522*		Paint Epoxy	EPXY ENML GL WHT, #R6B
4523	1/1/92	Paint	INT/EXT BL BK, #386
4524	10/1/91	Paint	CASE & DEERE GRN KAR # 66566
4526	3/28/90	Paint	LOW VOC GLOSS YELLOW HI-SLD # 84007
4528	3/16/92	Acrylic	Med gloss lt gray duracyl
4530	7/14/89	1205 Prime coat	
4532	1/1/94	Prism primer 770	
4550	11/1/91	Parker O-LUBE	
4570	7/4/89	Pentane	
4590	2/19/90	Phenolphtalein	INDICATOR SOLUTION; 0.5% in 50% alcohol; #56
4610	8/9/89	Phosphine	DOPANT 10-50PPM IN HYDROGEN; NONMETAL
4620		Acid Phosphoric	
4630*		Glue	Phtalic glue FROM JAPAN
4650	9/1/92	Plasti-dip	FOR SHOP TOOLS
4655	1/25/94	Platinum	
4660L	4/1/93	Polishung slurry	Rodel XSL3476
4665	6/8/94	LS10 High Purity Polishing Slurry	
4667	7/2/93	Fujimi P81	
4670	11/13/85	Stripper	Positive photoresist Stripper #843987
4690	3/8/90	Ink	POSTAGE METER INK
4700	7/18/91	Potassium Carbonate	
4710	2/14/94	Potassium Carbonate, anhydros	
4730	4/6/89	Potassium dichromate	
4750	7/12/90	Potassium Hydroxide	CAUSTIC SOLID
4760	11/4/91	Potassium Iodide	
4770	1/6/90	Potassium Permanganate	0.5 N
4790	4/1/91	Fluid (layout)	PRECISION BLUE LAYOUT FLUID
4810	4/1/91	Fluid (layout)	PRECISION RED LAYOUT FLUID
4830	8/16/90	Cleaner	AQUES, Milk Alk Clnr DEGRSR (F#162046)
4850	1/18/89	PRECISION, TOOL BLACK (F#170201)	DIL AQUS ACID
4870	4/1/88	Propane	HEATING FUEL--BULK
4890	4/1/88	Propane	MAINT CYL'S
4910	4/1/88	Propane	MOTOR FUEL--BULK
4930	4/1/92	Adhesive	PVC PLASTIC PIPE CEMENT, WELD-ON #711
4950	4/1/92	PVC/CVPC PRIMER, WELD-ON #P-70	
4970	3/17/88	Q9	LABORATORY DETERGENT
4980	8/5/94	Quartz Fused Crucible, Silicon Dioxide	

NUM	Msdsdate	Material	Description
4985	5/3/93	Quartz Powder	
4990	10/16/90	RP team	Tri (2-hydroxyethyl)
5010	4/7/89	Racon 11	CFC REFRIGERANT; FREON
5014	4/7/89	Racon 12	CFC REFRIGERANT; FREON
5018	4/7/89	Racon 22	CFC REFRIGERANT; FREON
5022	4/7/89	Racon 500	
5026	4/7/89	Racon 502	
5030	3/8/90	Varnish	RED INSULATING, KAR #67956
5070	12/31/88	Resin	ALCOHOL SOLUBLE MAELIC RESIN
5090	6/5/90	Cleaner	ROTO-ROOTER DRAIN CLEANER
5110	10/29/87	RTV Clear adhesive sealant	
5130	2/21/90	RTV Gasket Maker	AEROSOL
5138	5/22/90	RTV Gasket Maker	
5142	12/22/89	RTV Gasket Maker	
5150	12/22/89	RTV Hi Temp Make	
5170	7/15/88	Silicone Rubber Sealant	(CONSUMER LINE)
5210*		Adhesive	RUBBER/VINYL ADHESIVE, 3M #80
5230	10/1/91	Rust Inhibitor	VOITLANDER "404 T" WTR SOL CONC FOR MAC
5235	1/1/93	Heavy duty rust remover	
5240	1/4/94	Navel jelly Rust remover	
5250	3/9/90	Rust Penetrant	
5315	5/17/93	Lubricants, Rust Preventatives	
5350	8/27/89	Antifoam	SAG 710 SILICONE ANTIFOAM EMULSION
5355	12/20/90	Gasket Eliminator 515 sealant	
5360	2/24/93	Sei-125I	1 OZ SIL TCHAN FAST CURE EPOXY
5370	1/5/90	Sei-102p	ALK BOILR WTR TRTMT
5374	8/2/88	Sei-111	HVY DTY BOILR WTR TRTMT
5378	1/4/88	Sei-113	ALK BOILR WTR TRTMT
5382	11/28/88	Sei-115	
5386	6/3/88	Sei-154	
5390	6/3/88	Sei-167	
5394	11/24/87	Sei-224	COOLING TOWER TRTMNT
5396	11/28/88	Sei-281	
5420	2/17/88	Sharpening stones	
5430*		Sherman Williams Reducer	
5440L	5/24/93	Silca 1 reagent	
5450	5/8/86	Shellac	
5470	11/1/89	Silane	SEMICONDUCTOR GRADE
5510*		Dessicant	SILICA GEL MAT. #2756778
5520	5/11/90	Silica	
5530*	12/1/92	Silica-Collodial	GLANZOX 39008 POLISHING SLURRY
5534	5/24/93	Silica-Collodial	LUDOX POLISHING SLURRY
5538	1/13/88	Silica-Collodial	NALCO 2350 POLISHING SLURRY
5570	1/30/84	Silicon Carbide	ABRASIVE
5610	12/18/91	Silicon Wafer	N-TYPE & P-TYPE
5620	3/20/91	Polysilicon	
5630	1/1/80	Silicon Hyperpure	FOR WAFERS
5650	4/18/91	Silicone Fluid	GE SF96-200 INDUSTRIAL LINE
5670	7/1/92	Aerosol Lubricant	SILICONE LUBE, KAR "GOLD" #84447
5680L	3/2/93	Aerosol Lubricant	SILICONE LUBE, KAR
5710	1/27/92	Silicone Rubber Sealant	GE 102
5718	12/7/88	Silicone Rubber Sealant	WHITE, GE RTV102
5725L	12/22/89	Adhesive	Silicone, SEALENT CLR.RTV #79685
5730	3/5/90	Silicone Rubber Sealant	GE RTV112
5750	3/1/93	Simple Green	
5770*		Wax Sticks	SKYWAX 415 FROM JAPAN
5790*		Snoop	LEAK DET FOR EXTERNAL USE
5795	2/9/93	Soldering flux	

NUM	Msdsdate	Material	Description
5796	4/1/91	Tin/Lead solder alloy activated resin	
5797	8/12/91	Solder	
5810	1/16/90	Soda Ash	
5815	3/9/92	Sodium	1000 ug/ml .10%
5820	4/1/93	Sodium Chlorite	Bulk liquid
5830	10/11/88	Sodium Hydroxide	1.N SOLUTION
5850	10/24/89	Sodium Hydroxide	CALCIUM BUFFER
5860	11/9/94	Sodium Hypochlorite	Bleach
5870	5/1/85	Sodium Metabisulfite	ANHYDROUS WWTP
5890	3/18/93	Sodium Sulfide	ANHYDROUS--FLAKES 60-62%
5900	3/1/93	Sodium Sulfide	Bulk liquid
5905	9/12/93	Sodium Thiosulfate Titrant	
5910	5/31/89	Solvent	STODDARD TYPE ALIPHATIC HYDROCARBONS
5930*		Spectrum Activator	Lecco coat
5950*		Spectrum paint	Lecco coat
5970	1/4/93	Adhesive	SPEEDBONDER 324 STRUC
5975	4/1/92	Stainless steels	
5980L	1/8/93	Stadex SC-O14-S	
5990	10/1/90	Antistatic cleaner	STAT-AWAY
6010	1/1/99	Wax	PINE ROSIN WAXSTICKY WAX--QUARTZ T
6030	10/1/85	Sulfur Dioxide	
6090	1/22/92	Acid Sulfuric	1500 G TANK--WWTP
6094*		Acid Sulfuric	-.100 NORMAL
6102*		Acid Sulfuric	-25%
6110	2/19/90	Acid Sulfuric	50% W/W
6120	3/22/94	Acid Sulfuric	77-100%
6130	2/1/92	Adhesive	SUPER BONDER GEL
6150	6/15/87	Wax	SUPERLATIVE B,Q-077
6170	3/31/93	Surfactant	Reagent solution CAT #22693
6180	11/13/92	Oil lubricating	SYNCOLUBE, 40-60% white mineral oil
6190	3/15/91	Lubricant	TEFLON LUBE, KAR # 79417
6200	1/3/94	Rokramer 6200	
6210	4/10/92	Surfactant	TERGITOL MIN-FOAM 1X ,POLYALKYLENE GLY
6215	4/21/93	Tantalum	Cabot Corp
6220	5/1/93	Cleaner	TEXCLEAN 100 CLEAN COUNTER TOPS IN SEC.
6225	9/1/93	Cleaner	Texpure
6226	3/1/92	Tennant 698 Neutral pH	
6227	10/14/93	Tennant eco-HTS 4231	Tile Red Topcoat
6228	5/7/93	Tennant Eco HTS High Traffic System	
6229	10/14/93	Tennant Eco HTS	4232 Smoke Blue
6230	1/1/93	Threadlocker	LOCTITE #242 21
6231	3/1/92	Tennant 658 SRS Strength cleaner	
6235	11/9/93	Threadlocker	Loctite #242 21
6240	5/14/86	Titanium	
6245	5/15/92	TISAB	ORION APPLICATION SOLUTION
6250	5/16/91	TIXO-K10	01640300
6260	1/4/93	TMAH	
6270	9/29/88	Adhesive	TOUCHDOWN #1 CONTACT CEMENT
6272	1/18/94	Toximul 3406F	
6273	10/1/91	Tran 1,2, Dichloroethylene	
6275	2/1/85	Trichloroehtane	
6290	8/8/90	Trichlorosilane	Vol liq--BP 89F--in compressed gas cylinders
6300L	3/1/90	Tungsten Carbide	
6305	6/14/91	Turco Caviclean	
6307	10/1/85	Tungsten Carbide with Cobalt binder	
6310	9/19/90	Caviclean #2	TURCO CAVICLEAN #2
6338*		Vac pump fluid	Hi pur chem
6342*		Vac pump fluid	Hi pur chem

NUM	Msdsdate	Material	Description
6344	8/10/93	Dow Corning Dry Film Lubricant	
6345	4/7/92	Oil Lubricating	UNIVIS J 13
6347	12/2/91	Oil Lubricating	UNIVIS N 15
6350*		Oil Minerial	VAC PUMP FLD, INLND VAC IND "SANTOVAC 5"
6410	1/3/93	Adhesive Catalyst	VALTRON B--#AD1211 FOR INGOT MOUN ADH #
6420	8/1/91	Valtron	SP2500 and SP2260
6430	1/7/92	9N9	VANWET 9N9, NONIONIC SURFACTANT
6435	12/21/93	Vandium	100 g/ml
6440	7/1/93	3500 Valvelon	
6445	1/4/93	Vector HTC	Lapping vehicle
6450	1/4/93	Vector HTR	Lapping vehicle
6470	1/4/93	Vector HTS	Lapping vehicle-1.3 Synthetic
6472	1/4/93	Vector HTS	Lapping vehicle-1.4 Synthetic
6480	1/13/92	Vinnapas C 305 Glue	
6485	8/10/94	Wood dust	
6490	1/1/91	Walton-March cleaner	Floor cleaner
6510*		Warmeleit Paste	WARMELEIT PASTE P12
6530*		Oil Finish	GLDN OAK
6550*		Oil Finish	NATURAL
6560L	3/1/93	Adhesive	WELDBOND # 84524
6570	5/1/91	Weld-on	# FOR ACRYLIC, REACTIVE CEMENT
6590	10/1/92	Weld-on	16 # FOR ACRYLIC
6610	5/1/91	Weld-on	4 # FOR ACRYLIC
6630	4/1/92	Weld-on	810A # FOR ACRYLIC
6650	4/1/92	Weld-on	810B # FOR ACRYLIC, ORGANIC PEROXIDE
6670	10/15/92	Adhesive	WHITE GLUE, FRANKLIN #1106
6690	6/15/89	Wiz #F-57	MOLD RELEASE
6710	3/27/89	Cleaner	WIZ-9
6730*		Wype	
6740	12/3/90	F-10 Shaker	ZEP
6750	3/13/92	Aerosol Lubricant	ZEP 45
6770	3/3/90	Aerosol Lubricant	ZEP AEROLUBE
6790	6/15/88	Cleaner Hand	ZEP BEAD-IT
6805	7/27/89	Aerosol Cutting Oil	ZEP DRILL CHILL
6810	4/23/90	Aerosol Lubricant	ZEP DRY MOLY
6830	11/25/91	Cleaner	ZEP FORMULA 50
6850	7/26/89	Aerosol Cleaner	AEROSOL CLEANER
6870	2/2/89	Solvent Drain	ZEP-FLO DRAIN SOLVENT, SULFURIC ACID
6890	8/3/90	Zepreserve	NAPTHA & PARAFFIN OIL, Zep 1434
6900	5/11/93	Zinc	LABORATORY REAGENT, 1000 ug/mL (0.10% w/v
6910	9/1/89	Zinc	RE-NU AEROSOL, CRC-3074
6930	1/1/90	Zinc	RE-NU BULK
6950*		Spraypaint	LCQR CL GLS, #0917

Wacker Siltronic Corporation

WACKER

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Portland, Oregon 97283-0180
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☐ Fax: (503) 226-0052 Executive Suite
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FACSIMILE TRANSMITTAL SHEET

FAX No:

DATE: 1/31/95

FROM: S. Archer

TO: Gary Hickman

cc:

NUMBER OF PAGES (including this page): 5

MESSAGE/SPECIAL INSTRUCTIONS:

Gary, There is no 357-17 test
incorrect Found test

Wacker Siltronic Corporation

WACKER

TO: Gary Hickman

FROM: Sandra Archer

SUBJECT: Bioassay testing

DATE: January 31, 1995

Chemical use data:

Stepanol- 94- 650 lbs
93- 299 lbs

Antifoam- 94-24,910 lbs
93-39,010 lbs

Alum- 94-121,900 lbs
93-119,600 lbs

Attached to this fax:

Page 5 of NPDES permit
Chemical data

e. An acute bioassay test shall be considered to show toxicity if there is a statistically significant difference in survival between the control and 100 percent effluent, unless the permit specifically provides for a Zone of Immediate Dilution (ZID) for biotoxicity. If the permit specifies such a ZID, acute toxicity shall be indicated when a statistically significant difference in survival occurs at dilutions greater than that which is found to occur at the edge of the ZID.

f. A chronic bioassay test shall be considered to show toxicity if a statistically significant difference in survival occurs at dilutions greater than that which is known to occur at the edge of the mixing zone. If there is no dilution data for the edge of the mixing zone, any chronic bioassay test that shows a statistically significant effect in 100 percent effluent as compared to the control shall be considered to show toxicity.

g. If toxicity is shown, as defined in sections (e) or (f) of this permit condition, another toxicity test using the same species and Department approved methodology shall be conducted within two weeks, unless otherwise approved by the Department. If the second test also indicates toxicity, the permittee shall follow the procedure described in section (h) of this permit condition.

h. If two consecutive bioassay test results indicate acute and/or chronic toxicity, as defined in sections (e) or (f) of this permit condition, the permittee shall evaluate the source of the toxicity and submit a plan and time schedule for demonstrating compliance with water quality standards. Upon approval by the Department, the permittee shall implement the plan until compliance has been achieved. Evaluations shall be completed and plans submitted to the Department within 6 months unless otherwise approved in writing by the Department.

i. If bioassay testing indicates acute and/or chronic toxicity, the Department may reopen and modify this permit to include new limitations and/or conditions as determined by the Department to be appropriate, and in accordance with procedures outlined in Oregon Administrative Rules, Chapter 340, Division 45.

j. Bioassay results shall be reported to the Department on the 15th day of the month following receipt of the final test report.

Date	NH3	H2O2	pH	T deg C
11-09-93	2.25	17	7.3	22
11-11-93	5.5	8	7.3	23
11-12-93	2.75	28	7.5	22
11-04-93	2.55	17	7	23
10-28-93	3.21	27	7.8	23.5
10-27-93	3.35	14	7.7	21
10-26-93	2.93	20	7.28	19.5
10-25-93	0.063	25	7.42	25
10-21-93	3.7	16	24	7.4
10-20-93	6	14	*4 hr composite	
10-20-93	5.5	14	*grab	
10-19-93	2.66	20		
10-18-93	1.4	19		
10-16-93	0.65	22		
10-15-93	1.92	15		
10-14-93	2.05	17		
10-13-93	2.5	25		
10-12-93	1.58	8		
10-11-93	2.4	29		

DATE	B.O.D.	TSS	F-	PO4	Cr, T	Cr, +6	SiO2	H2O2	NH3	Al	pH	COD	
10-17-94	5.83	6	5.5	0.231	0.01	0.02	28	24	1.68	0.2	7.09		
10-14-94	8.9	11.75	5	0.215	0.03	0.03	27.8	26	2.9	0.3			
10-12-94	6.85	3.75	5.3	0.19	0.01	0.01							
08-19-94	1.02	3.8	5.7	0.2	0.01	0.01		26	3				15
08-17-94	INVALID	11.25	4.74	0.96	0.02	0.01		26	2.15			<0	
08-15-94	2.4	15.75	5.8	0.65	0.01	0.01		24	6.7				8
10-01-93	3.77	5.75	1.4					26	2				
09-29-93	4.269	3.75	1.3					26	1.3				
09-27-93	2.757	7.5	2.8					22	0.6				
06-09-93	2.11	5.25	1.4										16
12-09-92	1.87	9.5	0.9										14
02-25-92	2.28	3.5	1.8										

MEMORANDUM

CH2M HILL

TO: Sandra Archer/Wacker
Tom McCue/Wacker
Chip Bloomer/Wacker

COPIES: Mike Stanaway/CH2M HILL/CVO

FROM: Gary Hickman/CH2M HILL/CVO

DATE: February 15, 1995

SUBJECT: Wacker Siltronic Corporation Wastewater Toxicity Study
Suggested Approach

PROJECT: ASE144.31

This memo summarizes the results of a review of existing data and provides recommended steps for proceeding with the wastewater toxicity study. This and any future memos are intended to spur discussion between Wacker and CH2M HILL staff in the hope of creating an interactive approach to this study which considers both technical and economic factors.

After you have a chance to read through this, please call me to discuss the data review and recommendations. We should also review estimated costs of the recommended testing at that time. Once we reach agreement on our approach, we can determine how and when to proceed.

Unless otherwise stated, the use of the term "effluent" in this memo refers to Effluent 001, which is discharged to the Willamette River under NPDES Permit Number 101128.

Existing Data Review and Discussion

Toxicity Data

Table 1 summarizes the effluent toxicity data for 1993 and 1994. Pertinent observations are summarized below:

- The toxicity data base is quite limited; it consists of three fathead minnow bioassay tests and four *Ceriodaphnia* tests using conducted during 1993 and 1994. The existing data do not provide a good indication of toxicity variability or frequency of pass/fail.

- Wacker staff reported that their effluent was nontoxic prior to 1993.

- Unfortunately, the acute toxicity endpoints for both fathead minnow and *Ceriodaphnia* tests were reported only for 100% effluent and, therefore, did not consider the dilution factor of 2:1 provided by the Zone of Initial Dilution (ZID). It is impossible to tell from the summary data whether the acute results actually passed or failed considering the ZID.

- The fathead minnow acute test results failed the acute toxicity guidelines based on 100% effluent in August 1993, but passed when the test was re-run in September 1993. All fathead minnow chronic test results for 1993-4 passed the chronic toxicity guidelines with the allowed mixing zone dilution factor of 5:1.

- In 1993, the *Ceriodaphnia* acute test results passed the acute toxicity guidelines based on 100% effluent, and the chronic test results passed the chronic toxicity guidelines with the mixing zone dilution. In 1994, the *Ceriodaphnia* test results failed both the acute and chronic toxicity guidelines on the initial and re-run tests.

- Except for August 1993 sample, effluent toxicity to *Ceriodaphnia* was equal to or higher than the toxicity to fathead minnows (i.e., *Ceriodaphnia* was generally the more sensitive species).

Recommendation: future acute toxicity testing should include a 33% effluent dilution to evaluate pass/fail at the edge of the ZID, and future chronic toxicity testing should include a 17% effluent dilution to allow the most precise determination of pass/fail at the edge of the mixing zone. (Although there is some confusion about the interpretation of the ZID and mixing zone, it appears that a 2:1 dilution corresponds to 33% effluent [i.e., dilution of 1 part effluent with 2 parts river water, or 1/3] and that 5:1 dilution corresponds to 17% effluent [i.e., dilution of 1 part effluent with 5 parts river water, or 1/6]. This, however, needs to be confirmed from the original mixing zone study report.)

Chemical Data

Attachment 1 describes characteristics of constituent waste streams comprising Effluent 001, based on notes from our meeting on 13 January 1995 and information provided by Wacker. Please review the attached memo and let me know of any comments/corrections. From the information in the attached memo, the preliminary list of potential toxicity-causing constituents shown in Table 2 was developed.

Table 3 summarizes the existing physical/chemical data provided by Wacker. Please verify that the sampling locations indicated on the table are correct (i.e., "final effluent' and "combined effluent" before BD). Of the measured physical/chemical parameters, the most likely toxicity-causing constituents include ammonia, chromium, and hydrogen peroxide. Below are some observations relevant to the potential toxicity of those compounds.

- It was not clear how ammonia was reported in the data table provided, but I assume that it was as total ammonia ($NH_3 + NH_4^+$) [please confirm]. A review of the water quality criteria document for ammonia[1] indicates that chronic toxicity to fathead minnows occurs at total ammonia concentrations of approximately 25 mg/L (or 0.10 mg un-ionized NH_3/L), and that toxicity to *Ceriodaphnia* occurs at total ammonia concentrations of 75 mg/L or higher (0.30 mg un-ionized NH_3/L). Thus, the concentrations of ammonia measured in Wacker effluent appear to be roughly an order of magnitude lower than the toxic levels (Table 3).

[1] U.S.EPA, 1985. Ambient Water Quality Criteria for Ammonia -- 1984.

- Similarly, the water quality criteria document for chromium[2] indicates that Cr(VI) and Cr(III) cause chronic toxicity to either fathead minnows or *Ceriodaphnia* at concentrations of approximately 40 µg/L. Effluent chromium levels average 15 µg/L, and have been measured to be as high as 30 µg/L.

- There is no water quality criteria document for hydrogen peroxide, but it is toxic to certain organisms at low concentrations (on the order of a few mg/L). The relationship between the measured peroxide concentrations shown in Table 3 and levels actually in samples at the time bioassay tests were performed is questionable, because H_2O_2 reacts with many organic and reduced inorganic compounds. Nevertheless, based on the measured concentrations and its toxicity, H_2O_2 should be considered as a potential toxicant. **Recommendation: H_2O_2 should be measured in wastewater samples at the time the bioassay tests are performed. The analytical method should correspond with the procedure used by Wacker, if appropriate.**

Products such as polymers, surfactants, biocides, defoamers, etc. are often quite toxic. For example, from the rainbow trout reference toxicant data, we know that Linear Alkyl Sulfonate (LAS), an anionic surfactant (detergent), is acutely toxic to rainbow trout at LC50 levels of 5 to 6 mg/L. Since it is typically very difficult to measure these types of products, another way to assess their potential for causing toxicity is to examine usage rates and compare added concentrations to known or expected toxic levels.
Recommendation: It would be worthwhile to request that the chemical suppliers provide any toxicity data they have developed, or are willing to develop, for their products. Also, we should continue to investigate/estimate usage rates for the vendor-supplied products listed in Table 2.

Wacker provided some interesting chemical use data for Stepanol (ammonium lauryl sulfate, or ALS), antifoam [SAG 710?], and alum:

	Usage [lb/yr]	
Product	**1993**	**1994**
Stepanol	299	650
Antifoam	39,010	24,910
Alum	119,600	121,900

Stepanol usage more than doubled; antifoam usage decreased by one-third; and alum use remained roughly constant. The increase in Stepanol usage rates has roughly coincided with increasing toxicity measured over recent years.

Recommended Approach

Recommended next steps for this study are:

1. Expand whole effluent toxicity data base. Conduct a fathead minnow and *Ceriodaphnia* combined acute/chronic tests on whole effluent samples. I recommend a minimum of three sets of tests performed, for example, over the next 3 to 4 weeks.

---

[2] U.S.EPA, 1985. Ambient Water Quality Criteria for Chromium -- 1984.

Purpose: To enlarge the very limited existing toxicity data base to obtain a better picture of the variation and magnitude of wastewater toxicity. Also, to allow a more confident identification of the more sensitive test species (if one is in fact significantly more sensitive) and bioassay endpoint for use in Toxicity Identification Evaluation (TIE) testing.

2. **Toxicity source investigation**. At the same time as 1, collect samples of the CAD (after treatment but before combining with WAD), WAD, and BD streams for toxicity testing. To reduce cost, this testing could involve only *Ceriodaphnia* acute screening tests. There is some risk that existing toxicity will not show up without doing chronic tests or without testing fatheads, but the *Ceriodaphnia* acute screen seems to be the single best, low-cost choice based on the available data.

Purpose: To help focus in on the source of toxicity, and narrow the list of possible toxicity-causing constituents.

3. **Chemical characterization**. Characterize the whole effluent samples used in bioassay testing for the following parameters: pH, oxidation-reduction potential (ORP), ammonia-nitrogen (NH_3-N), total Kjeldahl nitrogen (TKN), anionic surfactants as MBAS, nonionic surfactants as CTAS, total suspended solids (TSS), total dissolved solids (TDS), Total and hexavalent chromium, hydrogen peroxide (measured at time of bioassay testing), sulfide, sulfite, fluoride, SiO_2, COD. (Question: is there any reason to suspect the presence of other metals or chlorine in Wacker effluent?)

Purpose: To provide a more thorough chemical characterization of Wacker's effluent and to help identify possible causes of any toxicity measured.

4. **Records keeping and continued information gathering**. (a) Thorough records should be kept of any production changes, atypical batch operations, process upsets, known spills, etc. during the period of sample collection for bioassay and chemical testing. (b) Efforts to estimate usage rates of vendor-supplied products (such as polymers, surfactants, biocides, and defoamers) should continue, and product toxicity data should be requested from the suppliers.

Purpose: (a) To identify any occurrences at the facility that might influence the measured toxicity. (b) To try to assess the potential toxicity related to use of products which are difficult to measure directly.

5. **TIE testing**. Phase I TIE testing, involving a array of sample manipulations followed by toxicity testing, should be conducted after the above steps are completed (or, possibly, simultaneously with the third set of tests). The conditions employed in this testing will be selected based on the results of steps 1 through 4. Phases II and III, if necessary, are intended to build on and confirm the findings of Phase I.

Purpose: To identify the cause(s) of effluent toxicity and provide a basis for evaluating mitigation methods (such as product substitution, process modification, wastewater treatment, source treatment or removal, and outfall improvements).

Sampling and Analysis Plan (Steps 1-3)

Toxicity Testing

Recommended wastewater samples bioassay tests are:

1. Final whole effluent - combined acute/chronic definitive tests using fathead minnow and *Ceriodaphnia.*

2. CAD after treatment but before combining with WAD - acute screen (one dilution only at 33% effluent) using *Ceriodaphnia.*

3. WAD before mixing with CAD - acute screen (one dilution only at 33% effluent) using *Ceriodaphnia.*

4. BD before mixing with combined CAD/WAD - acute screen (one dilution only at 33% effluent) using *Ceriodaphnia.*

All samples should be 24-hour composites consisting of subsamples collected hourly (if feasible). Sample volume requirements are:

- For combined acute/chronic definitive tests using fathead minnow and *Ceriodaphnia.* - 5 gallons collected three times at 2-day intervals (sampling dates will depend on the method of shipment and should be coordinated with the Bioassay Lab staff at CH2M HILL - phone no.: 503/752-4271 ext.3160).

- For acute screen using *Ceriodaphnia.* - 1 gallon (or less) collected one time (e.g., coinciding with the first sample for the acute/chronic definitive tests.

Bioassay samples should be shipped on ice to CH2M HILL's Bioassay Lab, 2300 NW Walnut Blvd, Corvallis, OR 97330, by overnight delivery. Samples should arrive at the lab at 4°C, so sample cooling during collection may be required. The lab can supply coolers and sample containers upon request.

Chemical Analysis

Many of the recommended chemical analytes are already measured in Wacker's effluent. If these analyses are currently done in your lab, and the lab has the capacity to run additional samples, some or all of these analyses could be performed onsite. CH2M HILL's Chemistry Lab can perform any of the recommended analyses not performed by Wacker; the testing responsibilities need to be worked out. Sampling volumes and procedures for chemical parameters can be provided as needed.

Schedule

The recommended schedule for the testing described in Steps 1-3 is to begin testing as soon as is feasible, conduct the first two sets of bioassay testing in two consecutive weeks, then skip a week or so before performing the third set of tests. Delaying the third round will allow time for data turn-around and review, and to make any appropriate modifications in the test plan and/or make preparations for TIE testing during the third round.

Table 1
Effluent Toxicity Data

			Toxicity [% Effluent]										
			Fathead minnow *Pimephales promelas*					Water flea *Ceriodaphnia dubia*					Rainbow Trout *Oncorhynchus mykiss*
		Test	48-hr	7-d Survival		Growth		48-hr	Survival		Reproduction		
Date	Lab	ID No.	Survival	NOEC	LC50	NOEC	IC25	Survival	NOEC	LC50	NOEC	IC25	96-hr LC50
9-Jun-93	NAS	357-11											>100
19-Aug-93	NAS	357-12,13	F	25	42.4	25	63.9	P	50	79.6	25	45.5	
28-Sep-93	NAS	357-14,15	P	50	70.7	25	49.3	P	50	70.7	50	43.5	
30-Sep-93	NAS	357-16											71.8
16-Aug-94	NAS	357-17,18	P	50	70.7	50	55.5	F	25	28.6	f <6.25	2.64	
13-Oct-94	NAS	357-19						F	f 6.25	15.1	f <6.25	1.89	
13-Oct-94	CAS	94-62							f 6.25	15.2			

Notes:

NAS = Northwestern Aquatic Sciences, Newport, OR; CAS = Columbia Aquatic Sciences, Carlsbad, CA

P = Passed Oregon DEQ acute toxicity guidelines (based on 100% effluent; allowed ZID dilution factor of 2:1 not considered).

F = Failed Oregon DEQ acute toxicity guidelines (based on 100% effluent; allowed ZID dilution factor of 2:1 not considered).

f = Failed chronic toxicity guidelines, considering the allowed mixing zone dilution factor of 5:1.

SCOEPA00029048

Table 2		
Potentially-Toxic Constituents by Waste Stream		
Concentrated Acid Drain (CAD)	**Weak Acid Drain (WAD)**	**Blow Down (BD)**
Ammonium lauryl sulfate (Stepanol)	Hydrogen peroxide, H_2O_2	Biocide (Dearcide 735)
Formaldehyde (Stepanol)	Tetramethylammonium hydroxide, TMAH	Diethylaminoethanol (Dearborn 154)
Ammonia, NH_3	Ammonia, NH_3	Sulfite, SO_3^{2-} (Dearborn 154)
Sulfide, S^{2-}	Scale inhibitor (Grace Dearborn 874)	Cooling water treatment (PolyElpH 956)
Sulfite, SO_3^{2-}	Surfactants (Q9)	Cooling water treatment (Dearborn 545)
Chlorite, ClO_2^-	Antifoam (SAG 710)	
Hexavalent chromium, Cr(VI)		
Trivalent chromium, Cr(III)		
Fluoride, F^-		
Polymer (Aquafloc)		
Antifoam (SAG 710)		

Table 3

Effluent Physical/Chemical Data

Date	NH3 [mg/L]	H2O2 [mg/L]	pH [pH units]	Temp [°C]	BOD [mg/L]	COD [mg/L]	TSS [mg/L]	F- [mg/L]	PO4 [mg/L]	Cr(T) [µg/L]	Cr(VI) [µg/L]	Al [mg/L]	SiO2 [mg/L]
Final Effluent (includes CAD, WAD, BD)													
10/11/93	2.4	29											
10/12/93	1.6	8											
10/13/93	2.5	25											
10/14/93	2.1	17											
10/15/93	1.9	15											
10/16/93	0.65	22											
10/18/93	1.4	19											
10/19/93	2.7	20											
10/20/93	6	14											
10/21/93	3.7	16	7.4	24									
10/25/93	0.06	25	7.4	25									
10/26/93	2.9	20	7.3	20									
10/27/93	3.4	14	7.7	21									
10/28/93	3.2	27	7.8	24									
11/4/93	2.6	17	7	23									
11/9/93	2.3	17	7.3	22									
11/11/93	5.5	8	7.3	23									
11/12/93	2.8	28	7.5	22									
Average	**2.7**	**19**	**7.4**	**23**									
Combined CAD/WAD Effluent (does not include BD)													
2/25/92					2.3		3.5	1.8					
12/9/92					1.9	14	9.5	0.9					
6/9/93					2.1	16	5.3	1.4					
9/27/93	0.6	22			2.8		7.5	2.8					
9/29/93	1.3	26			4.3		3.8	1.3					
10/1/93	2	26			3.8		5.8	1.4					
8/15/94	6.7	24			2.4	8	16	5.8	0.65	10	10		
8/17/94	2.2	26					11	4.7	0.96	20	10		
8/19/94	3	26			1	15	3.8	5.7	0.2	10	10		
10/12/94					6.9		3.8	5.3	0.19	10	10		
10/14/94	2.9	26			8.9		12	5	0.22	30	30	0.3	28
10/17/94	1.7	24	7.1		5.8		6	5.5	0.23	10	20	0.2	28
Average	**2.6**	**25**	**7.1**		**3.8**	**13**	**7.3**	**3.5**	**0.41**	**15**	**15**	**0.3**	**28**

SCOEPA00029050

Attachment 1

MEMORANDUM

TO: Tom McCue/Wacker
Chip Bloomer/Wacker
Sandee Archer/Wacker

FROM: Gary Hickman/CH2M HILL/CVO

DATE: February 6, 1995

SUBJECT: Wacker Siltronic Corporation Wastewater Toxicity Study
Waste streams and constituents

PROJECT: ASE144.31

Based on my notes from our meeting and the information provided by Sandee, characteristics of the various waste streams are listed below. Please review and correct as necessary.

1. Concentrated Acid Drain (CAD)

General description: Fluoride-containing waste streams
Flow ≈ 80 gpm + 20 gpm lime slurry = 100 gpm
CAD stream is most effected by batch operations (acid etch - 2-hr cycle: dump, lime to pH 10.7, alum and polymer added proportional to flow)
Treatment: Chromium reduction, chemical precipitation of F^- (using lime, alum, and polymer) and filtration
Constituents:

- HF, HNO3
- Ammonium lauryl sulfate (ALS) surfactant (Stepanol) - (28% ALS, 375 ppm formaldehyde)
- Lime, alum, polymer (Aquafloc?), antifoam(SAG 710?) - used at chemical precipitation system
- NaOH - used at acid fume scrubbers
- NaOH, H2SO4, NaS, NaClO2 - used at NOx scrubber
- Cr - chromic acid etching
- Sodium metabisulfite (Na2S2O5) - used to reduce Cr^{+6} to Cr^{+3}
- CaCl2 - used to help precipitate F^-
- Any polymer used at filter press which might return to waste stream with pressate?

2. Weak Acid Drain (WAD)

General description: Non-organic waste streams without Fluoride
Flow ≈ 250 gpm
Treatment: Neutralization
Constituents:

- HNO3, HCl, KOH
- H2SO4, NaOH - used at neutralization system
- Peroxides

NH4OH
Tetramethylammonium hydroxide (TMAH) - possibly via a cross connection with WAD
Grace Dearborn 874 - Cooling water treatment, Note: Chip referred to this as a phosphate-based scale inhibitor. Is this accurate? MSDS lists KOH but not phosphate.
Q9 - Laboratory detergent, anionic and nonionic surfactant, phosphates, high pH
Antifoam (SAG 710?) - added at neutralization system (?)

3. Blow Down (BD)

General description: RO/DI concentrate blowdown, boiler blowdown, cooling tower blowdown
Flow ≈ 120 gpm (50-80% is RO/DI concentrate blowdown)
Treatment: None
Constituents:

Dearcide 735(?) - brominated and chlorinated organic biocide used in cooling tower (« 1 mg/L in BD)
Dearborn 545(?) - cooling water treatment containing morpholine and sodium molybdate
PolyElpH 956(?) - cooling water treatment containing organophosphonic acid and sodium molybdate
Dearborn 154(?) - boiler water treatment containing NaOH, diethylaminoethanol, and sodium bisulfite

4. Storm Water (SW)

General description: stormwater
Flow ≈ unknown (intermittent)
Treatment: None
Constituents: unknown

5. Other Streams currently discharged to city sewer and POTW

Concentrated Caustic Drain CCD)
Organic Waste Water (OWW)
Silicon Slicing/Lapping Wastewater (SWW)

MEMORANDUM

CH2M HILL

TO: Sandra Archer/Wacker
Tom McCue/Wacker
Chip Bloomer/Wacker
Tom Rothschild/Wacker

COPIES: Mike Stanaway/CH2M HILL/CVO

FROM: Gary Hickman/CH2M HILL/CVO Gary

DATE: March 13, 1995

SUBJECT: Wacker Siltronic Corporation Wastewater Toxicity Study
Phase I TIE Approach

PROJECT: OPE40202.A0

This memo provides discussion and recommendations for Phase I Toxicity Identification Evaluation (TIE) effluent testing. Please review and then let's select our approach.

Preliminary Results from Initial Effluent Testing

Only preliminary, qualitative results are available from our first round of toxicity testing of whole effluent and the three individual waste streams, and only some of the physical/chemical characterization analyses have been completed. Nevertheless, the preliminary results provide valuable information relevant to TIE testing. For whole effluent, the acute 48-hour fathead minnow bioassay showed no toxicity at 100% effluent, whereas the acute 48-hour *Ceriodaphnia* test showed complete mortality at 100% and 33% effluent. Consequently, *Ceriodaphnia* was clearly the more sensitive test species for that whole effluent sample, and they exhibited toxicity at the critical dilution relative to discharge limits with the ZID dilution factor. This is bad news with respect to effluent compliance but good news in that we can use the acute *Ceriodaphnia* test to evaluate toxicity (at least acute toxicity) during TIE testing. Preliminary results also show that the samples labeled 95-5 and 95-6 were toxic at the 33% dilution but that the sample labeled 95-7 was nontoxic at 33% (100% survival). The samples did not indicate which numbers corresponded to which waste streams but I am guessing that 95-5 and 95-6 were CAD and WAD and that 95-7 was Blowdown (please confirm with Tom Rothschild).

I urge you to consider the physical/chemical results as preliminary only until they have been QA checked, but available whole effluent data include: H2O2 = 17 mg/L, Cr(VI) = 20 µg/L, TDS = 600 mg/L, TSS = 7 mg/L, Sulfite < 0.5 mg/L, and ORP = 170 mV. Ammonia, MBAS, total chromium, and other analyses are pending.

Phase I TIE Approach

The U.S. EPA has developed a systematic stepwise procedure for conducting TIEs, including three phases of testing. Phase I is intended to characterize groups or categories of toxicants, such as oxidants, cationic metals, volatiles, non-polar organics, etc. Phase II is intended to identify specific toxicants, and Phase III is intended to confirm whether or not the identified toxicant(s) is(are) the actual toxicant(s). EPA guidance documents for

conducting Phase I TIEs on acutely and chronically toxic effluents recommend the suites of testing shown in Tables 1 and 2, respectively. These protocols call for a fairly large number of tests and a concomitant relatively high cost, since each manipulation requires some labor for treatment and a toxicity bioassay test to evaluate whether the treatment affected toxicity. It may be that your budget for this project might not allow for this level of effort, and it might seem desirable to reduce the number of tests. Below, I will offer some suggestions for controlling costs; however, I feel compelled to tell you that EPA specifically cautions against reducing the number of tests (see Attachment 1 which is an excerpt from EPA's Phase I acute TIE guidance document). The risk here is in potentially having to repeat tests, leading to wasted effort.

Two possible methods for reducing TIE costs are (1) to eliminate tests from the acute TIE protocol (Table 1), and (2) use a tiered approach similar to the chronic protocol (Table 2). In alternative 1, I suggest that three tests could be eliminated from Table 1: pH 3 Adjustment, pH 11 Adjustment, and pH 7 Adjustment. The first two, I believe, provide little information that is not obtained by pH adjustment followed by filtration, aeration, or solid-phase extraction, and pH 7 is similar to the whole effluent (untreated) sample pH. However, this still leaves 14 tests. Alternative 2 would involve conducting the Tier 1 tests from Table 2 and only performing Tier 2 tests if Tier 1 does not provide sufficient information. Also, I believe the Methanol Eluate test (rinsing the solid phase column with methanol and evaluating toxicity of elutable contaminants) could be deferred or eliminated, leaving eight tests.

Based on the previous whole effluent toxicity results, it appears that we can effectively use *Ceriodaphnia* acute bioassay tests to evaluate toxicity. When conducting the TIE tests, it is important to conduct definitive rather than screening acute tests to allow us to discriminate changes in toxicity. The cost of *Ceriodaphnia* definitive acute tests is $315 after the 10% volume discount (see Brett Mucky's memo dated March 1).

In support of the TIE testing, it is important to repeat the physical/chemical characterization analyses on the sample used for TIE testing. This will help us to interpret the TIE testing results.

Other TIE Tests

Some other TIE tests that might be instructional include:

- Xeolite Treatment - removes NH4+, cationic metals, and some organics
- Anionic Exchange - removes anions such as chromates and fluoride
- Silica Gel - removes polar organics

These could be included in the Phase I array or could be used in Phase II if by Phase I indicated (either positive or negative) results.

Table 1

EPA Phase I Acute Toxicity Characterization Tests

Test	Toxicant Groups Potentially Identified
Untreated Effluent	Baseline toxicity
Oxidant Reduction	Oxidants, certain other reducible compounds
EDTA chelation	Certain cationic metals
pH 3 Adjustment	Compounds precipitated or otherwise made non-toxic at low pH
pH 3/Aeration	Sublatable, oxidizable, or strippable compounds at low pH
pH 3/Filtration	Suspended solids at low pH
pH 3/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at low pH
Initial pH/Aeration	Sublatable, oxidizable, or strippable compounds
Initial pH/Filtration	Suspended solids
Initial pH/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants
pH 10 Adjustment	Compounds precipitated or otherwise made non-toxic at high pH
pH 10/Aeration	Sublatable, oxidizable, or strippable compounds at high pH
pH 10/Filtration	Suspended solids at high pH
pH 10/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at high pH
pH 6 Adjustment	Compounds less or more toxic at lower pH
pH 7 Adjustment	Compounds less or more toxic at neutral pH
pH 8 Adjustment	Compounds less or more toxic at higher pH

Table 2

EPA Phase I Chronic Toxicity Characterization Tests

Test	Toxicant Groups Potentially Identified
Tier 1	
Untreated Effluent	Baseline toxicity
Oxidant Reduction	Oxidants, certain other reducible compounds
EDTA chelation	Certain cationic metals
Initial pH/Aeration	Sublatable, oxidizable, or strippable compounds
Initial pH/Filtration	Suspended solids
Initial pH/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants
Methanol Eluate	Compounds removed by solid-phase extraction
pH 6.5 Adjustment	Compounds less or more toxic at lower pH
pH 8.5 Adjustment	Compounds less or more toxic at higher pH
Tier 2	
Untreated Effluent	Baseline toxicity
pH 3 Adjustment	Compounds precipitated or otherwise made non-toxic at low pH
pH 3/Aeration	Sublatable, oxidizable, or strippable compounds at low pH
pH 3/Filtration	Suspended solids at low pH
pH 3/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at low pH
pH 3 SPE Methanol Eluate	Compounds removed by solid-phase extraction at pH 3
pH 10 Adjustment	Compounds precipitated or otherwise made non-toxic at high pH
pH 10/Aeration	Sublatable, oxidizable, or strippable compounds at high pH
pH 10/Filtration	Suspended solids at high pH
pH 10/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at high pH
pH 10 SPE Methanol Eluate	Compounds removed by solid-phase extraction at pH 11

SCOEPA00029055

Attachment 1

No Phase I characterization test should be dropped from use on the basis that the toxicants it is designed to address are not likely to be present in the effluent. In excluding any Phase I test, the analyst may be limiting the information that can be gained on effluent toxicants. The investigator should approach effluent characterization without a preconceived notion as to the cause of toxicity.

Wacker Siltronic Corporation

WACKER

TO: Murray Tilson, Tom McCue, Tom Rothschild

FROM: Sandee Archer

SUBJECT: Additional Bioassay Testing

DATE: March 15th, 1995

I have attached the lastest information from CH2M Hill. It appears that we still have a bioassay failure even using the 33% mixing zone.

I have spoken with Gary Hickman in depth about starting the Phase I Toxicity Investigation Evaluation (TIE). We both agree that it would be fairly dangerous to stray too far from the EPA recommendations for a Phase 1 TIE.

The following additional tests have been agreed upon by myself and Dr. Hickman.

Using the Chronic Toxicity Characterization Tests, but running Ceriodaphnia definitive acute tests. To reduce cost further four not five dilutions will be ran and Wacker will receive a volume discount so each test will be approximately $250 plus labor time. total costs for all test will be $3,000-$3,200.

1. Untreated Effluent- Baseline toxicity
2. Oxidant Reduction- using Sodium thiosulfate to eliminate peroxide, repeat this test twice.
3. EDTA chelation- eliminates cationic metals
4. Initial pH/ Aeration- eliminates subiatable, oxidizable or strippable compounds
5. Initial pH/Filtration-eliminates suspended solids. During the last bioassay testing period the CE looked somewhat cloudy.
6. Initial pH/Solid-Phase Extraction- eliminates non-polar organics, some metals and some surfactants
7. Xeolite Treatment- removes NH4+, cationic metals and some organics. This test will replace the pH adjustment tests that are meant to look for NH3 and NH4+.
8. Anionic Exchange- removes anions such as chromates and fluoride. Our current chromate level is somewhat close to toxic levels for chromate.
9. Silica Gel- removes polar organics, i.e., surfactants, formaldehyde etc.

I feel this test would give Wacker a very strong indication of possible contaminates in the CE. If we chose to eliminate any of these test there is a chance that we could miss the toxic compounds. Unfortunately, if these tests do not show anything definitive then we may need to do additional testing listed in Dr. Hickman's memo.

CH2M HILL

MEMORANDUM

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 4
To Sandra Archer	From Gary Hickman
Co. Wacker	Co. CH2M HILL
Dept.	Phone #
Fax #	Fax #

TO: Sandra Archer/Wacker
Tom McCue/Wacker
Chip Bloomer/Wacker
Tom Rothschild/Wacker

COPIES: Mike Stanaway/CH2M HILL/CVO

FROM: Gary Hickman/CH2M HILL/CVO Gary

DATE: February 15, 1995

SUBJECT: Wacker Siltronic Corporation Wastewater Toxicity Study
Phase I TIE Approach

PROJECT: OPE40202.A0

This memo provides discussion and recommendations for Phase I Toxicity Identification Evaluation (TIE) effluent testing. Please review and then let's select our approach.

Preliminary Results from Initial Effluent Testing

Only preliminary, qualitative results are available from our first round of toxicity testing of whole effluent and the three individual waste streams, and only some of the physical/chemical characterization analyses have been completed. Nevertheless, the preliminary results provide valuable information relevant to TIE testing. For whole effluent, the acute 48-hour fathead minnow bioassay showed no toxicity at 100% effluent, whereas the acute 48-hour *Ceriodaphnia* test showed complete mortality at 100% and 33% effluent. Consequently, *Ceriodaphnia* was clearly the more sensitive test species for that whole effluent sample, and they exhibited toxicity at the critical dilution relative to discharge limits with the ZID dilution factor. This is bad news with respect to effluent compliance but good news in that we can use the acute *Ceriodaphnia* test to evaluate toxicity (at least acute toxicity) during TIE testing. Preliminary results also show that the samples labeled 95-5 and 95-6 were toxic at the 33% dilution but that the sample labeled 95-7 was nontoxic at 33% (100% survival). The samples did not indicate which numbers corresponded to which waste streams but I am guessing that 95-5 and 95-6 were CAD and WAD and that 95-7 was Blowdown (please confirm with Tom Rothschild).

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Other TIE Tests

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pH 3/Filtration	Suspended solids at low pH
pH 3/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at low pH
Initial pH/Aeration	Sublatable, oxidizable, or strippable compounds
Initial pH/Filtration	Suspended solids
Initial pH/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants
pH 10 Adjustment	Compounds precipitated or otherwise made non-toxic at high pH
pH 10/Aeration	Sublatable, oxidizable, or strippable compounds at high pH
pH 10/Filtration	Suspended solids at high pH
pH 10/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at high pH
pH 6 Adjustment	Compounds less or more toxic at lower pH
pH 7 Adjustment	Compounds less or more toxic at neutral pH
pH 8 Adjustment	Compounds less or more toxic at higher pH

Table 2	
EPA Phase I Chronic Toxicity Characterization Tests	
Test	**Toxicant Groups Potentially Identified**
Tier 1	
Untreated Effluent	Baseline toxicity
Oxidant Reduction	Oxidants, certain other reducible compounds
EDTA chelation	Certain cationic metals
Initial pH/Aeration	Sublatable, oxidizable, or strippable compounds
Initial pH/Filtration	Suspended solids
Initial pH/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants
Methanol Eluate	Compounds removed by solid-phase extraction
pH 6.5 Adjustment	Compounds less or more toxic at lower pH
pH 8.5 Adjustment	Compounds less or more toxic at higher pH
Tier 2	
Untreated Effluent	Baseline toxicity
pH 3 Adjustment	Compounds precipitated or otherwise made non-toxic at low pH
pH 3/Aeration	Sublatable, oxidizable, or strippable compounds at low pH
pH 3/Filtration	Suspended solids at low pH
pH 3/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at low pH
pH 3 SPE Methanol Eluate	Compounds removed by solid-phase extraction at pH 3
pH 10 Adjustment	Compounds precipitated or otherwise made non-toxic at high pH
pH 10/Aeration	Sublatable, oxidizable, or strippable compounds at high pH
pH 10/Filtration	Suspended solids at high pH
pH 10/Solid-Phase Extraction	Non-polar organics, some metals, some surfactants at high pH
pH 10 SPE Methanol Eluate	Compounds removed by solid-phase extraction at pH 11

SCOEPA00029060

Attachment 1

No Phase I characterization test should be dropped from use on the basis that the toxicants it is designed to address are not likely to be present in the effluent. In excluding any Phase I test, the analyst may be limiting the information that can be gained on effluent toxicants. The investigator should approach effluent characterization without a preconceived notion as to the cause of toxicity.

Table 1
Effluent Toxicity Data

			Toxicity [% Effluent]										
			Fathead minnow, *Pimephales promelas*					Water flea, *Ceriodaphnia dubia*					
			ACUTE		CHRONIC			ACUTE		CHRONIC			
Date	Lab	Sample ID	Survival NOEC	Pass/ Fail	Survival NOEC	Growth NOEC	Pass/ Fail	Survival NOEC	Pass/ Fail	Survival NOEC	Repro NOEC	Pass/ Fail	Comments
18-Aug-93	NAS	93-?		F?	25	25	P	100	P	50	25	P	FH acute failed @ 100%; no data available for other dilutions.
27-Sep-93	NAS	93-?	100	P	50	25	P	100	P	50	50	P	
15-Aug-94	NAS	94-50	100	P	50	50	P	25	F	25 could have passed	<6.25	F	Cerio acute IC25=21.3%
12-Oct-94	NAS	94-61						50	P	6.25	<6.25	F	Cerio acute NOEC=50% (Steel's test),= 25% (Wilcoxon test), IC10=33.33%
12-Oct-94	CAS	94-62								6.25		F	This was a split sample (duplicate) test
6-Mar-95	CH2M	95-4	100	P	33	33	P	17	F	10	3	F	
20-Mar-95	CH2M	95-19						66	P				
3-Apr-95	CH2M	95-20						33 50	~~F~~ P				

Notes:

NAS = Northwestern Aquatic Sciences, Newport, OR; CAS = Columbia Aquatic Sciences, Carlsbad, CA; CH2M = CH2M HILL, Corvallis, OR

Pass/Fail - passed or failed Oregon DEQ toxicity guidelines with a 2:1 ZID dilution and a 5:1 mixing zone dilution (acute threshold = 33%; chronic threshold = 17%).

SCOEPA00029062

Table 2

Effluent Characterization Data

Parameter	Units	Sample ID and Date Collected toxic 95-4 6-Mar-95	not toxic 95-19 21-Mar-95	95-20 3-Apr-95
Bioassay				
Fathead Acute NOEC	%	100	-	-
Fathead Chronic NOEC	%	33	-	-
Cerio Acute NOEC	%	17	66	33
Cerio Chronic NOEC	%	3	-	-
Chemical				
pH	pH units	7.1	6.7	6.7
Alkalinity	mg/L as CaCO3	5	20	12
Hardness	mg/L as CaCO3	300	244	184
Conductivity	µmhos/cm	868	690	710
TDS	mg/L calcium could cause high TDS	604	554	-
TSS	mg/L	7	8	-
COD	mg/L	14	5	-
NH3-N Ammonia Nitrogen	mg/L original NH3	1.68	0.31	-
TKN	mg/L TMAH very toxic	1.81	0.36	-
Chlorine Residual	mg/L	0.05	0.08	0.06
H2O2	mg/L	17	20	-
Ox-Red Potential	mV	170	-	-
Fluoride	mg/L	4.4	-	-
Sulfide	mg/L	U 1	-	-
Sulfite	mg/L	U 0.5	-	-
MBAS	mg/L predominantly anionic surfactants stepanol	0.25	0.1	-
Chromium, Total	µg/L	1	1.1	-
Chromium (VI)	µg/L	U 20	U 8	U 8

U = less than specified method detection limit (MDL)

Antifoam- standarized test for testing - Grace Dearborn with toxicity data

SCOEPA00029063

MEMORANDUM

CH2M HILL

TO: Tom McCue/Wacker
Sandra Archer/Wacker

COPIES: Mike Stanaway/CH2M HILL/CVO

FROM: Gary Hickman/CH2M HILL/CVO

DATE: June 2, 1995

SUBJECT: Wacker Siltronic Corporation
Wastewater Toxicity Study
Project Approach and Progress Report

PROJECT: OPE40202.A0

Background

This memo summarizes the study approach, work completed, and test results, for the wastewater toxicity study performed for the Wacker Siltronic Corporation facility in Portland, Oregon.

Unless otherwise stated, use of the terms "effluent" and "whole effluent" in this memo refers to Effluent 001, which is discharged to the Willamette River under Wacker's NPDES discharge permit[1]. This effluent consists primarily of three waste streams: concentrated acid drain (CAD), weak acid drain (WAD) and (RO/DI water concentrate, boiler, and cooling water) blow down (BD). Wastewater treatment includes fluoride precipitation of CAD and neutralization of combined CAD and WAD.

The NPDES discharge permit[1] defines, for Wacker's effluent discharge to the Willamette River, a zone of initial dilution (ZID) having a 5-foot radius from the point of discharge at Outfall 003, and mixing zone having a 50-foot radius from the point of discharge at Outfall 003. A mixing zone dilution study conducted for the Wacker facility[2] identified worst-case (0 current velocity) dilutions at distances of 5 and 50 feet from the discharge point of 2:1 and 6:1 ($Q_{total}/Q_{effluent}$), respectively. These dilutions are equivalent to 50% effluent at the edge of the ZID and 17% effluent at the edge of the mixing zone. According to the discharge permit, the effluent is considered to be acutely toxic if an acute test No-Observable-Effects-Concentration (NOEC) is less than 50% effluent, and the effluent is considered to be chronically toxic if a chronic test NOEC is less than 17% effluent. Conversely, the effluent is considered to be in compliance for toxicity if the acute test NOEC≥50% effluent and the chronic test NOEC≥17% effluent.

[1] Oregon Department of Environmental Quality. National Pollutant Discharge Elimination System, Waste Discharge Permit Number 101128, Issued to Wacker Siltronic Corporation, July 14, 1993.
[2] Raymond, Richard/CH2M HILL. Mixing Zone Effluent Dilution Evaluation, prepared for Wacker Siltronic Corporation, February 4, 1994.

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Approach

The stepwise approach initially proposed for this study was as follows:

1. **Site visit, kickoff meeting, and initial data gathering.** Visit the site to review processes and wastewater sources, and meet with Wacker staff to discuss toxicity issues and initiate data gathering.

Purpose: To gain familiarity with the facility and staff, develop mutual understanding of problem and the project objectives, and kickoff the project.

2. **Existing data review.** Compile and review existing data on effluent toxicity and physical chemical characteristics, as well as known and potential constituents of the waste streams comprising the final effluent.

Purpose: To obtain, to the extent possible, a preliminary indication of wastewater characteristics and potential toxic constituents, and to evaluate the toxicity history of the facility's effluent.

3. **Current effluent toxicity evaluation and toxicity data base expansion.** Conduct fathead minnow and *Ceriodaphnia* dual endpoint acute/chronic tests on whole effluent samples.

Purpose: To enlarge the very limited existing toxicity data base (only one test per year is required by the discharge permit) to obtain a better picture of the variation and magnitude of wastewater toxicity. Also, to allow a more confident identification of the more sensitive test species (if one is in fact significantly more sensitive) and the appropriate bioassay endpoint (acute versus chronic) for use in Toxicity Identification Evaluation (TIE) testing.

4. **Toxicity source investigation.** At the same time as Step 3, collect samples of the CAD (after treatment but before combining with WAD), WAD, and BD streams for toxicity testing. To reduce cost, this testing could involve only *Ceriodaphnia* acute screening tests. There is some risk that existing toxicity will not show up without doing chronic tests or without testing fatheads, but the *Ceriodaphnia* acute screen seems to be the single best, low-cost choice based on the available data.

Purpose: To help focus in on the source(s) of toxicity, and narrow the list of possible toxicity-causing constituents, if appropriate.

5. **Chemical characterization.** Characterize the whole effluent samples used in bioassay testing under Step 3 for the following parameters (based on preliminary review of waste stream constituents): pH, oxidation-reduction potential (ORP), alkalinity, hardness, conductivity, chlorine residual, ammonia-nitrogen (NH_3-N), total Kjeldahl nitrogen (TKN), anionic surfactants as MBAS, total suspended solids (TSS), total dissolved solids (TDS), Total and hexavalent chromium, hydrogen peroxide (measured at time of bioassay testing), sulfide, sulfite, fluoride, COD.

Purpose: To provide a more thorough chemical characterization of Wacker's effluent and to potentially identify possible causes of any toxicity measured.

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6. Housekeeping and chemical use information gathering.
(A) Continue to maintain thorough records of any production changes, atypical batch operations, process upsets, known spills, etc. during the period of sample collection for bioassay and chemical testing.
(B) Continue efforts to estimate usage rates of vendor-supplied products (such as polymers, surfactants, biocides, and defoamers), and request product toxicity data from the suppliers.

Purpose: (A) To identify any occurrences at the facility that might influence the measured toxicity. (B) To try to assess the potential toxicity related to use of products which are difficult to measure directly.

7. Phase I TIE testing. Conduct Phase I Toxicity Identification Evaluation (TIE) testing, involving a array of sample manipulations followed by toxicity testing, either after the above steps are completed or concurrently with that testing. The conditions employed in this testing will be selected based on the results of steps 3 through 6. TIE testing is contingent on obtaining bioassay results indicating that the effluent is toxic at the edge of the ZID or mixing zone.

Purpose: To identify the class(es) of toxic constituents in whole effluent, and provide direction for Phase II and III TIE testing, if necessary.

8. Phase II and III TIE testing (if needed). Conduct Phase II and III TIE testing, if necessary, to confirm the findings of Phase I and identify specific toxic constituents.

Purpose: To identify the cause(s) of effluent toxicity and provide a basis for evaluating mitigation methods.

9. Investigate methods for controlling toxicity (if needed). If effluent is found to be toxic, and after the toxic constituent(s) is(are) identified, investigate one or more methods for controlling toxicity, such as product substitution, process modification, wastewater treatment, source treatment or removal, or outfall/dilution improvement.

10 Control method selection and implementation and follow-up confirmation monitoring (if needed).

Work Performed To-Date

Project work performed to-date includes:

- Site visit, kickoff meeting, and initial data gathering (Step 1) -- 13 January 1995.
- Review of waste streams and constituents (Step 2) -- memo dated 6 February 1995.
- Review of existing effluent toxicity and chemical data (Step 2) -- memo dated 15 February 1995.
- Re-analysis of historical effluent toxicity data considering zone of initial dilution (ZID) and mixing zone dilutions -- results presented at project meeting on 13 April 1995.

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- Evaluation of current effluent toxicity and chemical characteristics (Steps 3 and 5) -- 6 and 21 March, 3 and 21 April, and 12 May 1995. Results of first three test dates presented at project meeting on 13 April 1995; results from all samples summarized in this memo.

- Toxicity source evaluation (Step 4) -- 6 March 1995.

- Test plan for Phase I TIE (Step 7) -- memo dated 17 March 1995.

- Housekeeping and chemical use information (Step 6) -- performed by Wacker staff and presented in memo dated 15 February and at project meeting on 13 April 1995.

- Phase I TIE trials (Step 7) -- 21 March, 3 and 21 April, and 12 May 1995. TIE testing not completed because of low effluent toxicity.

- Project status meeting -- 13 April 1995.

- Draft progress report memo -- 2 May 1995.

- Final progress report memo -- 2 June 1995.

Test Results

Toxicity Data

Table 1 summarizes Wacker's historical effluent toxicity data for 1993 and 1994, and 1995 effluent toxicity data generated under this study. Pertinent observations are summarized below:

- Wacker staff reported that their effluent was nontoxic prior to 1993.

- The historical toxicity data base was quite limited; it consisted of three fathead minnow bioassay tests and four *Ceriodaphnia* tests conducted during 1993 and 1994. The historical data did not provide a good indication of toxicity variability or frequency of pass/fail.

- **Effluent toxicity to fathead minnows**. The August 1993 sample failed to meet the fathead minnow acute toxicity guideline based on 100% effluent and the raw data were not available to determine whether the sample would have passed or failed at 50% effluent. All three subsequent fathead minnow acute tests conducted (September 1993, August 1994, and March 1995) passed the acute toxicity guideline at 50% effluent. All four fathead minnow chronic tests conducted in 1993-95 passed the chronic toxicity guideline at 17% effluent.

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- **Effluent toxicity to *Ceriodaphnia*..**

  ***Ceriodaphnia* acute tests**

  - 1993: both tests passed the acute toxicity guideline of 50% effluent (actually passed at 100% effluent)
  - 1994: one test failed and one passed the acute toxicity guideline of 50% effluent
  - 1995: two test failed and five tests (including the last four) passed the acute toxicity guideline of 50% effluent

  ***Ceriodaphnia* chronic tests**

  - 1993: both tests passed the chronic toxicity guideline of 17% effluent
  - 1994: both tests failed the chronic toxicity guideline of 17% effluent
  - 1995: one test failed and the last two tests passed the chronic toxicity guideline of 17% effluent

- Except for August 1993 sample, effluent toxicity to *Ceriodaphnia* was equal to or greater than the toxicity to fathead minnows (i.e., *Ceriodaphnia* was generally the more sensitive species to Wacker effluent).

- *Ceriodaphnia* acute toxicity single-dilution screening tests performed on CAD, WAD, and BD samples from 6 March 1995 indicated that the CAD and WAD samples were acutely toxic at less than 33% effluent (the only dilution tested), but that the BD sample was not acutely toxic at 33%.

- Based on the 6 March 1995 toxicity testing results, Phase I TIE testing using *Ceriodaphnia* acute tests was planned for effluent samples collected on 20 March and 3 April, but the TIE testing was canceled because of low acute toxicity. Phase I TIE testing using *Ceriodaphnia* chronic tests was planned for effluent samples collected on 21 April and 12 May 1995, but again the TIE testing was canceled when the samples were found to have low toxicity (i.e., they were within compliance toxicity guidelines).

Chemical Data

Table 2 summarizes effluent characterization data for 1995. Comparison of the chemical data between the acutely- and chronically-toxic 6 March sample and the acutely-nontoxic 21 March sample yields mostly negative conclusions with respect to toxicity:

- Ammonia-nitrogen, chlorine residual, and fluoride concentrations were low in both samples, although NH3-N was slightly higher in the toxic sample.

- H2O2 concentrations were high in both samples but not higher in the toxic sample.

- MBAS (indicative of anionic surfactants) concentrations were low in both samples, although somewhat higher in the toxic sample.

- COD was somewhat higher in the toxic sample, possibly indicating the presence of more organic compounds.

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- TDS and conductivity levels were not indicative of osmotic problems in either sample.

- Chromium concentrations were low in both samples.

- Wacker staff have reported that there is no specific reason to suspect the presence of elevated levels of other metals in their wastewater.

Summary and Recommendations

Wacker's effluent toxicity appears to be transient. Since measuring both acute and chronic *Ceriodaphnia* toxicity in the 6 March 1995 sample, a total of five acute tests and two chronic tests have passed the toxicity guidelines, and only one acute test has failed. The last two, and three out of the last four, samples collected for the purpose of conducting Phase I TIE testing turned out to be nontoxic by the regulatory definition, and so TIE testing was canceled (the fourth sample was actually toxic according to the regulatory definition but only marginally so). Consequently, to avoid unnecessary and unproductive effort and expense, we do not recommend further attempts at TIE testing at this time. Instead, we recommend that you share these study results with the DEQ to demonstrate that a considerable effort has been made to investigate the source of toxicity, but that several recent samples have been nontoxic according to the effluent toxicity guidelines.

SCOEPA00029069

Martinsen, John/CVO

From: Skinner, Paul/CVO
To: Sewell, John/BAILEY; Dibble, Robert/BAILEY; Amoth, Alan/CVO; Firth, Alex/CVO; Schwindt, Allan/CVO; Bjerke, Brad/CVO; Byers, Bill/CVO; Collom, Barry/CVO; Irving, Bill/CVO; Wehnert, Bob/CVO; Youker, Bryan/CVO; Burr, Chris/CVO; Dahl, Cindy/CVO; Noling, Calvin/CVO; Amedo, Don/CVO; Brown, Darla/CVO; Castor, Dave/CVO; Grigsby, Dave/CVO; Johnson, Doug/CVO; Leek, Doyle/CVO; Livesay, Dave/CVO; Loehden, Dave/CVO; Morgans, Donna/CVO; Moyano, Dave/CVO; Peters, Dennis/CVO; Hickman, Gary/CVO; Zinkus, Glenn/CVO; Arico, John/CVO; Carr, Jim/CVO; Cave, John/CVO; Celorie, Jay/CVO; Cox, Jim/CVO; Danko, Joe/CVO; Foley, Joe/CVO; Graham, John/CVO; Mackie, Jay/CVO; Martinsen, John/CVO; Obert, Jeff/CVO; Sams, John/CVO; Simonds, John/CVO; Bialek, Kris/CVO; Clegg, Ken/CVO; Snider, Kile/CVO; Baxter, Laura/CVO; Bennett, Lynette/CVO; Maloney, Linda/CVO; Wood, Lionel/CVO; Bailey, Melinda/CVO; Bracken, Mike/CVO; Finerson, Mark/CVO; Harlos, Mike/CVO; Murphy, Mary/CVO; Murray, Marv/CVO; Portera, Michelle/CVO; Sailor, Mike/CVO; Wable, Milind/CVO; Berg, Paul/CVO; Cutsforth, Patti/CVO; Hazel, Paul/CVO; Mueller, Paul/CVO; Damiano, Richard/CVO; Riker, Rick/CVO; Smith, Rick/CVO; Topping, Ray/CVO; Wilson, Roz/CVO; Frey, Sue/CVO; McKinley, Scott/CVO; McLaren, Susan/CVO; Snider, Stacy/CVO; Amidon, Tonya/CVO; Genne, Tom/CVO; Peron, Wil/CVO; Hadfield, Earl/CVO; Schmitz, Barb/CVO; Farley, Jody/CVO; Kramer, Jim/CVO; Volkmann, Andrea/PDX; Crossland, Janis/PDX
Cc: Trost, Bob/CVO; HelpDesk/OPR ComputingServices; Denison, Mike/CVO; Hinman, Alan/PDX; Olmstead, Kim/PDX
Subject: CVO1 Username Changes
Date: Thu, Jun 1, 1995 10:16AM

This message contains additional information about the CVO1 username changes. In addition to your CVO1 username changing, the name of your personal directory will be changed to be the same as the new name. The files in the directory will not be affected.

If you have any questions, please contact me at x.3231

Thanks! Paul

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Table 1
Effluent Toxicity Data

			Toxicity [% Effluent]										
			Fathead minnow, *Pimephales promelas*					Water flea, *Ceriodaphnia dubia*					
			ACUTE		CHRONIC			ACUTE		CHRONIC			
Date	Lab	Sample ID	Survival NOEC	Pass/ Fail	Survival NOEC	Growth NOEC	Pass/ Fail	Survival NOEC	Pass/ Fail	Survival NOEC	Repro NOEC	Pass/ Fail	Comments
18-Aug-93	NAS	93-?		F?	25	25	P	100	P	50	25	P	FH acute failed @ 100%; no data available for other dilutions.
27-Sep-93	NAS	93-?	100	P	50	25	P	100	P	50	50	P	
15-Aug-94	NAS	94-50	100	P	50	50	P	25	F	25	<6.25	F	
12-Oct-94	NAS	94-61						50	P	6.25	<6.25	F	Cerio acute NOEC=50% (Steel's test), NOEC=25% (Wilcoxon test)
12-Oct-94	CAS	94-62								6.25		F	This was a split sample (duplicate) test
6-Mar-95	CH2M	95-4	100	P	33	33	P	17	F	10	3	F	
20-Mar-95	CH2M	95-19						66	P				
3-Apr-95	CH2M	95-20						33	F				
21-Apr-95	CH2M	95-24						50	P	50	17	P	
24-Apr-95	CH2M	95-25						50	P				
12-May-95	CH2M	95-29						50	P	50	17	P	
15-May-95	CH2M	95-30						50	P				

Notes:

NAS = Northwestern Aquatic Sciences, Newport, OR; CAS = Columbia Aquatic Sciences, Carlsbad, CA; CH2M = CH2M HILL, Corvallis, OR

Pass/Fail criteria - Oregon DEQ toxicity guidelines with a 1:1 ZID dilution (acute limit=50% effluent) and a 5:1 mixing zone dilution (chronic limit=17% effluent).

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Table 2

Effluent Characterization Data

Parameter	Units	Sample ID and Date Collected 95-4 6-Mar-95	95-19 20-Mar-95	95-20 3-Apr-95	95-24 21-Apr-95	95-29 15-May-95
Bioassay						
Fathead Acute NOEC	%	100	-	-	-	-
Fathead Chronic NOEC	%	33	-	-	-	-
Cerio Acute NOEC	%	17	66	33	50	50
Cerio Chronic NOEC	%	3	-	-	17	17
Chemical						
pH	pH units	7.1	6.7	6.7	6.4	6.9
Alkalinity	mg/L as CaCO3	5	20	12	10	U 10
Hardness	mg/L as CaCO3	300	244	184	288	218
Conductivity	µmhos/cm	868	690	710	1,013	870
TDS	mg/L	604	554	-	-	-
TSS	mg/L	7	8	-	-	-
COD	mg/L	14	5	-	-	-
NH3-N	mg/L	1.68	0.31	-	-	-
TKN	mg/L	1.81	0.36	-	-	-
Chlorine Residual	mg/L	0.05	0.08	0.06	0.04	0.02
H2O2	mg/L	17	20	-	-	-
Ox-Red Potential	mV	170	-	-	-	-
Fluoride	mg/L	4.4	2.8	-	-	-
Sulfide	mg/L	U 1	-	-	-	-
Sulfite	mg/L	U 0.5	-	-	-	-
MBAS	mg/L	0.25	0.1	-	-	-
Chromium, Total	µg/L	1	1.1	-	-	-
Chromium (VI)	µg/L	U 20	U 8	U 8	-	-
Notes:						
U = Less than specified method detection limit (MDL)						

SCOEPA00029072

CH2M HILL

MEMORANDUM

Post-It™ brand fax transmittal memo 7671	# of pages ▸ 2
To Sandra Archer	From Gary Hickman
Co. Wacker	Co. CH2M HILL
Dept.	Phone #
Fax #	Fax #

TO: Sandra Archer/Wacker

COPIES: Tom McCue/Wacker
Chip Bloomer/Wacker
Mike Stanaway/CH2M HILL

FROM: Gary Hickman/CH2M HILL/CVO Gary

DATE: April 18, 1995

SUBJECT: Wacker Siltronic Corporation Wastewater Toxicity Study
Dilution Provided by ZID and Mixing Zone

PROJECT: OPE40202.A0

After reviewing the 1994 mixing zone report[1] that you gave me at our meeting last week and discussing the data presentation with Richard Raymond, it appears that the allowable dilution assumed for the edge of the ZID may be incorrect whereas the allowable dilution assumed for the edge of the mixing zone appears to be correct. Your discharge permit (Schedule A, Item 3) specifies that the mixing zone has a 50-ft radius and the ZID has a 5-ft radius. The mixing zone report cited above presents dilutions, obtained through modeling, for various distances downstream from the discharge port (Table 2); it appears that this information was the basis for the dilution factors assumed for Wacker's effluent. The row of data in Table 2 for a current velocity of 0 ft/s lists dilution values as Q/Q_0 equal to 2 and 6 for 5 ft and 50 ft, respectively, from the outfall. This method of presenting the data is quite confusing (and I recommended that Richard include a separate table of corresponding dilution values as % effluent in the report he is presently preparing), but should be interpreted as follows:

Q_0 = effluent flow
Q_R = river flow (not used in report, but defined for this explanation)
Q = total flow = $Q_R + Q_0$

Thus, for Q/Q0 = 2
Q0 = 1 and QR = 1, so the dilution at the edge of the ZID is 1/2 or **50% effluent**. In other words, a Q/Q0 of 2 corresponds to a dilution factor (QR/Q0) of 1:1 not 2:1, and the dilution provided is equivalent to 50% effluent not 33%.

Similarly, for Q/Q0 = 6
Q0 = 1 and QR = 5, so the dilution at the edge of the ZID is 1/6 or **17% effluent**. In other words, a Q/Q0 of 6 corresponds to a dilution factor (QR/Q0) of 5:1.

(It is not clear to me how the 0 ft/s current velocity was chosen, but I would guess that maybe Wacker was directed by DEQ to use that conservative assumption. Do you know the background on this? A current velocity of 0 ft/s is certainly the worst case and, therefore, most conservative. It may be unreasonably conservative considering the extremely short amount of time that this condition exists [see figure in Attachment 1 of the

[1] CH2M HILL, 1994. Mixing Zone Effluent Dilution Evaluation. Memo prepared for Wacker Siltronic Corporation by Richard Raymond/CH2M HILL, Feb. 4, 1994.

report]. It seems to me that a compelling argument could be made for a higher current velocity assumption, which would provide a greater dilution.)

The effect of the acute toxicity threshold for pass/fail being 50% effluent rather than 33% on existing toxicity data is that the most recent sample tested in anticipation of TIE testing actually would have failed for *Ceriodaphnia* rather than passed (3 April 1995 sample, shown as having an acute NOEC of 33% and passing on Table 1 distributed at our meeting on 13 April). This increases the number of *Ceriodaphnia* acute toxicity failures to 3 out of 5 samples tested in 1994-95. The chronic toxicity score for Cerios is unchanged at 3 out of 3 failures in 1994-95. It also re-opens the question of whether the TIE should be conducted using the less-expensive acute tests (the hope/risk being that acute and chronic toxicity is caused by the same constituent), or whether TIE testing should be conducted using the more-thorough chronic tests (the dual endpoint chronic tests allow identification of both acute and chronic toxicity).

On a separate but closely related issue, it occurs to me that it might be an appropriate time to start coordinating the current and future discharge compliance evaluations. As you know, Richard Raymond is about to complete his mixing zone evaluation for future wastewater discharge conditions. I assume that this information will be used in the permitting process. Richard has indicated to me that the increased effluent flow rates in the future will result in higher dilutions in the mixing zone (although not high enough to have achieved compliance for all of the effluent toxicity values obtained to-date) but similar or even lower dilutions in the ZID. When the report is finalized, it would seem to be an appropriate time to consider the implications on future discharge compliance for both toxicity and physical/chemical parameters, especially if a new mixing zone/dilution allowance is to be negotiated. One straightforward method of potentially achieving compliance is to obtain higher dilutions via an effluent diffuser (other general methods of achieving compliance include process changes and wastewater treatment modifications). Through additional modeling, we could evaluate what type of diffuser would allow adequate dilution to achieve toxicity compliance, with an appropriate margin of safety. If this appeared to be a promising alternative, a rough cost estimate for an outfall diffuser could then be developed, for use in Wacker's decision-making process.

Please call if you have any questions or would like to discuss anything further.

RECEIVED
MAR 16 1994
WACKER SILTRONIC
Environmental Health & Safety

Oregon
DEPARTMENT OF
ENVIRONMENTAL
QUALITY
NORTHWEST REGION

March 15, 1994

TOM MCCUE ENVIRONMENTAL MANAGER
WACKER SILTRONIC CORPORATION
PO BOX 83180
PORTLAND OREGON 97283-0180

Re: WQ-Multnomah Co.
Wacker Siltronic
Permit No. 101128

Dear Mr. McCue:

Thank you for submitting the mixing zone evaluation report for Wacker's outfall. The evaluation report was submitted with your letter dated February 11, 1994.

The Department has reviewed the mixing zone evaluation, along with the bioassay results for the bioassay tests conducted in August and September, 1993. The bioassay test results are briefly summarized below:

Date	Test Species	Acute Result	Chronic Result
August 1993	Ceriodaphnia Dubia	100% survival	NOEC 25% Effluent LOEC 50% Effluent
	Pimephales Promelas	0% survival	n/a
September 1993	Ceriodaphnia Dubia	100% survival	NOEC 25% Effluent LOEC 50% Effluent
	Pimephales Promelas	100% survival	NOEC 25% Effluent LOEC 50% Effluent

Based on the bioassay results, it appears that Wacker's effluent exhibits chronic toxicity at effluent concentrations of 50% or greater, with No Observable Effect at 25% effluent. The mixing zone evaluation indicates that at worst-case conditions, 5:1 dilution occurs at the edge of the mixing zone (50 feet from the outfall), corresponding to an effluent concentration of 17%. Chronic toxicity is allowed within, but not beyond, the mixing zone. The bioassay results indicate that this condition is being met, since the NOEC is 25% effluent.

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD
DEQ-1

It also appears that Wacker's effluent may exhibit acute toxicity in 100% effluent. Acutely toxic conditions are not allowed within a mixing zone, unless a Zone of Immediate Dilution (ZID) is established and specified within the NPDES permit. If a ZID is not established, the effluent must not exhibit any acute toxicity, and any future bioassay result which indicates acute toxicity within the mixing zone would be regarded as a violation of Oregon environmental law.

Pursuant to Oregon Administrative Rule 340-45-445, the Department may establish a small ZID, in which acute toxicity is allowed. The mixing zone evaluation indicates that at worst-case conditions, (zero feet per second current flow in the receiving stream), 1:1 dilution occurs at a distance of 5 feet from the outfall, corresponding to an effluent concentration of 50%. We note that there was no acute toxicity at 50% or less effluent. Thus, if Wacker were to request establishment of a ZID, it appears that a radius of 5 feet from the outfall would be sufficient to ensure that acutely toxic conditions would not extend beyond the edge of the ZID.

At this time, the Department asks that Wacker consider whether or not it wishes to request a permit modification to establish a ZID. As I recall, we also discussed the possibility of changing the compliance point for chromium during the last inspection. Both of these items could be requested in a single modification request. A modification request can be made in the form of a letter detailing the requested changes; the fee for modifications that do not involve increases to permit limits is $550.

I would also like to inform you that as of April 1, I will assume a new position in the Northwest Region's Air Quality Section; Wacker will not be assigned to me in that position. It has been a pleasure working with you and Chip, and if I can provide assistance or historical perspective in your future dealings with the Department, please don't hesitate to contact me. Until April 1, I can be reached at 229-5292.

Sincerely,

George Davis

George F. Davis
Regional Engineer
Northwest Region

GFD:gfd

cc: Water Quality Division, DEQ

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

RECEIVED
MAY 8 1990
WACKER SILTRONIC

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ENGINEERIN
MAY 9 199
John L. Pittm
Wacker Siltron

May 4, 1990

John - FYI
Rich Gariepy

Mr. Richard G. Gariepy
Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283

Re: WQ-Multnomah County
NWR-WQ-90-154
NOTICE OF NONCOMPLIANCE

Dear Mr. Gariepy:

A review of Wacker's Discharge Monitoring Reports from January 1990 through March 1990 determined the following TSS excursions in violation of condition 1 of Schedule A of the permit:

MONTH	TYPE	QTY. (mg/l)	PERMIT LIMITS
Jan	TSS (day)	38.0	30.0
Jan	TSS (mo.)	24.9	15.0
Feb	TSS (day)	37.5	30.0
Feb	TSS (mo.)	27.6	15.0
Mar	TSS (mo.)	20.1	15.0

The Department issued a Notice on Noncompliance (NON: WQ-NWR-90-60) on February 7, 1990 for TSS excursions occurred during the months of September 1989 through December 1989.

Your response indicated that TSS excursions occur because the clarifier cannot handle the excessive load from the silicon solids wastewater (SSW) stream.

Please be advised that the noted violations are repeated Class III violations. If TSS excursions continued to persist, I will refer those violations to the Department's Enforcement Section with a recommendation to proceed with a formal enforcement action which may lead to a civil penalty assessment.

If you should have any questions, please contact me at 229-6273.

Sincerely,

George D. Yun

George D. Yun
Environmental Consultant

cc: Water Quality Division, DEQ
Enforcement Section, DEQ

EQ-1

NEIL GOLDSCHMIDT
GOVERNOR

Department of Environmental Quality

811 SW SIXTH AVENUE, PORTLAND, OREGON 97204-1390 PHONE (503) 229-5696

RECEIVED
FEB 8 1990

February 7, 1990

Mr. Richard G. Gariepy
Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283

Re: WQ-Multnomah County
NWR-WQ-90-60
NOTICE OF NONCOMPLIANCE

Dear Mr. Gariepy:

The Department has reviewed Wacker's Discharge Monitoring Reports from August 1989 through December 1989 and determined that Wacker has exceeded the following waste discharge limitations, in violation of condition 1 of Schedule A of the permit:

A. Fluoride.

(1) The monthly average loading limit for Outfall no. 1 is 33.0 lbs/day. In August, permittee discharged 37.4 lbs/day monthly average.

(2) The monthly average concentration limit is 6.0 mg/l. The monthly averages were 9.1 mg/l in August and 7.1 mg/l in September.

B. Total Suspended Solids (TSS)

(1) Permittee exceeded the monthly concentration limitation of 15 mg/l as follows: 19.7 mg/l in September, 24.9 mg/l in October, 15.9 mg/l in November, and 16.0 mg/l in December.

(2) Permittee exceeded the daily concentration limitation of 30 mg/l as follows: once in October with 39.4 mg/l and once in December with 31.5 mg/l.

Your letter dated 10 October 1989 stated that fluoride discharging into the weak acid drain system caused fluoride excursions, and the problem has been corrected by rerouting the stream into the concentrated acid drain. Fluoride excursions have indeed ceased to occur since that time, and the fluoride levels are considered to be back in compliance.

SCOEPA00029078

However, the Department feels that greater effort is needed toward correcting TSS excursions. In reviewing the monthly reports, we were told for the third time that a possible solution to TSS excursions was being worked out by Wacker Siltronic staff. But TSS violations continued to recur and no specific solutions to the problem have been given.

The Department requests your cooperation in ensuring these violations do not recur. Furthermore, the Department is requesting a detailed report to be submitted by 15 March 1990 including a proposal for eliminating TSS excursions and a time schedule for implementing the proposed corrective action.

Please be advised that the noted violations are Class III violations and these are subject to more formal enforcement action.

The Department looks forward to your cooperation. If you should have any questions about this matter, please contact me at 229-6273.

Sincerely,

George D. Yun

George D. Yun
Environmental Consultant

cc: Water Quality Division, DEQ
Enforcement Section, DEQ

Murray

Wacker Siltronic Corporation

WACKER

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
TWX 910-464-4777
FAX 503 226-0052

January 8, 1987

Mr. George Davis
Field Representative
Northwest Region
Department of Environmental Quality
811 S.W. 6th Ave.
Portland, OR 97204

Dear Mr. Davis:

Annual TTO Analysis for NPDES Permit No. 3647-J

As per Schedule B of the above referenced Waste Discharge Permit for our Portland facility, I am submitting the enclosed waste water analysis.

In accordance with 40 CFR 469.21 (a), we are required to monitor all toxic organic compounds annually.

Northwest Testing Laboratories, Inc., of Portland, Oregon, performed an analysis of 26 TTO compounds. The only compound above trace limits was Trichloroethylene (TCE), which we monitor for on a monthly basis. This sample was well below our limit of 1.37 mg/1.

Very truly yours,

WACKER SILTRONIC CORPORATION

Murray M. Tilson, P.E.
Environmental Manager

MMT:ll

Enclosure (1) TTO Analysis from Northwest Testing Laboratories, Inc. dated January 5, 1987

cc: Greg Carr (w/encl)
Jim Ellis (w/encl)
Jim Harper (w/encl)
John Pittman (w/encl)
Jerry Schaeffer (w/encl)

NORTHWEST TESTING LABORATORIES, INC.

CONSTRUCTION INSPECTION
MATERIALS INSPECTION
CHEMICAL ANALYSIS
PHYSICAL TESTING

5405 N. Lagoon Avenue
P.O. Box 17126
Portland, Oregon 97217-0126
Phone: (503) 289-1778

NON-DESTRUCTIVE TESTING
WELDING CERTIFICATION
SOIL TESTING
ASSAYING

January 5, 1987

Wacker Siltronic Corp.
P.O. Box 03180
Portland, OR 97203

Attention: Mr. Greg Carr

Subject: Analysis on one (1) sample submitted on 12-19-86, per your P.O. Number 61553-0.

Item: Wastewater

Analysis:

Trichloroethylene	0.1 ± 0.05 ppm
2,4,6, Trichlorophenol	<0.05 ppm
1,2,4, Trichlorobenzene	<0.05 ppm
Chloroform	<0.05 ppm
1,2 Dichlorobenzene	<0.05 ppm
1,3 Dichlorobenzene	<0.05 ppm
1,4 Dichlorobenzene	<0.05 ppm
1,1,1 Trichloroethane	<0.05 ppm
Methylenechloride	<0.05 ppm
Tetrachloroethylene	<0.05 ppm
2, Chlorophenol	<0.05 ppm
1,4 Dichlorophenol	<0.05 ppm
Pentachlorophenol	<0.05 ppm

Report No: 302727

Analysis: (continued)

1,1 Dichloroethylene	<0.05 ppm
4 Nitrophenol	<0.5 ppm
2 Nitrophenol	<0.5 ppm
Phenol	<0.5 ppm
Napthalene	<0.5 ppm
Anthracene	<0.5 ppm
Isophorone	<0.5 ppm
Toluene	<0.5 ppm
Ethylbenzene	<0.5 ppm
1,2 Diphenylhdrazine	<0.5 ppm
Bis (2-ethylhexyl) Phthalate	<0.5 ppm
Di-n-butyl Phthalate	<0.5 ppm
Butylbenzyl Phthalate	<0.5 ppm

Respectfully,
NORTHWEST TESTING LABORATORIES, INC.

Howard Holmes

Howard Holmes
Assistant Supervisor, Chemistry

Report No: 302727

cc: Mike Pilkington

To : Materials Characterization & Applications Staff

From : Warren Miller

Date : 03/04/87

Re : HF Procedure Changes

RECEIVED

MAR 4 1987

WACKER SILTRONIC

In light of yesterday's HF spill, I have made a change in several of our lab procedures. Effective immediately, ANY procedure requiring the handling of HF includes the following:

1) Turn on the Main HF valve (on the wall behind the station).
2) Access the HF in the individual station as needed.
3) IMMEDIATELY after obtaining the HF, turn off the Main HF valve.

Note: The valve in the back of the MOS station will be kept closed as an additional precaution.

The purpose of this change is to minimize the time that the Main HF valve is open. By doing this, even if our stations have a major leak, HF loss will be minimal. There are signs located above all HF access points to remind you to close the Main valve. If you should find the valve left open, please report this to me as soon as possible.

For future reference, the following procedures and steps were affected:

#105-006	Glassware Cleaning	steps 3.1-3.3
105-011	Tube Etching (HF) Procedure	2.3.3-2.3.5
105-014	Secco Etching Procedure	4.1-4.3
105-015	Modified Secco Etching Procedure	2.2-2.4

The seriousness of this situation must be stressed. Spills as catastrophic as this one cost the company a considerable sum (yesterday's spill was conservatively estimated at $1000). This does not include the liabilities for exceding the EPA limits for Fluorine. We cannot have any more accidents.

Please contact me if you have any questions. Thanks for your time.

cc: Bob Graupner
Bill Dyson
Murray Tilson
Greg Carr
files

GRACE Dearborn

Dearborn Division

W. R. Grace & Co. - Conn.
1300 Esther Street
Suite 200
Vancouver, WA 98660

(206) 693-9936

WACKER SILTRONICS
PORTLAND OREGON

September 30, 1992

TO: J. Linden, T Rothchild FROM: S Cohen

Subject: Cloudiness in the WAD

1. Testing of the 2nd and 3rd stage of the WAD on 9/27/92 showed near neutral LSI (+0.1) which indicates minimal post precipitation from the sand filters. The operators informed me this is normal on Monday, with minimal need to neutralize fluoride. We can discontinue feed of 874 on Saturday night until the time when heavy CAD flows begin.

2. We were informed on the mixing of the D.I. water regeneration streams to the WAD 2nd stage and the now cloudy appearance of this stream along with the shortened cation and anion runs.

A. With the mixing of well water to Bull Run water this is expected. The hardness is now 5 to 10 times normal Bull Run water and you can expect 70 to 80% less through put. Increasing the acid (lbs/ft^3) will increase through put on the cations. { Greater details can be supplied if desired }

B. The precipitation or cloudiness can be from two sources.

1. The increased hardness cation load mixed with anion regenerate will precipitate as calcium carbonate in the high pH solution.

2. The increased hardness on the cation may require two step sulfuric acid regeneration and may be calcium sulfate. If this is taking place the event of calcium sulfate precipitation in the cation resin itself will soon take place.

Either mechanism this cloudiness is precipitation of hardness on mixing with the caustic stream.

Possible solutions would be:

A. Take this stream through the CAD circuit so the precipitated hardness can be removed in the lamella/sand filter combination.

B. Addition of 874 at 5 ppm to the cation regenerate as it mixes with the anion stream.

We can provide further information with a full investigation of the ion exchange regeneration area.

3. If the boiler feed water is not D.I. the changes in Bull Run water will have some adverse affects on boiler water quality and need for increased condensate treatment.

4. The chemical changes in Bull run water should improve properly designed cooling water treatment programs as the make up water is less corrosive and should be easy to control for deposition.

WATER AND ENERGY
MANAGEMENT PROGRAM

Data Sheet

Dearborn Consulting Service Report

COMPANY: WACKER DATE: 9-27-92

ADDRESS: ATTN:

SYSTEM(S): WAD COPY TO:

RESULTS OF TESTS CONDUCTED

TEST DESCRIPTION				Acidified		Alk				Orth	Total	PPM
SAMPLE \ CONTROL	TDS		Ca	"H"	"H"	P	M	pH	LSI	PO_4	PO_4	SiO_4
WAD 2nd	1000		180			0	60	7.8	+.1	.05	.25	4.5
WAD 3rd	1000		160	225	190	0	90	7.9	+.1	.05	.32	6.0

BOILERS

STEAM PRODUCTION			
% BLOWDOWN			
FEEDWATER DEMAND			
% CONDENSATE RETURN			
DISPERSANT CONC.			
DEAERATOR	°F		PSIG

COOLING TOWERS

RECIRCULATION RATE			
ΔT			
EVAPORATION RATE			
CYCLES OF CONC.			
BLEED RATE			
MAKEUP RATE			

CHEMICAL USAGE/INVENTORY CONTROL

PRODUCT												
CURRENT DAILY USAGE												
ADJUSTED DAILY USAGE												
PRESENT INVENTORY												
INVENTORY DAYS												

DEARBORN SERVICE CONSULTANT

GRACE Dearborn

Dearborn Division W. R. Grace & Co. Conn., 300 Waukegan Street Deerfield, IL 60015

S-352

SCOEPA00029086

TO: Tom McCue 4 Sep 92
Jerry Linden

SUBJECT: Bioclean 103A (membrane Soap) Affect on WWTP TSS

FROM: Facilities Chemist/Thomas J. Rothschild

1. On Wednesday, 26 August 92, The CE composite sample showed a very high TSS (52 mg/L).

2. The RO membranes had been soaped the previous night. The soaping discharge has been extremely dirty for about the last 2 - 3 weeks because the city water source has been changed to approximately 50% well water.

3. This very dirty discharge must be directed to the CAD or OWW, but certainly not to the WAD. The WAD system is capable of only pH adjustment. The WAD system is incapable of any precipitation.

4. I did testing to see if the Bioclean 103A, by itself, (without any dirt) would affect CE TSS and Fluoride. I used a concentration of 25,000 mg/L Bioclean 103A.
   a. CAD Reaction Tank Influent:
      1) TSS:
         a) without soap: 16.0 mg/L
         b) with Soap: 19.0 mg/L
      2) Fluoride:
         a) without soap: 1200 mg/L
         b) with soap: 1350 mg/L
   b. CAD Reaction Tank Effluent: (off the top of the tank)
      1) TSS:
         a) without soap: 195.5 mg/L
         b) with soap: 519.5 mg/L
      2) Fluoride:
         a) without soap: 11.6 mg/L
         b) with soap: 20 mg/L
   c. RODI water:
      1) Fluoride:
         a) without soap: 0.03 mg/L
         b) with soap: 0.06 mg/L

5. At this high concentration of 25,000 mg/L the Bioclean 103A did have an effect on both the the TSS and the Fluoride.

6. I then did the following calculations to determine the actual concentration of the Bioclean 103A that would be found in the system as it would be diluted.
   a. Initial Bioclean 103A make-up:
      1) 45 lbs Bioclean 103A into 225 gallons H2O. 24,000 ppm
      2) 225 gallons H2O X 8.34 lbs/gallon = 1876 lbs H2O.
   b. Through WAD system:
      1) Forwarding Sump: 5000 gallons X 8.34lbs/gallon

= 41,700lbs

2) WWTP Tanks: 3 X 15,000 gallons X 8.34lbs/gallon
= 375,000lbs

3) 45lbs / 1876lbs / 41,700lbs / 375,000lbs
= 1.5 x E-12

4) 1.5 x E-12 X 1000000 = 0.0000015 = 1.5 ppt

c. Through CAD system:

1) Forwarding Sump: 5000 gallons X 8.34lbs/gallon
= 41,700 lbs

2) WWTP Tank: 18,000 gallons X 8.34lbs/gallon
= 150,120 lbs

3) 45lbs / 1876lbs / 41,700lbs / 150,120lbs
= 3.8 x E-12

4) 3.8 x E-12 X 1000000 = 0.0000038 = 3.8 ppt

7. At these very small concentrations (1.5 ppt and 3.8 ppt) I doubt that the Bioclean 103A would have any testable effect on the CE with regard to TSS or Fluorides.

8. However, it is possible that the dirt and slime washed off the membranes through the WAD system (where there is no precipitation treatment available) would affect the TSS at the CE.

GRACE Dearborn

Dearborn Division

W. R. Grace & Co. - Conn.
1300 Esther Street
Suite 200
Vancouver, WA 98660

(206) 693-9936

August 26, 1992

Wacker Siltronic Corporation
P.O. Box 83180
Portland, OR 97283-0180

Attention: Mr. Jerry Linden

Subject: Post-precipitation and Carryover in the WAD Circuit

Dear Mr. Linden:

There is concern about carryover of visible particles from the lamella separator to the sand filter. The particles are visible as they are flocculated and large enough to be observed. With the discontinuation of polymer (Aquafloc 477) the particles will be smaller and may not be as readily visible but will probably be in greater pounds per day or loading to the sand filter.

The carryover, as you have indicated, is more a case of hydraulics than chemistry. Re-piping the backwash surges to the head tank, versus the present, to the lamella, will reduce these surges and lower the carryover.

On the concern of post-precipitation after the lamella, the water chemistry indicates you are having calcium carbonate precipitation. The Langeliers index shows this water to be +1.9 to +2.1 which is definitely scaling, or easily forms calcium carbonate scale.

The high calcium ion (lime addition) in excess of 1000 ppm is the direct cause of the scaling tendency.

There are two recommendations we are making to control this scale problem:

1. Add the lime toward the bottom of the weak acid drain reaction vessel. This will allow greater mix time for the calcium fluoride reaction and allow you to operate at a lower residual of lime. (The lower the total calcium ion concentration, the less scaling in the water.)

2. We also provide a sequestering agent to stop the precipitation of calcium carbonate. Dearborn 874 at 5 to 10 ppm will keep the calcium carbonate in solution and stop the scale buildup after the sand filters in the WAD system.

The Dearborn 874 is permitted for use in cooling water systems and allowable for discharge on most permits. We have included the product brochure and MSDS so you can check if this meets your discharge requirements.

The Dearborn 874 is $1.69 per pound in 55-gallon drums, net weight 498 pounds, or $1.67 per pound in 180-gallon returnable Dear-Pak, totes, net weight 1,656 pounds, F.O.B. Vancouver, WA.

The use rate will be 7.5 ppm, or approximately 16 pounds per day, on a flow of 260,000 gallons. We can set up a feed system using the 4-10 milli-amp signal from the flow meter to control pump speed and chemical addition.

I will call you in the next few days to discuss this letter and our initial jar testing on a replacement anti-foam product which will reduce your operating costs.

Yours truly,

DEARBORN DIVISION
W.R. GRACE & CO.-CONN.

S.A. Cohen

Stephen A. Cohen

SAC/ss

cc: Mr. Tom McCue

PACIFIC ENVIRONMENTAL LABORATORY INC.
9405 S.W. Nimbus Ave.
Beaverton, OR 97005
(503) 644- 0660
Fax (503) 644-2202

CHAIN OF CUSTODY RECORD

COMPANY Wacker Siltronic Corp PROJECT NAME NPDES Renewal LAB PROJECT NUMBER

PROJECT MANAGER Kent Mayer PROJECT NUMBER

COLLECTED BY Thomas J. Rothschild P.O. NUMBER (@ Lab) RUSH ☐ YES ☑ NO

COMMENTS

SAMPLES RECEIVED AT 4°C ☑ YES ☐ NO

SAMPLES IN APPROPRIATE CONTAINERS ☑ YES ☐ NO

PROVIDE VERBAL RESULTS ☑ YES ☐ NO

PROVIDE PRELIMINARY FAX RESULTS ☐ YES ☑ NO

PROVIDE FINAL FAX RESULTS ☑ YES ☐ NO

PEL NO.	SAMPLE I.D.	DATE	TIME	SAMPLE DESCRIPTION	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH - HCID OAR/DEQ	TPH - Gasoline OAR/DEQ	TPH - Diesel OAR/DEQ	TPH - 418.1 Modified OAR/DEQ	HCID - Fuel Scan GC/FID	TPH 418.1	BTEX 602/8020	Halogenated Volatiles 601/8010	Volatiles 624/8240	Semivolatiles 625/8270	PCB's 608/8080	Chlorinated Pesticides 608/8080	TCLP (8) Metals	Full NPDES Scans-add.				REMARKS
	Combined	7-12-91	0845	Waste		X		14									X	X	X	X	X	X				
	Effluent			Treatment																						
				Combined																						
				Effluent																						

ANALYSES TO BE PERFORMED

RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
Thomas J. Rothschild	Wacker Siltronic	7-12-91/1420	[illegible]	[illegible]
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY

WACKER SILTRONIC MATERIALS CHARACTERIZATION LABORATORY

SEM/EDS/SIMS REPORT FORM

TEST NUMBER: 1960 DATE: 6-29-89

TYPE OF ANALYSIS: SEM-EDS

REQUESTED BY: Leigh-Ann Cimino

ANALYSIS BY: Tim Simpkins

PURPOSE OF ANALYSIS: Determine nature of sludge contamination

SAMPLE IDENTIFICATION: A: clarifier sludge from 6-25-89
B: clarifier sludge from 6-26-89

EQUIPMENT SETTINGS: 20 KEV
30 MA emission current

FINDINGS: SEM analysis of the two samples show sample A to be made up of the bodies of dead diatoms, while sample B is amorphous (photos 1&2). EDS analysis shows the diatomaceous sludge (A) to have a higher concentration of Si, lower concentration of Ca and has Fe versus the amorphous sludge B (plots 1&2).

CONCLUSIONS: It looks like the diatoms in the system were suddenly killed off sometime at or immediately before 6-25-89 (by the HF leak?). Diatomaceous earth is applied to the drum which picks up the clarifier sludge - LAC

SCOEPA00029092

WACKER

MATERIALS CHARACTERIZATION

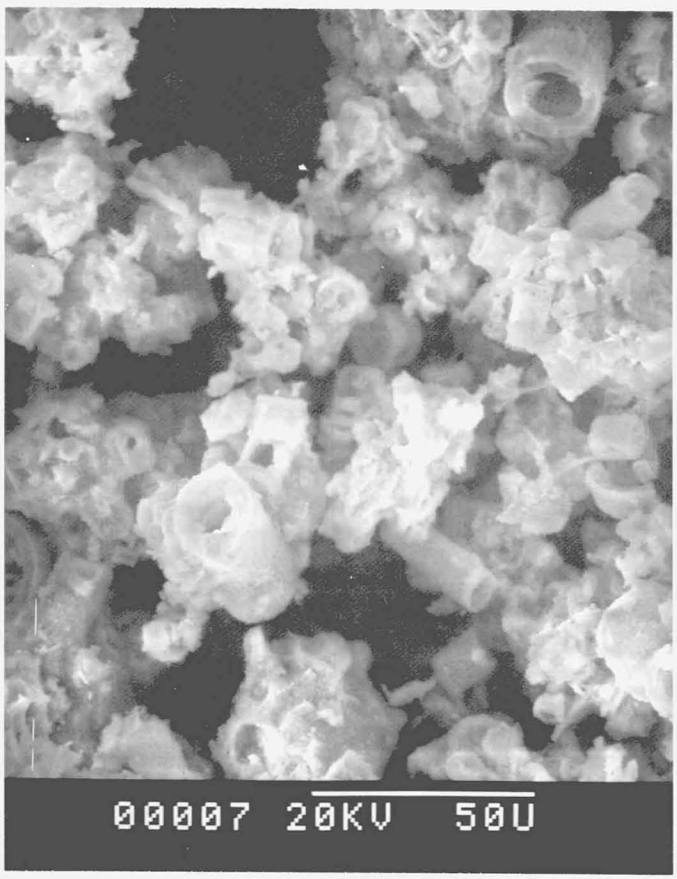
SEM Analysis

Date: 6-29-89 Test Number: 1960

Title: Sludge "A" from 6-25-89 Operator: TJ

Photo: 1

600x



Comments:

WACKER

MATERIALS CHARACTERIZATION

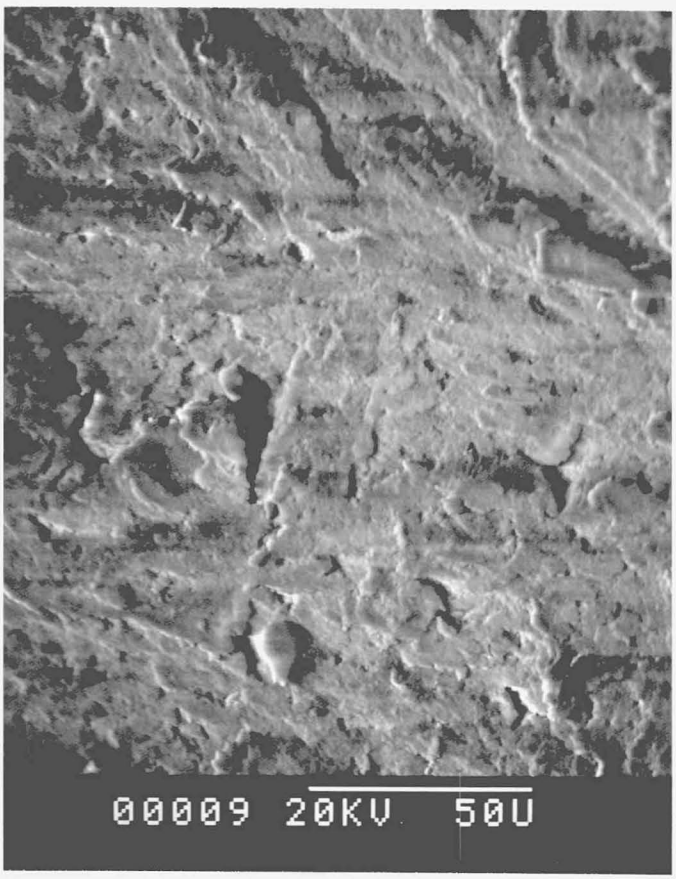
SEM Analysis

Date: 6-29-89 Test Number: 1960

Title: Sludge "B" from 6-26-89 Operator: TS

Photo: 2

600x



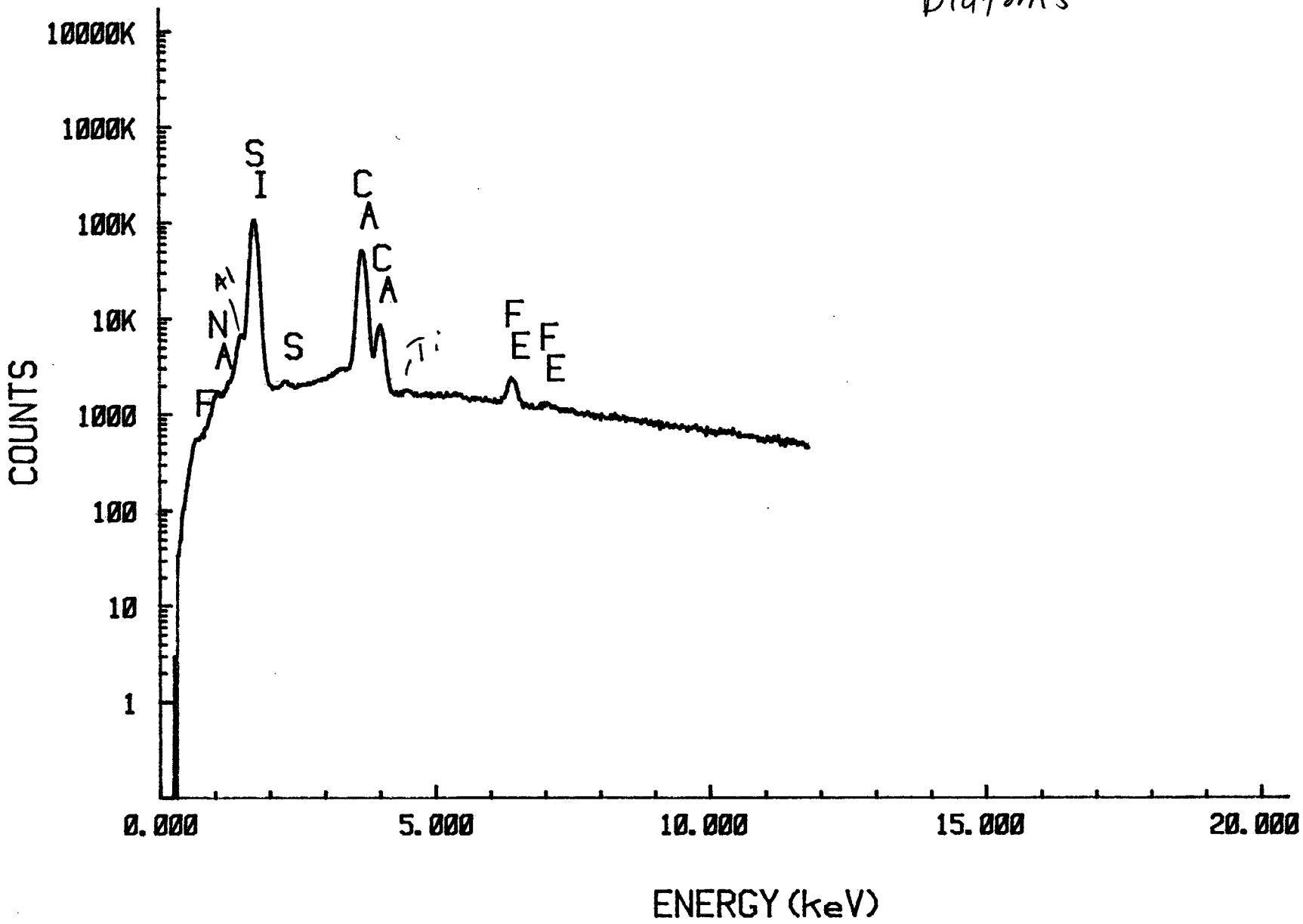
Comments:

plot 1

LT= 271 SECS

1960 SLUDGE "A" GENERAL

Diatoms

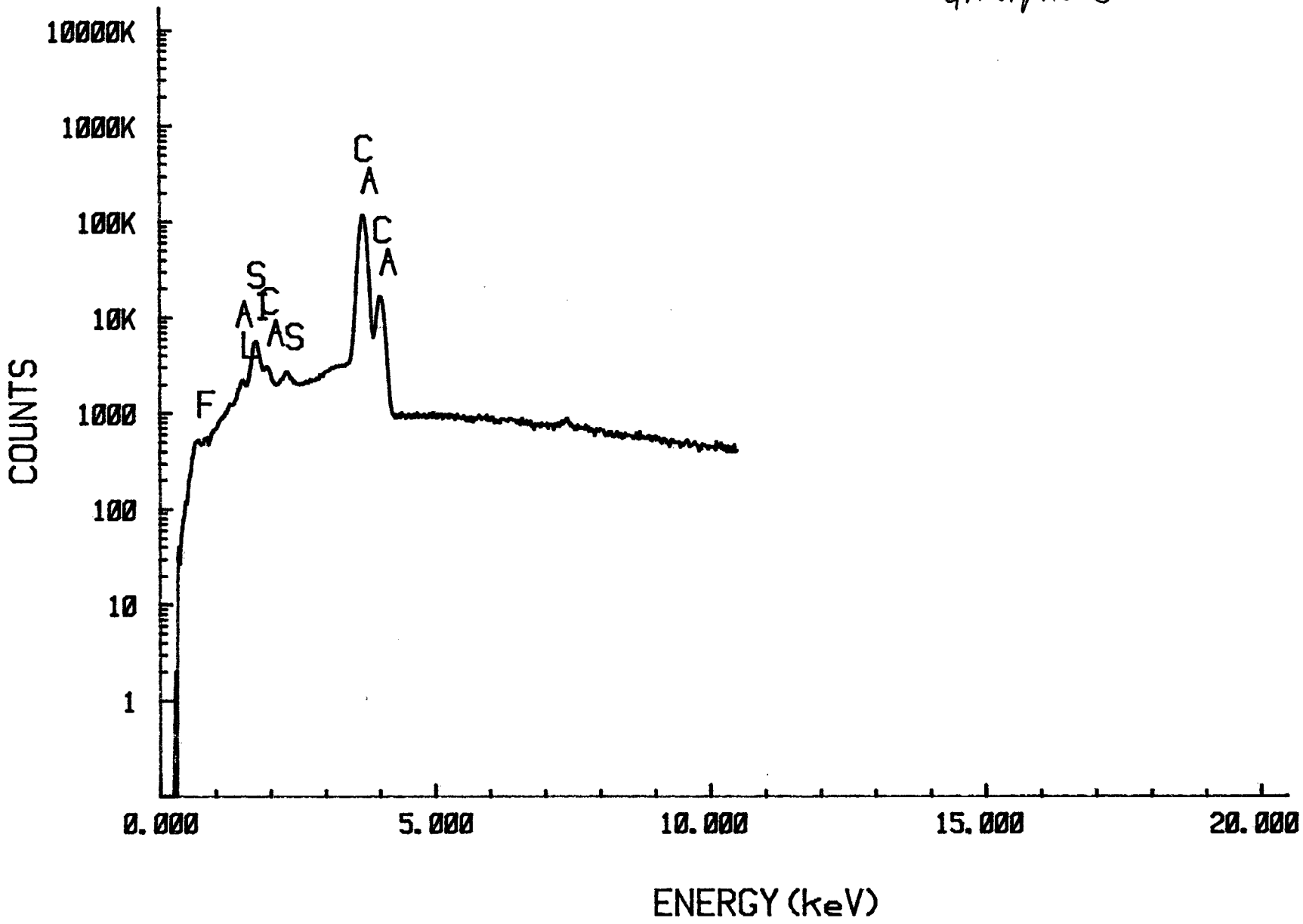


Plot 2

LT= 242 SECS

1960 SLUDGE "B" GENERAL

amorphous



Wacker Siltronic Corporation WACKER

SURFACE ANALYSIS INCOMING MATERIALS FORM

TEST NUMBER: 1960

STR NUMBER (if any):

DATE: 6/29/89

REQUESTED COMPLETION DATE AND TIME:

SUBMITTED BY: Leigh-Ann Cimino (for Rick Gariepy)

EXT:

ADDITIONAL REPORTS TO:

DO YOU WANT THE SAMPLE RETURNED:

~~SUGGE~~STED ANALYTICAL PROCEDURES:

SAMPLE IDENTIFICATION (ORIGIN OF MATERIAL) AND PROBLEM:

A: Clarifier sludge collected from dumpster 6/28
-the operator dug down to try and reach the sludge which came off the drum 6/25

B: Sludge which settled out of clarifier effluent samples collected 6/26

TO : RICK GARIEPY

FROM : JERRY LINDEN JRL

SUBJ : HF ACID LEAK

DATE : 6\27\89

The following is a summary of the events that took place on June 25, Sunday 1989 concerning the high quantity of HF acid sent to the WWTP

At about 0930 the CANT pH dropped from 9.3 to 8.8 and the reset on the controller was raised and that brought the pH back up to 9.4

At 1000 the clarifier water samples were pulled and found to have a pH of 9.6.The water looked clean going over the weirs

For the next five hours there was a gradual trend down in the CANT pH from 9.3 to 8.0 (see stripe chart WWTP)

At 1400 the clarifier pH was 9.3 and the water was still looked clean going over the weirs

At 1400 the operators started looking into a possible acid leak or dump from process as well as a possible problem with the lime delivery system

Operators checked with production found nothing abnormal going on so they started to check out the WWTP

At 1800,lime was being used in large volumes so the off going shift got ready for the on coming shift. At this time the clarifier was starting to show signs of the heavy lime use (white pin floc appeared to be floating in the water)
(NOTE)

From 1500 to 1900 one operator was working on keeping the lime system charged and restocking the lime deck while the other operator was checking on all acid users as well as checking on the other principle equipment for the plant
(RO,s, boilers, chillers, cooling systems, and air system)

At 1915 the clarifier looked a bluish white and had pin floc going over the weir to the river. Flow out of the clarifier was between 40 and 70 gpm. pH was 9.2 with the CAD storage tank at 90% of its capacity

(NOTE)
Night shift continued checking for possible causes. The CAD tank pH was 3.0 to 3.5 which is normal. The clarifier pH was 9.4 the flash mix pH was 9.0 to 9.4 two different pH meters were used to make sure that both meters were the same. Operators then called on the production maintenance tech. to help locate the problem. Security was also contacted to find out what areas were working.

Night operators then went out an checked acid storage, acid etch, quartz cleaning, all of EPI, all the labs, and any other acid user they could think of but there was nothing found to be out of the normal.

Because they could not find an acid leak they went back out to the treatment plant and started to do more checking out there.

At the WWTP the operators found that the CANT tank lime line may not have been working right so they pumped out the tank and found a brown clay that was hard and coated the lower part of the tank as well as blocking off 50% of the lime line. The lime line was cut above the blockage and put back on line.

At 2150 the night operators called me and informed me of what was going on and what they had done up to that time. I told them to keep looking and to do the best they could and to call back if they could not get it under control. At that time the pH was under control but the lime use was high.

At 0200 6\26\89 night operators went into the plant and checked the production areas again

At 0300 the CAD reset on the controller was up to 80 and they had added 2500 lb. lime. A maintenance tech and a maintenance supervisor were contacted and asked to help locate the leak.

At 0430 I was called again and told that the leak had not been found and things were starting to look bad at the WWTP. I then told them I would be right in.

At 0500 the maintenance tech and supervisor found a bad valve on a oxidation lab wet bench. A valve up stream was closed off to stop the flow.

at about 1400 the water going over the weirs to the river started to look cleaner but was not back to normal

The guards take readings on the acid tanks at 0800 every morning. After looking at their logs it showed a loss from the tanks of 33cm which with the help of Rick Gariepy,the HF reduction was found to be 1452 gal. After going back over the strip charts at the WWTP, it looks like the valve started leaking at about 0700 6\25\89 and the leak was stopped at 0500 6\26\89 that works out to be 1.1 gallon per minute which is a small amount to find when it is going down the CAD drain.

The following are the results of the samples that were pulled during the leak.

CAD storage tank fluoride count

date	time	ppm
6\25\89	1925	7250
6\26\89	0030	900
6\26\89	0830	3750
	0930	3000
	1030	2150
	1500	1025
	1700	700
	1920	500

Clarifier fluoride and tss counts

date	time	fluoride ppm	tss ppm
6\25\89	1925	3.9	not done
6\26\89	0030	4.9	1608
	0120	18	66.5
	0430	13	65
	0830	6.7	8676
	0930	6.3	3880
	1030	9.4	8248
	1500	4.8	126
	1700	3.1	7.0

CE fluoride and tss going out to the river

date	time	fluoride ppm	tss ppm
6\26\89	0030	4.7	434
	0830	5.0	1948
	0930	5.0	2212
	1030	5.2	1947
	1500	3.1	60
	1700	3.4	42
	1920	13	23

The average for the fluoride out to the river is 5.62 which is below the permit limit of monthly average 6 ppm and a daily max of 12 ppm

The average for the tss out to the river is 943.61 which is above the permit limit of 15 ppm monthly average and a daily max of 30

cc
John Pittman Murray Tilson
Jerry schaeffer

Wacker Siltronic Corporation

WACKER

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
TLX 4970339
FAX 503-226-0052

July 2, 1987

Mr. George Davis
Field Representative
Northwest Region
Department of Environmental Quality
811 S.W. 6th Ave.
Portland, OR 97204

Dear Mr. Davis,

Spill Incident Report of 6/25/87

As per your telephone conversation with Greg Carr of our company earlier this week, the following will serve as a follow-up report to an incident on 6/25/87.

At approximately 1 am on 6/25/87 an OWW drain line in the south yard plugged up quite suddenly. This caused wastewater to back and run across the gravel yard onto the main roadway crossing the plant site. From there the wastewater drained into a stormwater catch basin and eventually discharged to the Willamette River through our Combined Effluent pipeline.

This wastewater was from the OWW drain system and consisted of mainly a very weak concentration of detergents. The flow was estimated at 3 to 5 gpm and the pH was measured as neutral (pH of 6 to 9). The overflow was finally diverted into the OWW drain system at 10 am that morning. This resulted in a total discharge of approximately 2,000 gallons through the river outfall throughout the duration of the incident.

The repairs were made and the system was again operational later that day. Please call me at 243-2020, extension 301 if you have further questions regarding this incident.

Very Truly Yours,

WACKER SILTRONIC CORPORATION

Murray M. Tilson, P.E.
Environmental Manager

MMT:wk

cc: Harry Schmid
John Pittman
Greg Carr

Murray

Wacker Siltronic Corporation

Wacker Siltronic Corporation
P.O. Box 03180
Portland, OR 97203
7200 N.W. Front Ave.
Portland, OR 97210
Phone (503) 243-2020
TWX 910-464-4777
FAX 503 226-0052

June 30, 1987

Mr. George Davis
Field Representative
Northwest Region
Department of Environmental Quality
811 S.W. 6th Ave.
Portland,OR 97204

Dear Mr. Davis,

Waste Water Treatment Capacity Study

As per Schedule C;, Item No. 1, of our NPDES Waste Discharge Permit (Permit No. 100286) I am submitting the results of our findings after performing a detailed review of our waste water treatment system.

This review consisted of defining our design capacity of all system components, a review of our current and projected loading over a 5 year period and recommendations and time lines necessary to insure that improvements are made in a timely manner to maintain our required treatment efficiency.

Please call me at 243-2020, extension 301 if you have any questions regarding this study.

Very truly yours,

WACKER SILTRONIC CORPORATION

Murray M. Tilson, P.E.
Environmental Manager

MMT:ll

Enclosure (1) Wacker memo titled "WWTP Capacities" dated 6/15/87.

cc: John Pittman (w/att)
Greg Carr (w/att)
Mike Pilkington (w/att)
Larry Patterson, DEQ (w/att)

Wacker Siltronic Corporation WACKER

TO: Murray Tilson

FROM: Greg Carr Greg Carr

SUBJECT: WWTP Capacities

DATE: June 15, 1987

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I Scope

As required in our NPDES permit, schedule C, item 1 I have surveyed the WWTP (Waste Water Treatment Plant) for hydraulic capacities and treatment system limitations. This report summarizes my findings concerning all these systems.

II Weak Acid Drain System (WAD)

The WAD system handles the major hydraulic flow through the plant. PH control is the only treatment of this stream. The pH control system has been upgraded from the original single-stage acid/base neutralization to a two-stage unit. No further modifications to the pH control system are anticipated over the time period of this NPDES permit as the existing controls have sufficient capacity to neutralize the anticipated levels. The system will have to be hydraulicially modified to accommodate the anticipated increase in wastewater flows.

Table 1 WAD Design vs Actual Flows - GPM

	Design	Present Condition	1991 Condition
Avg. Flow	45	200	320
Max. Flow	230	260	420

Table 2 WAD Upgrade Schedule

Date	(Flow)	Action
Early 1988	250 GPM	Increase forwarding pump capacity by increasing pump speed to 3600 RPM
Early 1988	250 GPM	Increase line size and level control valve to 4" between storage tank and Neutralization tank

III Organic Waste Water System (OWW)

This system handles the wastewater streams containing organic materials that contribute to BOD of the effluent. It also contains suspended solids from various operations. Ph control is the only treatment of this system. The pH control system has been upgraded from the original single - stage acid/base neutralization to a two-stage unit. No further modifications to the pH control system are anticipated over the time period of the NPDES permit due to the buffering effect in the existing mix of wastewater. The system will have to be hydraulically modified to accommodate the anticipated increase in flow.

Table 3 OWW Design vs Actual Flows - GPM

	Design	Present Condition	1991 Condition
Avg. Flow	54	80	120
Max. Flow	195	120	170

Table 4 OWW Upgrade Schedule

Date	(Flow)	Action
Mid - 1989	150 GPM	Enlarge existing discharge line from Neutralization tank to meter vault 1 from 4" to 6" to accommodate increased flow.

IV Concentrated Acid Drain (CAD)

The CAD system handles the waste acid and rinse water from acid-using processes. It is especially designed for Hydrofluoric Acid (HF). It treats the water with lime neutralization which also precipitates the fluoride, removing it from the wastewater. The actual physical removal is done in the clarifier, described in Section V.

The system appears to have adequate capacity far increased water flow and acid usage. It has adequately handled spills of acid amounting to ten times the current loading without excessive pH problems. No further modifications to the pH control or hydraulic systems due to increased flows are anticipated during the time period of the existing NPDES permit.

Table 5 CAD Design vs Actual Flows - GPM

	Design	Present Condition	1991 Condition
Avg.	17	30	40
Max.	55	45	56

V Clarifier

The clarifier handles the CAD after it is neutralized, and the Silicon Waste Water (SWW) from the grinding operation. The inorganic flocculent (alum) and pH control systems have been upgraded since original construction and the clarifier performance has been greatly improved. No physical modifications to the system are anticipated during the time period of the existing NPDES permit, but the floccultion agent may have to be changed or increased to produce a denser flocculation. As flows increase, the average upflow rate of the clarifier increase, making it necessary to settle the solids faster. This may occur during peak flow conditions toward the end of the current NPDES permit period. No definite plans can be developed at the present time.

Table 6 Clarifier Design vs Actual Flows - GPM

	Design	Present Condition	1991 Condition
Avg.	88	50	74
Max.	265	100	150

VI Concentrated Caustic Waste (CCW)

The CCW system handles the waste caustic from various etching operations and the nitrous oxide scrubber (NOX) blowdown. In addition it has been modified to handle the waste caustic generated during the ion-exchange resin regeneration of the Deionized Water system. This waste caustic is used to neutralize the WAD and OWW systems when they become acid. At other times it is disposed of by neutralization with sulfuric acid in the OWW system. The system has adequate hydraulic capacity since the major volume load occurs during the regeneration of a particular resin bed. This regeneration load will not increase in volume in the future, although it may occur more frequently i.e. every two weeks instead of three weeks.

	Design	Present Condition	1991 Condition
Ave.	.8	3	3
Max.	50	40	40

VII Silicon Wastewater System (SWW)

The silicon wastewater system (SWW) handles the waste water generated in the grinding operation. Originally the system also handled the wastewater from the slicing operation but this wastestream was diverted to the OWW system to reduce the BOD of the combined effluent to the Willamette River. This system has sufficient hydraulic capacity to handle the anticipated flows through the time period of the current NPDES permit. The system does no pH or chemical control.

Table 8 SWW System Design vs Actual Flow - GPM

	Design	Present Condition	1991 Condition
Ave.	71	50	74 GPM
Max.	210	65	96 GPM

VIII Epitaxial Scrubber Waste (ESW)

The EPI scrubber waste currently is discharge as-is into the WAD system. It is anticipated that this waste stream will greatly increase in flow and chemical demand over the time period of the current NPDES permit. It is apparent that a point-of-generation neutralization system will be necessary to keep the pH of the wastewater in the WAD system above 2.5, which is the lowest practical limit for the WAD system. It is anticipated that this treatment unit will be necessary before June 1988. The design for this treatment system is currently not finalized.

Table 9 Epitaxial Scrubber Waste (ESW)

	Design (1985)	Present Condition	1991 Condition
Flow	16 GPM	30 GPM	100 GPM

Wacker Siltronic Corporation

TO: Murray Tilson

FROM: Greg Carr

SUBJECT: Alternatives to Wastewater BOD Tests

DATE: February 17, 1987

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SUMMARY

As requested by the DEQ in the new NPDES permit, Chemical Oxygen Demand (COD) and Total Oxidizable Carbon (TOC) were evaluated as replacement tests for the normal 5-day Biological Oxygen Demand (BOD) test. It appears there is little correlation between BOD, TOC and COD in the combined effluent stream which is discharged to the Willamette River. These two tests (TOC & COD) are not suitable replacements for the 5-day BOD test.

DETAILS

Combined effluent samples were split three ways, and TOC and COD tests were run on same samples as the normal BOD tests. Samples were split from August 1, 1986 to December 29, 1986 for a total of 20 samples. The BOD's were done on the standard 5-day incubation method, with oxygen measured by Winkler Titration. TOC was measured on the Ionics 5900 TOC monitor, and COD was measured by the in-vial digestion and measurement by a Hach DR3 monitor.

The plots of BOD vs COD (Appendix 1) and BOD vs TOC (Appendix 2) are attached. The data is quite scattered, and show no valid correlations. The COD data from the Hach meter is also of questionable value since the method has an inherent error of 5ppm (3% of full scale). The actual tabular data is attached as well (Appendix 3).

GEC/md

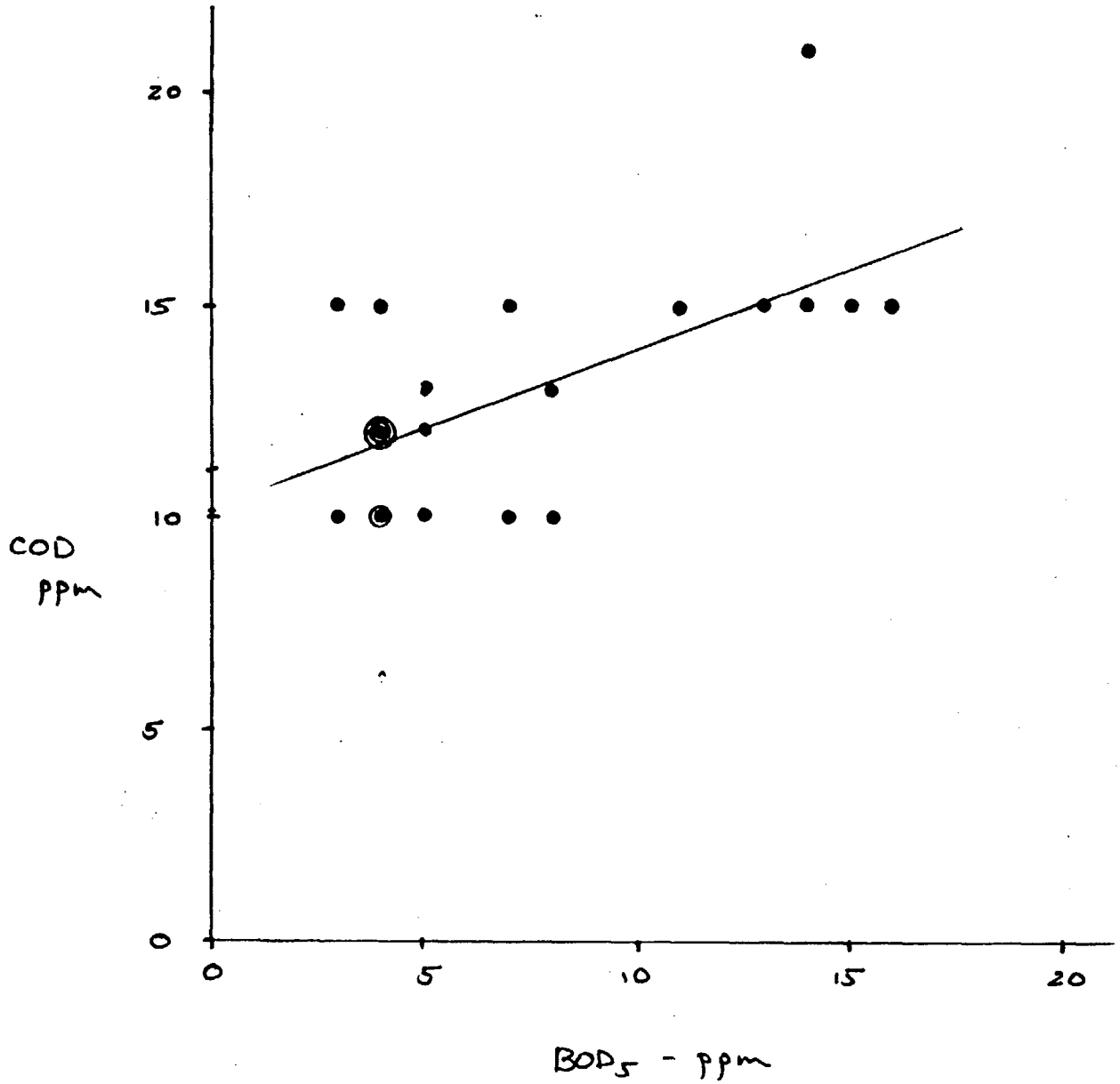
BOD - COD - TOC DATA

DATE	BOD	COD	TOC
8/01/86	4	10	1.25
8/08/86	4	10	1.27
8/15/86	4	15	1.07
8/22/86	3	10	0.96
9/05/86	3	15	1.74
9/12/86	4	12	1.12
9/19/86	5	10	1.64
9/26/86	8	13	1.81
10/03/86	7	10	1.66
10/17/86	7	15	1.26
10/24/86	5	12	1.53
10/31/86	11	15	2.98
11/07/86	8	10	1.94
11/14/86	15	15	2.02
11/21/86	4	12	1.94
11/26/86	14	20	1.72
12/05/86	13	15	2.01
12/12/86	16	15	1.52
12/19/86	4	12	1.78
12/29/86	14	15	1.22

Appendix

BOD VS COD WACKER SILTRONIC COMBINED EFFLUENT
8/1/86 - 12/29/86

slope = .38
intercept = 1.01
r = .63

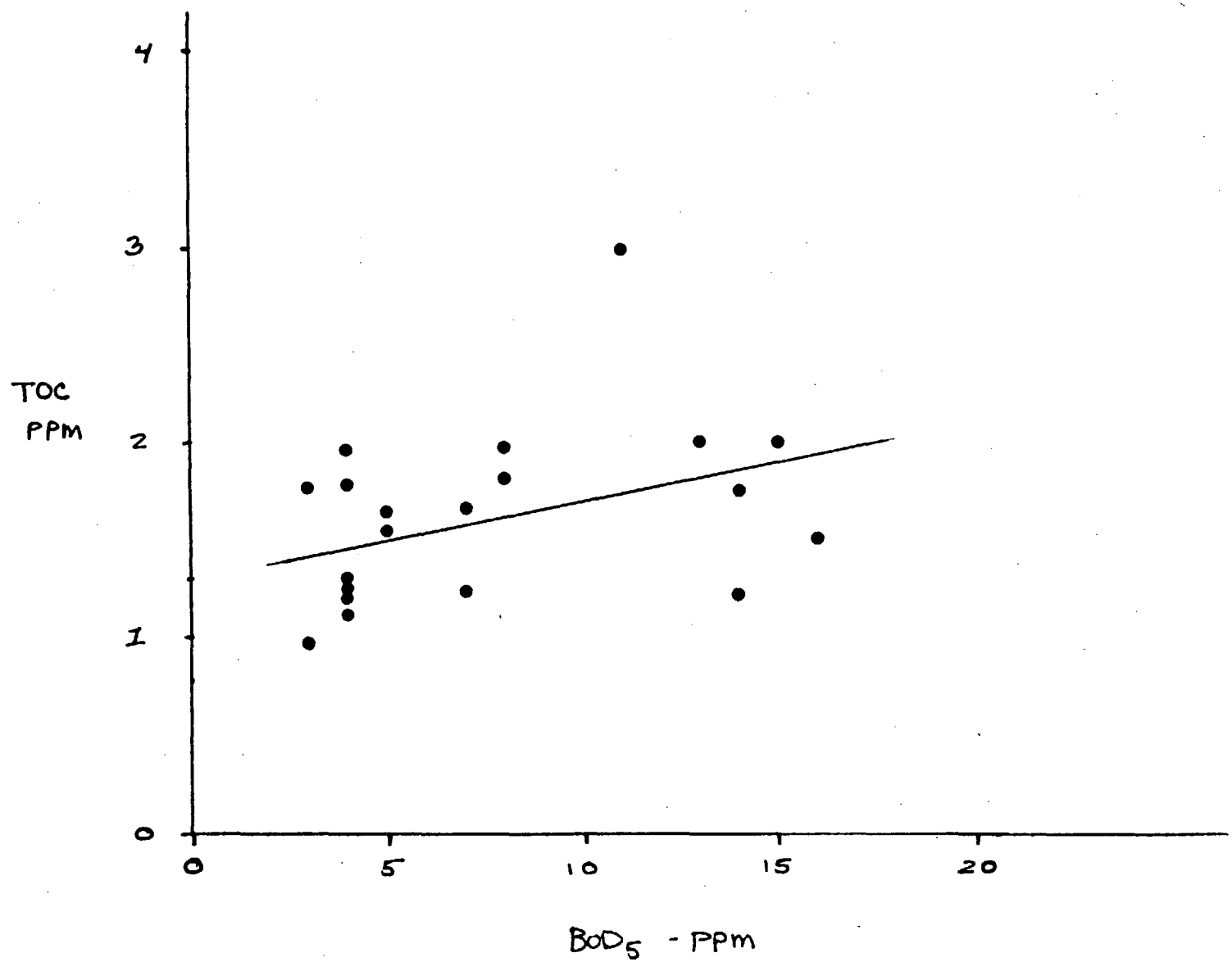


2/5/87
GEC

Appendix 2

BOD Vs TOC WACKER SILTRONIC COMBINED EFFLUENT
8/1/86 - 12/29/86

slope = .0383
intercept = 1.33
corr. = .38



2/5/87
GEC

WACKER SILTRONIC

JIM CLAXTON
ENVIRONMENTAL ENGINEER

Siltronic Corporation
7200 N.W. Front Avenue, M/S 30
Portland, OR 97210-3676, USA
Tel. 1-503-219-7313
Fax 1-503-219-7599
jim.claxton@siltronic.com

FAX

ER026: JW C

2004-April-16

To Elliot Zais

From Jim Claxton

Fax 503-229-6957

4 Page(s) incl. coversheet

Reference Additional Analytical Testing for NPDES Renewal

Hi Elliot

Here the results from Coffey. Call me if you have any questions.

jim

Ausgabe: 2002-04

Report Date: 04/16/2004
Job Number: A40401AZ
PWSID:
PO Number: 4500075102
Project No.: 31
Project Name: Annual 3510-2C

Tom Rothschild
Wacker Siltronic
7200 NW Front Avenue
Portland, OR 97210

Sample Information

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
A40401AZ-1	04-31-CE-C	Water	04/01/2004	0730

Analytical results are on the following page(s).

Sincerely,

Technical Services

The data submitted in this report is for the sole and exclusive use of the above-named client. All samples associated with the work order will be retained a maximum of 15 days from the report date or until the maximum holding time expires. All results pertain only to samples submitted.

Thank you for allowing Coffey Laboratories to be of service to you. If you have questions or need further assistance, please do not hesitate to call our Customer Services Department.

TS/atc

Sample Identification

Lab Sample ID#: A40401AZ-1 04-31-CE-C

Inorganic Chemicals

Contaminant	Analysis	Method	Detection Limit	Analyst
Aluminum	ND mg/L	EPA 200.8	0.1 mg/L	CV
Ammonia Nitrogen	2. mg/L	SM4500NH3BC	1. mg/L	MGH
Antimony	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Arsenic	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Barium	0.001 mg/L	EPA 200.8	0.001 mg/L	CV
Beryllium	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Boron	ND mg/L	EPA 200.8	0.025 mg/L	CV
Bromide	ND mg/L	EPA 300.0B	50. mg/L	BAB
Cadmium	ND mg/L	EPA 200.8	0.001 mg/L	CV
Chloramine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Cobalt	ND mg/L	EPA 200.8	0.0005 mg/L	CV
Copper	0.006 mg/L	EPA 200.8	0.005 mg/L	CV
Iron	ND mg/L	EPA 200.7	0.2 mg/L	MAJ
Lead	ND mg/L	EPA 200.8	0.001 mg/L	CV
Magnesium	2.3 mg/L	EPA 200.7	0.1 mg/L	MAJ
Manganese	0.018 mg/L	EPA 200.8	0.001 mg/L	CV
MBAS (Surfactants)	0.24 mg/L	EPA 425.1	0.05 mg/L	BAB
Mercury	ND mg/L	EPA 245.1	0.0005 mg/L	MAJ
Molybdenum	0.068 mg/L	EPA 200.8	0.005 mg/L	CV
Nickel	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Nitrate	40. mg/L	EPA 300.0	10. mg/L	BAB
Nitrite	2.4 mg/L	EPA 300.0	0.1 mg/L	BAB
Residual Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Selenium	ND mg/L	EPA 200.8	0.025 mg/L	CV
Silver	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Sulfate	21. mg/L	EPA 300.0	0.5 mg/L	BAB
Sulfide	ND mg/L	SM 4500-S2-D	0.02 mg/L	MAJ
Sulfite	ND mg/L	SM 4500-SO3-B	0.4 mg/L	JG

Thallium	ND mg/L	EPA 200.8	0.001 mg/L	CV
Tin	ND mg/L	EPA 200.8	0. mg/L	CV
Titanium	ND mg/L	EPA 200.8	0.01 mg/L	CV
Total Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Total Cyanide	ND mg/L	EPA 335.2	0.01 mg/L	MGH
Total Kjeldahl Nitrogen	1. mg/L	SM 4500-Norg-B	1. mg/L	MGH
Total Oil & Grease	ND mg/L	EPA 1664	3. mg/L	NAC
Total Organic Carbon	6.3 mg/L	EPA 415.1	0.8 mg/L	BAB
Total Phenols	ND mg/L	EPA 420.1	0.1 mg/L	JG
Zinc	ND mg/L	EPA 200.8	0.025 mg/L	CV

ND means none detected at or above the detection limit listed.

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TJR

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PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Wacker Siltronics Corporation	Project:	None	Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165	Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild	Reported:	8/20/97 09:23

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
97-165 Outfall 24-hour composite	P708034-01	Water	8/4/97

This report is not complete without attachment A. Attachment A contains results for Surfactants (EPA 425.1) for sample 97-165. The sample was analyzed by Coffey Laboratories, Inc. 12423 NE Whitaker Way, Portland, OR 97230.

NORTH CREEK ANALYTICAL
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Wacker Siltronics Corporation	Project:	None		Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165		Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild		Reported:	8/20/97 09:23

Total Metals per EPA 6000/7000 Series Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
97-165			**P708034-01**				**Water**	
Aluminum	0870185	8/6/97	8/8/97	EPA 6010A	0.100	**0.260**	mg/l	
Calcium	"	"	"	EPA 6010A	1.00	**94.7**	"	
Iron	"	"	"	EPA 6010A	0.100	ND	"	
Magnesium	"	"	"	EPA 6010A	0.100	**2.47**	"	
Manganese	"	"	"	EPA 6010A	0.0100	**0.0420**	"	
Potassium	"	"	"	EPA 6010A	10.0	**81.3**	"	
Sodium	"	"	"	EPA 6010A	1.00	**23.5**	"	
Antimony	0870243	8/11/97	8/14/97	EPA 6020	0.00100	**0.00100**	"	
Arsenic	"	"	"	EPA 6020	0.00100	ND	"	
Barium	"	"	"	EPA 6020	0.00200	**0.00330**	"	
Beryllium	"	"	"	EPA 6020	0.00100	ND	"	
Cadmium	"	"	"	EPA 6020	0.00100	ND	"	
Chromium	"	"	"	EPA 6020	0.00100	**0.00140**	"	
Cobalt	"	"	"	EPA 6020	0.00200	ND	"	
Copper	"	"	"	EPA 6020	0.00200	**0.0367**	"	
Lead	"	"	"	EPA 6020	0.00100	ND	"	
Nickel	"	"	"	EPA 6020	0.00200	**0.00200**	"	
Selenium	"	"	"	EPA 6020	0.00100	ND	"	
Silver	"	"	8/18/97	EPA 6020	0.00100	ND	"	
Thallium	"	"	8/14/97	EPA 6020	0.00100	ND	"	
Vanadium	"	"	"	EPA 6020	0.00500	ND	"	
Zinc	"	"	"	EPA 6020	0.00500	**0.0549**	"	
Mercury	0870167	8/7/97	8/8/97	EPA 7470A	0.000200	ND	"	

**Refer to end of report for text of notes and definitions.*

Mary A. Fritzmann Smith, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

SCOEPA00029116

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Environmental Laboratory Services

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PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Wacker Siltronics Corporation	Project:	None		Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165		Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild		Reported:	8/20/97 09:23

Conventional Chemistry Parameters per APHA/EPA Methods
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
97-165			**P708034-01**				**Water**	
Oil & Grease	0870232	8/11/97	8/15/97	EPA 1664	5.00	ND	mg/l	1
Total Kjeldahl Nitrogen	0870122	8/7/97	8/12/97	EPA 351.3	0.500	ND	"	
Sulfite	0870098	8/5/97	8/5/97	EPA 377.1	1.00	ND	"	
Total Organic Carbon	0870058	8/4/97	8/4/97	EPA 415.1	3.00	ND	"	
Total Organic Nitrogen	P708034			Calculation		63.6	"	5

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Wacker Siltronics Corporation	Project:	None	Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165	Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild	Reported:	8/20/97 09:23

Anions per EPA Method 300.0
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
97-165			**P708034-01**				**Water**	
Nitrate-Nitrogen	0870054	8/4/97	8/5/97	EPA 300.0	10.0	**63.0**	mg/l	
Nitrite-Nitrogen	"	"	8/4/97	EPA 300.0	0.100	**0.617**	"	

Refer to end of report for text of notes and definitions.

Mary A. Fritzmann Smith, Project Manager

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East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

SCOEPA00029118

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Wacker Siltronics Corporation	Project:	None		Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165		Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild		Reported:	8/20/97 09:23

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0870167	**Date Prepared: 8/7/97**				**Extraction Method: Metals**					
Blank	**0870167-BLK1**									
Mercury	8/8/97			**ND**	mg/l	**0.000200**				
LCS	**0870167-BS1**									
Mercury	8/8/97	0.00500		0.00510	mg/l	80.0-120	102			
Duplicate	**0870167-DUP1**		**P708084-02**							
Mercury	8/8/97		0.000690	0.000540	mg/l			20.0	**24.4**	2
Matrix Spike	**0870167-MS1**		**P708084-02**							
Mercury	8/8/97	0.00500	0.000690	0.00540	mg/l	75.0-125	**94.2**			
Matrix Spike	**0870167-MS2**		**P708125-01**							
Mercury	8/8/97	0.00500	ND	0.00520	mg/l	75.0-125	**104**			
Batch: 0870185	**Date Prepared: 8/6/97**				**Extraction Method: EPA 200/3005**					
Blank	**0870185-BLK1**									
Aluminum	8/8/97			**ND**	mg/l	**0.100**				
Calcium	"			**ND**	"	**0.100**				
Iron	"			**ND**	"	**0.100**				
Magnesium	"			**ND**	"	**0.100**				
Manganese	"			**ND**	"	**0.0100**				
Potassium	"			**ND**	"	**1.00**				
Sodium	"			**ND**	"	**1.00**				
LCS	**0870185-BS1**									
Aluminum	8/8/97	2.00		2.04	mg/l	80.0-120	102			
Calcium	"	10.0		10.1	"	80.0-120	101			
Iron	"	2.00		2.03	"	80.0-120	101			
Magnesium	"	10.0		10.3	"	80.0-120	103			
Manganese	"	0.500		0.482	"	80.0-120	96.4			
Potassium	"	10.0		9.57	"	80.0-120	95.7			
Sodium	"	10.0		9.92	"	80.0-120	99.2			
Duplicate	**0870185-DUP1**		**P708034-01**							
Aluminum	8/8/97		0.260	0.266	mg/l			20.0	**2.28**	
Calcium	"		94.7	95.5	"			20.0	**0.841**	
Iron	"		ND	ND	"			20.0		

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PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Wacker Siltronics Corporation	Project:	None		Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165		Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild		Reported:	8/20/97 09:23

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Duplicate (continued)	**0870185-DUP1**		**P708034-01**							
Magnesium	8/8/97		2.47	2.53	mg/l			20.0	**2.40**	
Manganese	"		0.0420	0.0430	"			20.0	**2.35**	
Potassium	"		81.3	85.1	"			20.0	**4.57**	
Sodium	"		23.5	24.0	"			20.0	**2.11**	
Matrix Spike	**0870185-MS1**		**P708034-01**							
Aluminum	8/8/97	2.00	0.260	2.30	mg/l	75.0-125	**102**			
Calcium	"	10.0	94.7	104	"	75.0-125	**93.0**			
Iron	"	2.00	ND	2.10	"	75.0-125	**105**			
Magnesium	"	10.0	2.47	12.6	"	75.0-125	**101**			
Manganese	"	0.500	0.0420	0.541	"	75.0-125	**99.8**			
Potassium	"	10.0	81.3	93.0	"	75.0-125	**117**			
›dium	"	10.0	23.5	33.9	"	75.0-125	**104**			
Batch: 0870243	**Date Prepared: 8/11/97**				**Extraction Method: EPA 200/3005**					
Blank	**0870243-BLK1**									
Antimony	8/14/97			**ND**	mg/l	**0.00100**				
Arsenic	"			**ND**	"	**0.00100**				
Barium	"			**ND**	"	**0.00200**				
Beryllium	"			**ND**	"	**0.00100**				
Cadmium	"			**ND**	"	**0.00100**				
Chromium	"			**ND**	"	**0.00100**				
Cobalt	"			**ND**	"	**0.00200**				
Copper	"			**ND**	"	**0.00200**				
Lead	"			**ND**	"	**0.00100**				
Nickel	"			**ND**	"	**0.00200**				
Selenium	"			**ND**	"	**0.00100**				
Silver	8/18/97			**ND**	"	**0.00100**				
Thallium	8/14/97			**ND**	"	**0.00100**				
Vanadium	"			**ND**	"	**0.00500**				
Zinc	"			**ND**	"	**0.00500**				
LCS	**0870243-BS1**									
Antimony	8/14/97	0.100		0.0959	mg/l	80.0-120	95.9			
Arsenic	"	0.100		0.0881	"	80.0-120	88.1			
Barium	"	0.100		0.103	"	80.0-120	103			
Beryllium	"	0.100		0.0995	"	80.0-120	99.5			
Cadmium	"	0.100		0.0935	"	80.0-120	93.5			

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Wacker Siltronics Corporation	Project:	None	Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165	Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild	Reported:	8/20/97 09:23

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
LCS (continued)	**0870243-BS1**									
Chromium	8/14/97	0.100		0.108	mg/l	80.0-120	108			
Cobalt	"	0.100		0.105	"	80.0-120	105			
Copper	"	0.100		0.103	"	80.0-120	103			
Lead	"	0.100		0.103	"	80.0-120	103			
Nickel	"	0.100		0.104	"	80.0-120	104			
Selenium	"	0.100		0.0766	"	75.0-115	76.6			
Silver	8/18/97	0.100		0.111	"	80.0-120	111			
Thallium	8/14/97	0.100		ND	"	80.0-120	NR			
Vanadium	"	0.100		0.110	"	80.0-120	110			
Zinc	"	0.100		0.0864	"	80.0-120	86.4			
Duplicate	**0870243-DUP1**		**P708034-01**							
Antimony	8/14/97		0.00100	0.00100	mg/l			20.0	**0**	
Arsenic	"		ND	ND	"			20.0		
Barium	"		0.00330	0.00340	"			20.0	**2.99**	
Beryllium	"		ND	ND	"			20.0		
Cadmium	"		ND	ND	"			20.0		
Chromium	"		0.00140	0.00150	"			20.0	**6.90**	
Cobalt	"		ND	ND	"			20.0		
Copper	"		0.0367	0.0381	"			20.0	**3.74**	
Lead	"		ND	ND	"			20.0		
Nickel	"		0.00200	0.00630	"			20.0	**104**	2
Selenium	"		ND	ND	"			20.0		
Silver	8/18/97		ND	ND	"			20.0		
Thallium	8/14/97		ND	ND	"			20.0		
Vanadium	"		ND	ND	"			20.0		
Zinc	"		0.0549	0.0600	"			20.0	**8.88**	
Matrix Spike	**0870243-MS1**		**P708034-01**							
Antimony	8/14/97	0.100	0.00100	0.0911	mg/l	75.0-125	**90.1**			
Arsenic	"	0.100	ND	0.0925	"	75.0-125	**92.5**			
Barium	"	0.100	0.00330	0.105	"	75.0-125	**102**			
Beryllium	"	0.100	ND	0.0953	"	75.0-125	**95.3**			
Cadmium	"	0.100	ND	0.0943	"	75.0-125	**94.3**			
Chromium	"	0.100	0.00140	0.118	"	75.0-125	**117**			
Cobalt	"	0.100	ND	0.112	"	75.0-125	**112**			
Copper	"	0.100	0.0367	0.144	"	75.0-125	**107**			
Lead	"	0.100	ND	0.0958	"	75.0-125	**95.8**			

North Creek Analytical, Inc.

Refer to end of report for text of notes and definitions.

Mary A. Fritzmann Smith, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
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SCOEPA00029121

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

Wacker Siltronics Corporation	Project:	None	Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165	Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild	Reported:	8/20/97 09:23

Total Metals per EPA 6000/7000 Series Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Matrix Spike (continued)	**0870243-MS1**		**P708034-01**							
Nickel	8/14/97	0.100	0.00200	0.111	mg/l	75.0-125	**109**			
Selenium	"	0.100	ND	0.0766	"	75.0-125	**76.6**			
Silver	8/18/97	0.100	ND	0.110	"	75.0-125	**110**			
Thallium	8/14/97	0.100	ND	ND	"	75.0-125	**NR**			
Vanadium	"	0.100	ND	0.123	"	75.0-125	**123**			
Zinc	"	0.100	0.0549	0.147	"	75.0-125	**92.1**			
Matrix Spike	**0870243-MS2**		**P708073-08**							
Antimony	8/14/97	0.100	ND	0.0932	mg/l	75.0-125	**93.2**			
Arsenic	"	0.100	ND	0.0888	"	75.0-125	**88.8**			
Barium	"	0.100	0.00810	0.110	"	75.0-125	**102**			
Beryllium	"	0.100	ND	0.0905	"	75.0-125	**90.5**			
Cadmium	"	0.100	ND	0.0926	"	75.0-125	**92.6**			
Chromium	"	0.100	0.00110	0.111	"	75.0-125	**110**			
Cobalt	"	0.100	ND	0.104	"	75.0-125	**104**			
Copper	"	0.100	ND	0.104	"	75.0-125	**104**			
Lead	"	0.100	ND	0.0992	"	75.0-125	**99.2**			
Nickel	"	0.100	ND	0.106	"	75.0-125	**106**			
Selenium	"	0.100	ND	0.0746	"	75.0-125	**74.6**			3
Silver	8/18/97	0.100	ND	0.115	"	75.0-125	**115**			
Thallium	8/14/97	0.100	ND	ND	"	75.0-125	**NR**			
Vanadium	"	0.100	0.0110	0.123	"	75.0-125	**112**			
Zinc	"	0.100	0.00640	0.0958	"	75.0-125	**89.4**			

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Wacker Siltronics Corporation	Project:	None		Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165		Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild		Reported:	8/20/97 09:23

Conventional Chemistry Parameters per APHA/EPA Methods/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0870058	**Date Prepared: 8/4/97**				**Extraction Method: Wet Chem**					
Blank	**0870058-BLK1**									
Total Organic Carbon	8/4/97			**ND**	mg/l	**3.00**				
LCS	**0870058-BS1**									
Total Organic Carbon	8/4/97	20.0		22.4	mg/l	85.0-115	112			
Duplicate	**0870058-DUP1**		**P708018-01**							
Total Organic Carbon	8/4/97		ND	ND	mg/l			20.0		
Batch: 0870098	**Date Prepared: 8/5/97**				**Extraction Method: Wet Chem**					
Blank	**0870098-BLK1**									
Sulfite	8/5/97			**ND**	mg/l	**1.00**				
plicate	**0870098-DUP1**		**P708034-01**							
Sulfite	8/5/97		ND	ND	mg/l			20.0		
Batch: 0870122	**Date Prepared: 8/7/97**				**Extraction Method: Wet Chem**					
Blank	**0870122-BLK1**									
Total Kjeldahl Nitrogen	8/12/97			**ND**	mg/l	**0.500**				
LCS	**0870122-BS1**									
Total Kjeldahl Nitrogen	8/12/97	5.00		3.83	mg/l	75.0-125	76.6			
Duplicate	**0870122-DUP1**		**P708046-01**							
Total Kjeldahl Nitrogen	8/12/97		18.0	18.8	mg/l			20.0	**4.35**	
Matrix Spike	**0870122-MS1**		**P708046-01**							
Total Kjeldahl Nitrogen	8/12/97	10.0	18.0	26.9	mg/l	75.0-125	**89.0**			
Batch: 0870232	**Date Prepared: 8/11/97**				**Extraction Method: EPA 1664**					
Blank	**0870232-BLK1**									
Oil & Grease	8/15/97			**ND**	mg/l	**5.00**				1
LCS	**0870232-BS1**									
Oil & Grease	8/15/97	80.0		74.0	mg/l	79.0-114	92.5			1
LCS Dup	**0870232-BSD1**									
Oil & Grease	8/15/97	80.0		74.5	mg/l	79.0-114	93.1	10.0	0.647	1

..orth Creek Analytical, Inc.

**Refer to end of report for text of notes and definitions.*

Mary A. Fritzmann Smith, Project Manager

NORTH CREEK ANALYTICAL
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Wacker Siltronics Corporation	Project:	None	Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165	Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild	Reported:	8/20/97 09:23

Anions per EPA Method 300.0/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0870054	**Date Prepared: 8/4/97**				**Extraction Method: Wet Chem**					
Blank	**0870054-BLK1**									
Nitrate-Nitrogen	8/4/97			**ND**	mg/l	**0.100**				
Nitrite-Nitrogen	"			**ND**	"	**0.100**				
Blank	**0870054-BLK2**									
Nitrate-Nitrogen	8/5/97			**ND**	mg/l	**0.100**				
Nitrite-Nitrogen	"			**ND**	"	**0.100**				
LCS	**0870054-BS1**									
Nitrate-Nitrogen	8/4/97	0.226		0.242	mg/l	85.0-115	107			
Nitrite-Nitrogen	"	0.304		0.319	"	85.0-115	105			
LCS	**0870054-BS2**									
Nitrate-Nitrogen	8/5/97	0.226		0.247	mg/l	85.0-115	109			
Nitrite-Nitrogen	"	0.304		0.325	"	85.0-115	107			
Duplicate	**0870054-DUP1**		**P708034-01**							
Nitrate-Nitrogen	8/5/97		63.0	63.0	mg/l			20.0	**0**	
Nitrite-Nitrogen	8/4/97		0.617	0.453	"			20.0	**30.7**	2
Matrix Spike	**0870054-MS1**		**P708034-01**							
Nitrate-Nitrogen	8/5/97	2.00	63.0	57.7	mg/l	75.0-125	**NR**			4
Nitrite-Nitrogen	8/4/97	2.00	0.617	2.20	"	75.0-125	**79.2**			
Matrix Spike Dup	**0870054-MSD1**		**P708034-01**							
Nitrate-Nitrogen	8/5/97	2.00	63.0	56.8	mg/l	75.0-125	**NR**	40.0		4
Nitrite-Nitrogen	8/4/97	2.00	0.617	2.12	"	75.0-125	**75.1**	40.0	**5.31**	

**Refer to end of report for text of notes and definitions.*

Mary A. Fritzmann Smith, Project Manager

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
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SCOEPA00029124

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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Wacker Siltronics Corporation	Project:	None	Sampled:	8/4/97
7200 N.W. Front	Project Number:	97-165	Received:	8/4/97
Portland, OR 97210	Project Manager:	Thomas Rothschild	Reported:	8/20/97 09:23

Notes and Definitions

#	Note
1	Since total Oil and Grease was ND, sample was not analyzed for nonpolar hydrocarbons.
2	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
3	The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.
4	The recovery of this spike is outside control limits due to sample dilution required from high analyte concentration and/or matrix interferences.
5	Total Organic Nitrogen is the sum of Total Kjeldahl Nitrogen, Nitrate-Nitrogen and Nitrite-Nitrogen.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
.	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference

ATTACHMENT A

Report Date: August 12, 1997
Job Number: 970804CE
PO Number: None Provided
Project No: P708034
Project Name: None Provided

Mary A. Fritzmann Smith
North Creek Analytical
9405 SW Nimbus Ave.
Beaverton, OR 97008

Analytical Narrative

The sample was received on 08/04/97 by Coffey Laboratories, Inc. (CLI) Sample Reception personnel under strict chain of custody protocol. The following information was provided at the time of sample reception:

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
970804CE-1	P708034-01 **97-165**	Liquid	08/04/97	NP

The recommended holding time for each batch of analyses was in accordance with the data quality objectives as specified in the CLI Quality Assurance Plan unless otherwise noted.

Acceptable precision and accuracy were achieved for all analyses associated with this work order as demonstrated by the recoveries of the quality control samples analyzed concurrently with each batch.

The data submitted in this report is for the sole and exclusive use of the above-named client. All samples associated with the work order will be retained a maximum of 15 days from the report date or until the maximum holding time expires. All results pertain only to samples submitted.

Thank you for allowing Coffey Laboratories to be of service to you. If you have questions or need further assistance, please do not hesitate to call our Customer Services Department.

Sincerely,

Technical Services

TS /atc

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

Analytical Data

North Creek Analytical

Job Number: 970804CE
Page Number: 2 of 2

Lab Sample ID: 970804CE-1
Field ID: P708034-01 **97-165**
Date/Time: 08/04/97
Matrix: Liquid

EPA Category: Conventional Parameters

Parameter	Method	Detection Limit	Analytical Result	Units
MBAS (Surfactants)	EPA 425.1	0.01	0.03	mg/L

Coffey Laboratories, Inc.
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1.1c

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

CHAIN OF CUSTODY REPORT

Work Order # P708034

REPORT TO: Wacker Siltronic
ATTENTION: Tom Rothschild
ADDRESS: 7200 N.W Front Ave
Portland Oregon 97210
PHONE: 218-7374 FAX: ~~44~~ 412-4144
PROJECT NAME: Bioassay-97
PROJECT NUMBER: 97-164
SAMPLED BY: Tom Rothschild

INVOICE TO: Wacker Siltronic
ATTENTION: Accts. Payable
ADDRESS: same
P.O. NUMBER: 405748 NCA QUOTE #:

TURNAROUND REQUEST in Business Days *
Organic & Inorganic Analyses: [X] Standard | 7 | 5 | 4 | 3 | 2 | 1 | Same Day
Fuels & Hydrocarbon Analyses: [5] Standard | 3-4 | 2 | 1 | Same Day
OTHER Specify:
* Turnaround Requests less than standard may incur Rush Charges.

	CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NCA SAMPLE ID (Laboratory Use Only)	Bioassay (1)	metals(2)	TOC	Oil/Grease	Surfactants	Total Organic Nitrogen	Sulfate	Nitrate-N	MATRIX (W, S, A, O)	# OF CONTAINERS	COMMENTS
1.	97-164	~~08AM~~ 04 Aug 97/0840		X								W	2	
2.	97-165	0840 4 Aug 97			X	X	X	X	X	X	X	W	6	
3.														
4.														
5.														
6.														
7.														
8.														
9.														
10.														

Analysis Request: EPA 1601 - Pass Fail T.R. 4/97

RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	DATE
Thomas J. Rothschild	04 Aug 97	[signature]	8-4-97
PRINT NAME: Thomas J. Rothschild FIRM: Wacker	TIME: 1030	PRINT NAME: Gary Spangler FIRM: NCA	TIME: 1030
[signature]	8-4-97	Sara McClurg	8-4-97
PRINT NAME: Gary Spangler FIRM: NCA	TIME: 1110	PRINT NAME: Sara McClurg FIRM: NCA	TIME: 1110

ADDITIONAL REMARKS (1) Dual End Point - Acute and Chronic EPA 1600/4-89/001 and EPA 600/4.90/027
(2) Target Analyte List (23 analytes) EPA 6010A/7000 Series

PAGE 1 OF 1

CCC Rev 8, 1/96

SCOEPA00029128

LOG SHEET

SAMPLES SENT TO OUTSIDE LABORATORY

1. Facilities Operations # (Year - #): 97-165

2. Date/Time of Sample: 4 Aug 97 / 0840

3. Name of Sampler: Thomas J. Rothschild

4. Sample Description: Outfall, 24-hour composite

5. Sent To: ✓ North Creek Analytical
(formerly Pacific Environmental Laboratory, Inc.)
9405 SW Nimbus Avenue
Beaverton, Oregon 97005
643-9200

___ Wacker's Analytical Laboratory

___ Columbia Analytical Services, Incorporated
1152 3rd Avenue
Longview, Washington 98632
(206) 577-7222

___ _____

6. Analyses Required: metals, TOC, Oil/Grease, Surfactants
Total Organic Nitrogen, Sulfite, Nitrate

7. Chain of Custody Submitted; (Yes) No

8. Purchase Order Number: 405748

9. Cost (or estimate): _____

10. Results Received On: FAX: 20 Aug 97 Final: 25 Aug 97

11. Additional Notes; _____

TJR 15 Nov 91
TJR 24 Jan 97 Revised

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

July 31, 1991

Wacker Siltronic Corp.
P.O. Box 83180
Portland, OR 97283-0180

Attn: Kent Mayer

Re: P.O. #33634
PROJECT - NPDES Renewal
PEL #91-2160

Enclosed is the lab report for your sample which was received on July 12, 1991.

I. Sample Description

One Water Sample

The sample was received under a chain of custody.

The sample was received in a container consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Lab Manager

Howard Boorse
QA/QC Manager

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: pH per EPA 9040
Results in standard units

Sample I.D.	pH
Combined Effluent	7.2
Range	0-14

METHOD: Total Suspended Solids per Standard Methods 2540 D
Results in mg/L (ppm)

Sample I.D.	TSS
Combined Effluent	20
Detection Limit	2

METHOD: Biochemical Oxygen Demand per Standard Methods 5210
Results in mg/L (ppm)

Sample I.D.	BOD
Combined Effluent	13
Lab Blank	ND
Detection Limit	10

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: Chemical Oxygen Demand per EPA 410
Results in mg/L (ppm)

Sample I.D.	COD
Combined Effluent	28
Lab Blank	ND
Detection Limit	5

METHOD: Fluoride per Standard Methods 4110
Results in mg/L (ppm)

Sample I.D.	Fluoride
Combined Effluent	1.3
Lab Blank	ND
Detection Limit	0.1

METHOD: Ammonia-Nitrogen per Standard Methods 4500-NH_3-F
Results in mg/L (ppm)

Sample I.D.	Ammonia-N
Combined Effluent	6.6
Lab Blank	ND
Detection Limit	0.1

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: Total Cyanide per Standard Methods 4500 CN B, 4110
Results in mg/L (ppm)

Sample I.D.	Cyanide
Combined Effluent	ND
Lab Blank	ND
Detection Limit	0.1

METHOD: Total Metals per EPA 3005, 6010, 7000 series
Results in mg/L (ppm)

Compound	Combined Effluent	Lab Blank	Detection Limit
Aluminum	2.7	ND	0.05
Antimony	ND	ND	0.5
Arsenic	0.010	ND	0.002
Beryllium	ND	ND	0.01
Cadmium	ND	ND	0.01
Chromium	ND	ND	0.01
Copper	ND	ND	0.02
Lead	ND	ND	0.1
Mercury	ND	ND	0.002
Nickel	ND	ND	0.05
Selenium	ND	ND	0.01
Silver	ND	ND	0.01
Thallium	ND	ND	0.5
Zinc	0.02	ND	0.01

METHOD: Methylene Blue Active Substances
per EPA 425.1 (Surfactants)

Sample I.D.	MBAS
Combined Effluent	ND
Lab Blank	ND
Detection Limit	0.04

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: Total Organic Carbon per EPA 415.1
Results in mg/L (ppm)

Sample I.D.	TOC
Combined Effluent	3.4
Lab Blank	ND
Detection Limit	0.5

METHOD: Total Phenols per Standard Methods 5530 B, D
Results in mg/L (ppm)

Sample I.D.	Total Phenols
Combined Effluent	ND
Lab Blank	ND
Detection Limit	10

METHOD: Oil and Grease per EPA 413.2
Results in mg/L (ppm)

Sample I.D.	Oil & Grease
Combined Effluent	2.3
Lab Blank	ND
Detection Limit	0.5

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: Organochlorine Pesticides and PCB's per EPA 8080/608
Results in mg/kg (ppm)

Compound	Combined Effluent	Lab Blank	Water Detection Limit
Aldrin	ND	ND	0.10
alpha-BHC	ND	ND	0.10
beta-BHC	ND	ND	0.10
delta-BHC	ND	ND	0.10
gamma-BHC (Lindane)	ND	ND	0.10
Chlordane	ND	ND	0.20
4-4'-DDD	ND	ND	0.20
4-4'-DDE	ND	ND	0.10
4-4'-DDT	ND	ND	0.20
Dieldrin	ND	ND	0.10
Endosulfan	ND	ND	0.20
Endosulfan II	ND	ND	0.10
Endosulfan Sulfate	ND	ND	1.0
Endrin	ND	ND	0.10
Endrin Aldehyde	ND	ND	0.20
Heptachlor	ND	ND	0.10
Heptachlor Epoxide	ND	ND	1.0
Methoxychlor	ND	ND	2.0
Toxaphene	ND	ND	2.5
PCB 1016	ND	ND	0.10
PCB 1221	ND	ND	0.10
PCB 1232	ND	ND	0.10
PCB 1242	ND	ND	0.10
PCB 1248	ND	ND	0.10
PCB 1254	ND	ND	0.10
PCB 1260	ND	ND	0.10

8080/608 Surrogate Recovery (%)

Sample I.D.	2,4,5,6-Tetrachloro-m-xylene
Combined Effluent	78

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: Volatiles per EPA 8240
Results in ug/L (ppb)

Compound	Combined Effluent	Lab Blank	Detection Limit
Acetone	ND	ND	50
Acrolein	ND	ND	100
Acrylonitrile	ND	ND	50
Benzene	ND	ND	2.0
Bromodichloromethane	ND	ND	2.0
Bromoform	ND	ND	2.0
Bromomethane	ND	ND	10
2-Butanone	ND	ND	100
Carbon disulfide	ND	ND	2.0
Carbon tetrachloride	ND	ND	2.0
Chlorobenzene	ND	ND	2.0
Chlorodibromomethane	ND	ND	2.0
Chloroethane	ND	ND	10
Chloroform	ND	ND	2.0
Chloromethane	ND	ND	10
Dibromomethane	ND	ND	2.0
Dichlorobenzenes	ND	ND	2.0
Dichlorodifluoromethane	ND	ND	2.0
1,1-Dichloroethane	ND	ND	2.0
1,2-Dichloroethane	ND	ND	2.0
1,1-Dichloroethene	ND	ND	2.0
cis-1,2-Dichloroethene	ND	ND	2.0
trans-1,2-Dichloroethene	ND	ND	2.0
1,2-Dichloropropane	ND	ND	2.0
cis-1,3-Dichloropropene	ND	ND	2.0
trans-1,3-Dichloropropene	ND	ND	2.0
Ethylbenzene	ND	ND	2.0
2-Hexanone	ND	ND	2.0
Methylene chloride	ND	ND	2.0
4-Methyl-2-pentanone	ND	ND	2.0
Styrene	ND	ND	2.0
1,1,2,2-Tetrachloroethane	ND	ND	2.0
Tetrachloroethene	ND	ND	2.0
Toluene	ND	ND	2.0
1,1,1-Trichloroethane	ND	ND	2.0
1,1,2-Trichloroethane	ND	ND	2.0
Trichloroethene	ND	ND	2.0
Trichlorofluoromethane	ND	ND	2.0
1,2,3,-Trichloropropane	ND	ND	2.0
Vinyl acetate	ND	ND	10
Vinyl chloride	ND	ND	10
Xylene	ND	ND	2.0
2-Chloroethylvinyl ether	ND	ND	2.0

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

8240 Surrogate Recoveries (%)

Sample I.D.	1,2-Dichloro-ethane-d4	Toluene-d8	4-Bromofluoro-benzene
Combined Effluent	95	98	92
EPA Limits	76-114	88-110	86-115

METHOD: NPDES Testing per EPA 8270
Results in ug/L (ppb)

Compound	Combined Effluent	Lab Blank	Detection Limit
Acenaphthene	ND	ND	25
Acenaphthylene	ND	ND	25
Anthracene	ND	ND	25
Benzidine	ND	ND	50
Benzo(a)anthracene	ND	ND	25
Benzo(a)pyrene	ND	ND	25
3,4-Benzofluoranthene	ND	ND	25
Benzo(g,h,i)perylene	ND	ND	25
Benzo(k)fluoranthene	ND	ND	25
bis(2-Chloroethoxy) methane	ND	ND	25
bis(2-Chloroethyl) ether	ND	ND	25
bis(2-Chloroisopropyl) ether	ND	ND	50
bis(2-ethylhexyl)phthalate	ND	ND	25
4-Bromophenyl phenyl ether	ND	ND	25
Butylbenzyl phthalate	ND	ND	25
2-Chloronaphthalene	ND	ND	25
4-Chlorophenylphenyl ether	ND	ND	25
Chrysene	ND	ND	25
Dibenz(a,h)anthracene	ND	ND	25
1,2-Dichlorobenzene	ND	ND	25
1,3-Dichlorobenzene	ND	ND	25
1,4-Dichlorobenzene	ND	ND	25
3,3'-Dichlorobenzidine	ND	ND	50
Diethylphthalate	ND	ND	25
Dimethylphthalate	ND	ND	25
Di-n-butylphthalate	ND	ND	25
2,4-Dinitrotoluene	ND	ND	25
2,6-Dinitrotoluene	ND	ND	25
Di-n-octylphthalate	ND	ND	25
1,2-Diphenylhydrazine	ND	ND	50

PACIFIC ENVIRONMENTAL LABORATORY INC.

PEL REPORT NUMBER: 91-2160
CLIENT: Wacker Siltronic Corp.
P.O. NUMBER: 33634
PROJECT: NPDES Renewal
DATE: July 31, 1991
ITEM: One Water Sample

METHOD: NPDES Testing per EPA 8270
Results in ug/L (ppb)

Compound	Combined Effluent	Lab Blank	Detection Limit
Fluoranthene	ND	ND	25
Fluorene	ND	ND	25
Hexachlorobenzene	ND	ND	25
Hexachlorobutadiene	ND	ND	50
Hexachlorocyclopentadiene	ND	ND	50
Hexachloroethane	ND	ND	50
Indeno(1,2,3-cd)pyrene	ND	ND	25
Isophorone	ND	ND	25
Naphthalene	ND	ND	25
Nitrobenzene	ND	ND	25
N-Nitrosodimethylamine	ND	ND	25
N-Nitrosodi-n-propylamine	ND	ND	50
N-Nitrosodiphenylamine	ND	ND	25
Phenanthrene	ND	ND	25
Pyrene	ND	ND	25
1,2,4-Trichlorobenzene	ND	ND	25
2-Chlorophenol	ND	ND	25
2,4-Dichlorophenol	ND	ND	25
2,4-Dimethylphenol	ND	ND	25
4,6-Dinitro-o-cresol	ND	ND	50
2,4-Dinitrophenol	ND	ND	50
2-Nitrophenol	ND	ND	25
4-Nitrophenol	ND	ND	50
p-Chloro-m-cresol	ND	ND	25
Pentachlorophenol	ND	ND	50
Phenol	ND	ND	25
2,4,6-Trichlorophenol	ND	ND	25

8270 Surrogate Recoveries (%)

Compound	Combined Effluent	Lab Blank	Detection Limits
Phenol-d6	21	31	10-94
2-Fluorophenol	46	55	21-100
2,4,6,-Tribromophenol	56	78	10-123
Nitrobenzene-d5	59	73	35-114
2-Fluorobiphenyl	90	72	43-116
Terphenyl-d14	88	92	10-123

Wacker Siltronic Corporation

WACKER

TO: John Pittman

FROM: Tom McCue

SUBJECT: Phosphate Treatment Test

DATE: December 15, 1993

We set up a test of the CAD system to determine if the present system could handle individual phosphoric acid dumps and keep within the POTW discharge permit. The test was one half scale or 15 gallons of phosphoric acid.

The test results are graphed for better clarity. The first graph indicates we were at the permit limit for fluoride and stayed there for a period of an hour and a half. The second graph shows a more disturbing problem with the inability to control solids carry over from the lamella to the sand filters. The NTU readings are an indication of the amount of solids carry over from the lamellas. NTUs can not be equated directly with mg/l however it has been our experience that there is a relationship of 2 NTU/mg TSS. The graph indicates we would dramatically increase the amount of solids sent to the sand filters.

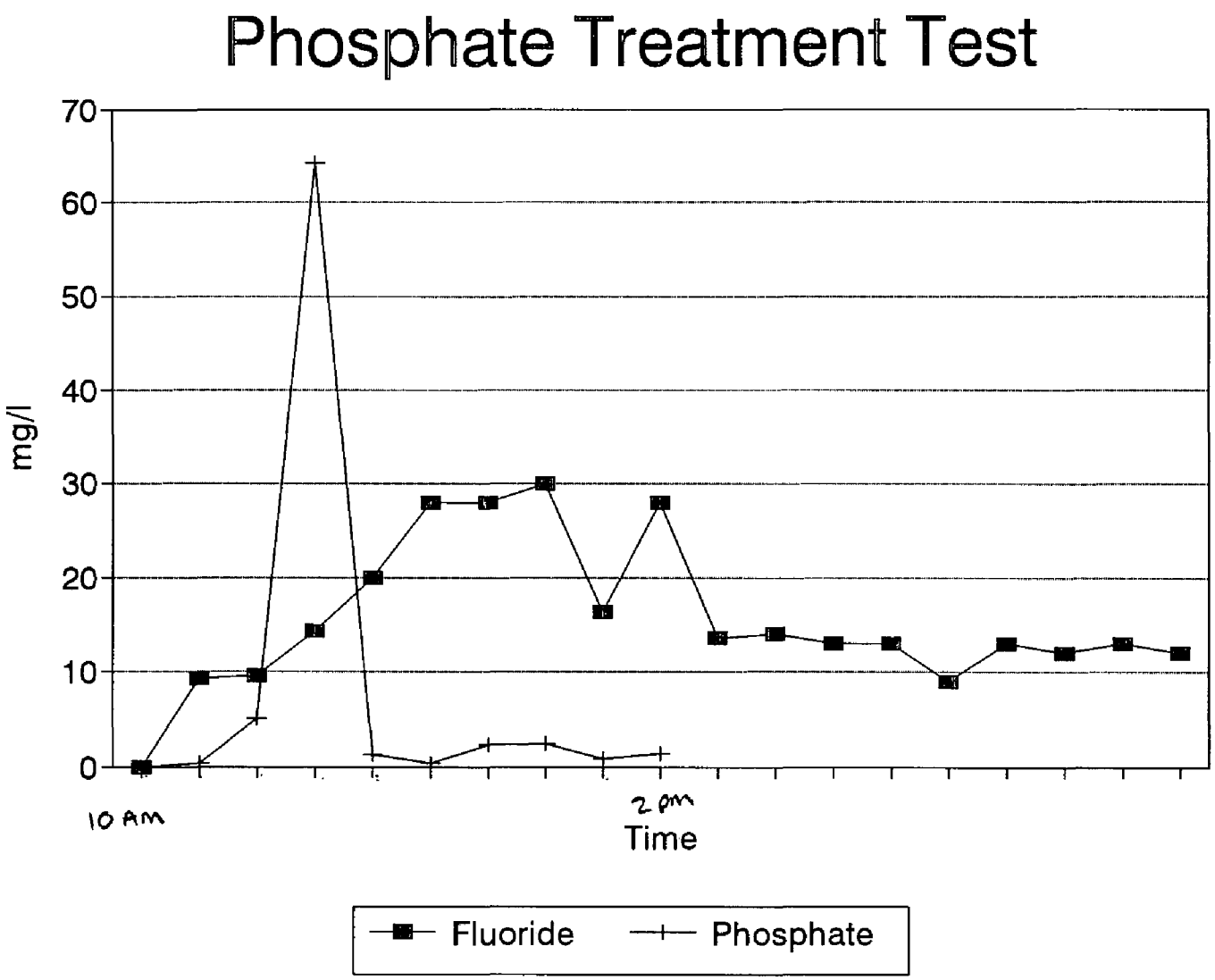
These results are as predicted except that laboratory scale tests indicated we could control solids carry over with good polymer controls. We failed. We are setting up additional laboratory tests today and thursday based on what we have learned thus far. If we are unsuccessful in maintaining compliance with city permits and control solids without blinding the sand filters we will not be able to start up the Laminar Flow Etch project in March as scheduled.

Additional testing both in the laboratory and at the treatment plant are necessary to gather data necessary for engineering decisions. I will need to keep the temporary chemist through 12/23 to complete this work.

12/14/93

15 GAL H_3PO_4

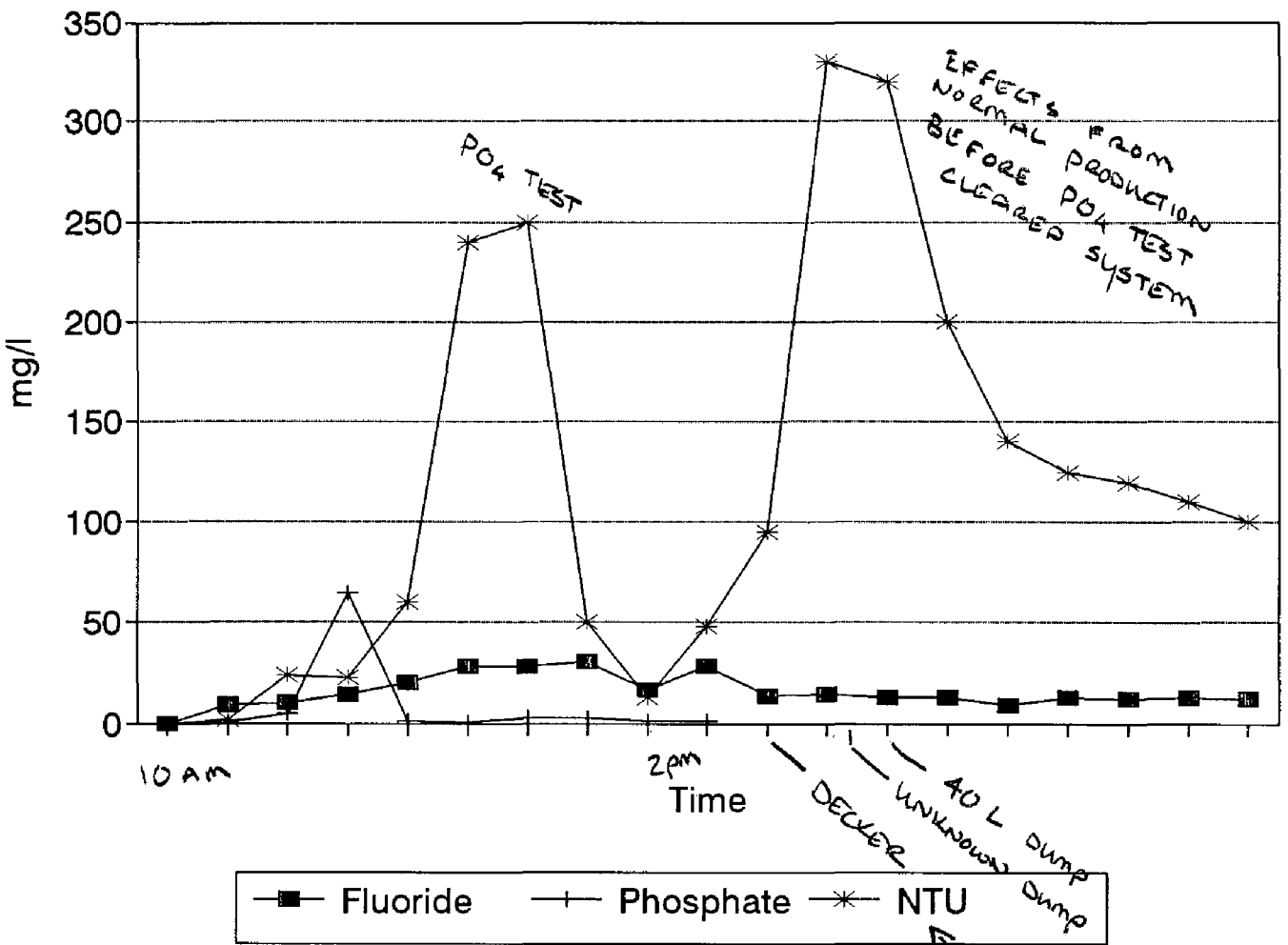
½ EXPECTED LOAD



12/14/93

15 GAL H_3PO_4

Phosphate Treatment Test



approx. 2x mg/L.

DIFICULTY EXPERIENCED WITH SOLIDS CARRY OVER FROM LAMELLA TO SAND FILTERS.

START 10:00

LAMELLA=+
SANDFILTER=* SAMPLES TAKEN EVERY 30 MINUTES START TIME

	NTU	FLUORIDE	pH	LIME USE	ALUM	POLYMER	ORTHO	PHO4 TOTAL	FLOW	React. TK pH
1015 +	2.0	9.2	9.8	81	6	.10	0.46	0.33	60	9.8
*	.52	4.0	8.8	81	15		0.43	0.44	60	
1045 +	24	9.6	7.1	69	4.4	*	5.65 **	4.96	65	7.1
*	20	4.8	8.8	69	10		0.33	0.36	65	
1115 +	22	14.4	6.8	68	Ø		54.0	64.3	62	8.3
*	1.5	4.2	8.7	68	12	*	1.9	1.08	62	8.3
1145 +	60	20	7.2	67	Ø	*	1.67	1.2	57	10.1
*	1.2	5	8.5	67	8.9	*	2.42	1.5	57	10.1
1215 +	240	28	9.3	65	Ø	*	1.0	0.34	61	10.2
*	1.5	5.4	7.5	65	Ø		2.05	3.2	61	10.2
1245 +	250	28	8.3	64	Ø		0.78	2.26	60	10.05
*	8.0	8.0	7.1	64	Ø		1.54	2.16	60	10.05
1315 +	50	30	7.8	63	Ø		0.65	2.4	49	10.0
*	23	12	8.5	63	Ø		1.46	1.33	49	10.0
1345 +	13	16.4	9.2	62	0		0.73	0.82	46	10
*	22	12.8	9.0	62	0		1.25	1.31	46	10
1415 +	48	28	9.5	90 *	0		0.59	1.38	48	10
*	37	32	9.2	90	0		1.09	1.04	48	10

OPERATORS WILL DO TESTING ON THE pH, FLUORIDES, NTU, LIME USE, ALUM, POLYMER AND FLOW.

CHEMIST WILL DO TESTING ON THE ORTHO PHOSPHATES, AND TOTAL PHOSPHATES.

THE FLOW FROM THE SANDFILTERS WILL GO TO THE OWW STARTING 30 MINUTES AFTER THE ACID HAS BEEN DUMPED. DURING THE TESTING IF THE FLUORIDES GO ABOVE 25 PPM THEN FLOW FROM THE SANDFILTERS WILL BE DIVERTED UNTIL THEY GET BELOW 20 PPM.

* TANK FILLED

** T-PO4 - turbid after machine ground on turbid sample chemical's added. sample went clear.

LAMELLA=+
SANDFILTER=* SAMPLES TAKEN EVERY 30 MINUTES START TIME

	NTU	FLUORIDE	pH	LIME USE	ALUM	POLYMER	ORTHO	PHO4 TOTAL	FLOW	CAD. REACT. OH
530 +	95	13.6	8.6	95	Ø	10.0%			66	10
*	31	14.4	8.8	95	Ø	"			66	10
600 +	330	14	9.5	91	Ø	"			64	10
*	20	14	9.4	91	Ø	"			64	10
630 +	320	13	7.7	89	Ø	"			62	9.9
*	25	12.6	9.5	89	Ø	"			62	9.9
1930 +	200	13	9.3	85	0	"			40/140	10.06
*	72	11	9.0	85	0	"			40/140	10.06
2130 +	140	9	9.4	82	0	"			44/144	10.0
2130 *	170	10	9.3	82	0	"			44/144	10.0
2230 +	125	13	9.4	81	8	"			48/162	9.9
2230 *	150	13	9.4	81	0	"			48/162	9.9
2300 +	120	12	9.4	80	0	"			50/164	10.0
2300 *	140	13	9.5	80	10	"			50/164	10.0
2330 +	110	13	9.5	80	0	"			52/167	10.0
2330 *	125	13	9.5	80	12.5	"			52/167	10.0
2430	100	12	9.4	80	5.0	"			50/164	10.0
2430	100	10	9.4	80	16.5	"			50/164	10.0
						"				

OPERATORS WILL DO TESTING ON THE pH, FLUORIDES, NTU, LIME USE, ALUM, POLYMER AND FLOW.

CHEMIST WILL DO TESTING ON THE ORTHO PHOSPHATES, AND TOTAL PHOSPHATES.

THE FLOW FROM THE SANDFILTERS WILL GO TO THE OWW STARTING 30 MINUTES AFTER THE ACID HAS BEEN DUMPED. DURING THE TESTING IF THE FLUORIDES GO ABOVE 25 PPM THEN FLOW FROM THE SANDFILTERS WILL BE DIVERTED UNTIL THEY GET BELOW 20 PPM.

NOTE : J-PRESS PUT ON LINE AT 1745

" : DECKER DUMP AT APRX 1500

" : UNKNOWN DUMP AT " 1540

" : 40 L DUMP AT " 1630

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Laboratory Split Comparison

Sampling event

DEQ Case Number: 2003-1257

Source Name: Siltronic Corporation
Contact Person: Thomas J. Rothschild
Address: 7200 NW Front Ave., Portland, Oregon 97210
Collected By: Dianne Irish

Sample Date: 29 October 2003
Phone: 503-243-2020

Region/Division:

Analysis ♠	FIELD MEASUREMENTS♣			SOURCE SAMPLE RESULTS					DEQ LAB RESULTS				
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up
BOD(1)				6 mg/L				29 Oct 2003 ~1300					
TSS				2.1 mg/L				29 Oct 2003 ~1000					
F^-				7.4 mg/L				29 Oct 2003 ~1000					
Total $PO_4^{\equiv}$				0.2 mg/L				29 Oct 2003 ~1000					
Cr^{Total}(1)				<0.01 mg/L				29 Oct 2003 ~1300					

Sample	Sample point description ♠ (ie. Effluent comp.).	Container number	
		SOURCE	DEQ ♠
A		Combined Effluent	
B			
C			
D			

Fill in your split sample results and mail to:

DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201
Attn: QA Chemist

Post-it® Fax Note 7671	Date 2/18/04	# of pages ▶ 1
To Elliot Zais	From Myron Burr	
Co./Dept.	Co.	
Phone #	Phone # 503-219-7832	
Fax # 503-229-6957	Fax #	

Shaded area for DEQ use.
♣DEQ sampler enter your field measurements, if taken; indicate whether they are estimates.
♠DEQ sampler is responsible for completing this column.

Need assistance with this form? Contact the QA chemist at (503) 229-5983.

(1) Coffey Laboratories, Inc.

02/18/2004 14:57 FAX 503 219 7599 SILTRONIC FAB1 UPSTAIRS 001

*** TX REPORT ***

TRANSMISSION OK

TX/RX NO	1443
CONNECTION TEL	95032296957
CONNECTION ID	
ST. TIME	02/18 14:56
USAGE T	01'04
PGS. SENT	1
RESULT	OK

OREGON DEPARTMENT OF ENVIRONMENTAL Q

Inter-Laboratory Split Comparison

Source Name: Siltronic Corporation
Contact Person: Thomas J. Rothschild
Address: 7200 NW Front Ave., Portland, Oregon 97210
Collected By: Dianne Irish

Sample Date: 29 October 2
Phone: 503-243-2020
Region/Division:

Analysis ♠	FIELD MEASUREMENTS♣			SOURCE SAMPLE RESULTS						
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up	Sample A	Samp B
BOD(1)				6 mg/L				29 Oct 2003 ~1300		
TSS				2.1 mg/L				29 Oct 2003 ~1000		
F⁻				7.4 mg/L				29 Oct 2003 ~1000		
Total PO_4^{3-}				0.2 mg/L				29 Oct 2003 ~1000		
Cr Total(1)				<0.01 mg/L				29 Oct 2003 ~1300		

Sample	Sample point description ♠ (ie. Effluent comp.).	Container number	
		SOURCE	DEQ ♠
A		Combined Effluent	
B			
C			
D			

Fill in your split sampl

DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201
Attn: QA Chemist

Post-it® Fax Note
To Elliot Z
Co./Dept.
Phone #
Fax # 503-229-

Shaded area for DEQ use.
♣DEQ sampler enter your field measurements, if taken; indicate whether they are estimates.
♠DEQ sampler is responsible for completing this column.

Need assistance with this form? Contact the QA chemist at (503) 229-5983

(1) Coffey Laboratories, Inc.

Permit # 101128 NPDES

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Laboratory Split Comparison

DEQ Case Number: _____

Source Name: Wacker Siltronic Corporation
Contact Person: Thomas J. Rothschild
Address: 7200 NW Front Avenue Portland, OR 97210
Collected By: Thomas J. Rothschild

Sample Date: 23-July 2002
Phone: 503-243-2020

Region/Division: _____

ER035 JWC

Analysis ♠ (1)	FIELD MEASUREMENTS♣			SOURCE SAMPLE RESULTS					DEQ LAB RESULTS				
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up
BOD				4 mg/L				23 Jul 2002 ~1300					
TSS				1.9 mg/L				23 Jul 2002 ~1000					
F^-				8.2 mg/L				23 Jul 2002 ~1100					
Total $PO_4^{\equiv}$				0.1 mg/L				23 Jul 2002 ~1000					
Cr Total				<0.001 mg/L				23 Jul 2002 ~1300					

Sample	Sample point description ♠ (ie. Effluent comp.).	Container number	
		SOURCE	DEQ ♠
A		Combined Effluent	
B		—	
C		—	
D		—	

Fill in your split sample results and mail to:

DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201
Attn: QA Chemist

Shaded area for DEQ use.
♣DEQ sampler enter your field measurements, if taken; indicate whether they are estimates.
♠DEQ sampler is responsible for completing this column.

Need assistance with this form? Contact the QA chemist at (503) 229-5983.

(1) Analyses Parameters filled in by Wacker Siltronic Corporation Facilities Chemist. TJR

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

QA Chemist
DEQ Lab
1712 SW 11th Avenue
Portland, OR 97201

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Mary Jane Fowler ☒ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery 10 1 2 02

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number
(Transfer from service label) 7001 0360 0004 7576 1953

PS Form 3811, August 2001 Domestic Return Receipt 102595-01-M-2509

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• Sender: Please print your name, address, and ZIP+4 in this box •

Jim Claxton
Environmental Engineer
Wacker Siltronic Corp.
7200 NW Front Avenue, Mail Stop 30
Portland, OR 97210-3676

97210-3676

SCOEPA00029148

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(Domestic Mail Only; No Insurance Coverage Provided)

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Return Receipt Fee (Endorsement Required)	1.75
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$4.65

clayton

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AUG - 9 2002

Sent To QA Chemist DEQ Lab

Street, Apt. No.; or PO Box No. 1712 SW 11th Avenue

City, State, ZIP+ 4 Portland, OR 97201

PS Form 3800, January 2001 See Reverse for Instructions

7002 2030 0003 5905 1076

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Total Postage & Fees	$ 4.42

Postmark Here
USPS
PORTLAND OR OAK GROVE BR 97268
FEB 19 2004

Sent To QA Chemist, DEQ Lab
Street, Apt. No.; or PO Box No. 1712 SW 11th Ave.
City, State, ZIP+4 Portland, OR 97201

PS Form 3800, June 2002 See Reverse for Instructions

SCOEPA00029150

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

QA Chemist
DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201

COMPLETE THIS SECTION ON DELIVERY

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SCOEPA00029151

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Myron Burr
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

24 (RE: Inter-Lab Split Comparison)

SCOEPA00029152

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Laboratory Split Comparison

Sampling Dept

DEQ Case Number: 2003-1257

Source Name: Siltronic Corporation
Contact Person: Thomas J. Rothschild
Address: 7200 NW Front Ave., Portland, Oregon 97210
Collected By: Dianne Irish

Sample Date: 29 October 2003
Phone: 503-243-2020

Region/Division:

Analysis ♠	FIELD MEASUREMENTS♣			SOURCE SAMPLE RESULTS					DEQ LAB RESULTS				
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up
BOD(1)				6 mg/L				29 Oct 2003 ~1300					
TSS				2.1 mg/L				29 Oct 2003 ~1000					
F^-				7.4 mg/L				29 Oct 2003 ~1000					
Total $PO_4^{\equiv}$				0.2 mg/L				29 Oct 2003 ~1000					
Cr Total(1)				<0.01 mg/L				29 Oct 2003 ~1300					

Sample	Sample point description ♠ (ie. Effluent comp.).	Container number	
		SOURCE	DEQ ♠
A		Combined Effluent	
B			
C			
D			

Fill in your split sample results and mail to:

DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201
Attn: QA Chemist

Shaded area for DEQ use.
♣DEQ sampler enter your field measurements, if taken; indicate whether they are estimates.
♠DEQ sampler is responsible for completing this column.

Need assistance with this form? Contact the QA chemist at (503) 229-5983.

(1) Coffey Laboratories, Inc.

ER009: MB

SCOEPA00029153

WACKER SILTRONIC

JIM CLAXTON
ENVIRONMENTAL ENGINEER

Siltronic Corporation
7200 N.W. Front Avenue, M/S 30
Portland, OR 97210-3676, USA
Tel. 1-503-219-7313
Fax 1-503-219-7599
jim.claxton@siltronic.com

FAX

2004-April-16

To Elliot Zais

From Jim Claxton

Fax 503-229-6957

4 Page(s) incl. coversheet

Reference Additional Analytical Testing for NPDES Renewal

Hi Elliot

Here the results from Coffey. Call me if you have any questions.

jim

Contacted Coffey after sending and got a value for
Chrome – ND @ 0.005
Chloride – 170 ppm
Calcium – 74 ppm

Usa-Ausgabe: 2002-04

Report Date: 04/16/2004
Job Number: A40401AZ
PWSID:
PO Number: 4500075102
Project No.: 31
Project Name: Annual 3510-2C

Tom Rothschild
Wacker Siltronic
7200 NW Front Avenue
Portland, OR 97210

Sample Information

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
A40401AZ-1	04-31-CE-C	Water	04/01/2004	0730

Analytical results are on the following page(s).

Sincerely,

Technical Services

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Thank you for allowing Coffey Laboratories to be of service to you. If you have questions or need further assistance, please do not hesitate to call our Customer Services Department.

TS/atc

Sample Identification

Lab Sample ID#: A40401AZ-1 04-31-CE-C

Inorganic Chemicals

	Contaminant	Analysis	Method	Detection Limit	Analyst
	Aluminum	ND mg/L	EPA 200.8	0.1 mg/L	CV
99990031	Ammonia Nitrogen	2. mg/L	SM4500NH3BC	1. mg/L	MGH
	Antimony	ND mg/L	EPA 200.8	0.0025 mg/L	CV
	Arsenic	ND mg/L	EPA 200.8	0.0025 mg/L	CV
7440393	Barium TOTAL?	0.001 mg/L	EPA 200.8	0.001 mg/L	CV
	Beryllium	ND mg/L	EPA 200.8	0.0025 mg/L	CV
14798131	Boron	ND mg/L	EPA 200.8	0.025 mg/L	CV
24959679	Bromide ion?	ND mg/L	EPA 300.0B	50. mg/L	BAB
	Cadmium	ND mg/L	EPA 200.8	0.001 mg/L	CV
10599903	Chloramine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
7440484	Cobalt total	ND mg/L	EPA 200.8	0.0005 mg/L	CV
	Copper	0.006 mg/L	EPA 200.8	0.005 mg/L	CV
7439896	Iron TOTAL	ND mg/L	EPA 200.7	0.2 mg/L	MAJ
	Lead	ND mg/L	EPA 200.8	0.001 mg/L	CV
7439954	Magnesium TOTAL	2.3 mg/L	EPA 200.7	0.1 mg/L	MAJ
7439965	Manganese TOTAL	0.018 mg/L	EPA 200.8	0.001 mg/L	CV
99990028	MBAS (Surfactants)	0.24 mg/L	EPA 425.1	0.05 mg/L	BAB
	Mercury	ND mg/L	EPA 245.1	0.0005 mg/L	MAJ
7439987	Molybdenum TOTAL	0.068 mg/L	EPA 200.8	0.005 mg/L	CV
	Nickel	ND mg/L	EPA 200.8	0.0025 mg/L	CV
511	Nitrate water soluble	40. mg/L	EPA 300.0	10. mg/L	BAB
99990030	Nitrite as N	2.4 mg/L	EPA 300.0	0.1 mg/L	BAB
99990029	Residual Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
	Selenium	ND mg/L	EPA 200.8	0.025 mg/L	CV
	Silver	ND mg/L	EPA 200.8	0.0025 mg/L	CV
14808798	Sulfate ion	21. mg/L	EPA 300.0	0.5 mg/L	BAB
18496258	Sulfide ion	ND mg/L	SM 4500-S2-D	0.02 mg/L	MAJ
14265453	Sulfite ion	ND mg/L	SM 4500-SO3-B	0.4 mg/L	JG

4/16/2004

	Thallium	ND mg/L	EPA 200.8	0.001 mg/L	CV
7440315 X	Tin organic tin comps	ND mg/L	EPA 200.8	0. mg/L	CV
7440326 X	Titanium total	ND mg/L	EPA 200.8	0.01 mg/L	CV
99990029 X	Total Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
57125 X	Total Cyanide	ND mg/L	EPA 335.2	0.01 mg/L	MGH
99990012 X	Total Kjeldahl Nitrogen GIS 030-031	1. mg/L	SM 4500-Norg-B	1. mg/L	MGH
	Total Oil & Grease	ND mg/L	EPA 1664	3. mg/L	NAC
99990023 X	Total Organic Carbon	6.3 mg/L	EPA 415.1	0.8 mg/L	BAB
99990014	Total Phenols	ND mg/L	EPA 420.1	0.1 mg/L	JG
	Zinc	ND mg/L	EPA 200.8	0.025 mg/L	CV

ND means none detected at or above the detection limit listed.

Report Date: April 16, 2004
Job Number: A40401AZ
PO Number: 4500075102
Project No: 31
Project Name: Annual 3510-2C

Tom Rothschild
Wacker Siltronic
7200 NW Front Avenue
Portland, OR 97210-3676

Analytical Narrative

The sample was received on 04/01/04 by Coffey Laboratories, Inc. (CLI) Sample Reception personnel under strict chain of custody protocol. The following information was provided at the time of sample reception:

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
A40401AZ-1	04-31-CE-C	Water	04/01/04	0730

The recommended holding time for each batch of analyses was in accordance with the data quality objectives as specified in the CLI Quality Assurance Plan unless otherwise noted.

Acceptable precision and accuracy were achieved for all analyses associated with this work order as demonstrated by the recoveries of the quality control samples analyzed concurrently with each batch.

The data submitted in this report is for the sole and exclusive use of the above-named client. All samples associated with the work order will be retained a maximum of 15 days from the report date or until the maximum holding time expires. All results pertain only to samples submitted.

Thank you for allowing Coffey Laboratories to be of service to you. If you have questions or need further assistance, please do not hesitate to call our Customer Services Department.

Sincerely,

Technical Services

TS /atc

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

Analytical Data

Wacker Siltronic

Job Number: A40401AZ

Lab Sample ID: A40401AZ-1
Field ID: 04-31-CE-C
Date/Time: 04/01/04 0730
Matrix: Water

EPA Category: Inorganic Chemicals

Parameter	Method	Detection Limit	Analytical Result	Units
Ammonia Nitrogen	SM4500NH3BC	1.	2.	mg/L
Total Oil & Grease	EPA 1664	3.	ND	mg/L
Chloride	EPA 300.0	20.	170.	mg/L
Nitrate	EPA 300.0	10.	40.	mg/L
Nitrite	EPA 300.0	0.1	2.4	mg/L
Sulfate	EPA 300.0	0.5	21.	mg/L
Bromide	EPA 300.0B	50.	ND	µg/L
Total Cyanide	EPA 335.2	0.01	ND	mg/L
Total Organic Carbon	EPA 415.1	0.8	6.3	mg/L
1 Phenols	EPA 420.1	0.1	ND	mg/L
MBAS (Surfactants)	EPA 425.1	0.05	0.24	mg/L
Residual Chlorine	SM 4500-Cl-G	0.05	ND	mg/L
Total Chlorine	SM 4500-Cl-G	0.05	ND	mg/L
Chloramine	SM 4500-Cl-G	0.05	ND	mg/L
Total Kjeldahl Nitrogen	SM 4500-Norg-B	1.	1.	mg/L
Sulfide	SM 4500-S2-D	0.02	ND	mg/L
Sulfite	SM 4500-SO3-B	0.4	ND	mg/L

ND means none detected at or above the detection limit listed.

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

Analytical Data

Wacker Siltronic

Job Number: A40401AZ
Page Number: 3 of 3

Lab Sample ID: A40401AZ-1
Field ID: 04-31-CE-C
Date/Time: 04/01/04 0730
Matrix: Water

EPA Category: Inorganic Chemicals

Parameter	Method	Detection Limit	Analytical Result	Units
Calcium	EPA 200.7	0.1	74.	mg/L
Iron	EPA 200.7	0.2	ND	mg/L
Magnesium	EPA 200.7	0.1	2.3	mg/L
Aluminum	EPA 200.8	0.1	ND	mg/L
Antimony	EPA 200.8	0.002	ND	mg/L
Arsenic	EPA 200.8	0.002	ND	mg/L
Barium	EPA 200.8	0.001	0.001	mg/L
Beryllium	EPA 200.8	0.002	ND	mg/L
[illegible]n	EPA 200.8	0.02	ND	mg/L
Cadmium	EPA 200.8	0.001	ND	mg/L
Chromium	EPA 200.8	0.005	ND	mg/L
Cobalt	EPA 200.8	0.0005	ND	mg/L
Copper	EPA 200.8	0.005	0.006	mg/L
Lead	EPA 200.8	0.001	ND	mg/L
Manganese	EPA 200.8	0.001	0.018	mg/L
Molybdenum	EPA 200.8	0.005	0.068	mg/L
Nickel	EPA 200.8	0.002	ND	mg/L
Selenium	EPA 200.8	0.02	ND	mg/L
Silver	EPA 200.8	0.002	ND	mg/L
Thallium	EPA 200.8	0.001	ND	mg/L
Tin	EPA 200.8	0.	ND	mg/L
Titanium	EPA 200.8	0.01	ND	mg/L
Zinc	EPA 200.8	0.02	ND	mg/L
Mercury	EPA 245.1	0.0005	ND	mg/L

ND means none detected at or above the detection limit listed.

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

Apr 16 04 01:43p Coffey Labs 5032541452 p.4

Report Date: 04/16/2004
Job Number: A40401AZ
PWSID:
PO Number: 4500075102
Project No.: 31
Project Name: Annual 3510-2C

Tom Rothschild
Wacker Siltronic
7200 NW Front Avenue
Portland, OR 97210

Sample Information

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
A40401AZ-1	04-31-CE-C	Water	04/01/2004	0730

Analytical results are on the following page(s).

Sincerely,

Technical Services

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TS/atc

Sample Identification

Lab Sample ID#: A40401AZ-1 04-31-CE-C

Inorganic Chemicals

Contaminant	Analysis	Method	Detection Limit	Analyst
Aluminum	ND mg/L	EPA 200.8	0.1 mg/L	CV
Ammonia Nitrogen	2. mg/L	SM4500NH3BC	1. mg/L	MGH
Antimony	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Arsenic	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Barium	0.001 mg/L	EPA 200.8	0.001 mg/L	CV
Beryllium	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Boron	ND mg/L	EPA 200.8	0.025 mg/L	CV
Bromide	ND mg/L	EPA 300.0B	50. mg/L	BAB
Cadmium	ND mg/L	EPA 200.8	0.001 mg/L	CV
Chloramine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Cobalt	ND mg/L	EPA 200.8	0.0005 mg/L	CV
Copper	0.006 mg/L	EPA 200.8	0.005 mg/L	CV
Iron	ND mg/L	EPA 200.7	0.2 mg/L	MAJ
Lead	ND mg/L	EPA 200.8	0.001 mg/L	CV
Magnesium	2.3 mg/L	EPA 200.7	0.1 mg/L	MAJ
Manganese	0.018 mg/L	EPA 200.8	0.001 mg/L	CV
MBAS (Surfactants)	0.24 mg/L	EPA 425.1	0.05 mg/L	BAB
Mercury	ND mg/L	EPA 245.1	0.0005 mg/L	MAJ
Molybdenum	0.068 mg/L	EPA 200.8	0.005 mg/L	CV
Nickel	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Nitrate	40. mg/L	EPA 300.0	10. mg/L	BAB
Nitrite	2.4 mg/L	EPA 300.0	0.1 mg/L	BAB
Residual Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Selenium	ND mg/L	EPA 200.8	0.025 mg/L	CV
Silver	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Sulfate	21. mg/L	EPA 300.0	0.5 mg/L	BAB
Sulfide	ND mg/L	SM 4500-S2-D	0.02 mg/L	MAJ
Sulfite	ND mg/L	SM 4500-SO3-B	0.4 mg/L	JG

4/16/2004

Thallium	ND mg/L	EPA 200.8	0.001 mg/L	CV
Tin	ND mg/L	EPA 200.8	0. mg/L	CV
Titanium	ND mg/L	EPA 200.8	0.01 mg/L	CV
Total Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Total Cyanide	ND mg/L	EPA 335.2	0.01 mg/L	MGH
Total Kjeldahl Nitrogen	1. mg/L	SM 4500-Norg-B	1. mg/L	MGH
Total Oil & Grease	ND mg/L	EPA 1664	3. mg/L	NAC
Total Organic Carbon	6.3 mg/L	EPA 415.1	0.8 mg/L	BAB
Total Phenols	ND mg/L	EPA 420.1	0.1 mg/L	JG
Zinc	ND mg/L	EPA 200.8	0.025 mg/L	CV

ND means none detected at or above the detection limit listed.

Report Date: 04/16/2004
Job Number: A40401AZ
PWSID:
PO Number: 4500075102
Project No.: 31
Project Name: Annual 3510-2C

Tom Rothschild
Wacker Siltronic
7200 NW Front Avenue
Portland, OR 97210

Sample Information

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
A40401AZ-1	04-31-CE-C	Water	04/01/2004	0730

Analytical results are on the following page(s).

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TS/atc

Sample Identification

Lab Sample ID#: A40401AZ-1 04-31-CE-C

Inorganic Chemicals

Contaminant	Analysis	Method	Detection Limit	Analyst
Aluminum	ND mg/L	EPA 200.8	0.1 mg/L	CV
Ammonia Nitrogen	2. mg/L	SM4500NH3BC	1. mg/L	MGH
Antimony	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Arsenic	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Barium	0.001 mg/L	EPA 200.8	0.001 mg/L	CV
Beryllium	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Boron	ND mg/L	EPA 200.8	0.025 mg/L	CV
Bromide	ND mg/L	EPA 300.0B	50. mg/L	BAB
Cadmium	ND mg/L	EPA 200.8	0.001 mg/L	CV
Chloramine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Cobalt	ND mg/L	EPA 200.8	0.0005 mg/L	CV
Copper	0.006 mg/L	EPA 200.8	0.005 mg/L	CV
Iron	ND mg/L	EPA 200.7	0.2 mg/L	MAJ
Lead	ND mg/L	EPA 200.8	0.001 mg/L	CV
Magnesium	2.3 mg/L	EPA 200.7	0.1 mg/L	MAJ
Manganese	0.018 mg/L	EPA 200.8	0.001 mg/L	CV
MBAS (Surfactants)	0.24 mg/L	EPA 425.1	0.05 mg/L	BAB
Mercury	ND mg/L	EPA 245.1	0.0005 mg/L	MAJ
Molybdenum	0.068 mg/L	EPA 200.8	0.005 mg/L	CV
Nickel	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Nitrate	40. mg/L	EPA 300.0	10. mg/L	BAB
Nitrite	2.4 mg/L	EPA 300.0	0.1 mg/L	BAB
Residual Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Selenium	ND mg/L	EPA 200.8	0.025 mg/L	CV
Silver	ND mg/L	EPA 200.8	0.0025 mg/L	CV
Sulfate	21. mg/L	EPA 300.0	0.5 mg/L	BAB
Sulfide	ND mg/L	SM 4500-S2-D	0.02 mg/L	MAJ
Sulfite	ND mg/L	SM 4500-SO3-B	0.4 mg/L	JG

4/16/2004

Thallium	ND mg/L	EPA 200.8	0.001 mg/L	CV
Tin	ND mg/L	EPA 200.8	0. mg/L	CV
Titanium	ND mg/L	EPA 200.8	0.01 mg/L	CV
Total Chlorine	ND mg/L	SM 4500-Cl-G	0.05 mg/L	JG
Total Cyanide	ND mg/L	EPA 335.2	0.01 mg/L	MGH
Total Kjeldahl Nitrogen	1. mg/L	SM 4500-Norg-B	1. mg/L	MGH
Total Oil & Grease	ND mg/L	EPA 1664	3. mg/L	NAC
Total Organic Carbon	6.3 mg/L	EPA 415.1	0.8 mg/L	BAB
Total Phenols	ND mg/L	EPA 420.1	0.1 mg/L	JG
Zinc	ND mg/L	EPA 200.8	0.025 mg/L	CV

ND means none detected at or above the detection limit listed.

STORET data summary

Station number 402000, SP&S Railroad Bridge, Portland, Oregon
Data retrieved on July 9, 1992 by George Davis/Doug Jones

Parameter	No. of Samples	Average	Maximum	Minimum	units
F^-	7	0.10	0.10	0.10	mg/l
PO_4^{-3}	190	0.105	0.260	0.030	mg/l
Cr_T	10	16	50	1	ug/l
Dissolved Oxygen	see attached data from 1980 to present				
DO	144	10.82	11.26	10.31	mg/l

WILLAMETTE RIVER

FLOW : 7,000 CFS SOURCE: BOB BAUMGARTNER

7Q10 : LOWEST FLOW AVERAGED OVER SEVEN DAYS WHICH IS EXPECTED TO OCCUR IN A TYPICAL 10 YR PERIOD.

```
**********************************************************************************************************
**********************************************************************************************************
**                                                                                                      **
**                        *****   *    *  *    *  *    *    ***    ******   *    *                      **
**                       *    *  *    *  **   **  **   **   *  *   *    *   *    *                      **
**                       *       *    *  * * *  * * * *   *    *   *    *    *  *                       **
**                        *****  *    *  *  *  *  *  *  *   *******  ******     * *                      **
**                            *  *    *  *    *  *    *  *    *  *  *       *                           **
**   *****               *    *  *    *  *    *  *    *  *    *  *   *      *                 *****    **
**  *    *                *****    *****   *    *  *    *  *    *  *    *     *                *    *   **
**  *                                                                                                   *      **
**   *****                                                                                             *****   **
**        *                          ****  STORET SUMMARY SECTION  ****                                    *   **
**  *    *                                                                                              *    *   **
**   *****                                                                                             *****   **
**            FOLLOWING  IS A RETRIEVAL OF DATA FROM THE ENVIRONMENTAL PROTECTION AGENCY'S  STORET SYSTEM,      **
**  *******   A DATABASE  OF  SAMPLING  SITES  AND THEIR ASSOCIATED  QUALITY  DATA.  THE  INFORMATION  WAS  *******   **
**     *      RETRIEVED  USING  SPECIFIC  STORET INSTRUCTION SETS  IN COMBINATION TO SELECT  ONLY THE DATA     *      **
**     *      REQUESTED FOR THIS RETRIEVAL. BRIEF EXPLANATIONS OF THE INSTRUCTION SETS ARE INCLUDED BELOW.     *      **
**     *                   QUESTIONS MAY BE DIRECTED TO THE STORET USER ASSISTANCE SECTION AT                 *      **
**     *                                          (800) 424-9067.                                            *      **
**     *                                                                                                     *      **
**     *                                                                                                     *      **
**                                            ************                                                         **
**   *****                                                                                             *****   **
**  *    *                                                                                              *    *   **
**  *    *                                                                                              *    *   **
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**  *    *                                                                                              *    *   **
**  *    *                                                                                              *    *   **
**   *****                                                                                             *****   **
**                                                                                                      **
**  ******              FOLLOWING IS THE FORMAT FOR THE STATION HEADER INFORMATION WHICH APPEARS        ******   **
**  *    *               ON EACH PAGE OF THE RETRIEVAL UNLESS STATION AGGREGATION WAS PERFORMED         *    *   **
**  *    *        ***********************************************************************************  *    *   **
**  ******        *                                                                               *  ******   **
**  *   *         *                                  STATION NUMBER(S)                            *  *   *    **
**  *    *        *                                  LATITUDE/LONGITUDE PRECISION CODE            *  *    *   **
**  *    *        *                                  STATION LOCATION                             *  *    *   **
**                *                                  STATE/COUNTY CODE STATE NAME COUNTY NAME     *              **
**  *******       *                                  MAJOR BASIN NAME MAJ/MIN/SUB BASIN CODE      *  *******   **
**  *             *                                  MINOR BASIN NAME                             *  *         **
**  *             *STATION TYPE                      AGENCY CODE  STORED DATE  HYDROLOGIC UNIT    *  *         **
**  ***           *                                  STATION DEPTH     ELEVATION                  *  ***       **
**  *             *                                  ECOREGION                                    *  *         **
**  *             *                                  WATER BODY                                   *  *         **
**  *******       *                                  AQUIFERS                                     *  *******   **
**                *                                  LOCKED DATE                                  *              **
**  *******       *                                                                               *  *******   **
**     *          *RIVER MILE INDEX                                                               *     *      **
**     *          *                                                                               *     *      **
**     *          ***********************************************************************************     *      **
**     *                                                                                                 *      **
**     *                                                                                                 *      **
**     *                                                                                                 *      **
**                                      CONTINUED ON NEXT PAGE(S)                                            **
**                                      --------- -- ---- -------                                            **
**                                                                                                           **
**********************************************************************************************************
```

RETRIEVAL PROGRAM

PGM=RET
THIS IS A TABULAR LISTING OF ACTUAL SAMPLE VALUES FOR SELECTED PARAMETERS

A BEGINNING DATE OF (YY/MM/DD) 80/01/01 WAS REQUESTED
NO ENDING DATE WAS REQUESTED -- STORET ASSUMED THE ENDING DATE WAS THAT OF THE MOST RECENT DATA VALUE FOUND

STATION SELECTION WAS BY:

AGENCY CODE(S) AND STATION NUMBER(S) FOR THE FOLLOWING AGENCY(S):
21400000

STATIONS SELECTED WERE RESTRICTED TO:

AGENCIES WHOSE DATA HAS NOT BEEN 'RETIRED'

CONTACTS FOR AGENCY CODES RETRIEVED:

AGENCY	PRIMARY CONTACT NAME	ORGANIZATION	PHONE NUMBER(S)
21400000	PETTIT, GREG	OREGON DEPT ENV QUALITY	(503)229-5983

DATA SPECIFICATIONS:

REQUESTED PARAMETERS:
PARAMETER CODES AND ABBREVIATIONS
00300 DO MG/L

NOTE
NO REMARK CODE RESTRICTIONS WERE SPECIFIED - COMPUTATIONS WILL
BE PERFORMED WITHOUT REGARD TO DATA REMARKS

DATA RESTRICTIONS:

NOTE
NO DEPTH INDICATOR RESTRICTIONS WERE SPECIFIED - COMPUTATIONS WILL
BE PERFORMED WITHOUT REGARD TO DEPTH INDICATORS

NOTE
NO GRAB/COMPOSITE RESTRICTIONS WERE UTILIZED, SO BOTH GRAB AND COMPOSITE SAMPLE TYPES MAY HAVE
BEEN INCLUDED - COMPUTATIONS WILL BE PERFORMED WITHOUT REGARD TO SAMPLE TYPE

NOTE
NO COMPOSITE SAMPLE RESTRICTIONS WERE SPECIFIED - COMPUTATIONS WILL INCLUDE STATISTICAL FEATURES OF
THE COMPOSITING PROCESS, PRODUCING VALID RESULTS ONLY WHEN SOPHISTICATED COMPOSITES ARE NOT ENCOUNTERED.
SPECIFY COMPOSITE HANDLING KEYWORDS "ANC" AND/OR "DSROC" IF NEEDED

***** END OF SUMMARY SECTION *****

402000 22WILL00700 09AT10/11/12
45 34 45.5 122 44 41.9 5
WILLAMETTE RIVER AT SP&S RR BRIDGE (PORTLAND)
41051 OREGON MULTNOMAH
PACIFIC NORTHWEST 130923
WILLAMETTE RIVER BASIN
21400000 17090012017 0006.500 ON
0000 FEET DEPTH

/TYPA/AMBNT/FISH/STREAM/SOLIDS/TISSUE/NET/BACK

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00300 DO MG/L	
80/01/15	0800	WATER		13.0	
80/02/07	1630	WATER		12.7	
80/03/05	1510	WATER		11.6	
80/04/03	1825	WATER		11.7	
80/05/08	1648	WATER		10.3	
80/06/05	1545	WATER		9.8	$\bar{x}$ = 10.37
80/07/10	1830	WATER		9.0	
80/08/07	1700	WATER		5.7	
80/08/14	1425	WATER	$\bar{x}$ = 6.68	6.4	
80/08/20	1540	WATER		6.5	
80/08/28	1730	WATER		7.9	
80/09/11	1625	WATER		8.5	
80/10/09	1815	WATER		8.8	
80/11/06	1330	WATER		9.9	
80/12/04	0915	WATER		12.5	
81/01/08	1520	WATER		12.9	
81/02/05	1500	WATER		12.8	
81/03/05	1630	WATER		12.0	
81/04/09	1605	WATER		11.8	
81/05/07	1740	WATER		10.3	
81/06/04	1545	WATER		9.9	$\bar{x}$ = 10.65
81/07/09	1705	WATER		8.8	
81/08/06	1810	WATER		7.4	
81/09/03	1645	WATER		8.2	
81/10/08	1715	WATER		9.8	
81/11/05	1540	WATER		10.8	
81/12/03	1555	WATER		13.1	
82/01/20	1130	WATER		13.9	
82/02/04	1630	WATER		13.2	
82/03/04	1440	WATER		13.0	
82/04/07	1410	WATER		12.1	
82/05/06	1445	WATER		11.0	
82/06/08	1055	WATER	10.15	10.4	
82/06/22	1530	WATER		9.9	$\bar{x}$ = 10.98*
82/07/08	1500	WATER	9.35	10.2	
82/07/20	1510	WATER		8.5	11.13 EXTRAPOLATED
82/08/05	1630	WATER	8.45	8.9	
82/08/17	1600	WATER		8.0	
82/09/02	1525	WATER		8.2J	
82/10/14	0850	WATER		9.7	
82/11/04	1510	WATER	12.89	11.6	

402000 22WILL00700 09AT10/11/12
45 34 45.5 122 44 41.9 5
WILLAMETTE RIVER AT SP&S RR BRIDGE (PORTLAND)
41051 OREGON MULTNOMAH
PACIFIC NORTHWEST 130923
WILLAMETTE RIVER BASIN
21400000 17090012017 0006.500 ON
0000 FEET DEPTH

/TYPA/AMBNT/FISH/STREAM/SOLIDS/TISSUE/NET/BACK

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00300 DO MG/L	
83/01/05	1630	WATER		13.2	
83/02/10	1400	WATER		13.1	
83/03/03	1400	WATER		12.3	
83/04/14	1535	WATER		12.3	
83/06/09	1605	WATER	11.18	10.9	
83/07/14	1430	WATER		9.4	
83/08/03	1030	WATER		9.1	$\bar{x}$ = 11.27*
83/08/03	1100	WATER		9.2	
83/08/03	1110	WATER		9.1	
83/08/03	1410	WATER	9.2	9.2	11.26 EXTRAPOLATED
83/08/03	1425	WATER		9.7	
83/08/03	1435	WATER		9.7	
83/08/11	1735	WATER		8.3	
83/09/14	1535	WATER		9.2	
83/10/20	1245	WATER		9.5	
83/11/10	1505	WATER		11.5	
83/12/13	1317	WATER		13.4	
84/01/12	1205	WATER		12.9	
84/02/09	1505	WATER		12.4	
84/03/15	1440	WATER		12.0	
84/04/11	1615	WATER		12.4	
84/05/10	1315	WATER		12.0	
84/06/06	1535	WATER		10.2	$\bar{x}$ = 11.12
84/07/12	1315	WATER		8.9	
84/08/15	1535	WATER		8.3	
84/09/11	1655	WATER		8.6	
84/10/10	1535	WATER		9.6	
84/11/08	1445	WATER		12.4	
84/12/13	1350	WATER		13.7	
85/01/15	1445	WATER		13.5	
85/02/27	1500	WATER		12.4	
85/04/11	1545	WATER	12.51	11.3	
85/05/09	1740	WATER		11.9	
85/06/05	1135	WATER		11.0	$\bar{x}$ = 10.98*
85/07/17	1353	WATER		7.2	
85/07/31	1435	WATER	7.1	7.0	
85/08/14	1310	WATER		8.2	
85/09/10	1335	WATER	9.6	8.0	10.99 EXTRAPOLATED
85/11/14	1220	WATER		12.9	
85/12/18	1435	WATER		13.5	
86/01/09	1220	WATER		13.1	

JAN	
FEB	12.96
MAR	12.51
APRIL	11.66
MAY	11.18
JUNE	9.97
JULY	8.50
AUG	7.91
SEPT	
OCT	9.6
NOV	11.17
DEC.	12.89

402000 22WILL00700 09AT10/11/12
45 34 45.5 122 44 41.9 5
WILLAMETTE RIVER AT SP&S RR BRIDGE (PORTLAND)
41051 OREGON MULTNOMAH
PACIFIC NORTHWEST 130923
WILLAMETTE RIVER BASIN
21400000 17090012017 0006.500 ON
0000 FEET DEPTH

/TYPA/AMBNT/FISH/STREAM/SOLIDS/TISSUE/NET/BACK

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00300 DO MG/L
86/02/20	1350	WATER		13.9
86/03/13	1440	WATER		11.8
86/06/26	1530	WATER	11.18	8.3
86/07/24	1500	WATER	11.66	8.1
86/08/14	1340	WATER		7.6
86/09/04	1530	WATER		7.4
86/10/08	1615	WATER		9.7
86/12/04	1515	WATER	11.17	13.1
87/01/08	1020	WATER		13.2
87/02/11	1515	WATER		12.4
87/03/11	1515	WATER		11.8
87/04/08	0830	WATER		10.3
87/05/06	1710	WATER		12.1
87/06/03	1650	WATER		9.8
87/06/29	1500	WATER	8.43	8.3
87/06/30	0750	WATER		7.2
87/06/30	1515	WATER		8.5
87/07/01	0615	WATER		7.8
87/07/01	1525	WATER		8.7
87/07/27	1450	WATER		7.9
87/07/28	0530	WATER	8.04	7.4
87/07/28	1435	WATER		8.0
87/07/29	0540	WATER		7.6
87/07/29	1415	WATER		8.9
87/08/31	1650	WATER		8.8
87/09/01	0725	WATER		7.7
87/09/01	1505	WATER	7.77	8.2
87/09/02	0710	WATER		7.4
87/11/05	1045	WATER	9.6	9.2
87/12/04	1000	WATER		12.0
88/01/06	1025	WATER		13.0
88/02/04	0845	WATER		13.3
88/02/04	0850	WATER	13.25	13.2
88/03/09	1130	WATER		12.1
88/04/07	1600	WATER		12.6
88/05/12	0945	WATER		11.8
88/06/08	1045	WATER		10.9
88/07/25	1555	WATER		8.5
88/07/26	0740	WATER		7.6
88/07/26	1415	WATER	7.82	8.2
88/07/27	0755	WATER		7.6

$\bar{x} = 10.33$ *
10.58 EXTRAPOLATED

$\bar{x} = 10.37$ *
10.31 EXTRAPOLATED

402000 22WILL00700 09AT10/11/12
45 34 45.5 122 44 41.9 5
WILLAMETTE RIVER AT SP&S RR BRIDGE (PORTLAND)
41051 OREGON MULTNOMAH
PACIFIC NORTHWEST 130923
WILLAMETTE RIVER BASIN
21400000 17090012017 0006.500 ON
0000 FEET DEPTH

/TYPA/AMBNT/FISH/STREAM/SOLIDS/TISSUE/NET/BACK

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00300 DO MG/L	
88/07/27	1350	WATER		7.9	
88/07/28	0735	WATER		7.1	
88/08/22	1435	WATER		8.2	
88/08/23	0820	WATER		7.4	
88/08/23	1355	WATER	7.80	7.8	
88/08/24	0835	WATER		7.7	$\bar{x}$ = 10.95*
88/08/24	1425	WATER		8.0	
88/08/25	0900	WATER		7.7	10.97 EXTRAPOLATED
88/09/26	1030	WATER		9.4	
88/10/27	1045	WATER	11.17	9.4	
88/12/22	1410	WATER		12.4	
89/01/26	1530	WATER		13.6	
89/03/15	1525	WATER	12.96	13.2	
89/04/18	1515	WATER		11.4	
89/06/08	1410	WATER	11.18	9.3	
89/07/19	1540	WATER		7.6	$\bar{x}$ = 10.56*
89/08/14	1010	WATER		8.3	
89/09/21	1350	WATER		8.6	10.73 EXTRAPOLATED
89/11/14	1645	WATER	9.6	10.8	
89/12/06	1500	WATER		12.2	
90/01/23	1605	WATER		13.2	
90/02/21	1430	WATER		13.9	
90/03/21	1400	WATER		12.3	
90/04/23	1410	WATER		10.4	
90/05/30	1440	WATER		10.3	
90/06/26	1400	WATER		10.1	$\bar{x}$ = 10.84
90/08/21	1300	WATER	8.5	6.4	
90/09/19	1630	WATER		8.1	10.65 EXTRAPOLATED
90/10/23	1520	WATER		10.1	
90/11/14	1600	WATER		11.4	
90/12/27	1005	WATER		13.0	
91/01/16	1515	WATER		13.9	
91/02/20	1255	WATER		12.2	
91/03/13	1305	WATER	13.55	13.5	
91/03/13	1310	WATER		13.6	$\bar{x}$ = 11.26
91/04/10	1250	WATER		12.8	
91/05/08	1145	WATER		10.7	
91/06/05	1240	WATER		10.7	11.11 EXTRAPOLATED
91/07/02	1221	WATER		9.4	
91/09/27	1245	WATER	7.91	8.8	
91/10/09	1332	WATER		9.3	
			11.17		
			12.89		

402000 22WILL00700 09AT10/11/12
45 34 45.5 122 44 41.9 5
WILLAMETTE RIVER AT SP&S RR BRIDGE (PORTLAND)
41051 OREGON MULTNOMAH
PACIFIC NORTHWEST 130923
WILLAMETTE RIVER BASIN
21400000 17090012017 0006.500 ON
0000 FEET DEPTH

/TYPA/AMBNT/FISH/STREAM/SOLIDS/TISSUE/NET/BACK

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00300 DO MG/L
92/01/29	1115	WATER		12.3
92/04/15	1130	WATER	12.51	10.8
92/05/05	1525	WATER	10.3	10.1
92/05/05	1635	WATER		10.5

7004 1160 0003 7254 7649

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here #60

Sen Dr. Elliot Zais
Stre Water Quality Source Control, DEQ
or P 2020 SW 4th Ave., Suite 400
City, Portland, OR 97201-4987

PS Form 3800, August 2006 See Reverse for Instructions

Certified Mail Provides:

- A mailing receipt
- A unique identifier for your mailpiece
- A record of delivery kept by the Postal Service for two years

PS Form 3800, June 2002 (Reverse)

Important Reminders:

- Certified Mail may ONLY be combined with First-Class Mail® or Priority Mail®.
- Certified Mail is *not* available for any class of international mail.
- NO INSURANCE COVERAGE IS PROVIDED with Certified Mail. For valuables, please consider Insured or Registered Mail.
- For an additional fee, a *Return Receipt* may be requested to provide proof of delivery. To obtain Return Receipt service, please complete and attach a Return Receipt (PS Form 3811) to the article and add applicable postage to cover the fee. Endorse mailpiece "Return Receipt Requested". To receive a fee waiver for a duplicate return receipt, a USPS® postmark on your Certified Mail receipt is required.
- For an additional fee, delivery may be restricted to the addressee or addressee's authorized agent. Advise the clerk or mark the mailpiece with the endorsement *"Restricted Delivery"*.
- If a postmark on the Certified Mail receipt is desired, please present the article at the post office for postmarking. If a postmark on the Certified Mail receipt is not needed, detach and affix label with postage and mail.

IMPORTANT: Save this receipt and present it when making an inquiry. Internet access to delivery information is not available on mail addressed to APOs and FPOs.

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X DEQ/NWR ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) NOV 1 6 2007 C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

DEQ/NWR

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number
(*Transfer from service label*) 7004 1160 0003 7254 7649

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

#60

SCOEPA00029178

7004 1160 0003 7254 7663

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

#60

Sent To: Oregon DEQ
WQ-DMR Processing
Street, or PO Box: 811 SW 6th Ave.
City, State: Portland, Oregon 97204-1390

PS Form ... uctions

Certified Mail Provides:

- A mailing receipt
- A unique identifier for your mailpiece
- A record of delivery kept by the Postal Service for two years

Important Reminders:

- Certified Mail may ONLY be combined with First-Class Mail® or Priority Mail®.
- Certified Mail is *not* available for any class of international mail.
- NO INSURANCE COVERAGE IS PROVIDED with Certified Mail. For valuables, please consider Insured or Registered Mail.
- For an additional fee, a *Return Receipt* may be requested to provide proof of delivery. To obtain Return Receipt service, please complete and attach a Return Receipt (PS Form 3811) to the article and add applicable postage to cover the fee. Endorse mailpiece "Return Receipt Requested". To receive a fee waiver for a duplicate return receipt, a USPS® postmark on your Certified Mail receipt is required.
- For an additional fee, delivery may be restricted to the addressee or addressee's authorized agent. Advise the clerk or mark the mailpiece with the endorsement *"Restricted Delivery"*.
- If a postmark on the Certified Mail receipt is desired, please present the article at the post office for postmarking. If a postmark on the Certified Mail receipt is not needed, detach and affix label with postage and mail.

IMPORTANT: Save this receipt and present it when making an inquiry. Internet access to delivery information is not available on mail addressed to APOs and FPOs.

PS Form 3800, June 2002 (Reverse)

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Randy Oman
☐ Agent
☐ Addressee

B. Received by (Printed Name) Randy Oman
C. Date of Delivery 11/14/7

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1160 0003 7254 7663

PS Form 3811, February 2004 Domestic Return Receipt #60 102595-02-M-1540

SCOEPA00029181

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	10	1	TO	2007	10	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Process Waste Water Flow	SAMPLE MEASUREMENT	3,408	3,929	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--			totalizing recorder	
BOD	SAMPLE MEASUREMENT	9.9	14.9	kg/day	--	2.9	4.5	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	4.9	7.1	kg/day	--	1.4	2.0	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	<0.004	kg/day	--	<0.001	<0.001	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	0.2	0.6		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	28.8	32.3	kg/day	--	8.5	10.0	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.2	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or imprisonment of between 6 months and 5 years).

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503, NUMBER 243-2020

DATE: YEAR 07, MO 11, DAY 9

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outages: pH of 5.88 for 5 mins.

SCOEPA00029183

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	10	1	TO	2007	10	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE (54-61)	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					0.8	1.7	NTC		6/1	Grab
	PERMIT REQUIREMENT									One sample every 4 hours	
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319. [illegible]

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
AREA CODE	NUMBER	YEAR	MO	DAY
503	243-2020	07	11	9

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029184

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
101128	Outfall 002

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	10	1	TO	2007	10	31
	(20-23)	(23-25)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MV-3 Flow	SAMPLE MEASUREMENT	1,034	1,389	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.3	0.5	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
Tom McCue
Environmental Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319 (Penalties under these statutes are subject to a fine of up to $10,000 and imprisonment of between 6 months and 5 years).

Siltronic Corp. by:
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	07	11	9
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029185

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
101128	Outfall 003

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-23)	MO (22-23)	DAY (24-25)	TO YEAR (26-27)	MO (28-29)	DAY (30-31)
2007	10	1	2007	10	31

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	4,442	5,152	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	74.1	°F		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	5.88	7.29	8.87			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC 1001 AND 33 USC 1319 (Penalties under these statutes may include fines up to $10,000 and imprisonment of between 6 months and 5 years.)

Siltronic Corp by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	11	9

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029186

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
October-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	2.1	7.39	2.0	7.0	8.0	28.02	0.100	0.352	0.0005	0.0018	0.000	0.000	0.000	0.000
11	1.0	3.2	0.5	1.6	10.0	32.28	0.176	0.570	0.0005	0.0016	0.000	0.000	0.000	0.000
18	4.0	14.9	1.9	7.1	8.7	32.31	0.154	0.572	0.0005	0.0019	0.000	0.000	0.000	0.000
25	4.5	14.0	1.3	4.1	7.3	22.62	0.165	0.515	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3608	1	0.7	1	8.3
2	3464	2	0.6	2	8.1
3	3392	3	0.7	3	8.1
4	3521	4	0.6	4	8.1
5	3865	5	0.6	5	8.0
6	2900	6	0.9	6	7.7
7	3487	7	0.6	7	7.7
8	3627	8	0.6	8	7.8
9	3498	9	0.6	9	7.9
10	3415	10	0.6	10	8.1
11	3240	11	0.6	11	7.8
12	3490	12	0.7	12	7.8
13	3025	13	0.6	13	7.7
14	3593	14	0.7	14	7.7
15	3664	15	0.5	15	7.5
16	3475	16	0.8	16	8.0
17	3585	17	0.9	17	8.0
18	3714	18	0.7	18	8.0
19	3259	19	0.8	19	8.2
20	3683	20	0.8	20	8.3
21	3502	21	0.8	21	8.4
22	3028	22	1.0	22	8.1
23	3051	23	0.9	23	7.6
24	3150	24	1.0	24	8.0
25	3119	25	0.9	25	8.3
26	3286	26	0.8	26	8.1
27	3104	27	0.9	27	8.1
28	3301	28	0.9	28	8.0
29	3335	29	0.8	29	8.4
30	3339	30	0.9	30	7.8
31	3929	31	0.7	31	7.7
Total:	105649				

(002) DAILY FLOW'S	
Day	M^3
1	859
2	943
3	1052
4	1030
5	1287
6	1079
7	1071
8	1155
9	950
10	1128
11	1049
12	954
13	852
14	1131
15	1045
16	1083
17	1049
18	1052
19	731
20	943
21	1166
22	1121
23	1196
24	1174
25	1177
26	1389
27	496
28	1098
29	1075
30	984
31	731
Total:	32048

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.174	0.000	0.000
0.503	0.000	0.000
0.237	0.000	0.000
0.144	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Morgan Sale for Tom McCue	DATE	Telephone
Tom McCue		11/12/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

7004 1160 0003 7254 7786

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

Sent To Oregon DEQ
WQ-DMR Processing
Street, A 811 SW 6th Ave.
or PO Bo
City, Sta Portland, Oregon 97204-1390

002

PS Form ... ctions

SCOEPA00029188

7004 1160 0003 7254 7279

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

Sent To Dr. Elliot Zais
Street, A Water Quality Source Control, DEQ
or PO B 2020 SW 4th Ave., Suite 400
City, Sta Portland, OR 97201-4987

002

PS Form ... ctions

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by (*Printed Name*) JAN 14 2008
C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number
(*Transfer from service label*) 7004 1160 0003 7254 7779

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE

PORTLAND OR 972

14 JAN 2009 PM 3

First Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Randy Oman
☐ Agent
☐ Addressee

B. Received by (Printed Name) Randy Oman
C. Date of Delivery 1/14/05

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number
(Transfer from service label) 7004 1160 0003 7254 7786

PS Form 3811, February 2004 Domestic Return Receipt 002 102595-02-M-1540

UNITED STATES POSTAL SERVICE

PORTLAND OR 972

14 JAN 2003 PM 5 L

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029193

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	12	1	TO	2007	12	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-68)	SAMPLE TYPE (69-70)
Process Waste Water Flow	SAMPLE MEASUREMENT	3,231	3,714	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--			totalizing recorder	
BOD	SAMPLE MEASUREMENT	23.2	30.1	kg/day	--	7.2	8.9	mg/L		1/7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	6.1	7.9	kg/day	--	2.0	2.5	mg/L		1/7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	0.009	kg/day	--	0.001	0.003	mg/L		1/7	24HC
	PERMIT REQUIREMENT	0.091	0.27		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	21.7	25.6	kg/day	--	6.8	7.3	mg/L		1/7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.1	mg/L		1/7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503, NUMBER 243-2020

DATE: YEAR 08, MO 1, DAY 11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outages: pH outage 12/25/07 for 5 minutes at 5.95

SCOEPA00029194

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

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	YEAR	MO	DAY		YEAR	MO	DAY
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	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

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PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53)	(54-61)		(4 Card Only) QUALITY OR CONCENTRATION (38-45)	(46-53)	(54-61)		NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					0.8	2.9	NTC		6/1	Grab
	PERMIT REQUIREMENT									One sample every 4 hours	
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	08	1	11
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029195

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
101128	Outfall 002

Form Approved.
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MONITORING PERIOD

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FROM	2007	12	1	TO	2007	12	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-69)	SAMPLE TYPE (70-71)
MV-3 Flow	SAMPLE MEASUREMENT	1,095	1,980	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.1	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
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	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. [illegible]

Siltronic Corp by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	08	1	11
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029196

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
101128	Outfall 003

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	12	1	TO	2007	12	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	4,326	5,220	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	72.2	°F		1/7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	5.95	7.43	8.10			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
Total minutes outside of 6.0-9.0 range	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
Tom McCue
Environmental Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC 1001 AND 33 USC 1319. [illegible]

Siltronic Corp. by: [signature] for Siltronic
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	08	1	11
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029197

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
December-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	6.4	20.35	2.5	7.9	7.0	22.20	0.116	0.369	0.0005	0.0016	0.000	0.000	0.000	0.000
13	8.9	30.1	2.1	7.1	6.5	21.83	0.093	0.315	0.00256	0.0087	0.000	0.000	0.000	0.000
20	8.0	28.3	1.2	4.2	7.3	25.64	0.098	0.346	0.0005	0.0018	0.000	0.000	0.000	0.000
27	5.6	14.2	2.0	5.1	6.7	17.04	0.098	0.249	0.0005	0.0013	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3237	1	0.8	1	8.3
2	3206	2	0.9	2	8.3
3	3714	3	0.9	3	8.4
4	3627	4	0.7	4	8.4
5	3331	5	0.6	5	7.8
6	3180	6	0.7	6	8.4
7	3312	7	0.8	7	8.3
8	3403	8	0.6	8	8.2
9	3259	9	0.8	9	8.1
10	3187	10	0.9	10	8.4
11	3346	11	1.1	11	8.2
12	3252	12	0.7	12	8.2
13	3384	13	0.6	13	8.2
14	3229	14	0.8	14	8.2
15	3233	15	0.8	15	8.2
16	3191	16	0.7	16	8.0
17	3301	17	0.8	17	7.9
18	3399	18	0.7	18	8.3
19	3468	19	0.7	19	8.5
20	3532	20	1.1	20	8.3
21	3229	21	0.7	21	8.1
22	3487	22	0.7	22	8.1
23	3350	23	0.6	23	8.0
24	3339	24	1.2	24	7.9
25	2555	25	1.1	25	8.0
26	2786	26	0.5	26	8.3
27	2544	27	0.7	27	8.3
28	2900	28	0.7	28	8.3
29	3233	29	0.6	29	8.2
30	2733	30	0.7	30	8.5
31	3210	31	0.6	31	8.4
Total:	100160				

(002) DAILY FLOW'S	
Day	M^3
1	1707
2	367
3	999
4	379
5	1870
6	1086
7	1908
8	500
9	1094
10	1113
11	1310
12	1041
13	905
14	916
15	969
16	1121
17	912
18	1143
19	890
20	890
21	1749
22	530
23	1071
24	954
25	980
26	871
27	1030
28	1548
29	628
30	1980
31	1473
Total:	33934

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.083	0.000	0.000
0.066	0.000	0.000
0.125	0.000	0.000
0.087	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue				503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

7004 1160 0003 7254 7731

U.S. Postal Service™
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OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

Se
Si
or
Ci

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

867

PS Instructions

SCOEPA00029199

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

DEQ/NWR

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1160 0003 7254 7731

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029201

7004 1160 0003 7254 7748

U.S. Postal Service™
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OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

Sent To Oregon DEQ
WQ-DMR Processing
Street, A 811 SW 6th Ave.
or PO B Portland, Oregon 97204-1390
City, Sta

PS Form ... ctions

SCOEPA00029202

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Randy Oman
☐ Agent
☐ Addressee

B. Received by (Printed Name) Randy Oman
C. Date of Delivery 12/13/7

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Transfer from service label)* 7004 1160 0003 7254 7748

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SCOEPA00029203

UNITED STATES POSTAL SERVICE

13 DEC 2007 PM 3

First Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029204

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 001 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-21)	MO (22-23)	DAY (24-25)	TO YEAR (26-27)	MO (28-29)	DAY (30-31)
2007	11	1	2007	11	30

NOTE: Read instructions before completing this form.

PARAMETER (32-47)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Process Waste Water Flow	SAMPLE MEASUREMENT	3,326	3,706	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--			totalizing recorder	
BOD	SAMPLE MEASUREMENT	28.3	41.8	kg/day	--	8.7	12.7	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	8.2	10.2	kg/day	--	2.5	3.1	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	<0.004	kg/day	--	<0.001	<0.001	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	0.091	0.27		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	23.8	25.5	kg/day	--	7.3	8.5	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.2	0.4	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319 (Penalties under these statutes may include fines up to $10,000 and a maximum imprisonment of between 6 months and 5 years).

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	12	11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outages: none

SCOEPA00029205

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
101128	Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-23)	MO (22-23)	DAY (24-25)	TO YEAR (26-29)	MO (28-29)	DAY (30-31)
2007	11	1	2007	11	30

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					1.0	2.4	NTC		6/1	Grab
	PERMIT REQUIREMENT								"One sample every 4 hours"		
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. [illegible]

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	12	11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029206

PERMITTEE NAME/ADDRESS (Include Facility Name/Location If Different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-18)
101128	Outfall 002
PERMIT NUMBER	DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR	MO	DAY	TO YEAR	MO	DAY
2007	11	1	2007	11	30
(19-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (62-69) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MV-3 Flow	SAMPLE MEASUREMENT	1,054	1,972	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.2	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319 (Penalties under these statutes may include fines up to $10,000 and/or imprisonment of between 6 months and 5 years.)

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	12	11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029207

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 003 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR	MO	DAY	TO YEAR	MO	DAY
2007	11	1	2007	11	30
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	4,380	5,394	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	72.9	°F		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	6.17	7.35	8.60			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. [illegible]

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	12	11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029208

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
November-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	6.9	24.16	2.5	8.8	6.7	23.46	0.408	1.429	0.0005	0.0018	0.000	0.000	0.000	0.000
8	10.7	34.4	2.9	9.3	6.7	21.53	0.129	0.415	0.0005	0.0016	0.000	0.000	0.000	0.000
15	5.8	19.1	3.1	10.2	7.7	25.39	0.117	0.386	0.0005	0.0016	0.000	0.000	0.000	0.000
21	7.3	21.9	2.2	6.6	8.5	25.52	0.118	0.354	0.0005	0.0015	0.000	0.000	0.000	0.000
29	12.7	41.8	1.9	6.3	7.1	23.23	0.175	0.576	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3502	1	0.9	1	7.9
2	3328	2	1.0	2	8.1
3	3422	3	0.9	3	7.8
4	3354	4	0.9	4	7.9
5	3256	5	1.3	5	7.6
6	3312	6	0.9	6	7.9
7	3278	7	0.9	7	8.1
8	3214	8	0.9	8	7.9
9	3297	9	1.0	9	8.1
10	3430	10	1.0	10	8.2
11	3490	11	0.9	11	8.2
12	3365	12	0.9	12	7.9
13	3373	13	1.0	13	8.2
14	3146	14	1.2	14	7.9
15	3297	15	1.1	15	8.0
16	3706	16	1.0	16	8.3
17	3229	17	1.0	17	8.2
18	3244	18	1.0	18	8.3
19	3305	19	1.6	19	8.4
20	3653	20	0.9	20	8.3
21	3002	21	0.9	21	8.3
22	3581	22	0.9	22	8.2
23	3301	23	1.0	23	8.2
24	3517	24	0.9	24	8.1
25	3335	25	0.9	25	7.9
26	3055	26	0.9	26	8.4
27	2960	27	1.1	27	8.5
28	3286	28	1.1	28	8.3
29	3290	29	0.8	29	8.3
30	3263	30	0.7	30	8.0
31		31		31	
Total:	99793				

(002) DAILY FLOW'S	
Day	M^3
1	731
2	988
3	1972
4	704
5	1033
6	1340
7	727
8	1317
9	704
10	939
11	1211
12	916
13	644
14	1022
15	893
16	916
17	1015
18	1086
19	1181
20	1030
21	1136
22	1056
23	1098
24	1102
25	1015
26	1064
27	1136
28	1227
29	1215
30	1200
31	
Total:	31617

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.217	0.000	0.000
0.061	0.000	0.000
0.091	0.000	0.000
0.074	0.000	0.000
0.086	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		for Siltronic	12/11/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

DEQ Laboratory
ATTN: QA Chemist
1712 SW 11th Ave.
Portland, Oregon

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Therese Ingleby ☐ Agent ☐ Addressee

B. Received by (Printed Name) Therese Ingleby C. Date of Delivery NOV 14 2004

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1160 0003 7254 7601

PS Form 3811, February 2004 Domestic Return Receipt 058 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029211

Koreen Lail
Environmental Engineer

Siltronic Corporation
7200 NW Front Avenue, M/S 30
Portland OR 97210-3676, USA
Tel. 503-219-7994
Fax 503-219-7599
Koreen.lail@siltronic.com

KLL: 058

DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201

ATTN: QA Chemist

November 9, 2007

Inter-Laboratory Split Comparison

To Whom it May Concern:

Enclosed are the source sample results that were taken on 10/11/2007 for the Inter-Laboratory Split Comparison. While the M8240 was listed as part of the required testing, upon conversations in 2006 with Dan Hickman from DEQ, and with Brian Cone from Test America, the M8240 test has been changed to the M8260. Additionally, as part of our normal procedure for monthly sampling we also ran the 608, 624, and 625 methods.

The lab notated the following two deviations from the method control limits:

1. The percent recovery for Hexachloroethane and p-Cresol in the LCS for Semi-Volatile Organics by EPA 625 exceeded method specified control limits (low recovery). All other QC parameters were in control.

2. One of the Glucose/Glutamic Acid control samples for BOD exceeded control limits (low demand). The other was in control and BOD results do not appear impacted based on consistency with past results.

If you have any questions, please contact me.

Best regards,

Koreen Lail
Environmental Affairs
Siltronic Corporation

Enclosures:
Analytical report
Inter-laboratory split comparison form

cc: Tom Rothschild
DMR File

OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY

Inter-Laboratory Split Comparison

DEQ Case Number: _____

Source Name: Siltronic Corporation USA
Contact Person: Thomas Rothschild
Address: 7200 N.W. Front Avenue
Collected By: Dianne Irish

Sample Date: 11 Oct 2007
Phone: (503) 219-7374

Region/Division: _____

Analysis ♠	FIELD MEASUREMENTS♣			SOURCE SAMPLE RESULTS					DEQ LAB RESULTS				
	Sample A	Sample B	Sample C	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up	Sample A	Sample B	Sample C	Sample D	Date/Time Analysis set up
pH				7.1									
TSS				0.5 mg/L									
F				10.0 mg/L									
PO_4				0.18 mg/L									
Cr				<1.0 ug/L									
As				<1.0 ug/L									
BOD				<2.0 mg/L									
EPA 8260				<50 ug/L									
8270				<10 ug/L									

Sample	Sample point description ♠ (ie. Effluent comp.).	Container number	
		SOURCE	DEQ ♠
A		Combined ~~Effluent~~	
B			
C			
D			

Fill in your split sample results and mail to:

DEQ Lab
1712 SW 11th Ave.
Portland, OR 97201
Attn: QA Chemist

Shaded area for DEQ use.
♣DEQ sampler enter your field measurements, if taken; indicate whether they are estimates.
♠DEQ sampler is responsible for completing this column.

Need assistance with this form? Contact the QA chemist at (503) 229-5983.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Laboratory Division

Survey: Siltronic

Sampling Subproject (fund code): 37423

Collected by: Elliot Zais VOC

Sampling Event #:

Date Received in Lab: 11 Oct 2007

Date Reported:

Report Data to: Elliot Zais 503/229-5292

Item #	LASAR # (required)	SITE NAME lat/long (in decimal degrees)*	Nutrient Basic	DO BOD	~~Metals~~ Organics		Date Time	Temp (Deg. C)	pH (SU)	Cond. (Umhos/cm)	Elev RM	Tests Required
1	28999	Outfall No 1 Grab combined effluent of WWTP			B 03049 A+B		11 Oct 2007					M 8270
					X 7558		1315					M 8240
2	28999	"			B 03050 A+B		11 Oct					"
					X 7559		1317					
3	28999	"			B 03052 A+B		11 Oct					"
			12 drops H_2SO_4		X 7557		1319					
4	28999	Outfall No 1 24 hr C combined effluent of WWTP	R 976		TM 0006		11 Oct					BOD, SS, F, pH Total phosphate Total chrome
			STP 377		25 drops HNO3		1325					
5												
6												
7												

* lat/long only required if station is new

Comments: SPLIT sample

LEGAL SAMPLE: Chain of Custody Record

Total # of containers received: ____ Initial placement in refrigerator #: ____

Relinquished by: ____ Received By: ____

Date/Time: Date/Time:

Meter #'s:

03-LAB-0001-FORM

SCOEPA00029214

Specialty Analytical

19761 S.W. 95th Avenue
Tualatin, OR 97062
(503) 612-9007
Fax (503) 612-8572
1 (877) 612-9007

October 22, 2007

Thomas Rothschild
Siltronic Corporation
7200 NW Front Ave
M/S 30
Portland, OR 97210

TEL: (503) 219-7313
FAX: (503) 219-7599

RE: Monthly

Order No.: 0710073

Dear Thomas Rothschild:

Specialty Analytical received 2 samples on 10/11/2007 for the analyses presented in the following report.

There were no problems with the analysis and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative, or as qualified with flags. Results apply only to the samples analyzed. Without approval of the laboratory, the reproduction of this report is only permitted in its entirety.

If you have any questions regarding these tests, please feel free to call.

Sincerely,

Ned Engleson
Project Manager

Technical Review

Specialty Analytical **Date:** *22-Oct-07*

CLIENT: Siltronic Corporation
Project: Monthly
Lab Order: 0710073

CASE NARRATIVE

The percent recovery for Hexachloroethane and p-Cresol in the LCS for Semi-Volatile Organics by EPA 625 exceeded method specified control limits (low recovery). All other QC parameters were in control.

One of he Glucose/Glutamic Acid control samples for BOD exceeded control limits (low demand). The other was in control and BOD results do not appear impacted based on consistency with past results.

SCOEPA00029216

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-130-CE-C
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:25:00 PM
Project:	Monthly		
Lab ID:	0710073-01	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP/MS		**200.8**				Analyst: **zau**
Arsenic	ND	1.00		ug/L	1	10/16/2007 11:26:00 AM
Chromium	ND	1.00		ug/L	1	10/16/2007 11:26:00 AM
BIOLOGICAL OXYGEN DEMAND- 5 DAY		**E405.1**				Analyst: **sub**
Biochemical Oxygen Demand	ND	2.00		mg/L	1	10/12/2007

SCOEPA00029217

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BASE/NEUTRALS/ACIDS		**E625**				Analyst: **bda**
1,2,4-Trichlorobenzene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
1,2-Dichlorobenzene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
1,2-Diphenylhydrazine	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
1,3-Dichlorobenzene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
1,4-Dichlorobenzene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2,4,6-Trichlorophenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2,4-Dichlorophenol	ND	9.52		µg/L	1	10/12/2007 12:32:00 PM
2,4-Dimethylphenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2,4-Dinitrophenol	ND	9.52		µg/L	1	10/12/2007 12:32:00 PM
2,4-Dinitrotoluene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2,6-Dinitrotoluene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2-Chloronaphthalene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2-Chlorophenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
2-Nitrophenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
3,3'-Dichlorobenzidine	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
4,6-Dinitro-2-methylphenol	ND	9.52		µg/L	1	10/12/2007 12:32:00 PM
4-Bromophenyl phenyl ether	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
4-Chloro-3-methylphenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
4-Chlorophenyl phenyl ether	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
4-Nitrophenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Acenaphthene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Acenaphthylene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Aniline	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Anthracene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benz(a)anthracene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benzidine	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benzo(a)pyrene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benzo(b)fluoranthene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benzo(g,h,i)perylene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benzo(k)fluoranthene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Benzoic Acid	ND	19.0		µg/L	1	10/12/2007 12:32:00 PM
Bis(2-chloroethoxy)methane	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Bis(2-chloroethyl)ether	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Bis(2-chloroisopropyl)ether	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Bis(2-ethylhexyl)phthalate	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Butyl benzyl phthalate	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Carbazole	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Chrysene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Di-n-butyl phthalate	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Di-n-octyl phthalate	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Dibenz(a,h)anthracene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM

SCOEPA00029218

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
BASE/NEUTRALS/ACIDS		**E625**				Analyst: **bda**
Diethyl phthalate	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Dimethyl phthalate	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Fluoranthene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Fluorene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Hexachlorobenzene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Hexachlorobutadiene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Hexachlorocyclopentadiene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Hexachloroethane	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Indeno(1,2,3-cd)pyrene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Isophorone	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
N-Nitrosodi-n-propylamine	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
N-Nitrosodimethylamine	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
N-Nitrosodiphenylamine	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Naphthalene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Nitrobenzene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
o-Cresol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
p-Cresol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Pentachlorophenol	ND	9.52		µg/L	1	10/12/2007 12:32:00 PM
Phenanthrene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Phenol	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Pyrene	ND	4.76		µg/L	1	10/12/2007 12:32:00 PM
Pyridine	ND	9.52		µg/L	1	10/12/2007 12:32:00 PM
Surr: 2,4,6-Tribromophenol	79.3	33.1-99.7		%REC	1	10/12/2007 12:32:00 PM
Surr: 2-Fluorobiphenyl	47.0	33.1-96.2		%REC	1	10/12/2007 12:32:00 PM
Surr: 2-Fluorophenol	39.9	13.4-57.1		%REC	1	10/12/2007 12:32:00 PM
Surr: 4-Terphenyl-d14	84.2	41-122		%REC	1	10/12/2007 12:32:00 PM
Surr: Nitrobenzene-d5	62.6	28.9-99.9		%REC	1	10/12/2007 12:32:00 PM
Surr: Phenol-d6	28.5	10.6-38.5		%REC	1	10/12/2007 12:32:00 PM
SEMIVOLATILE ORGANICS BY GC/MS		**SW8270D**				Analyst: **bda**
1,2,4-Trichlorobenzene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
1,2-Dichlorobenzene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
1,3-Dichlorobenzene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
1,4-Dichlorobenzene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
2,4,5-Trichlorophenol	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
2,4,6-Trichlorophenol	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
2,4-Dichlorophenol	ND	2.86		ug/L	1	10/12/2007 12:32:00 PM
2,4-Dimethylphenol	ND	2.86		ug/L	1	10/12/2007 12:32:00 PM
2,4-Dinitrophenol	ND	9.52		ug/L	1	10/12/2007 12:32:00 PM
2,4-Dinitrotoluene	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
2,6-Dinitrotoluene	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM

SCOEPA00029219

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANICS BY GC/MS		**SW8270D**				Analyst: **bda**
2-Chloronaphthalene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
2-Chlorophenol	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
2-Methylnaphthalene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
2-Methylphenol	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
2-Nitroaniline	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
2-Nitrophenol	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
3,3'-Dichlorobenzidine	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
3-&4-Methylphenol	ND	9.52		ug/L	1	10/12/2007 12:32:00 PM
3-Nitroaniline	ND	5.71		ug/L	1	10/12/2007 12:32:00 PM
4,6-Dinitro-2-methylphenol	ND	9.52		ug/L	1	10/12/2007 12:32:00 PM
4-Bromophenyl phenyl ether	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
4-Chloro-3-methylphenol	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
4-Chloroaniline	ND	2.86		ug/L	1	10/12/2007 12:32:00 PM
4-Chlorophenyl phenyl ether	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
4-Nitroaniline	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
4-Nitrophenol	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
Acenaphthene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Acenaphthylene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Anthracene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Benz(a)anthracene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Benzo(a)pyrene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Benzo(b)fluoranthene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Benzo(g,h,i)perylene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Benzo(k)fluoranthene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Benzoic Acid	ND	19.0		ug/L	1	10/12/2007 12:32:00 PM
Benzyl Alcohol	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
Bis(2-chloroethoxy)methane	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Bis(2-chloroethyl)ether	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
Bis(2-chloroisopropyl)ether	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Bis(2-ethylhexyl)phthalate	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Butyl benzyl phthalate	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Carbazole	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Chrysene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Di-n-butyl phthalate	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Di-n-octyl phthalate	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Dibenz(a,h)anthracene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Dibenzofuran	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Diethyl phthalate	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Dimethyl phthalate	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Fluoranthene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Fluorene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM

SCOEPA00029220

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
SEMIVOLATILE ORGANICS BY GC/MS		**SW8270D**				Analyst: **bda**
Hexachlorobenzene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Hexachlorobutadiene	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
Hexachlorocyclopentadiene	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
Hexachloroethane	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
Indeno(1,2,3-cd)pyrene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Isophorone	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
N-Nitrosodi-n-propylamine	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
N-Nitrosodimethylamine	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
N-Nitrosodiphenylamine	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Naphthalene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Nitrobenzene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Pentachlorophenol	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
Phenanthrene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Phenol	ND	1.90		ug/L	1	10/12/2007 12:32:00 PM
Pyrene	ND	0.952		ug/L	1	10/12/2007 12:32:00 PM
Pyridine	ND	4.76		ug/L	1	10/12/2007 12:32:00 PM
Surr: 2,4,6-Tribromophenol	83.1	33.1-99.7		%REC	1	10/12/2007 12:32:00 PM
Surr: 2-Fluorobiphenyl	49.1	33.1-96.2		%REC	1	10/12/2007 12:32:00 PM
Surr: 2-Fluorophenol	36.5	13.4-57.1		%REC	1	10/12/2007 12:32:00 PM
Surr: 4-Terphenyl-d14	74.1	41-122		%REC	1	10/12/2007 12:32:00 PM
Surr: Nitrobenzene-d5	63.2	28.9-99.9		%REC	1	10/12/2007 12:32:00 PM
Surr: Phenol-d6	26.7	10.6-38.5		%REC	1	10/12/2007 12:32:00 PM
PURGEABLES		**E624**				Analyst: **bda**
1,1,1-Trichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1,2,2-Tetrachloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1,2-Trichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1-Dichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1-Dichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dichloropropane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,3-Dichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,4-Dichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
2-Butanone	ND	10.0		µg/L	1	10/15/2007 3:46:00 PM
2-Chloroethyl vinyl ether	ND	1.00		µg/L	1	10/17/2007 3:07:00 PM
4-Methyl-2-pentanone	ND	10.0		µg/L	1	10/15/2007 3:46:00 PM
Acrolein	ND	10.0		µg/L	1	10/15/2007 3:46:00 PM
Acrylonitrile	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Benzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Bromodichloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM

SCOEPA00029221

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PURGEABLES		**E624**				Analyst: **bda**
Bromoform	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Bromomethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Carbon tetrachloride	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chloroform	2.78	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
cis-1,3-Dichloropropene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Dibromochloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Ethylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
m,p-Xylene	ND	2.00		µg/L	1	10/15/2007 3:46:00 PM
Methylene chloride	ND	5.00		µg/L	1	10/15/2007 3:46:00 PM
o-Xylene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Tetrachloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Toluene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
trans-1,2-Dichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
trans-1,3-Dichloropropene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Trichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Trichlorofluoromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Vinyl chloride	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Surr: 1,2-Dichloroethane-d4	85.2	83.4-126		%REC	1	10/15/2007 3:46:00 PM
Surr: 4-Bromofluorobenzene	90.1	90.9-117	S	%REC	1	10/15/2007 3:46:00 PM
Surr: Dibromofluoromethane	92.1	81.1-112		%REC	1	10/15/2007 3:46:00 PM
Surr: Toluene-d8	113	90-120		%REC	1	10/15/2007 3:46:00 PM
VOLATILE ORGANICS BY GC/MS		**SW8260B**				Analyst: **bda**
1,1,1,2-Tetrachloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1,1-Trichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1,2,2-Tetrachloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1,2-Trichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1-Dichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1-Dichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,1-Dichloropropene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2,3-Trichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2,3-Trichloropropane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2,4-Trichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2,4-Trimethylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dibromo-3-chloropropane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dibromoethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,2-Dichloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM

SCOEPA00029222

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANICS BY GC/MS		**SW8260B**				Analyst: **bda**
1,2-Dichloropropane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,3,5-Trimethylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,3-Dichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,3-Dichloropropane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
1,4-Dichlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
2,2-Dichloropropane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
2-Butanone	ND	10.0		µg/L	1	10/15/2007 3:46:00 PM
2-Chlorotoluene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
2-Hexanone	ND	10.0		µg/L	1	10/15/2007 3:46:00 PM
4-Chlorotoluene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
4-Isopropyltoluene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
4-Methyl-2-pentanone	ND	20.0		µg/L	1	10/15/2007 3:46:00 PM
Acetone	ND	50.0		µg/L	1	10/15/2007 3:46:00 PM
Acrylonitrile	ND	5.00		µg/L	1	10/15/2007 3:46:00 PM
Benzene	ND	0.300		µg/L	1	10/15/2007 3:46:00 PM
Bromobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Bromochloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Bromodichloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Bromoform	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Bromomethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Carbon disulfide	ND	2.00		µg/L	1	10/15/2007 3:46:00 PM
Carbon tetrachloride	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chlorobenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chloroethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chloroform	2.78	1.00		µg/L	1	10/15/2007 3:46:00 PM
Chloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
cis-1,2-Dichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
cis-1,3-Dichloropropene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Dibromochloromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Dibromomethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Dichlorodifluoromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Ethylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Hexachlorobutadiene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Isopropylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
m,p-Xylene	ND	2.00		µg/L	1	10/15/2007 3:46:00 PM
Methyl tert-butyl ether	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Methylene chloride	ND	20.0		µg/L	1	10/15/2007 3:46:00 PM
n-Butylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
n-Propylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Naphthalene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
o-Xylene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM

SCOEPA00029223

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANICS BY GC/MS		**SW8260B**				Analyst: **bda**
sec-Butylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Styrene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
tert-Butylbenzene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Tetrachloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Toluene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
trans-1,2-Dichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
trans-1,3-Dichloropropene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Trichloroethene	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Trichlorofluoromethane	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Vinyl chloride	ND	1.00		µg/L	1	10/15/2007 3:46:00 PM
Surr: 1,2-Dichloroethane-d4	85.2	72.2-129		%REC	1	10/15/2007 3:46:00 PM
Surr: 4-Bromofluorobenzene	90.1	73.5-125		%REC	1	10/15/2007 3:46:00 PM
Surr: Dibromofluoromethane	92.1	58.8-148		%REC	1	10/15/2007 3:46:00 PM
Surr: Toluene-d8	113	79.8-137		%REC	1	10/15/2007 3:46:00 PM
ORGANOCHLORINE PEST/PCB		**E608**				Analyst: **jrp**
4,4'-DDD	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
4,4'-DDE	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
4,4'-DDT	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Aldrin	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
alpha-BHC	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1016	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1221	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1232	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1242	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1248	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1254	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
Aroclor 1260	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
beta-BHC	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Chlordane	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM
delta-BHC	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Dieldrin	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Endosulfan I	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Endosulfan II	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Endosulfan Sulfate	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Endrin	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Endrin Aldehyde	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
gamma-BHC	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Heptachlor	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Heptachlor epoxide	ND	0.0955		µg/L	1	10/18/2007 9:53:00 PM
Toxaphene	ND	0.955		µg/L	1	10/18/2007 9:53:00 PM

SCOEPA00029224

Specialty Analytical

Date: *22-Oct-07*

CLIENT:	Siltronic Corporation	**Client Sample ID:**	07-126-CE-g
Lab Order:	0710073	**Collection Date:**	10/11/2007 1:20:00 PM
Project:	Monthly		
Lab ID:	0710073-02	**Matrix:**	WASTE WATER

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
ORGANOCHLORINE PEST/PCB		**E608**				Analyst: **jrp**
Surr: Decachlorobiphenyl	61.5	18.9-133		%REC	1	10/18/2007 9:53:00 PM
Surr: TCMX	70.8	20.8-90.1		%REC	1	10/18/2007 9:53:00 PM

SCOEPA00029225

Specialty Analytical

Date: *22-Oct-07*

CLIENT: Siltronic Corporation
WorkOrder: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 200.8

Sample ID **MBLK-19698** SampType: **MBLK** TestCode: **200.8** Units: **ug/L** Prep Date: **10/15/2007** Run ID: **ICPMS_071016A**
Client ID: **ZZZZZ** Batch ID: **19698** TestNo: **200.8** Analysis Date: **10/16/2007** SeqNo: **497404**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Chromium	ND	1.00									

Sample ID **LCS-19698** SampType: **LCS** TestCode: **200.8** Units: **ug/L** Prep Date: **10/15/2007** Run ID: **ICPMS_071016A**
Client ID: **ZZZZZ** Batch ID: **19698** TestNo: **200.8** Analysis Date: **10/16/2007** SeqNo: **497405**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	48.48	1.00	50	0	97	85	115	0	0		
Chromium	49.15	1.00	50	0	98.3	85	115	0	0		

Sample ID **0710073-01BMS** SampType: **MS** TestCode: **200.8** Units: **ug/L** Prep Date: **10/15/2007** Run ID: **ICPMS_071016A**
Client ID: **07-130-CE-C** Batch ID: **19698** TestNo: **200.8** Analysis Date: **10/16/2007** SeqNo: **497409**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	53.28	1.00	50	0.8408	105	70	130	0	0		
Chromium	47.47	1.00	50	0.1932	94.6	70	130	0	0		

Sample ID **0710073-01BMSD** SampType: **MSD** TestCode: **200.8** Units: **ug/L** Prep Date: **10/15/2007** Run ID: **ICPMS_071016A**
Client ID: **07-130-CE-C** Batch ID: **19698** TestNo: **200.8** Analysis Date: **10/16/2007** SeqNo: **497410**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	54.12	1.00	50	0.8408	107	70	130	53.28	1.56	20	
Chromium	48.55	1.00	50	0.1932	96.7	70	130	47.47	2.25	20	

Sample ID **0710073-01BDUP** SampType: **DUP** TestCode: **200.8** Units: **ug/L** Prep Date: **10/15/2007** Run ID: **ICPMS_071016A**
Client ID: **07-130-CE-C** Batch ID: **19698** TestNo: **200.8** Analysis Date: **10/16/2007** SeqNo: **497408**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	0.936	1.00	0	0	0	0	0	0.8408	0	20	J

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 200.8

Sample ID	0710073-01BDUP	SampType:	DUP	TestCode:	200.8	Units:	ug/L	Prep Date:	10/15/2007	Run ID:	ICPMS_071016A
Client ID:	07-130-CE-C	Batch ID:	19698	TestNo:	200.8			Analysis Date:	10/16/2007	SeqNo:	497408

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chromium	0.2399	1.00	0	0	0	0	0	0.1932	0	20	J

Sample ID	CCV	SampType:	CCV	TestCode:	200.8	Units:	ug/L	Prep Date:		Run ID:	ICPMS_071016A
Client ID:	ZZZZZ	Batch ID:	19698	TestNo:	200.8			Analysis Date:	10/16/2007	SeqNo:	497411

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	49.95	1.00	50	0	99.9	90	110	0	0		
Chromium	48.82	1.00	50	0	97.6	90	110	0	0		

Sample ID	ICV	SampType:	ICV	TestCode:	200.8	Units:	ug/L	Prep Date:		Run ID:	ICPMS_071016A
Client ID:	ZZZZZ	Batch ID:	19698	TestNo:	200.8			Analysis Date:	10/16/2007	SeqNo:	497403

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	50.08	1.00	50	0	100	90	110	0	0		
Chromium	49.48	1.00	50	0	99	90	110	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

SCOEPA00029227

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 608_W

Sample ID	MB-19741	SampType:	MBLK	TestCode:	608_W	Units:	µg/L	Prep Date:	10/18/2007	Run ID:	GCK_071018A
Client ID:	ZZZZZ	Batch ID:	19741	TestNo:	E608			Analysis Date:	10/18/2007	SeqNo:	498429

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4'-DDD	ND	0.100									
4,4'-DDE	ND	0.100									
4,4'-DDT	ND	0.100									
Aldrin	ND	0.100									
alpha-BHC	ND	0.100									
alpha-Chlordane	ND	0.100									
Aroclor 1016	ND	1.00									
Aroclor 1221	ND	1.00									
Aroclor 1232	ND	1.00									
Aroclor 1242	ND	1.00									
Aroclor 1248	ND	1.00									
Aroclor 1254	ND	1.00									
Aroclor 1260	ND	1.00									
beta-BHC	ND	0.100									
Chlordane	ND	1.00									
delta-BHC	ND	0.100									
Dieldrin	ND	0.100									
Endosulfan I	ND	0.100									
Endosulfan II	ND	0.100									
Endosulfan Sulfate	ND	0.100									
Endrin	ND	0.100									
Endrin Aldehyde	ND	0.100									
gamma-BHC	ND	0.100									
gamma-Chlordane	ND	0.100									
Heptachlor	ND	0.100									
Heptachlor epoxide	ND	0.100									
Methoxychlor	ND	0.100									
Toxaphene	ND	1.00									
Surr:Decachlorobiphenyl	0.1292	0	0.2	0	64.6	18.9	133	0	0		
Surr: TCMX	0.1132	0	0.2	0	56.6	20.8	90.1	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 608_W

Sample ID	LCS-19741	SampType:	LCS	TestCode:	608_W	Units:	µg/L	Prep Date:	10/18/2007	Run ID:	GCK_071018A
Client ID:	ZZZZZ	Batch ID:	19741	TestNo:	E608			Analysis Date:	10/18/2007	SeqNo:	498430

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4'-DDD	0.1505	0.0500	0.2	0	75.3	31	141	0	0		
4,4'-DDE	0.146	0.0500	0.2	0	73	30	145	0	0		
4,4'-DDT	0.1315	0.0500	0.2	0	65.8	25	160	0	0		
Aldrin	0.08768	0.0500	0.2	0	43.8	42	122	0	0		
alpha-BHC	0.1334	0.0500	0.2	0	66.7	37	134	0	0		
beta-BHC	0.1593	0.0500	0.2	0	79.6	17	147	0	0		
delta-BHC	0.1327	0.0500	0.2	0	66.4	19	140	0	0		
Dieldrin	0.1378	0.0500	0.2	0	68.9	36	146	0	0		
Endosulfan I	0.1214	0.0500	0.2	0	60.7	45	153	0	0		
Endosulfan II	0.1544	0.0500	0.2	0	77.2	0.01	202	0	0		
Endosulfan Sulfate	0.142	0.0500	0.2	0	71	26	144	0	0		
Endrin	0.1777	0.0500	0.2	0	88.8	30	147	0	0		
Endrin Aldehyde	0.1297	0.0500	0.2	0	64.9	50	150	0	0		
gamma-BHC	0.1434	0.0500	0.2	0	71.7	32	127	0	0		
Heptachlor	0.09939	0.0500	0.2	0	49.7	34	111	0	0		
Heptachlor epoxide	0.1431	0.0500	0.2	0	71.6	37	142	0	0		

Sample ID	0710073-02AMS	SampType:	MS	TestCode:	608_W	Units:	µg/L	Prep Date:	10/18/2007	Run ID:	GCK_071018A
Client ID:	07-126-CE-g	Batch ID:	19741	TestNo:	E608			Analysis Date:	10/18/2007	SeqNo:	498439

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4'-DDD	0.4157	0.200	0.3992	0	104	31	141	0	0		
4,4'-DDE	0.3706	0.200	0.3992	0	92.8	30	145	0	0		
4,4'-DDT	0.3319	0.200	0.3992	0	83.1	25	160	0	0		
Aldrin	0.2377	0.200	0.3992	0	59.5	42	122	0	0		
alpha-BHC	0.3306	0.200	0.3992	0	82.8	37	134	0	0		
alpha-Chlordane	0.2693	0.200	0.3992	0	67.5	40	140	0	0		
beta-BHC	0.413	0.200	0.3992	0	103	17	147	0	0		
delta-BHC	0.321	0.200	0.3992	0	80.4	19	140	0	0		
Dieldrin	0.3513	0.200	0.3992	0	88	36	146	0	0		
Endosulfan I	0.3137	0.200	0.3992	0	78.6	45	153	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

CLIENT: Siltronic Corporation
WorkOrder: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 608_W

Sample ID **0710073-02AMS** SampType: **MS** TestCode: **608_W** Units: **µg/L** Prep Date: **10/18/2007** Run ID: **GCK_071018A**
Client ID: **07-126-CE-g** Batch ID: **19741** TestNo: **E608** Analysis Date: **10/18/2007** SeqNo: **498439**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Endosulfan II	0.3605	0.200	0.3992	0	90.3	0.01	202	0	0		
Endosulfan Sulfate	0.342	0.200	0.3992	0	85.7	26	144	0	0		
Endrin	0.3921	0.200	0.3992	0	98.2	30	147	0	0		
Endrin Aldehyde	0.2789	0.200	0.3992	0	69.9	50	150	0	0		
gamma-BHC	0.3688	0.200	0.3992	0	92.4	32	127	0	0		
gamma-Chlordane	0.3475	0.200	0.3992	0	87	40	140	0	0		
Heptachlor	0.3224	0.200	0.3992	0	80.7	34	111	0	0		
Heptachlor epoxide	0.3422	0.200	0.3992	0	85.7	37	142	0	0		
Methoxychlor	0.4136	0.200	0.3992	0	104	40	140	0	0		

Sample ID **CCV** SampType: **CCV** TestCode: **608_W** Units: **µg/L** Prep Date: Run ID: **GCK_071018A**
Client ID: **ZZZZZ** Batch ID: **19741** TestNo: **E608** Analysis Date: **10/18/2007** SeqNo: **498441**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4,4'-DDD	0.1907	0.100	0.2	0	95.4	85	115	0	0		
4,4'-DDE	0.227	0.100	0.2	0	113	85	115	0	0		
4,4'-DDT	0.2243	0.100	0.2	0	112	85	115	0	0		
Aldrin	0.2117	0.100	0.2	0	106	85	115	0	0		
alpha-BHC	0.2193	0.100	0.2	0	110	85	115	0	0		
beta-BHC	0.2109	0.100	0.2	0	105	85	115	0	0		
delta-BHC	0.1915	0.100	0.2	0	95.8	85	115	0	0		
Dieldrin	0.2147	0.100	0.2	0	107	85	115	0	0		
Endosulfan I	0.2103	0.100	0.2	0	105	85	115	0	0		
Endosulfan II	0.2114	0.100	0.2	0	106	85	115	0	0		
Endosulfan Sulfate	0.2079	0.100	0.2	0	104	85	115	0	0		
Endrin	0.2232	0.100	0.2	0	112	85	115	0	0		
Endrin Aldehyde	0.2046	0.100	0.2	0	102	85	115	0	0		
gamma-BHC	0.2179	0.100	0.2	0	109	85	115	0	0		
Heptachlor	0.2206	0.100	0.2	0	110	85	115	0	0		
Heptachlor epoxide	0.2059	0.100	0.2	0	103	85	115	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

SCOEPA00029230

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 624_W

Sample ID	MB-19700	SampType:	MBLK	TestCode:	624_W	Units:	µg/L	Prep Date:	10/15/2007	Run ID:	5973J_071015A
Client ID:	ZZZZZ	Batch ID:	19700	TestNo:	E624			Analysis Date:	10/15/2007	SeqNo:	497226

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	ND	1.00									
1,1,2,2-Tetrachloroethane	ND	1.00									
1,1,2-Trichloroethane	ND	1.00									
1,1-Dichloroethane	ND	1.00									
1,1-Dichloroethene	ND	1.00									
1,2-Dichlorobenzene	ND	1.00									
1,2-Dichloroethane	ND	1.00									
1,2-Dichloropropane	ND	1.00									
1,3-Dichlorobenzene	ND	1.00									
1,4-Dichlorobenzene	ND	1.00									
2-Butanone	ND	10.0									
2-Chloroethyl vinyl ether	ND	1.00									
4-Methyl-2-pentanone	ND	10.0									
Acrolein	ND	10.0									
Acrylonitrile	ND	1.00									
Benzene	ND	1.00									
Bromodichloromethane	ND	1.00									
Bromoform	ND	1.00									
Bromomethane	ND	1.00									
Carbon tetrachloride	ND	1.00									
Chlorobenzene	ND	1.00									
Chloroethane	ND	1.00									
Chloroform	ND	1.00									
Chloromethane	ND	1.00									
cis-1,3-Dichloropropene	ND	1.00									
Dibromochloromethane	ND	1.00									
Ethylbenzene	0.17	1.00									J
m,p-Xylene	0.15	2.00									J
Methylene chloride	ND	5.00									
o-Xylene	ND	1.00									
Tetrachloroethene	ND	1.00									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

SCOEPA00029231

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 624_W

Sample ID **MB-19700** SampType: **MBLK** TestCode: **624_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015A**
Client ID: **ZZZZZ** Batch ID: **19700** TestNo: **E624** Analysis Date: **10/15/2007** SeqNo: **497226**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Toluene	ND	1.00									
trans-1,2-Dichloroethene	ND	1.00									
trans-1,3-Dichloropropene	ND	1.00									
Trichloroethene	ND	1.00									
Trichlorofluoromethane	ND	1.00									
Vinyl chloride	ND	1.00									
Surr:1,2-Dichloroethane-d4	84.67	1.00	100	0	84.7	83.4	126	0	0		
Surr:4-Bromofluorobenzene	89.32	1.00	100	0	89.3	90.9	117	0	0		S
Surr:Dibromofluoromethane	91.7	1.00	100	0	91.7	81.1	112	0	0		
Surr: Toluene-d8	113.5	1.00	100	0	114	90	120	0	0		

Sample ID **LCS-19700** SampType: **LCS** TestCode: **624_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015A**
Client ID: **ZZZZZ** Batch ID: **19700** TestNo: **E624** Analysis Date: **10/15/2007** SeqNo: **497232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	37.38	1.00	40	0	93.4	52	162	0	0		
1,1,2,2-Tetrachloroethane	35.41	1.00	40	0	88.5	46	157	0	0		
1,1,2-Trichloroethane	37.76	1.00	40	0	94.4	52	150	0	0		
1,1-Dichloroethane	37.32	1.00	40	0	93.3	59	155	0	0		
1,1-Dichloroethene	37.38	1.00	40	0	93.4	0.01	234	0	0		
1,2-Dichlorobenzene	45.55	1.00	40	0	114	18	190	0	0		
1,2-Dichloroethane	30.3	1.00	40	0	75.8	49	155	0	0		
1,2-Dichloropropane	36.12	1.00	40	0	90.3	0.01	210	0	0		
1,3-Dichlorobenzene	49.45	1.00	40	0	124	59	156	0	0		
1,4-Dichlorobenzene	48.4	1.00	40	0	121	18	190	0	0		
2-Butanone	22.26	10.0	40	0	55.6	50	150	0	0		
2-Chloroethyl vinyl ether	28.34	1.00	40	0	70.8	0.01	305	0	0		
4-Methyl-2-pentanone	33.88	10.0	40	0	84.7	50	150	0	0		
Acrolein	24.47	10.0	40	0	61.2	50	150	0	0		
Acrylonitrile	26.11	1.00	40	0	65.3	60	140	0	0		
Benzene	37.8	1.00	40	0	94.5	37	151	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

SCOEPA00029232

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 624_W

Sample ID **LCS-19700** SampType: **LCS** TestCode: **624_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015A**
Client ID: **ZZZZZ** Batch ID: **19700** TestNo: **E624** Analysis Date: **10/15/2007** SeqNo: **497232**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromodichloromethane	35.84	1.00	40	0	89.6	35	155	0	0		
Bromoform	33.96	1.00	40	0	84.9	45	169	0	0		
Bromomethane	39.09	1.00	40	0	97.7	0.01	242	0	0		
Carbon tetrachloride	40.54	1.00	40	0	101	70	140	0	0		
Chlorobenzene	47.18	1.00	40	0	118	37	160	0	0		
Chloroethane	31.63	1.00	40	0	79.1	14	230	0	0		
Chloroform	37.95	1.00	40	0	94.9	51	138	0	0		
Chloromethane	22.65	1.00	40	0	56.6	0.01	273	0	0		
cis-1,3-Dichloropropene	36.11	1.00	40	0	90.3	0.01	227	0	0		
Dibromochloromethane	40.44	1.00	40	0	101	53	149	0	0		
Ethylbenzene	48.16	1.00	40	0.17	120	37	162	0	0		
m,p-Xylene	94.34	2.00	80	0.15	118	50	150	0	0		
Methylene chloride	31.46	5.00	40	0	78.7	0.01	221	0	0		
o-Xylene	47.06	1.00	40	0	118	50	150	0	0		
Tetrachloroethene	64.13	1.00	40	0	160	64	148	0	0		SC
Toluene	47.83	1.00	40	0	120	47	150	0	0		
trans-1,2-Dichloroethene	38.26	1.00	40	0	95.7	54	156	0	0		
trans-1,3-Dichloropropene	39.59	1.00	40	0	99	17	183	0	0		
Trichloroethene	39.61	1.00	40	0	99	71	157	0	0		
Trichlorofluoromethane	31.08	1.00	40	0	77.7	17	181	0	0		
Vinyl chloride	25.62	1.00	40	0	64	0.01	251	0	0		

Sample ID **0710073-02BMS** SampType: **MS** TestCode: **624_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015A**
Client ID: **07-126-CE-g** Batch ID: **19700** TestNo: **E624** Analysis Date: **10/15/2007** SeqNo: **497229**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	36.9	1.00	40	0	92.2	52	162	0	0		
1,1,2,2-Tetrachloroethane	34.01	1.00	40	0	85	46	157	0	0		
1,1,2-Trichloroethane	35.63	1.00	40	0	89.1	52	150	0	0		
1,1-Dichloroethane	37.76	1.00	40	0	94.4	59	155	0	0		
1,1-Dichloroethene	39.36	1.00	40	0	98.4	0.01	234	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan.
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

SCOEPA00029233

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 624_W

Sample ID	0710073-02BMS	SampType:	MS	TestCode:	624_W	Units:	µg/L	Prep Date:	10/15/2007	Run ID:	5973J_071015A
Client ID:	07-126-CE-g	Batch ID:	19700	TestNo:	E624			Analysis Date:	10/15/2007	SeqNo:	497229

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2-Dichlorobenzene	39.16	1.00	40	0	97.9	18	190	0	0		
1,2-Dichloroethane	29.63	1.00	40	0	74.1	49	155	0	0		
1,2-Dichloropropane	35.73	1.00	40	0	89.3	0.01	210	0	0		
1,3-Dichlorobenzene	45.48	1.00	40	0	114	59	156	0	0		
1,4-Dichlorobenzene	44.3	1.00	40	0	111	18	190	0	0		
2-Butanone	37.83	10.0	40	0	94.6	50	150	0	0		
4-Methyl-2-pentanone	62.03	10.0	80	0	77.5	50	150	0	0		
Acrolein	21.6	10.0	40	0	54	50	150	0	0		
Acrylonitrile	41.97	1.00	40	0	105	60	140	0	0		
Benzene	37.05	1.00	40	0	92.6	37	151	0	0		
Bromodichloromethane	33.9	1.00	40	0	84.8	35	155	0	0		
Bromoform	30.43	1.00	40	0	76.1	45	169	0	0		
Bromomethane	46.31	1.00	40	0	116	0.01	242	0	0		
Carbon tetrachloride	39.93	1.00	40	0	99.8	70	140	0	0		
Chlorobenzene	44.9	1.00	40	0	112	37	160	0	0		
Chloroethane	37.14	1.00	40	0	92.8	14	230	0	0		
Chloroform	39.55	1.00	40	2.78	91.9	51	138	0	0		
Chloromethane	51.06	1.00	40	0	128	0.01	273	0	0		
cis-1,3-Dichloropropene	32.72	1.00	40	0	81.8	0.01	227	0	0		
Dibromochloromethane	36.14	1.00	40	0	90.4	53	149	0	0		
Ethylbenzene	45.27	1.00	40	0.39	112	37	162	0	0		
m,p-Xylene	89.11	2.00	80	0.29	111	50	150	0	0		
Methylene chloride	29.33	5.00	40	0	73.3	0.01	221	0	0		
o-Xylene	44.01	1.00	40	0	110	50	150	0	0		
Tetrachloroethene	40.66	1.00	40	0	102	64	148	0	0		
Toluene	45.49	1.00	40	0	114	47	150	0	0		
trans-1,2-Dichloroethene	39.14	1.00	40	0	97.8	54	156	0	0		
trans-1,3-Dichloropropene	36.52	1.00	40	0	91.3	17	183	0	0		
Trichloroethene	37.49	1.00	40	0	93.7	71	157	0	0		
Trichlorofluoromethane	37.41	1.00	40	0	93.5	17	181	0	0		
Vinyl chloride	38.52	1.00	40	0	96.3	0.01	251	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 624_W

Sample ID	0710073-02BMS	SampType:	MS	TestCode:	624_W	Units:	µg/L	Prep Date:	10/15/2007	Run ID:	5973J_071015A
Client ID:	07-126-CE-g	Batch ID:	19700	TestNo:	E624			Analysis Date:	10/17/2007	SeqNo:	497891

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Chloroethyl vinyl ether	11.44	1.00	40	0	28.6	0.01	305	0	0		

Sample ID	CCV-19700	SampType:	CCV	TestCode:	624_W	Units:	µg/L	Prep Date:		Run ID:	5973J_071015A
Client ID:	ZZZZZ	Batch ID:	19700	TestNo:	E624			Analysis Date:	10/15/2007	SeqNo:	497225

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1-Trichloroethane	34.52	1.00	40	0	86.3	75	125	0	0		
1,1,2,2-Tetrachloroethane	34.28	1.00	40	0	85.7	60.5	139.5	0	0		
1,1,2-Trichloroethane	34.68	1.00	40	0	86.7	71	129	0	0		
1,1-Dichloroethane	35.11	1.00	40	0	87.8	72.5	127.5	0	0		
1,1-Dichloroethene	37.67	1.00	40	0	94.2	50.5	149.5	0	0		
1,2-Dichlorobenzene	41.68	1.00	40	0	104	63	137	0	0		
1,2-Dichloroethane	28.04	1.00	40	0	70.1	68	132	0	0		
1,2-Dichloropropane	33.47	1.00	40	0	83.7	34	166	0	0		
1,3-Dichlorobenzene	46.03	1.00	40	0	115	73	127	0	0		
1,4-Dichlorobenzene	45.52	1.00	40	0	114	63	137	0	0		
2-Butanone	48.02	10.0	40	0	120	50	150	0	0		
2-Chloroethyl vinyl ether	19.07	1.00	40	0	47.7	0.01	224	0	0		
4-Methyl-2-pentanone	59.23	10.0	80	0	74	50	150	0	0		
Acrolein	24.23	10.0	40	0	60.6	50	150	0	0		
Acrylonitrile	36.82	1.00	40	0	92	60	140	0	0		
Benzene	34.75	1.00	40	0	86.9	64	136	0	0		
Bromodichloromethane	31.58	1.00	40	0	79	65.5	134.5	0	0		
Bromoform	30.83	1.00	40	0	77.1	71	129	0	0		
Bromomethane	39.41	1.00	40	0	98.5	14	186	0	0		
Carbon tetrachloride	36.36	1.00	40	0	90.9	73	127	0	0		
Chlorobenzene	43.49	1.00	40	0	109	66	134	0	0		
Chloroethane	34.95	1.00	40	0	87.4	38	162	0	0		
Chloroform	34.67	1.00	40	0	86.7	67.5	132.5	0	0		
Chloromethane	38.7	1.00	40	0	96.8	0.01	204	0	0		
cis-1,3-Dichloropropene	32.07	1.00	40	0	80.2	24	176	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

SCOEPA00029235

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 624_W

Sample ID **CCV-19700** SampType: **CCV** TestCode: **624_W** Units: **µg/L** Prep Date: Run ID: **5973J_071015A**
Client ID: **ZZZZZ** Batch ID: **19700** TestNo: **E624** Analysis Date: **10/15/2007** SeqNo: **497225**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dibromochloromethane	35.71	1.00	40	0	89.3	67.5	132.5	0	0		
Ethylbenzene	43.26	1.00	40	0	108	59	141	0	0		
m,p-Xylene	86.45	2.00	80	0	108	50	150	0	0		
Methylene chloride	30.26	5.00	40	0	75.6	60.5	139.5	0	0		
o-Xylene	42.71	1.00	40	0	107	50	150	0	0		
Tetrachloroethene	40.26	1.00	40	0	101	73.5	126.5	0	0		
Toluene	44.04	1.00	40	0	110	74.5	125.5	0	0		
trans-1,2-Dichloroethene	37.35	1.00	40	0	93.4	69.5	130.5	0	0		
trans-1,3-Dichloropropene	36.02	1.00	40	0	90	50	150	0	0		
Trichloroethene	35.87	1.00	40	0	89.7	66.5	133.5	0	0		
Trichlorofluoromethane	35.13	1.00	40	0	87.8	48	152	0	0		
Vinyl chloride	32.89	1.00	40	0	82.2	4	196	0	0		

Sample ID **CCV-19700** SampType: **CCV** TestCode: **624_W** Units: **µg/L** Prep Date: Run ID: **5973J_071015A**
Client ID: **ZZZZZ** Batch ID: **19700** TestNo: **E624** Analysis Date: **10/17/2007** SeqNo: **497888**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Chloroethyl vinyl ether	12.52	1.00	40	0	31.3	0.01	224	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan.
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

SCOEPA00029236

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID	MB-19684	SampType:	MBLK	TestCode:	625X_W	Units:	µg/L	Prep Date:	10/11/2007	Run ID:	5973G_071012A
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497060

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	5.00									
1,2-Dichlorobenzene	ND	5.00									
1,2-Diphenylhydrazine	ND	5.00									
1,3-Dichlorobenzene	ND	5.00									
1,4-Dichlorobenzene	ND	5.00									
2,4,6-Trichlorophenol	ND	5.00									
2,4-Dichlorophenol	ND	10.0									
2,4-Dimethylphenol	ND	5.00									
2,4-Dinitrophenol	ND	10.0									
2,4-Dinitrotoluene	ND	5.00									
2,6-Dinitrotoluene	ND	5.00									
2-Chloronaphthalene	ND	5.00									
2-Chlorophenol	ND	5.00									
2-Nitrophenol	ND	5.00									
3,3'-Dichlorobenzidine	ND	5.00									
4,6-Dinitro-2-methylphenol	ND	10.0									
4-Bromophenyl phenyl ether	ND	5.00									
4-Chloro-3-methylphenol	ND	5.00									
4-Chlorophenyl phenyl ether	ND	5.00									
4-Nitrophenol	ND	5.00									
Acenaphthene	ND	5.00									
Acenaphthylene	ND	5.00									
Aniline	0.03	5.00									J
Anthracene	ND	5.00									
Benz(a)anthracene	ND	5.00									
Benzidine	0.06	5.00									J
Benzo(a)pyrene	ND	5.00									
Benzo(b)fluoranthene	ND	5.00									
Benzo(g,h,i)perylene	ND	5.00									
Benzo(k)fluoranthene	ND	5.00									
Benzoic Acid	0.11	20.0									J

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

SCOEPA00029237

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID	MB-19684	SampType:	MBLK	TestCode:	625X_W	Units:	µg/L	Prep Date:	10/11/2007	Run ID:	5973G_071012A
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497060

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bis(2-chloroethoxy)methane	ND	5.00									
Bis(2-chloroethyl)ether	ND	5.00									
Bis(2-chloroisopropyl)ether	ND	5.00									
Bis(2-ethylhexyl)phthalate	ND	5.00									
Butyl benzyl phthalate	ND	5.00									
Carbazole	ND	5.00									
Chrysene	ND	5.00									
Di-n-butyl phthalate	ND	5.00									
Di-n-octyl phthalate	ND	5.00									
Dibenz(a,h)anthracene	ND	5.00									
Diethyl phthalate	ND	5.00									
Dimethyl phthalate	ND	5.00									
Fluoranthene	ND	5.00									
Fluorene	ND	5.00									
Hexachlorobenzene	ND	5.00									
Hexachlorobutadiene	ND	5.00									
Hexachlorocyclopentadiene	ND	5.00									
Hexachloroethane	ND	5.00									
Indeno(1,2,3-cd)pyrene	ND	5.00									
Isophorone	ND	5.00									
N-Nitrosodi-n-propylamine	ND	5.00									
N-Nitrosodimethylamine	ND	5.00									
N-Nitrosodiphenylamine	ND	5.00									
Naphthalene	ND	5.00									
Nitrobenzene	0.32	5.00									J
o-Cresol	0.1	5.00									J
p-Cresol	0.04	5.00									J
Pentachlorophenol	ND	10.0									
Phenanthrene	ND	5.00									
Phenol	0.23	5.00									J
Pyrene	ND	5.00									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

SCOEPA00029238

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID	MB-19684	SampType:	MBLK	TestCode:	625X_W	Units:	µg/L	Prep Date:	10/11/2007	Run ID:	5973G_071012A
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497060

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Pyridine	ND	10.0									
Surr:2,4,6-Tribromophenol	94.35	0	100	0	94.4	33.1	99.7	0	0		
Surr: 2-Fluorobiphenyl	52.46	0	100	0	52.5	33.1	96.2	0	0		
Surr: 2-Fluorophenol	55.88	0	100	0	55.9	13.4	57.1	0	0		
Surr: 4-Terphenyl-d14	90.7	0	100	0	90.7	41	122	0	0		
Surr: Nitrobenzene-d5	84.91	0	100	0	84.9	28.9	99.9	0	0		
Surr: Phenol-d6	40.36	0	100	0	40.4	10.6	38.5	0	0		S

Sample ID	LCS-19684	SampType:	LCS	TestCode:	625X_W	Units:	µg/L	Prep Date:	10/11/2007	Run ID:	5973G_071012A
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497064

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	26.21	5.00	50	0	52.4	44	142	0	0		
1,2-Dichlorobenzene	24.6	5.00	50	0	49.2	32	129	0	0		
1,2-Diphenylhydrazine	42.6	5.00	50	0	85.2	40	140	0	0		
1,3-Dichlorobenzene	21.49	5.00	50	0	43	0.01	172	0	0		
1,4-Dichlorobenzene	23.58	5.00	50	0	47.2	20	124	0	0		
2,4,6-Trichlorophenol	47.16	5.00	50	0	94.3	37	144	0	0		
2,4-Dichlorophenol	41.74	10.0	50	0	83.5	39	135	0	0		
2,4-Dimethylphenol	36.98	5.00	50	0	74	32	119	0	0		
2,4-Dinitrophenol	25.66	10.0	50	0	51.3	0.01	191	0	0		
2,4-Dinitrotoluene	47.29	5.00	50	0	94.6	39	139	0	0		
2,6-Dinitrotoluene	49.08	5.00	50	0	98.2	50	158	0	0		
2-Chloronaphthalene	38.87	5.00	50	0	77.7	60	118	0	0		
2-Chlorophenol	41.19	5.00	50	0	82.4	23	134	0	0		
2-Nitrophenol	43.28	5.00	50	0	86.6	29	182	0	0		
3,3'-Dichlorobenzidine	49.19	5.00	50	0	98.4	0.01	262	0	0		
4,6-Dinitro-2-methylphenol	45.94	10.0	50	0	91.9	0.01	181	0	0		
4-Bromophenyl phenyl ether	56.68	5.00	50	0	113	53	127	0	0		
4-Chloro-3-methylphenol	42.59	5.00	50	0	85.2	22	147	0	0		
4-Chlorophenyl phenyl ether	49.29	5.00	50	0	98.6	25	158	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan.
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

SCOEPA00029239

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID	LCS-19684	SampType:	LCS	TestCode:	625X_W	Units:	µg/L	Prep Date:	10/11/2007	Run ID:	5973G_071012A
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497064

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
4-Nitrophenol	19.01	5.00	50	0	38	0.01	132	0	0		
Acenaphthene	42.41	5.00	50	0	84.8	47	145	0	0		
Acenaphthylene	40.14	5.00	50	0	80.3	33	145	0	0		
Aniline	35.09	5.00	50	0.03	70.1	46	134	0	0		
Anthracene	42.48	5.00	50	0	85	27	133	0	0		
Benz(a)anthracene	44.72	5.00	50	0	89.4	33	143	0	0		
Benzidine	47.7	5.00	50	0.06	95.3	40	140	0	0		
Benzo(a)pyrene	37.33	5.00	50	0	74.7	17	163	0	0		
Benzo(b)fluoranthene	37.72	5.00	50	0	75.4	24	159	0	0		
Benzo(g,h,i)perylene	39.35	5.00	50	0	78.7	0.01	219	0	0		
Benzo(k)fluoranthene	37.02	5.00	50	0	74	11	162	0	0		
Benzoic Acid	2.03	20.0	50	0.11	3.84	0	250	0	0		J
Bis(2-chloroethoxy)methane	46.36	5.00	50	0	92.7	33	184	0	0		
Bis(2-chloroethyl)ether	51.75	5.00	50	0	104	12	158	0	0		
Bis(2-ethylhexyl)phthalate	53.14	5.00	50	0	106	8	158	0	0		
Butyl benzyl phthalate	48.96	5.00	50	0	97.9	0.01	152	0	0		
Carbazole	42.39	5.00	50	0	84.8	73	131	0	0		
Chrysene	43.69	5.00	50	0	87.4	17	168	0	0		
Di-n-butylphthalate	48.02	5.00	50	0	96	1	118	0	0		
Di-n-octylphthalate	52.55	5.00	50	0	105	4	146	0	0		
Dibenz(a,h)anthracene	38.37	5.00	50	0	76.7	0.01	227	0	0		
Diethylphthalate	50.83	5.00	50	0	102	0.01	114	0	0		
Dimethylphthalate	48.63	5.00	50	0	97.3	0.01	112	0	0		
Fluoranthene	42.52	5.00	50	0	85	26	137	0	0		
Fluorene	44.09	5.00	50	0	88.2	59	121	0	0		
Hexachlorobenzene	46.43	5.00	50	0	92.9	0.01	152	0	0		
Hexachlorobutadiene	15.68	5.00	50	0	31.4	24	116	0	0		
Hexachlorocyclopentadiene	21.12	5.00	50	0	42.2	10	110	0	0		
Hexachloroethane	16.41	5.00	50	0	32.8	40	113	0	0		S
Indeno(1,2,3-cd)pyrene	37.6	5.00	50	0	75.2	0.01	171	0	0		
Isophorone	42.17	5.00	50	0	84.3	21	196	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID **LCS-19684** SampType: **LCS** TestCode: **625X_W** Units: **µg/L** Prep Date: **10/11/2007** Run ID: **5973G_071012A**
Client ID: **ZZZZZ** Batch ID: **19684** TestNo: **E625** Analysis Date: **10/12/2007** SeqNo: **497064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
N-Nitrosodi-n-propylamine	56.24	5.00	50	0	112	0.01	230	0	0		
N-Nitrosodimethylamine	24.99	5.00	50	0	50	0.01	250	0	0		
N-Nitrosodiphenylamine	28.17	5.00	50	0	56.3	0.01	250	0	0		
Naphthalene	33.55	5.00	50	0	67.1	21	133	0	0		
Nitrobenzene	42.62	5.00	50	0.32	84.6	35	180	0	0		
o-Cresol	38.1	5.00	50	0.1	76	55	126	0	0		
p-Cresol	16.46	5.00	25	0.04	65.7	76	107	0	0		S
Pentachlorophenol	40.23	10.0	50	0	80.5	14	176	0	0		
Phenanthrene	42.85	5.00	50	0	85.7	54	120	0	0		
Phenol	19.27	5.00	50	0.23	38.1	5	112	0	0		
Pyrene	44.81	5.00	50	0	89.6	52	115	0	0		
Pyridine	20.18	10.0	50	0	40.4	33	158	0	0		

Sample ID **0710073-02AMS** SampType: **MS** TestCode: **625X_W** Units: **µg/L** Prep Date: **10/11/2007** Run ID: **5973G_071012A**
Client ID: **07-126-CE-g** Batch ID: **19684** TestNo: **E625** Analysis Date: **10/12/2007** SeqNo: **497063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	14.58	4.76	47.62	0	30.6	44	142	0	0		S
1,2-Dichlorobenzene	10.5	4.76	47.62	0	22.1	32	129	0	0		S
1,2-Diphenylhydrazine	31.62	4.76	47.62	0	66.4	40	140	0	0		
1,3-Dichlorobenzene	8.895	4.76	47.62	0	18.7	0.01	172	0	0		
1,4-Dichlorobenzene	10.1	4.76	47.62	0	21.2	20	124	0	0		
2,4,6-Trichlorophenol	35.57	4.76	47.62	0	74.7	37	144	0	0		
2,4-Dichlorophenol	29.89	9.52	47.62	0	62.8	39	135	0	0		
2,4-Dimethylphenol	6.238	4.76	47.62	0	13.1	32	119	0	0		S
2,4-Dinitrophenol	30.33	9.52	47.62	0	63.7	0.01	191	0	0		
2,4-Dinitrotoluene	35.46	4.76	47.62	0	74.5	39	139	0	0		
2,6-Dinitrotoluene	36.61	4.76	47.62	0	76.9	50	158	0	0		
2-Chloronaphthalene	27.96	4.76	47.62	0	58.7	60	118	0	0		S
2-Chlorophenol	26.97	4.76	47.62	0	56.6	23	134	0	0		
2-Nitrophenol	29.82	4.76	47.62	0	62.6	29	182	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan.
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

SCOEPA00029241

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID	0710073-02AMS	SampType:	MS	TestCode:	625X_W	Units:	µg/L	Prep Date:	10/11/2007	Run ID:	5973G_071012A
Client ID:	07-126-CE-g	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497063

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
3,3'-Dichlorobenzidine	10.64	4.76	47.62	0	22.3	0.01	262	0	0		
4,6-Dinitro-2-methylphenol	37.19	9.52	47.62	0	78.1	0.01	181	0	0		
4-Bromophenyl phenyl ether	42.95	4.76	47.62	0	90.2	53	127	0	0		
4-Chloro-3-methylphenol	32.57	4.76	47.62	0	68.4	22	147	0	0		
4-Chlorophenyl phenyl ether	36.66	4.76	47.62	0	77	25	158	0	0		
4-Nitrophenol	10.65	4.76	47.62	0	22.4	0.01	132	0	0		
Acenaphthene	31.49	4.76	47.62	0	66.1	47	145	0	0		
Acenaphthylene	29.65	4.76	47.62	0	62.3	33	145	0	0		
Aniline	0.3143	4.76	47.62	0	0.66	46	134	0	0		JS
Anthracene	30.18	4.76	47.62	0	63.4	27	133	0	0		
Benz(a)anthracene	34.19	4.76	47.62	0	71.8	33	143	0	0		
Benzidine	0.07619	4.76	47.62	0	0.16	40	140	0	0		JS
Benzo(a)pyrene	29.85	4.76	47.62	0	62.7	17	163	0	0		
Benzo(b)fluoranthene	35.05	4.76	47.62	0	73.6	24	159	0	0		
Benzo(g,h,i)perylene	36.67	4.76	47.62	0	77	0.01	219	0	0		
Benzo(k)fluoranthene	33.81	4.76	47.62	0	71	11	162	0	0		
Benzoic Acid	10.14	19.0	47.62	0.2381	20.8	0	250	0	0		J
Bis(2-chloroethoxy)methane	32.44	4.76	47.62	0	68.1	33	184	0	0		
Bis(2-chloroethyl)ether	30.89	4.76	47.62	0	64.9	12	158	0	0		
Bis(2-chloroisopropyl)ether	29.57	4.76	47.62	0	62.1	36	166	0	0		
Bis(2-ethylhexyl)phthalate	41.93	4.76	47.62	0	88.1	8	158	0	0		
Butyl benzyl phthalate	37.9	4.76	47.62	0	79.6	0.01	152	0	0		
Carbazole	33.19	4.76	47.62	0	69.7	73	131	0	0		S
Chrysene	33.85	4.76	47.62	0	71.1	17	168	0	0		
Di-n-butylphthalate	37.51	4.76	47.62	0	78.8	1	118	0	0		
Di-n-octylphthalate	41.63	4.76	47.62	0	87.4	4	146	0	0		
Dibenz(a,h)anthracene	35.12	4.76	47.62	0	73.8	0.01	227	0	0		
Diethyl phthalate	38.65	4.76	47.62	0	81.2	0.01	114	0	0		
Dimethyl phthalate	36.46	4.76	47.62	0	76.6	0.01	112	0	0		
Fluoranthene	32.28	4.76	47.62	0	67.8	26	137	0	0		
Fluorene	33.3	4.76	47.62	0	69.9	59	121	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blank; J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID **0710073-02AMS** SampType: **MS** TestCode: **625X_W** Units: **µg/L** Prep Date: **10/11/2007** Run ID: **5973G_071012A**
Client ID: **07-126-CE-g** Batch ID: **19684** TestNo: **E625** Analysis Date: **10/12/2007** SeqNo: **497063**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachlorobenzene	35.46	4.76	47.62	0	74.5	0.01	152	0	0		
Hexachlorobutadiene	9.362	4.76	47.62	0	19.7	24	116	0	0		S
Hexachlorocyclopentadiene	17.42	4.76	47.62	0	36.6	10	110	0	0		
Hexachloroethane	7.257	4.76	47.62	0	15.2	40	113	0	0		S
Indeno(1,2,3-cd)pyrene	34.74	4.76	47.62	0	73	0.01	171	0	0		
Isophorone	30.63	4.76	47.62	0	64.3	21	196	0	0		
N-Nitrosodi-n-propylamine	38.13	4.76	47.62	0.219	79.6	0.01	230	0	0		
N-Nitrosodimethylamine	19.83	4.76	47.62	0	41.6	0.01	250	0	0		
N-Nitrosodiphenylamine	19.09	4.76	47.62	0	40.1	0.01	250	0	0		
Naphthalene	19.67	4.76	47.62	0	41.3	21	133	0	0		
Nitrobenzene	27.67	4.76	47.62	0.2095	57.7	35	180	0	0		
o-Cresol	24.24	4.76	47.62	0.1143	50.7	55	126	0	0		S
p-Cresol	11.7	4.76	47.62	0.04762	24.5	76	107	0	0		S
Pentachlorophenol	31.64	9.52	47.62	0	66.4	14	176	0	0		
Phenanthrene	33.38	4.76	47.62	0	70.1	54	120	0	0		
Phenol	15.45	4.76	47.62	0.2	32	5	112	0	0		
Pyrene	35.64	4.76	47.62	0	74.8	52	115	0	0		
Pyridine	14.52	9.52	47.62	0	30.5	33	158	0	0		S

Sample ID **CCV-19684** SampType: **CCV** TestCode: **625X_W** Units: **µg/L** Prep Date: Run ID: **5973G_071012A**
Client ID: **ZZZZZ** Batch ID: **19684** TestNo: **E625** Analysis Date: **10/12/2007** SeqNo: **497059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	37.52	5.00	40	0	93.8	80	120	0	0		
1,2-Dichlorobenzene	39.04	5.00	40	0	97.6	80	120	0	0		
1,2-Diphenylhydrazine	37.93	5.00	40	0	94.8	80	120	0	0		
1,3-Dichlorobenzene	38.42	5.00	40	0	96	80	120	0	0		
1,4-Dichlorobenzene	38.88	5.00	40	0	97.2	80	120	0	0		
2,4,6-Trichlorophenol	38.03	5.00	40	0	95.1	80	120	0	0		
2,4-Dichlorophenol	38.89	10.0	40	0	97.2	80	120	0	0		
2,4-Dimethylphenol	38.53	5.00	40	0	96.3	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; S - Spike Recovery outside accepted recovery limits; B - Analyte detected in the associated Method Blan.
J - Analyte detected below quantitation limits; R - RPD outside accepted recovery limits

SCOEPA00029243

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID **CCV-19684** SampType: **CCV** TestCode: **625X_W** Units: **µg/L** Prep Date: Run ID: **5973G_071012A**
Client ID: **ZZZZZ** Batch ID: **19684** TestNo: **E625** Analysis Date: **10/12/2007** SeqNo: **497059**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2,4-Dinitrophenol	33.34	10.0	40	0	83.4	80	120	0	0		
2,4-Dinitrotoluene	39.63	5.00	40	0	99.1	80	120	0	0		
2,6-Dinitrotoluene	40.05	5.00	40	0	100	80	120	0	0		
2-Chloronaphthalene	37.6	5.00	40	0	94	80	120	0	0		
2-Chlorophenol	39.86	5.00	40	0	99.7	80	120	0	0		
2-Nitrophenol	39.73	5.00	40	0	99.3	80	120	0	0		
3,3´-Dichlorobenzidine	38.9	5.00	40	0	97.3	80	120	0	0		
4,6-Dinitro-2-methylphenol	41.26	10.0	40	0	103	80	120	0	0		
4-Bromophenyl phenyl ether	38.39	5.00	40	0	96	80	120	0	0		
4-Chloro-3-methylphenol	39.59	5.00	40	0	99	80	120	0	0		
4-Chlorophenyl phenyl ether	38.54	5.00	40	0	96.4	80	120	0	0		
4-Nitrophenol	40.31	5.00	40	0	101	80	120	0	0		
Acenaphthene	36.81	5.00	40	0	92	80	120	0	0		
Acenaphthylene	36.59	5.00	40	0	91.5	80	120	0	0		
Aniline	39.86	5.00	40	0	99.7	80	120	0	0		
Anthracene	36.22	5.00	40	0	90.6	80	120	0	0		
Benz(a)anthracene	36.45	5.00	40	0	91.1	80	120	0	0		
Benzidine	43.27	5.00	40	0	108	80	120	0	0		
Benzo(a)pyrene	46.86	5.00	40	0	117	80	120	0	0		
Benzo(b)fluoranthene	45.1	5.00	40	0	113	80	120	0	0		
Benzo(g,h,i)perylene	47.57	5.00	40	0	119	80	120	0	0		
Benzo(k)fluoranthene	42.48	5.00	40	0	106	80	120	0	0		
Benzoic Acid	40.09	20.0	40	0	100	80	120	0	0		
Bis(2-chloroethoxy)methane	39.22	5.00	40	0	98	80	120	0	0		
Bis(2-chloroethyl)ether	39.75	5.00	40	0	99.4	80	120	0	0		
Bis(2-chloroisopropyl)ether	41.28	5.00	40	0	103	80	120	0	0		
Bis(2-ethylhexyl)phthalate	42.26	5.00	40	0	106	80	120	0	0		
Butyl benzyl phthalate	39.5	5.00	40	0	98.8	80	120	0	0		
Carbazole	36.28	5.00	40	0	90.7	80	120	0	0		
Chrysene	35.58	5.00	40	0	89	80	120	0	0		
Di-n-butyl phthalate	37.01	5.00	40	0	92.5	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 625X_W

Sample ID	CCV-19684	SampType:	CCV	TestCode:	625X_W	Units:	µg/L	Prep Date:		Run ID:	5973G_071012A
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	E625			Analysis Date:	10/12/2007	SeqNo:	497059

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Di-n-octylphthalate	42.27	5.00	40	0	106	80	120	0	0		
Dibenz(a,h)anthracene	46.27	5.00	40	0	116	80	120	0	0		
Diethylphthalate	38.88	5.00	40	0	97.2	80	120	0	0		
Dimethylphthalate	37.76	5.00	40	0	94.4	80	120	0	0		
Fluoranthene	35.84	5.00	40	0	89.6	80	120	0	0		
Fluorene	37.3	5.00	40	0	93.3	80	120	0	0		
Hexachlorobenzene	37.56	5.00	40	0	93.9	80	120	0	0		
Hexachlorobutadiene	37.85	5.00	40	0	94.6	80	120	0	0		
Hexachlorocyclopentadiene	39.55	5.00	40	0	98.9	80	120	0	0		
Hexachloroethane	40.4	5.00	40	0	101	80	120	0	0		
Indeno(1,2,3-cd)pyrene	46.06	5.00	40	0	115	80	120	0	0		
Isophorone	39.15	5.00	40	0	97.9	80	120	0	0		
N-Nitrosodi-n-propylamine	42.83	5.00	40	0	107	80	120	0	0		
N-Nitrosodimethylamine	38.48	5.00	40	0	96.2	80	120	0	0		
N-Nitrosodiphenylamine	36.64	5.00	40	0	91.6	80	120	0	0		
Naphthalene	36.66	5.00	40	0	91.7	80	120	0	0		
Nitrobenzene	38.13	5.00	40	0	95.3	80	120	0	0		
o-Cresol	41.78	5.00	40	0	104	80	120	0	0		
p-Cresol	17.43	5.00	20	0	87.2	80	120	0	0		
Pentachlorophenol	38.88	10.0	40	0	97.2	80	120	0	0		
Phenanthrene	35.75	5.00	40	0	89.4	80	120	0	0		
Phenol	39.36	5.00	40	0	98.4	80	120	0	0		
Pyrene	36.47	5.00	40	0	91.2	80	120	0	0		
Pyridine	41.68	10.0	40	0	104	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_W

Sample ID	MB-19701	SampType:	MBLK	TestCode:	8260_W	Units:	µg/L	Prep Date:	10/15/2007	Run ID:	5973J_071015B
Client ID:	ZZZZZ	Batch ID:	19701	TestNo:	SW8260B			Analysis Date:	10/15/2007	SeqNo:	497234

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	1.00									
1,1,1-Trichloroethane	ND	1.00									
1,1,2,2-Tetrachloroethane	ND	1.00									
1,1,2-Trichloroethane	ND	1.00									
1,1-Dichloroethane	ND	1.00									
1,1-Dichloroethene	ND	1.00									
1,1-Dichloropropene	ND	1.00									
1,2,3-Trichlorobenzene	ND	1.00									
1,2,3-Trichloropropane	ND	1.00									
1,2,4-Trichlorobenzene	1.42	1.00									
1,2,4-Trimethylbenzene	ND	1.00									
1,2-Dibromo-3-chloropropane	ND	1.00									
1,2-Dibromoethane	ND	1.00									
1,2-Dichlorobenzene	ND	1.00									
1,2-Dichloroethane	ND	1.00									
1,2-Dichloropropane	ND	1.00									
1,3,5-Trimethylbenzene	ND	1.00									
1,3-Dichlorobenzene	ND	1.00									
1,3-Dichloropropane	ND	1.00									
1,4-Dichlorobenzene	ND	1.00									
2,2-Dichloropropane	ND	1.00									
2-Butanone	ND	10.0									
2-Chlorotoluene	ND	1.00									
2-Hexanone	ND	10.0									
4-Chlorotoluene	ND	1.00									
4-Isopropyltoluene	ND	1.00									
4-Methyl-2-pentanone	ND	20.0									
Acetone	ND	50.0									
Acrylonitrile	ND	5.00									
Benzene	ND	0.300									
Bromobenzene	ND	1.00									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_W

Sample ID	MB-19701	SampType:	MBLK	TestCode:	8260_W	Units:	µg/L	Prep Date:	10/15/2007	Run ID:	5973J_071015B
Client ID:	ZZZZZ	Batch ID:	19701	TestNo:	SW8260B			Analysis Date:	10/15/2007	SeqNo:	497234

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromochloromethane	ND	1.00									
Bromodichloromethane	ND	1.00									
Bromoform	ND	1.00									
Bromomethane	ND	1.00									
Carbon disulfide	ND	2.00									
Carbon tetrachloride	ND	1.00									
Chlorobenzene	ND	1.00									
Chloroethane	ND	1.00									
Chloroform	ND	1.00									
Chloromethane	ND	1.00									
cis-1,2-Dichloroethene	ND	1.00									
cis-1,3-Dichloropropene	ND	1.00									
Dibromochloromethane	ND	1.00									
Dibromomethane	ND	1.00									
Dichlorodifluoromethane	ND	1.00									
Ethylbenzene	0.17	1.00									J
Hexachlorobutadiene	ND	1.00									
Isopropylbenzene	ND	1.00									
m,p-Xylene	ND	2.00									
Methyl tert-butyl ether	ND	1.00									
Methylene chloride	ND	20.0									
n-Butylbenzene	ND	1.00									
n-Propylbenzene	ND	1.00									
Naphthalene	ND	1.00									
o-Xylene	ND	1.00									
sec-Butylbenzene	ND	1.00									
Styrene	ND	1.00									
tert-Butylbenzene	ND	1.00									
Tetrachloroethene	ND	1.00									
Toluene	ND	1.00									
trans-1,2-Dichloroethene	ND	1.00									

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blan.

SCOEPA00029247

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_W

Sample ID **MB-19701** SampType: **MBLK** TestCode: **8260_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015B**
Client ID: **ZZZZZ** Batch ID: **19701** TestNo: **SW8260B** Analysis Date: **10/15/2007** SeqNo: **497234**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
trans-1,3-Dichloropropene	ND	1.00									
Trichloroethene	ND	1.00									
Trichlorofluoromethane	ND	1.00									
Vinyl chloride	ND	1.00									
Surr:1,2-Dichloroethane-d4	84.67	0	100	0	84.7	72.2	129	0	0		
Surr:4-Bromofluorobenzene	89.32	0	100	0	89.3	73.5	125	0	0		
Surr:Dibromofluoromethane	91.7	0	100	0	91.7	58.8	148	0	0		
Surr: Toluene-d8	113.5	0	100	0	114	79.8	137	0	0		

Sample ID **LCS-19701** SampType: **LCS** TestCode: **8260_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015B**
Client ID: **ZZZZZ** Batch ID: **19701** TestNo: **SW8260B** Analysis Date: **10/15/2007** SeqNo: **497238**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	37.38	1.00	40	0	93.4	69.9	130	0	0		
Benzene	37.8	0.300	40	0	94.5	77.9	125	0	0		
Chlorobenzene	47.18	1.00	40	0	118	82.5	114	0	0		S,O
Toluene	47.83	1.00	40	0	120	74.6	119	0	0		S,O
Trichloroethene	39.61	1.00	40	0	99	74.7	125	0	0		

Sample ID **0710073-02BMS** SampType: **MS** TestCode: **8260_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015B**
Client ID: **07-126-CE-g** Batch ID: **19701** TestNo: **SW8260B** Analysis Date: **10/15/2007** SeqNo: **497236**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	39.36	1.00	40	0	98.4	51.4	176	0	0		
Benzene	37.05	0.300	40	0	92.6	71.5	118	0	0		
Chlorobenzene	44.9	1.00	40	0	112	79.8	114	0	0		
Toluene	45.49	1.00	40	0	114	79.6	121	0	0		
Trichloroethene	37.49	1.00	40	0	93.7	73.6	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blan

SCOEPA00029248

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260_W

Sample ID **0710073-02BMSD** SampType: **MSD** TestCode: **8260_W** Units: **µg/L** Prep Date: **10/15/2007** Run ID: **5973J_071015B**
Client ID: **07-126-CE-g** Batch ID: **19701** TestNo: **SW8260B** Analysis Date: **10/15/2007** SeqNo: **497237**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	37.14	1.00	40	0	92.8	51.4	176	39.36	5.80	20	
Benzene	35.52	0.300	40	0	88.8	71.5	118	37.05	4.22	20	
Chlorobenzene	43.89	1.00	40	0	110	79.8	114	44.9	2.28	20	
Toluene	43.99	1.00	40	0	110	79.6	121	45.49	3.35	20	
Trichloroethene	35.73	1.00	40	0	89.3	73.6	120	37.49	4.81	20	

Sample ID **CCV-19701** SampType: **CCV** TestCode: **8260_W** Units: **µg/L** Prep Date: Run ID: **5973J_071015B**
Client ID: **ZZZZZ** Batch ID: **19701** TestNo: **SW8260B** Analysis Date: **10/15/2007** SeqNo: **497233**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1-Dichloroethene	37.67	1.00	40	0	94.2	80	120	0	0		
1,2-Dichloropropane	33.47	1.00	40	0	83.7	80	120	0	0		
Chloroform	34.67	1.00	40	0	86.7	80	120	0	0		
Ethylbenzene	43.26	1.00	40	0	108	80	120	0	0		
Toluene	44.04	1.00	40	0	110	80	120	0	0		
Vinyl chloride	32.89	1.00	40	0	82.2	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

SCOEPA00029249

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270LL_W

Sample ID	**MB-19684**	SampType:	**MBLK**	TestCode:	**8270LL_W**	Units:	**ug/L**	Prep Date:	**10/11/2007**	Run ID:	**5973G_071012B**
Client ID:	**ZZZZZ**	Batch ID:	**19684**	TestNo:	**SW8270D**			Analysis Date:	**10/12/2007**	SeqNo:	**497067**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	1.00									
1,2-Dichlorobenzene	ND	1.00									
1,3-Dichlorobenzene	ND	1.00									
1,4-Dichlorobenzene	ND	1.00									
2,4,5-Trichlorophenol	ND	5.00									
2,4,6-Trichlorophenol	ND	5.00									
2,4-Dichlorophenol	ND	3.00									
2,4-Dimethylphenol	ND	3.00									
2,4-Dinitrophenol	ND	10.0									
2,4-Dinitrotoluene	ND	5.00									
2,6-Dinitrotoluene	ND	5.00									
2-Chloronaphthalene	ND	1.00									
2-Chlorophenol	ND	1.00									
2-Methylnaphthalene	ND	1.00									
2-Methylphenol	ND	2.00									
2-Nitroaniline	ND	5.00									
2-Nitrophenol	ND	5.00									
3,3'-Dichlorobenzidine	0.49	5.00									J
3-&4-Methylphenol	ND	10.0									
3-Nitroaniline	ND	6.00									
4,6-Dinitro-2-methylphenol	ND	10.0									
4-Bromophenyl phenyl ether	ND	1.00									
4-Chloro-3-methylphenol	ND	2.00									
4-Chloroaniline	ND	3.00									
4-Chlorophenyl phenyl ether	ND	1.00									
4-Nitroaniline	ND	5.00									
4-Nitrophenol	ND	5.00									
Acenaphthene	ND	1.00									
Acenaphthylene	ND	1.00									
Anthracene	ND	1.00									
Benz(a)anthracene	ND	1.00									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270LL_W

Sample ID	MB-19684	SampType:	MBLK	TestCode:	8270LL_W	Units:	ug/L	Prep Date:	10/11/2007	Run ID:	5973G_071012B
Client ID:	ZZZZZ	Batch ID:	19684	TestNo:	SW8270D			Analysis Date:	10/12/2007	SeqNo:	497067

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)pyrene	0.33	1.00									J
Benzo(b)fluoranthene	ND	1.00									
Benzo(g,h,i)perylene	ND	1.00									
Benzo(k)fluoranthene	ND	1.00									
Benzoic Acid	ND	20.0									
Benzyl Alcohol	ND	5.00									
Bis(2-chloroethoxy)methane	ND	1.00									
Bis(2-chloroethyl)ether	ND	2.00									
Bis(2-chloroisopropyl)ether	ND	1.00									
Bis(2-ethylhexyl)phthalate	ND	1.00									
Butyl benzyl phthalate	ND	1.00									
Carbazole	ND	1.00									
Chrysene	ND	1.00									
Di-n-butyl phthalate	ND	1.00									
Di-n-octyl phthalate	0.68	1.00									J
Dibenz(a,h)anthracene	ND	1.00									
Dibenzofuran	ND	1.00									
Diethyl phthalate	ND	1.00									
Dimethyl phthalate	ND	1.00									
Fluoranthene	ND	1.00									
Fluorene	0.7	1.00									J
Hexachlorobenzene	ND	1.00									
Hexachlorobutadiene	ND	2.00									
Hexachlorocyclopentadiene	ND	5.00									
Hexachloroethane	ND	2.00									
Indeno(1,2,3-cd)pyrene	ND	1.00									
Isophorone	ND	1.00									
N-Nitrosodi-n-propylamine	ND	2.00									
N-Nitrosodimethylamine	ND	1.00									
N-Nitrosodiphenylamine	ND	1.00									
Naphthalene	ND	1.00									

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270LL_W

Sample ID **MB-19684** SampType: **MBLK** TestCode: **8270LL_W** Units: **ug/L** Prep Date: **10/11/2007** Run ID: **5973G_071012B**
Client ID: **ZZZZZ** Batch ID: **19684** TestNo: **SW8270D** Analysis Date: **10/12/2007** SeqNo: **497067**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrobenzene	0.32	1.00									J
Pentachlorophenol	ND	5.00									
Phenanthrene	ND	1.00									
Phenol	0.22	2.00									J
Pyrene	ND	1.00									
Pyridine	ND	5.00									
Surr:2,4,6-Tribromophenol	98.97	0	100	0	99	33.1	99.7	0	0		
Surr: 2-Fluorobiphenyl	54.81	0	100	0	54.8	33.1	96.2	0	0		
Surr: 2-Fluorophenol	51.14	0	100	0	51.1	13.4	57.1	0	0		
Surr: 4-Terphenyl-d14	79.76	0	100	0	79.8	41	122	0	0		
Surr: Nitrobenzene-d5	85.7	0	100	0	85.7	28.9	99.9	0	0		
Surr: Phenol-d6	37.82	0	100	0	37.8	10.6	38.5	0	0		

Sample ID **LCS-19684** SampType: **LCS** TestCode: **8270LL_W** Units: **ug/L** Prep Date: **10/11/2007** Run ID: **5973G_071012B**
Client ID: **ZZZZZ** Batch ID: **19684** TestNo: **SW8270D** Analysis Date: **10/12/2007** SeqNo: **497070**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	26.15	1.00	50	0	52.3	27.5	88.1	0	0		
1,4-Dichlorobenzene	21.76	1.00	50	0	43.5	27.8	80.9	0	0		
2,4-Dinitrotoluene	47.92	5.00	50	0	95.8	52.9	97.6	0	0		
2-Chlorophenol	38.91	1.00	50	0	77.8	27.8	77.9	0	0		
4-Chloro-3-methylphenol	43.92	2.00	50	0	87.8	33.5	88.5	0	0		
4-Nitrophenol	20.31	5.00	50	0	40.6	11.4	49.1	0	0		
Acenaphthene	41.57	1.00	50	0	83.1	39.8	94.2	0	0		
N-Nitrosodi-n-propylamine	53.28	2.00	50	0	107	33.9	92.1	0	0		S,O
Pentachlorophenol	41.7	5.00	50	0	83.4	43.3	113	0	0		
Phenol	18.03	2.00	50	0.22	35.6	10.4	46.1	0	0		
Pyrene	43.12	1.00	50	0	86.2	59.4	119	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270LL_W

Sample ID **0710073-02AMS** SampType: **MS** TestCode: **8270LL_W** Units: **ug/L** Prep Date: **10/11/2007** Run ID: **5973G_071012B**
Client ID: **07-126-CE-g** Batch ID: **19684** TestNo: **SW8270D** Analysis Date: **10/12/2007** SeqNo: **497069**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	14.55	0.952	47.62	0	30.6	27.5	88.1	0	0		
1,4-Dichlorobenzene	9.314	0.952	47.62	0	19.6	27.8	80.9	0	0		S
2,4-Dinitrotoluene	35.7	4.76	47.62	0	75	52.9	97.6	0	0		
2-Chlorophenol	25.43	0.952	47.62	0	53.4	27.8	77.9	0	0		
4-Chloro-3-methylphenol	33.57	1.90	47.62	0	70.5	33.5	88.5	0	0		
4-Nitrophenol	11.35	4.76	47.62	0	23.8	11.4	49.1	0	0		
Acenaphthene	30.86	0.952	47.62	0	64.8	39.8	94.2	0	0		
N-Nitrosodi-n-propylamine	36.07	1.90	47.62	0	75.7	33.9	92.1	0	0		
Pentachlorophenol	32.78	4.76	47.62	0	68.8	43.3	113	0	0		
Phenol	14.43	1.90	47.62	0.1905	29.9	10.4	46.1	0	0		
Pyrene	34.29	0.952	47.62	0	72	59.4	119	0	0		

Sample ID **CCV-19684** SampType: **CCV** TestCode: **8270LL_W** Units: **ug/L** Prep Date: Run ID: **5973G_071012B**
Client ID: **ZZZZZ** Batch ID: **19684** TestNo: **SW8270D** Analysis Date: **10/12/2007** SeqNo: **497066**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,4-Dichlorobenzene	37.51	1.00	40	0	93.8	80	120	0	0		
2,4,6-Trichlorophenol	36.3	5.00	40	0	90.8	80	120	0	0		
2,4-Dichlorophenol	39.79	3.00	40	0	99.5	80	120	0	0		
2-Nitrophenol	41.88	5.00	40	0	105	80	120	0	0		
4-Chloro-3-methylphenol	40.83	2.00	40	0	102	80	120	0	0		
Acenaphthene	36.09	1.00	40	0	90.2	80	120	0	0		
Benzo(a)pyrene	44.55	1.00	40	0	111	80	120	0	0		
Di-n-octylphthalate	38.25	1.00	40	0	95.6	80	120	0	0		
Fluoranthene	36.16	1.00	40	0	90.4	80	120	0	0		
Hexachlorobutadiene	37.89	2.00	40	0	94.7	80	120	0	0		
N-Nitrosodiphenylamine	33.57	1.00	40	0	83.9	80	120	0	0		
Pentachlorophenol	40.3	5.00	40	0	101	80	120	0	0		
Phenol	38.5	2.00	40	0	96.2	80	120	0	0		

Qualifiers: ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan

SCOEPA00029253

CLIENT: Siltronic Corporation
Work Order: 0710073
Project: Monthly

ANALYTICAL QC SUMMARY REPORT

TestCode: BOD5

Sample ID	LCS	SampType:	LCS	TestCode:	BOD5	Units:	mg/L	Prep Date:		Run ID:	SUBWET_071012A
Client ID:	ZZZZZ	Batch ID:	R48796	TestNo:	E405.1			Analysis Date:	10/12/2007	SeqNo:	498009

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Biochemical Oxygen Demand	191.5	2.00	214	0	89.5	85	115	0	0		

Sample ID	LCSD	SampType:	LCSD	TestCode:	BOD5	Units:	mg/L	Prep Date:		Run ID:	SUBWET_071012A
Client ID:	ZZZZZ	Batch ID:	R48796	TestNo:	E405.1			Analysis Date:	10/12/2007	SeqNo:	498010

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Biochemical Oxygen Demand	173.5	2.00	214	0	81.1	85	115	191.5	9.86	20	S

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blan.

KEY TO FLAGS

A This sample contains a Gasoline Range Organic not identified as a specific hydrocarbon product. The result was quantified against gasoline calibration standards.

A1 This sample contains a Diesel Range Organic not identified as a specific hydrocarbon product. The result was quantified against diesel calibration standards.

A2 This sample contains a Lube Oil Range Organic not identified as a specific hydrocarbon product. The result was quantified against a lube oil calibration standard.

A3 The result was determined to be Non-Detect based on hydrocarbon pattern recognition. The product was carry-over from another hydrocarbon type.

B The blank exhibited a positive result greater than the reporting limit for this compound.

CN See Case Narrative.

D Result is based from a dilution.

E Result exceeds the calibration range for this compound. The result should be considered as estimate.

F The positive result for this hydrocarbon is due to single component contamination. The product does not match any hydrocarbon in the fuels library.

H Sample was analyzed outside recommended hold time.

HT At clients request, sample was analyzed outside recommended hold time.

J The result for this analyte is between the MDL and the PQL and should be considered as estimated concentration.

K Diesel result is biased high due to amount of Oil contained in the sample.

L Diesel result is biased high due to amount of Gasoline contained in the sample.

M Oil result is biased high due to amount of Diesel contained in the sample.

N Gasoline result is biased high due to amount of Diesel contained in the sample.

MC Sample concentration is greater than 4x the spiked value, the spiked value is considered insignificant.

MI Result is outside control limits due to matrix interference.

MSA Value determined by Method of Standard Addition.

O Laboratory Control Standard (LCS) exceeded laboratory control limits, but meets CCV criteria. Data meets EPA requirements.

P Detection levels of Methylene Chloride may be laboratory contamination, due to previous analysis or background levels.

Q Detection levels elevated due to sample matrix.

R RPD control limits were exceeded.

RF Duplicate failed due to result being at or near the method-reporting limit.

RP Matrix spike values exceed established QC limits, post digestion spike is in control.

S Recovery is outside control limits.

SC Closing CCV or LCS exceeded high recovery control limits, but associated samples are non-detect. Data meets EPA requirements.

* The result for this parameter was greater that the maximum contaminant level of the TCLP regulatory limit.

Rev Dec 15, 2004

CHAIN OF CUSTODY RECORD

Page ____ of ____

Specialty Analytical
19761 S.W. 95th. Avenue
Tualatin, OR 97062
(503) 612-9007 - Phone
(503) 612-8572 - Fax

Contact Person/Project Manager: Tom Rothschild
Company: Sultronic
Address: 7200 NW Front Ave
Portland, Oregon 97210
Phone: 503.219-7374 Fax: 503.219-4144
Project No. ____ Project Name: Monthly
Invoice To: Accts Payable P.O. No. 4500521869

Collected By: Dianne Irish
Signature: Dianne Irish
Printed: Dianne Irish

Signature: ____
Printed: ____

Turn Around Time
☐ Normal
☒ Rush ____
Specify

Rush Analyses Must Be Scheduled With The Lab In Advance

For Laboratory Use
Lab Job No. 0M100073
Shipped Via: Specialty
Air Bill No. ____
Temperature On Receipt: Amb °C
Specialty Analytical Containers? Y / N
Specialty Analytical Trip Blanks? Y / N

Date	Time	Sample I.D.	Matrix	No. of Containers	BOD	Cr (T)	As (T)	608	624	625	1-2, Diphenylhydrazine	8270	8240		Comments	Lab I.D.
10.11.07	1320	07-126-CE-S	W	14				X	X	X	X	X	X			
10.11.07	1325	07-130-CE-E	W	2	X	X	X									

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time
Dianne Irish Company: Sultronic	10/11/07	1400	Nikki Sulton Company: Specialty	Company:		

Unless Reclaimed, Samples Will Be Disposed of 60 Days After Receipt.
Received For Lab By: Nikki Sulton Date: 10/11/07 Time: 1453

Copies: White-Original Yellow-Project File Pink-Customer Copy

BENCHSHEET

pH

Test Date: 10·16·07 Sample Date: 10·16·07 Analyst: DI

Slope: 99.7 (Range: 92 to 102%)

Standards:

4.0 mg/L: Lot #: 1603735 Date Opened: 8/18/06

7.0 mg/L: Lot #: ~~6HH~~ DI 1611562 Date Opened: 5/9/07

10.0 mg/L: Lot #: 1608475 Date Opened: 2/1/07

Sample	pH Units
① CE-composite (10·11·07)	7.1
OWW-grab @ 1300	9.9

Notes: sample kept refridgerated - DEQ split

Reference: 1. Standard Methods For The Examination of Water And Wastewater, 2005, 21st Edition, Section 4500-H^+ B page 4-90.

DEI 13 Aug 2003
DEI 01 Jun 2007 Revised

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BENCHSHEET

PHOSPHATES (PO_4)

Sample Date: 10·11·07 Analyst: DI

Note: Rinse all glassware with 1:1 HCl before using.

1. 25 ml aliquot in 50 ml Erlenmeyer flask.
2. Add one Potassium Persulfate Pillow, Hach #2451. (Hach Lot # A7144)
3. Add 2 ml H_2SO_4, 5.25 N. Swirl. (Hach Lot # A7080)
4. Gently boil for 30 minutes.
5. Cool to room temperature
6. Add 2 ml NaOH, 5.0 N. Swirl. (Hach Lot # A7087)
7. Use Hach DR/4000 Method 8190, Phosphorous Reactive, Low Range: 0-2.500 mg/L, HACH Program 3025.
8. Hach PhosVer 3 Phosphate Reagent Powder Pillow Lot # A6326.
9. DR/4000 reading: CE: 0.176 mg/L MV-3: 0.503 mg/L

   Other Sample: _____ : _____ mg/L

10. Quality Control: Spike each sample with 0.020 ml of 500 mg/L Phosphate Standard. This should increase the concentration by 1.000 mg/L.

	CE mg/L	MV-3 mg/L	
After Spike Concentration:	~~1.271~~ 1.271 DI	1.543	
% Recovery:	109.5	104	

% Recovery acceptable range: 80 - 120%

Comments: _____

Notes: NPDES Permit Limits: Both CE and MV-3 each:
Daily Maximum = 15 mg/L; Monthly Average = 10 mg/L.

References: 1. Standard Methods for the Examination of Water and Wastewater, 1998, 20th Edition, Section 4500-P B&E. page 4-142
2. NPDES Permit #101128.

TJR 27 Nov 1991
DEI 29 Sep 2005 Revised

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BENCHSHEET

FLUORIDE ANALYSIS

Test Date: 10·11·07 Sample Date: 10·11·07 Analyst: DI

Slope: -59.5 (Range: -54 to -60 mV)

Standards:

1.0 mg/L: Lot #: A7039 Date Opened: 8/10/07

10.0 mg/L: Lot #: A7072 Date Opened: 8/10/07

Data:

Sample	Fluoride, mg/L
CE (1:1)	4.98 x 2 = 9.96

Quality Control: Spike each of the above samples with 0.1 ml of 1000 mg/L Standard. The Fluoride concentration should increase by 2.0 mg/L.
Manufacturer: RICCA
Lot Number: 1707358

	CE		
After Spike Concentration:	6.9 mg/L	mg/L	mg/L
Recovery:	96 %	%	%

% Recovery acceptable range: 80 - 120%

Comments: _____

Note: NPDES permit: monthly avg. 17.4 mg/L, daily max. 32 mg/L.

References:
1. Standard Methods For The Examination of Water And Wastewater, 1998 20th Edition, Section 4500-F C, page 4-81.
2. Orion Research Manual for the Fluoride Electrode, Model 940900, 1991.
3. NPDES Permit #101128.

TJR 06 Apr 1987
DEM 09 Mar 2004 Revised

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BENCHSHEET

TOTAL SUSPENDED SOLIDS (TSS)

Sample Date: 10·11·07 Oven Temp: 106 C Analyst: DI

Date In: 10·11·07 Time In/Out: 1420 / 1140 (10·12·07)

Tin #	Sample	Vol, ml	Gross Wt, g	Tare Wt, g	TSS, mg/L
13	Blank	NA	0.0887	0.0887	
14	CE	500	0.0922	0.0919	0.6
15	CE	500	0.0895	0.0893	0.4
				Average CE TSS	0.5
16	OWW	100	0.0963	0.0889	74
17	OWW	100	0.0967	0.0898	69
				Average OWW TSS	71.5
				Average TSS	
				Average TSS	

Comments: _____

Calculation: TSS, mg/L = $\frac{\text{(Gross Wt, g - Tare Wt, g) X 1,000,000}}{\text{Volume of Sample, ml}}$

Note: NPDES permit: monthly avg. 23 mg/L, daily max. 61 mg/L.
POTW permit: daily max 350 mg/L.

Reference: 1. Standard Methods for the Examination of Water and Wastewater, 2005, 21st Edition, Section 2540 D, page 2-58.
2. National Pollution Discharge Elimination System Permit #101128.

TJR 21 Mar 1987
DEI 01 Jun 2007 Revised

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City, State: Portland, Oregon 97204-1390

054

PS Form 3800, August 2006 See Reverse for Instructions

SCOEPA00029261

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

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Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Randy Oman ☐ Agent ☐ Addressee

B. Received by (Printed Name) Randy Oman
C. Date of Delivery 10-11-7

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

OCT 11 2007

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7004 1160 0003 7254 7595

PS Form 3811, February 2004 Domestic Return Receipt #054 102595-02-M-1540

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Siltronic Corporation
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SCOEPA00029263

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2020 SW 4th Ave., Suite 400
City, State: Portland, OR 97201-4987

054

PS Form ... Instructions

SCOEPA00029264

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
x DEQ/NWR ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) OCT 11 2007 C. Date of Delivery

D. Is delivery address different from Item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

DEQ/NWR

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number (*Transfer from service label*) 7004 1160 0003 7254 7588

PS Form 3811, February 2004 Domestic Return Receipt #054 102595-02-M-1540

UNITED STATES POSTAL SERVICE
PORTLAND OR 972
11 OCT 2007 PM 5 T

First Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

PERMIT ... NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 001 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	9	1	TO	2007	9	30
	(30-31)	(32-33)	(34-35)		(36-37)	(38-39)	(40-41)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Process Waste Water Flow	SAMPLE MEASUREMENT	3,447	3,702	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--			totalizing	recorder
BOD	SAMPLE MEASUREMENT	20.4	25.9	kg/day	--	6.0	8.1	mg/L		1/7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	7.7	11.1	kg/day	--	2.3	3.1	mg/L		1/7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	<0.004	kg/day	--	<0.001	<0.001	mg/L		1/7	24HC
	PERMIT REQUIREMENT	0.2	0.6		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	24.7	26.5	kg/day	--	7.2	7.7	mg/L		1/7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.2	mg/L		1/7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. [illegible]

Siltronic Corp. by: [signature]

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503, NUMBER 243-2020

DATE: YEAR 07, MO 10, DAY 9

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outages: none

SCOEPA00029267

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-23)	MO (22-23)	DAY (24-25)	TO YEAR (26-29)	MO (28-29)	DAY (30-31)
2007	9	1	2007	9	30

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-66)	FREQUENCY OF ANALYSIS (67-68)	SAMPLE TYPE (69-70)
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					1.0	2.8	NTC		6/1	Grab
	PERMIT REQUIREMENT									One sample every 4 hours	
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319. [illegible]

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503, NUMBER 243-2020

DATE: YEAR 07, MO 10, DAY 9

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029268

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)
NAME: Siltronic Corporation
ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

Site ID 93450

FACILITY
LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) 101128 — PERMIT NUMBER
(17-19) Outfall 002 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	9	1	TO	2007	9	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	(54-61) AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MV-3 Flow	SAMPLE MEASUREMENT	999	2,135	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.2	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER
Tom McCue
Environmental Manager
TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC 1001 AND 33 USC 1319. (Penalties under these statutes may include fines up to $10,000 and/or imprisonment of between 6 months and 5 years.)

Siltronic Corp. by:
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	07	10	9
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029269

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 003

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (30-31)	MO (32-33)	DAY (34-35)	TO YEAR (36-37)	MO (38-39)	DAY (40-41)
2007	9	1	2007	9	30

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	4,446	5,584	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	79.1	°F		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	6.21	7.29	7.87			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC § 1001 AND 33 USC § 1319

Siltronic Corp by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	10	9

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029270

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
September-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	5.4	19.36	3.1	11.1	7.4	26.53	0.099	0.355	0.0005	0.0018	0.000	0.000	0.000	0.000
13	8.1	25.9	3.1	9.9	6.6	21.09	0.202	0.645	0.0005	0.0016	0.000	0.000	0.000	0.000
20	6.0	20.8	1.4	4.8	7.3	25.11	0.133	0.459	0.0005	0.0017	0.000	0.000	0.000	0.000
27	4.6	15.7	1.5	5.1	7.7	26.23	0.093	0.317	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3449	1	1.3	1	7.8
2	3702	2	1.3	2	7.9
3	3699	3	1.4	3	7.4
4	3373	4	1.2	4	8.0
5	3377	5	1.4	5	7.4
6	3585	6	1.0	6	7.2
7	3441	7	1.2	7	7.8
8	3449	8	1.1	8	7.4
9	3490	9	0.8	9	8.0
10	3381	10	0.8	10	8.0
11	3524	11	1.0	11	7.8
12	3445	12	1.0	12	7.8
13	3195	13	1.3	13	7.6
14	3263	14	1.5	14	7.9
15	3403	15	0.9	15	8.0
16	3479	16	1.1	16	8.0
17	3672	17	0.9	17	8.3
18	3589	18	1.0	18	8.2
19	3399	19	0.8	19	7.9
20	3449	20	0.8	20	8.0
21	3422	21	0.7	21	7.5
22	3354	22	1.0	22	7.9
23	3229	23	0.7	23	7.9
24	3271	24	1.0	24	7.9
25	3331	25	0.7	25	7.9
26	3555	26	0.8	26	7.7
27	3407	27	0.7	27	8.1
28	3452	28	0.8	28	8.1
29	3555	29	0.8	29	8.2
30	3471	30	0.5	30	8.2
31		31		31	
Total:	103412				

(002) DAILY FLOW'S	
Day	M^3
1	920
2	1060
3	882
4	920
5	1340
6	496
7	977
8	927
9	810
10	878
11	1204
12	545
13	946
14	905
15	1196
16	1242
17	1291
18	401
19	1158
20	2135
21	890
22	969
23	859
24	1011
25	1079
26	1086
27	723
28	1113
29	1007
30	996
31	
Total:	29967

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.191	0.000	0.000
0.068	0.000	0.000
0.090	0.000	0.000
0.035	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			DATE	Telephone
Tom McCue	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	for Siltronic	10/9/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

7003 2260 0003 1472 9987

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Sent To Dr. Elliot Zais
Street, Water Quality Source Control, DEQ
or PO B 2020 SW 4th Ave., Suite 400
City, St Portland, OR 97201-4987

49

PS Form ... ctions

SCOEPA00029272

7003 2260 0003 7472 9970

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$

Postmark Here

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

49

for instructions

SCOEPA00029273

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X DEQ/NWR ☐ Agent ☐ Addressee

B. Received by (Printed Name) | C. Date of Delivery
SEP 7 2007

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number
(Transfer from service label) 7003 2260 0003 1472 9987

PS Form 3811, February 2004 Domestic Return Receipt 49 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210-3676

M/S 30

SCOEPA00029275

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Randy Oman
☐ Agent
☐ Addressee

B. Received by (Printed Name) Randy Oman
C. Date of Delivery 9/7/7

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7003 2260 0003 1472 9970

PS Form 3811, February 2004 Domestic Return Receipt 49 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029277

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	8	1	TO	2007	8	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Process Waste Water Flow	SAMPLE MEASUREMENT	4,475	35,433	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--			totalizing recorder	
BOD	SAMPLE MEASUREMENT	8.6	14.4	kg/day	--	2.5	4.2	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	8.3	11.9	kg/day	--	2.4	3.5	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	<0.004	kg/day	--	<0.001	<0.001	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	0.2	0.6		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	24.5	31.7	kg/day	--	7.1	9.4	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.2	0.2	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and imprisonment of between 6 months and 5 years.)

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503 NUMBER 243-2020

DATE: YEAR 07 MO 9 DAY 5

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outages: 6 minutes @ 11.65.

SCOEPA00029278

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: 101128

(17-19) DISCHARGE NUMBER: Outfall 001

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	8	1	TO	2007	8	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					0.7	2.8	NTC		6/1	Grab
	PERMIT REQUIREMENT									One sample every 4 hours	
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 per violation, imprisonment of between 6 months and 5 years.)

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503, NUMBER 243-2020

DATE: YEAR 07, MO 9, DAY 5

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029279

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

PERMIT NUMBER (2-16)	DISCHARGE NUMBER (17-19)
101128	Outfall 002

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	8	1	TO	2007	8	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MV-3 Flow	SAMPLE MEASUREMENT	757	999	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.3	0.5	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

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Siltronic Corp. By:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	07	9	5
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029280

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-18) DISCHARGE NUMBER
101128	Outfall 003

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	8	1	TO	2007	8	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	5,231	36,179	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	80.6	°F		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	6.50	7.22	11.65			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	07	9	5
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029281

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
August-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	1.0	3.40	3.5	11.9	4.6	15.59	0.229	0.778	0.0005	0.0017	0.000	0.000	0.000	0.000
10	2.0	7.1	1.9	6.8	8.3	29.54	0.113	0.402	0.0005	0.0018	0.000	0.000	0.000	0.000
16	2.1	7.1	3.4	11.4	9.4	31.67	0.238	0.801	0.0005	0.0017	0.000	0.000	0.000	0.000
23	3.2	11.1	1.4	4.9	6.6	22.92	0.102	0.355	0.0005	0.0017	0.000	0.000	0.000	0.000
27	4.2	14.4	1.9	6.5	6.8	22.95	0.109	0.371	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3498	1	0.6	1	7.6
2	3396	2	0.6	2	7.3
3	3384	3	0.6	3	7.6
4	2862	4	0.6	4	7.4
5	3558	5	0.7	5	7.7
6	3661	6	0.5	6	7.9
7	3767	7	0.6	7	7.9
8	3536	8	0.7	8	7.7
9	3672	9	0.8	9	7.6
10	3558	10	0.7	10	7.4
11	3301	11	0.5	11	7.5
12	4221	12	0.5	12	7.7
13	3611	13	1.3	13	7.4
14	2423	14	0.8	14	7.4
15	3494	15	2.0	15	7.3
16	3365	16	1.3	16	7.6
17	3312	17	0.9	17	7.5
18	3396	18	0.8	18	7.7
19	35433	19	0.7	19	7.9
20	3210	20	0.7	20	8.1
21	3388	21	0.6	21	7.7
22	3407	22	0.6	22	7.7
23	3483	23	0.6	23	7.6
24	3528	24	0.5	24	7.7
25	3718	25	0.5	25	7.8
26	3210	26	0.5	26	7.5
27	3399	27	0.5	27	7.7
28	3566	28	0.7	28	7.8
29	3354	29	0.6	29	7.9
30	3521	30	0.7	30	7.7
31	3490	31	0.8	31	7.6
Total:	138725				

(002) DAILY FLOW'S	
Day	M^3
1	572
2	575
3	481
4	715
5	863
6	541
7	750
8	549
9	602
10	602
11	909
12	693
13	897
14	712
15	591
16	670
17	617
18	727
19	746
20	553
21	772
22	988
23	893
24	946
25	909
26	958
27	946
28	969
29	999
30	848
31	859
Total:	23452

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.213	0.000	0.000
0.489	0.000	0.000
0.485	0.000	0.000
0.295	0.000	0.000
0.250	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	[signature] for Siltronic	DATE	Telephone
Tom McCue		9/5/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

7003 2260 0003 1472 9888

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

Sent To Dr. Elliot Zais
Street, or PO Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
City, St Portland, OR 97201-4987

PS Form ... uctions

SCOEPA00029283

7003 2260 0003 1472 9895

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

Sent To Oregon DEQ
WQ-DMR Processing
Street, A 811 SW 6th Ave.
or PO Bo
City, Sta Portland, Oregon 97204-1390

PS Form ... ctions

SCOEPA00029284

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature]
☐ Agent
☐ Addressee

B. Received by (Printed Name)

C. Date of Delivery
8-10-7

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number
(Transfer from service label) 7003 2260 0003 1472 9895

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

SCOEPA00029285

UNITED STATES POSTAL SERVICE

PORTLAND OR 972
AUG 10 2007
PM

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029286

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by *(Printed Name)*
C. Date of Delivery AUG 10 2007

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

DEQ/NWR

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number
(Transfer from service label) 7003 2260 0003 1472 9888

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE PORTLAND OR 972

10 AUG 2007 PM 3 T

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

576

SCOEPA00029288

SUBMITTER NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 001 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	7	1	TO	2007	7	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Process Waste Water Flow	SAMPLE MEASUREMENT	3,425	4,039	m^3/day	--	--	--	--		Continuous totalizing recorder	
	PERMIT REQUIREMENT	--	--		--	--	--				
BOD	SAMPLE MEASUREMENT	11.8	19.6	kg/day	--	3.6	6.0	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	7.8	13.4	kg/day	--	2.3	3.5	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	<0.004	kg/day	--	<0.001	<0.001	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	0.2	0.6		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	25.0	29.8	kg/day	--	7.4	8.1	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.2	0.3	mg/L		1/ 7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503 NUMBER 243-2020

DATE: YEAR 07 MO 8 DAY 7

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outages: 2 on 7/5/07: 1st: 39 mins @ pH 11.3, 2nd: 15 mins @ pH 10.79.

SCOEPA00029289

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-18): Outfall 001 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (38-41)	MO (42-45)	DAY (46-49)	TO YEAR (50-53)	MO (54-57)	DAY (58-61)
2007	7	1	2007	7	31

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PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					1.5	83.3	NTC		6/1	Grab
	PERMIT REQUIREMENT									One sample every 4 hours	
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503 NUMBER 243-2020

DATE: YEAR 07 MO 8 DAY 7

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029290

COMPANY NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

PERMIT NUMBER (2-16): 101128

DISCHARGE NUMBER (17-19): Outfall 002

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OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-21)	MO (22-23)	DAY (24-25)	TO YEAR (26-27)	MO (28-29)	DAY (30-31)
2007	7	1	2007	7	31

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	MAXIMUM (54-61)	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MV-3 Flow	SAMPLE MEASUREMENT	581	1,022	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.2	0.2	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319 (Penalties under these statutes are multiple fines up to $10,000 and a maximum imprisonment of between 6 months and 5 years.)

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	8	7

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029291

COMPANY NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 003 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	7	1	TO	2007	7	31
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	4,006	4,804	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	80.1	°F		1/7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	6.17	7.13	11.30			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE ACCURATE AND COMPLETE I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 USC 1001 AND 33 USC 1319 (Penalties under these statutes are certain fines up to $10,000 and a maximum imprisonment of between 6 months and 5 years.)

Siltronic Corp by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	07	8	7
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029292

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 Permit Number: 101128
7200 NW Front Avenue July-07 Discharge Data
Portland, Oregon 97210-3676

Outfal # 001												
Date	BOD mg/L	BOD Weekly Loading kg	TSS mg/L	TSS Weekly Loading kg	Fluoride mg/L	Fluoride Weekly Loading kg	Total Cr mg/L	Total Cr Weekly Loading kg	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	4.3	14.60	1.2	4.1	6.4	21.7	0.0005	0.0017	0.000	0.000	0.000	0.000
12	6.0	19.6	1.5	4.9	7.2	23.5	0.0005	0.0016	0.000	0.000	0.000	0.000
19	2.9	9.0	2.9	9.0	8.1	25.2	0.0005	0.0016	0.000	0.000	0.000	0.000
26	1.0	3.8	3.5	13.4	7.8	29.8	0.0005	0.0019	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3381	1	0.7	1	8.0
2	3248	2	0.6	2	7.8
3	3509	3	0.6	3	7.7
4	3407	4	0.5	4	7.6
5	3396	5	0.6	5	7.7
6	3362	6	0.6	6	7.6
7	3396	7	0.8	7	7.3
8	3558	8	0.7	8	7.1
9	3630	9	23.2	9	7.8
10	3195	10	1.4	10	7.4
11	3328	11	0.8	11	7.2
12	3263	12	0.6	12	7.4
13	3521	13	2.1	13	7.4
14	3373	14	1.0	14	7.5
15	3172	15	0.9	15	7.5
16	3206	16	0.6	16	7.3
17	3452	17	0.7	17	7.6
18	3312	18	0.5	18	8.0
19	3108	19	0.7	19	8.1
20	3297	20	0.7	20	7.7
21	3449	21	0.6	21	7.8
22	3577	22	0.7	22	7.7
23	3649	23	0.8	23	7.7
24	3702	24	1.3	24	8.1
25	3543	25	0.8	25	7.8
26	3820	26	0.6	26	7.4
27	4039	27	0.6	27	7.6
28	3687	28	0.5	28	7.1
29	3490	29	0.5	29	7.4
30	3233	30	0.5	30	7.5
31	2862	31	0.6	31	7.7
Total:	106167				

(002) DAILY FLOW'S	
Day	M^3
1	511
2	295
3	458
4	450
5	447
6	685
7	697
8	628
9	647
10	598
11	700
12	644
13	593
14	618
15	587
16	541
17	587
18	1022
19	572
20	500
21	413
22	674
23	564
24	439
25	613
26	534
27	765
28	333
29	780
30	541
31	575
Total:	18012

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.219	0.000	0.000
0.147	0.000	0.000
0.249	0.000	0.000
0.213	0.000	0.000

Koreen Lail
Environmental Engineer

Siltronic Corporation
7200 NW Front Avenue, MS 20
Portland OR 97210-3676, USA
Tel. 503-219-7994
Fax 503-219-7599
Koreen.lail@siltronic.com

Date: 7/6/2007

From: LAIL

RE: 7/5/07 WWTP OUTAGE

On 7/5/07, the Waste Water Treatment Plant incurred two outages to the river. The first excursion began at 10:43 a.m. and ended at 11:22 a.m. The peak pH during that time period was 11.3. The second outage began at 11:56 a.m. and ended at 12:11 p.m. The peak pH for that time period was 10.79. The total combined time for both excursions was 54 minutes.

These outages were the result of a failure of a pH probe and an acid pump. Prior to the initial outage, the WAD 3 neutralization tank's pH probe underwent its weekly calibration. The technician noted that the probe was acting sluggishly but it did come into calibration. He replaced it back into the tank and proceeded to calibrate other probes. During that time, the pH probe failed to a reading of 5.0. This failure caused excess caustic to be dumped into the WAD 3 neutralization tank. This excess chemical addition wasn't noticed until after the outfall alarm sounded.

After making some system adjustments, the Waste Treatment Operators ascertained that they would not be able to get this excursion quickly under control. They then valved off the effluent flow to the outfall for 36 minutes while valving in the WAD 2 neutralization tank as a bypass. (The WAD 2 neutralization tank was running at a pH of approximately 7.6). The WAD 2 neutralization tank was valved to the outfall at 11:56 a.m. This action triggered another excursion of 15 minutes due to effluent being trapped in the pipes and sand filters from the initial outfall excursion and by the failure of the WAD 2 acid pump.

While the outfall pH was being brought back to normal levels, the WAD 3 pH probe was changed out and the tank was neutralized to a normal pH before being put back into service.

Actions that are being taken to avoid future occurrences of this problem include a complete root-cause analysis and follow-up of any corrective actions identified during the review. Action items will be tracked via the AR database.

kl

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Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

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- Print your name and address on the reverse so that we can return the card to you.
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1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X

☐ Agent
☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

DEQ/NWR

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

AUG 30 2007

3. Service Type
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☐ Registered ☐ Return Receipt for Merchandise
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PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

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Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029297

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WQ-DMR Processing
Street, Apt. No., or PO Box No.
811 SW 6th Ave.
City, State, ZIP+4
Portland, Oregon 97204-1390

PS Form 3800, August 2006 See Reverse for Instructions

SCOEPA00029298

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by (Printed Name)

C. Date of Delivery
8/31/7

D. Is delivery address different from Item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number
(Transfer from service label) 7003 2260 0003 1472 9949

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jan-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
9	5.0	16.64	16.5	54.9	8.0	26.7	0.076	0.250	0.0005	0.0017	0.000	0.000	0.000	0.000
15	6.0	22.3	7.5	27.9	6.9	25.7	0.046	0.170	0.0005	0.0019	0.000	0.000	0.000	0.000
22	6.0	20.5	9.8	33.5	6.5	22.0	0.086	0.290	0.0005	0.0017	0.000	0.000	0.000	0.000
29	7.0	25.4	6.8	24.7	6.9	24.9	0.124	0.450	0.001	0.0036	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M3	Day	NTU's	Day	pH
1	3823	1	5.0	1	8.0
2	3521	2	3.2	2	7.8
3	5584	3	3.6	3	8.1
4	4584	4	3.8	4	7.8
5	3407	5	4.3	5	8.0
6	3911	6	6.4	6	7.9
7	3331	7	1.6	7	8.1
8	3138	8	3.1	8	8.3
9	3328	9	4.8	9	8.2
10	3899	10	3.0	10	8.1
11	3721	11	3.7	11	7.9
12	3820	12	3.2	12	7.5
13	3755	13	4.0	13	7.6
14	3786	14	5.6	14	7.5
15	3717	15	6.8	15	7.6
16	3502	16	5.3	16	7.9
17	3638	17	3.1	17	7.8
18	3941	18	4.1	18	8.0
19	3865	19	5.5	19	7.9
20	3861	20	4.2	20	7.8
21	3861	21	3.4	21	7.7
22	3415	22	3.1	22	7.8
23	3059	23	3.9	23	7.8
24	4062	24	4.0	24	7.8
25	3699	25	3.8	25	7.7
26	3714	26	3.0	26	7.8
27	3876	27	2.9	27	7.8
28	3600	28	3.6	28	8.0
29	3630	29	2.8	29	7.8
30	3596	30	2.4	30	7.9
31	3774	31	3.8	31	8.2
Total:	116419				

(002) DAILY FLOWS	
Day	M3
1	666
2	288
3	647
4	541
5	367
6	719
7	731
8	220
9	269
10	1208
11	1033
12	848
13	1367
14	1204
15	1132
16	1302
17	1397
18	799
19	1079
20	1052
21	1052
22	1806
23	678
24	1234
25	1064
26	1075
27	1287
28	1484
29	734
30	1139
31	1079
Total:	29501

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl2 Free Available Daily Max mg/L	Cl2 Free Available Monthly Avg. mg/L
0.124	0.000	0.000
0.204	0.000	0.000
0.18	0.000	0.000
0.123	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Roger Lagal for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Feb-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	5.0	16.86	10.1	34.1	5.3	17.9	0.091	0.310	0.0005	0.0017	0.000	0.000	0.000	0.000
12	3.0	11.4	3.2	12.1	6.2	23.5	0.130	0.490	0.0005	0.0019	0.000	0.000	0.000	0.000
19	6.4	24.5	12.1	46.3	5.5	20.9	0.136	0.520	0.0005	0.0019	0.000	0.000	0.000	0.000
26	6.0	19.2	8.7	27.9	9.6	30.7	0.062	0.200	0.001	0.0032	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	4032	1	4.4	1	8.2
2	3468	2	3.2	2	8.1
3	3748	3	3.2	3	7.7
4	3630	4	3.5	4	7.5
5	3373	5	3.3	5	7.6
6	3699	6	3.6	6	7.8
7	3187	7	2.5	7	7.7
8	3642	8	2.4	8	7.7
9	3642	9	3.1	9	7.7
10	3502	10	4.3	10	7.9
11	3702	11	4.2	11	7.7
12	3786	12	4.5	12	7.6
13	3460	13	4.5	13	7.8
14	3786	14	5.2	14	8.0
15	3441	15	4.5	15	8.0
16	3668	16	4.1	16	8.1
17	3971	17	4.3	17	7.7
18	3293	18	6.0	18	7.8
19	3823	19	5.8	19	7.8
20	3683	20	6.0	20	7.9
21	3744	21	4.9	21	7.8
22	3634	22	4.4	22	7.9
23	3498	23	3.8	23	7.7
24	3464	24	4.0	24	7.5
25	3210	25	3.8	25	7.6
26	3203	26	3.3	26	8.0
27	3437	27	3.4	27	7.9
28	3134	28	3.0	28	7.9
29	3365	29	3.1	29	7.9
Total:	103226				

(002) DAILY FLOW'S	
Day	M^3
1	1079
2	1677
3	1143
4	1363
5	1647
6	507
7	935
8	1121
9	1325
10	924
11	973
12	992
13	1416
14	1026
15	837
16	1139
17	765
18	973
19	1052
20	1113
21	1325
22	1545
23	1170
24	1333
25	848
26	541
27	958
28	1003
29	1166
Total:	31894

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.164	0.000	0.000
0.04	0.000	0.000
0.201	0.000	0.000
0.079	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Karen Lail for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Mar-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	7.0	23.29	5.3	17.6	7.4	24.7	0.072	0.530	0.0005	0.0017	0.000	0.000	0.000	0.000
11	5.0	17.0	10.5	35.6	8.5	28.7	0.151	1.130	0.0005	0.0017	0.000	0.000	0.000	0.000
18	3.0	8.5	6.7	18.9	8.6	24.4	0.081	0.500	0.0005	0.0014	0.000	0.000	0.000	0.000
24	5.0	16.3	6.6	21.5	6.5	21.1	0.078	0.500	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3297	1	3.1	1	7.8
2	3551	2	2.6	2	7.6
3	3362	3	3.4	3	7.7
4	3328	4	4.1	4	7.6
5	3346	5	3.2	5	7.6
6	3240	6	3.6	6	7.7
7	3384	7	3.0	7	8.0
8	3411	8	2.8	8	7.9
9	3248	9	3.8	9	7.9
10	3434	10	3.2	10	7.8
11	3392	11	2.8	11	7.6
12	3301	12	2.8	12	7.3
13	3418	13	3.3	13	7.5
14	3127	14	3.7	14	7.6
15	3218	15	3.0	15	7.5
16	3441	16	3.1	16	7.8
17	3240	17	2.7	17	7.5
18	2828	18	2.7	18	7.6
19	3017	19	3.0	19	7.4
20	3237	20	3.9	20	7.6
21	3399	21	2.3	21	7.6
22	3540	22	3.0	22	7.7
23	3176	23	3.4	23	7.5
24	3263	24	4.5	24	7.6
25	3630	25	2.7	25	7.8
26	3112	26	3.3	26	7.8
27	4024	27	3.8	27	7.7
28	3593	28	3.7	28	7.4
29	3536	29	3.0	29	7.5
30	3797	30	3.3	30	7.4
31	3320	31	2.9	31	7.7
Total:	104210				

(002) DAILY FLOWS	
Day	M^3
1	984
2	1064
3	897
4	1287
5	1124
6	2722
7	1351
8	935
9	962
10	973
11	1060
12	1151
13	1700
14	901
15	1200
16	1090
17	1075
18	1257
19	765
20	1090
21	878
22	969
23	999
24	848
25	1416
26	1056
27	958
28	863
29	1215
30	1124
31	890
Total:	34805

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.183	0.000	0.000
0.142	0.000	0.000
0.057	0.000	0.000
0.061	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Kyleen Lowe for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Apr-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	6.0	18.90	19.5	61.4	8.9	27.9	0.110	0.346	0.001	0.0031	0.000	0.000	0.000	0.000
8	5.0	17.6	4.6	16.2	8.2	29.0	0.072	0.254	0.001	0.0035	0.000	0.000	0.000	0.000
15	7.0	26.4	6.1	23.0	7.4	27.7	0.068	0.256	0.0005	0.0019	0.000	0.000	0.000	0.000
22	6.0	22.3	5.8	21.5	7.0	26.0	0.088	0.326	0.0005	0.0019	0.000	0.000	0.000	0.000
29	5.0	16.7	4.8	16.0	6.0	20.2	0.074	0.247	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3150	1	4.8	1	7.8
2	3354	2	7.1	2	7.7
3	3600	3	2.8	3	7.5
4	3365	4	3.6	4	7.5
5	3369	5	2.6	5	7.5
6	3403	6	2.7	6	7.6
7	3381	7	3.3	7	7.7
8	3528	8	2.7	8	7.5
9	3513	9	2.6	9	7.7
10	3320	10	2.1	10	7.3
11	3381	11	2.6	11	7.6
12	3763	12	3.1	12	7.7
13	3555	13	2.7	13	7.5
14	3589	14	2.3	14	7.9
15	3767	15	2.4	15	7.5
16	3513	16	1.8	16	7.4
17	3547	17	2.8	17	7.6
18	3384	18	2.9	18	7.8
19	3218	19	2.6	19	8.0
20	3381	20	2.2	20	8.0
21	3540	21	4.1	21	7.7
22	3710	22	2.5	22	7.5
23	3585	23	2.4	23	7.4
24	3278	24	3.7	24	7.8
25	3502	25	2.9	25	7.9
26	3449	26	3.0	26	7.9
27	3638	27	3.4	27	8.3
28	3483	28	3.1	28	7.5
29	3339	29	3.6	29	7.8
30	3540	30	3.4	30	7.4
Total:	104142				

(002) DAILY FLOW'S	
Day	M^3
1	950
2	1408
3	1132
4	1056
5	863
6	1102
7	1068
8	909
9	1015
10	897
11	992
12	1033
13	916
14	1386
15	318
16	666
17	2109
18	424
19	299
20	534
21	549
22	2033
23	341
24	496
25	295
26	360
27	439
28	439
29	469
30	238
Total:	24735

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.057	0.000	0.000
0.16	0.000	0.000
0.048	0.000	0.000
0.072	0.000	0.000
0.076	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Kreen Lail for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
May-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	4.0	13.67	1.3	4.4	8.2	27.9	0.126	0.430	0.0005	0.0017	0.000	0.000	0.000	0.000
13	4.0	13.9	4.6	16.0	7.0	24.5	0.095	0.330	0.0005	0.0017	0.000	0.000	0.000	0.000
20	5.0	17.6	3.4	11.9	7.5	26.4	0.045	0.160	0.0005	0.0018	0.000	0.000	0.000	0.000
27	5.0	16.2	2.4	7.8	5.5	17.9	0.078	0.250	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3570	1	3.2	1	7.7
2	3176	2	5.7	2	7.7
3	3524	3	4.4	3	7.7
4	3524	4	4.6	4	7.8
5	3437	5	5.1	5	7.6
6	3418	6	2.5	6	7.7
7	3195	7	3.0	7	7.8
8	3668	8	3.2	8	8.1
9	3562	9	3.0	9	7.8
10	3316	10	3.0	10	7.9
11	3494	11	3.0	11	7.7
12	2922	12	3.1	12	7.8
13	3487	13	3.9	13	8.0
14	3547	14	4.1	14	8.0
15	3381	15	3.9	15	6.8
16	3169	16	3.0	16	7.7
17	3206	17	6.3	17	7.9
18	2862	18	3.9	18	7.5
19	3138	19	3.6	19	7.7
20	3513	20	5.0	20	7.9
21	3653	21	4.8	21	8.1
22	3309	22	4.3	22	7.7
23	3214	23	5.2	23	7.5
24	3290	24	5.2	24	7.6
25	2888	25	3.5	25	7.7
26	3460	26	4.4	26	7.6
27	3240	27	5.2	27	7.5
28	3346	28	3.8	28	7.6
29	3517	29	2.3	29	7.8
30	3097	30	2.9	30	7.9
31	3627	31	2.6	31	7.8
Total:	103752				

(002) DAILY FLOWS	
Day	M^3
1	295
2	549
3	329
4	246
5	295
6	515
7	299
8	288
9	454
10	397
11	291
12	295
13	746
14	333
15	360
16	314
17	288
18	602
19	333
20	299
21	329
22	481
23	341
24	257
25	299
26	280
27	704
28	719
29	424
30	488
31	757
Total:	12610

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.089	0.000	0.000
0.052	0.000	0.000
0.044	0.000	0.000
0.064	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Brent Saed for Siltronic	DATE 8/28/07	Telephone
Tom McCue				503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jun-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
3	5.0	17.38	4.6	16.0	4.8	16.7	0.069	0.240	0.001	0.0035	0.000	0.000	0.000	0.000
10	4.0	10.4	7.0	18.2	5.0	13.0	0.116	0.302	0.0005	0.0013	0.000	0.000	0.000	0.000
17	4.0	13.3	3.5	11.7	7.6	25.3	0.095	0.317	0.0005	0.0017	0.000	0.000	0.000	0.000
24	3.0	9.2	5.4	16.6	8.9	27.4	0.127	0.391	0.0005	0.0015	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	2979	1	2.4	1	7.8
2	3233	2	2.5	2	7.7
3	3475	3	2.4	3	7.7
4	3555	4	2.2	4	7.5
5	3244	5	5.0	5	7.9
6	3335	6	3.5	6	8.0
7	3483	7	5.3	7	7.9
8	3869	8	7.6	8	8.2
9	3059	9	9.2	9	8.1
10	2605	10	2.8	10	8.1
11	3028	11	2.4	11	7.9
12	3100	12	1.7	12	7.7
13	2763	13	2.3	13	7.9
14	3411	14	2.5	14	7.7
15	3271	15	2.4	15	7.7
16	3089	16	2.9	16	7.9
17	3335	17	3.7	17	7.9
18	2892	18	1.8	18	7.8
19	3070	19	2.4	19	7.9
20	2975	20	2.7	20	7.9
21	3335	21	7.7	21	7.8
22	3369	22	3.7	22	7.7
23	3161	23	3.6	23	7.7
24	3078	24	3.1	24	7.8
25	3222	25	3.0	25	7.8
26	3282	26	2.7	26	7.9
27	3305	27	3.0	27	7.5
28	3203	28	3.1	28	7.8
29	2707	29	3.6	29	7.4
30	3153	30	3.9	30	7.6
Total:	95587				

(002) DAILY FLOW'S	
Day	M^3
1	424
2	768
3	371
4	806
5	405
6	435
7	360
8	435
9	454
10	568
11	492
12	303
13	613
14	405
15	363
16	613
17	360
18	273
19	591
20	193
21	409
22	375
23	314
24	344
25	454
26	329
27	397
28	352
29	413
30	261
Total:	12882

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.075	0.000	0.000
0.07	0.000	0.000
0.099	0.000	0.000
0.084	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Roger Gael for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jul-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	8.0	25.14	0.2	0.6	8.6	27.0	0.105	0.330	0.0005	0.0016	0.000	0.000	0.000	0.000
8	3.0	9.0	0.6	1.8	7.7	23.0	0.054	0.160	0.0005	0.0015	0.000	0.000	0.000	0.000
13	0.6	2.0	1.3	4.3	7.1	23.5	0.143	0.470	0.0005	0.0017	0.000	0.000	0.000	0.000
22	1.5	3.9	0.6	1.6	5.2	13.5	0.073	0.190	0.0005	0.0013	0.000	0.000	0.000	0.000
29	1.5	4.2	0.6	1.7	6.3	17.7	0.114	0.320	0.0005	0.0014	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3142	1	3.4	1	7.7
2	3180	2	3.7	2	8.0
3	3524	3	4.0	3	7.8
4	3066	4	4.7	4	8.0
5	3199	5	3.7	5	7.9
6	3123	6	4.4	6	7.7
7	3123	7	4.3	7	8.1
8	2987	8	3.9	8	7.9
9	2729	9	4.3	9	7.9
10	3184	10	5.0	10	7.7
11	3335	11	5.0	11	7.9
12	2987	12	5.0	12	8.0
13	3305	13	2.4	13	8.0
14	3335	14	3.9	14	8.0
15	3362	15	5.8	15	7.7
16	3259	16	5.1	16	7.8
17	3373	17	4.1	17	7.7
18	3244	18	5.4	18	7.8
19	2313	19	5.2	19	7.9
20	3320	20	4.2	20	7.9
21	2816	21	1.1	21	8.0
22	2601	22	1.0	22	8.1
23	2692	23	1.0	23	7.9
24	3275	24	1.1	24	7.8
25	2877	25	0.9	25	7.7
26	3157	26	1.2	26	7.6
27	2881	27	0.7	27	7.5
28	2775	28	1.2	28	7.7
29	2809	29	0.9	29	7.7
30	2907	30	1.0	30	7.4
31	2862	31	1.3	31	7.5
Total:	94743				

(002) DAILY FLOW'S	
Day	M^3
1	416
2	405
3	435
4	231
5	432
6	413
7	413
8	689
9	254
10	322
11	572
12	386
13	534
14	488
15	303
16	394
17	1177
18	310
19	185
20	185
21	326
22	511
23	341
24	413
25	447
26	303
27	314
28	356
29	269
30	329
31	564
Total:	12716

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.094	0.000	0.000
0.024	0.000	0.000
0.093	0.000	0.000
0.098	0.000	0.000
0.145	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Karen Lai for Siltronic	8/28/08	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Aug-04 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	1.5	4.03	0.6	1.6	7.4	19.8	0.188	0.500	0.001	0.0027	0.000	0.000	0.000	0.000
12	4.0	12.3	0.9	2.8	8.2	25.2	0.163	0.500	0.001	0.0031	0.000	0.000	0.000	0.000
19	3.0	7.8	0.9	2.3	8.7	22.8	0.135	0.350	0.002	0.0052	0.000	0.000	0.000	0.000
26	4.0	13.7	1.2	4.1	8.5	28.9	0.120	0.410	0.002	0.0068	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	2851	1	1.6	1	7.5
2	2654	2	1.2	2	7.2
3	2593	3	1.1	3	7.3
4	2794	4	1.6	4	7.4
5	2684	5	1.6	5	7.6
6	2911	6	1.7	6	7.7
7	2938	7	0.6	7	7.8
8	2983	8	0.6	8	8.0
9	2627	9	0.6	9	7.7
10	2798	10	1.0	10	7.6
11	2669	11	0.8	11	7.8
12	3085	12	0.8	12	7.6
13	3237	13	0.6	13	7.8
14	2801	14	0.7	14	7.8
15	2975	15	0.7	15	7.6
16	3006	16	1.2	16	7.4
17	2858	17	1.0	17	7.4
18	2623	18	1.5	18	7.4
19	2605	19	1.3	19	7.4
20	2794	20	0.9	20	7.5
21	3013	21	0.8	21	7.5
22	2911	22	2.7	22	7.7
23	2896	23	0.9	23	7.6
24	2710	24	0.7	24	7.5
25	2851	25	2.5	25	8.0
26	3415	26	3.8	26	8.0
27	3752	27	2.5	27	7.4
28	3316	28	3.8	28	7.6
29	3112	29	3.0	29	7.8
30	3430	30	3.6	30	7.7
31	3297	31	3.5	31	8.0
Total:	91188				

(002) DAILY FLOW'S	
Day	M^3
1	424
2	549
3	409
4	428
5	644
6	538
7	632
8	435
9	477
10	534
11	587
12	439
13	632
14	750
15	553
16	750
17	530
18	534
19	598
20	556
21	458
22	659
23	439
24	530
25	488
26	587
27	617
28	428
29	583
30	598
31	269
Total:	16653

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.594	0.000	0.000
0.123	0.000	0.000
0.25	0.000	0.000
0.180	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	DATE	Telephone
Tom McCue	Karen Lord for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED			

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Sep-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	4.0	12.70	0.6	1.9	8.0	25.3	0.098	0.310	0.0005	0.0016	0.000	0.000	0.000	0.000
9	6.0	19.0	4.0	12.7	7.0	22.2	0.137	0.430	0.001	0.0032	0.000	0.000	0.000	0.000
16	6.0	19.9	1.8	6.0	8.7	28.8	0.155	0.510	0.0005	0.0017	0.000	0.000	0.000	0.000
23	6.0	21.4	1.6	5.7	9.0	31.9	0.098	0.350	0.0005	0.0018	0.000	0.000	0.000	0.000
30	4.0	11.5	1.0	2.9	8.1	23.2	0.087	0.250	0.0005	0.0014	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3320	1	3.4	1	8.3
2	3176	2	3.9	2	7.8
3	3365	3	4.8	3	8.1
4	3426	4	4.2	4	8.1
5	3301	5	4.3	5	8.3
6	3328	6	3.9	6	8.2
7	3059	7	2.0	7	8.0
8	3384	8	4.2	8	8.1
9	3172	9	4.1	9	7.7
10	3195	10	4.0	10	7.6
11	3206	11	3.9	11	8.2
12	3085	12	3.6	12	8.1
13	3502	13	3.9	13	8.2
14	3343	14	4.3	14	8.1
15	3558	15	4.1	15	7.7
16	3312	16	6.7	16	8.2
17	3172	17	5.0	17	8.5
18	3320	18	4.5	18	8.4
19	3199	19	4.9	19	8.1
20	3047	20	4.7	20	8.1
21	3460	21	4.0	21	8.0
22	3184	22	4.6	22	7.9
23	3562	23	4.5	23	8.2
24	3256	24	5.4	24	8.0
25	3059	25	3.9	25	8.0
26	3116	26	4.5	26	8.0
27	3316	27	4.2	27	7.8
28	3123	28	4.1	28	7.7
29	3237	29	3.5	29	7.7
30	2881	30	3.2	30	7.6
Total:	97665				

(002) DAILY FLOW'S	
Day	M^3
1	621
2	485
3	458
4	280
5	341
6	553
7	310
8	496
9	310
10	291
11	568
12	341
13	503
14	276
15	344
16	488
17	284
18	481
19	326
20	360
21	435
22	458
23	496
24	185
25	428
26	360
27	507
28	235
29	670
30	507
Total:	12398

Outfall #'002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.115	0.000	0.000
0.668	0.000	0.000
0.082	0.000	0.000
0.064	0.000	0.000
0.059	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Morgan Gail Siltronic	DATE 8/28/07	Telephone
Tom McCue			503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Oct-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
7	1.5	4.80	3.0	9.6	10.2	32.6	0.093	0.300	0.0005	0.0016	0.000	0.000	0.000	0.000
14	4.0	13.3	2.0	6.6	7.5	25.0	0.189	0.630	0.0005	0.0017	0.000	0.000	0.000	0.000
19	6.0	19.1	1.4	4.4	7.5	23.8	0.025	0.080	0.0005	0.0016	0.000	0.000	0.000	0.000
28	4.0	13.0	2.2	7.2	5.9	19.3	0.025	0.080	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOWS	
Day	M^3
1	3623
2	3528
3	2760
4	3259
5	3222
6	3369
7	3199
8	3259
9	3343
10	3271
11	3275
12	3464
13	3286
14	3320
15	3134
16	3437
17	3441
18	3339
19	3176
20	3456
21	3540
22	3691
23	3195
24	3282
25	3354
26	3290
27	3487
28	3256
29	3100
30	3449
31	3384
Total:	103188

(001) Turbidity Daily Avg	
Day	NTU's
1	4.7
2	5.1
3	3.7
4	5.5
5	3.7
6	4.2
7	4.1
8	3.7
9	3.9
10	4.7
11	5.0
12	3.6
13	3.5
14	3.7
15	3.3
16	3.7
17	3.8
18	4.9
19	4.5
20	3.6
21	4.4
22	4.0
23	3.6
24	4.4
25	4.0
26	3.7
27	3.1
28	3.5
29	3.5
30	3.7
31	4.2

(001) pH Daily Avg	
Day	pH
1	8.0
2	7.7
3	8.2
4	8.3
5	7.8
6	8.3
7	8.1
8	8.1
9	8.3
10	8.1
11	8.0
12	8.0
13	7.7
14	8.0
15	7.8
16	7.9
17	7.9
18	7.8
19	8.0
20	7.7
21	8.1
22	7.9
23	7.9
24	8.2
25	8.1
26	8.1
27	8.0
28	7.7
29	7.9
30	8.2
31	8.1

(002) DAILY FLOWS	
Day	M^3
1	428
2	670
3	530
4	386
5	526
6	307
7	466
8	344
9	492
10	273
11	397
12	401
13	564
14	492
15	473
16	155
17	454
18	310
19	379
20	314
21	269
22	231
23	401
24	238
25	481
26	280
27	337
28	242
29	556
30	189
31	655
Total:	12243

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.059	0.000	0.000
0.206	0.000	0.000
0.025	0.000	0.000
0.025	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	DATE	Telephone
Tom McCue			8/28/07	503-243-2020
TYPED OR PRINTED				

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Nov-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	1.5	5.28	1.3	4.6	6.8	23.9	0.157	0.550	0.0005	0.0018	0.000	0.000	0.000	0.000
11	5.0	13.6	1.8	4.9	7.1	19.3	0.149	0.410	0.0005	0.0014	0.000	0.000	0.000	0.000
18	1.5	5.0	1.9	6.4	7.7	25.7	0.368	1.230	0.0005	0.0017	0.000	0.000	0.000	0.000
23	5.0	16.5	0.7	2.3	7.1	23.5	0.074	0.240	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3638	1	4.8	1	8.2
2	3403	2	4.8	2	8.2
3	3407	3	4.3	3	7.9
4	3517	4	3.5	4	7.9
5	3331	5	4.6	5	7.8
6	3403	6	4.7	6	7.6
7	3286	7	5.1	7	7.7
8	3377	8	6.1	8	8.0
9	3104	9	4.3	9	8.0
10	3328	10	3.2	10	7.7
11	2729	11	4.1	11	7.8
12	2998	12	4.6	12	7.6
13	3426	13	3.3	13	8.0
14	3100	14	3.7	14	7.6
15	3138	15	3.6	15	7.8
16	3354	16	4.0	16	7.6
17	3282	17	3.4	17	7.7
18	3343	18	3.3	18	7.9
19	3426	19	3.8	19	8.1
20	3293	20	4.6	20	7.8
21	3339	21	4.4	21	7.4
22	3222	22	3.5	22	7.8
23	3293	23	3.6	23	7.7
24	3373	24	3.9	24	8.0
25	3346	25	3.5	25	8.1
26	3297	26	3.9	26	7.8
27	3445	27	4.5	27	7.8
28	3437	28	4.1	28	7.9
29	3282	29	3.9	29	7.5
30	3229	30	4.3	30	7.8
Total:	99149				

(002) DAILY FLOW'S	
Day	M^3
1	572
2	375
3	556
4	314
5	662
6	738
7	102
8	307
9	572
10	553
11	545
12	265
13	485
14	254
15	628
16	261
17	583
18	273
19	356
20	299
21	265
22	443
23	303
24	299
25	424
26	178
27	223
28	485
29	212
30	511
Total:	12042

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.099	0.000	0.000
0.064	0.000	0.000
0.319	0.000	0.000
0.101	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Tom Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Dec-04 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	5.0	16.24	1.5	4.9	6.9	22.2	0.070	0.230	0.0005	0.0016	0.000	0.000	0.000	0.000
9	4.0	13.7	2.7	9.2	6.9	23.5	0.073	0.250	0.0005	0.0017	0.000	0.000	0.000	0.000
16	1.5	5.2	0.8	2.8	7.6	26.4	0.078	0.270	0.0005	0.0017	0.000	0.000	0.000	0.000
22	3.0	8.3	1.7	4.7	5.6	15.6	0.122	0.340	0.0005	0.0014	0.000	0.000	0.000	0.000
30	4.0	12.8	1.2	3.9	6.7	21.6	0.097	0.310	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3256	1	5.0	1	7.6
2	3248	2	4.2	2	7.7
3	3483	3	3.8	3	7.9
4	3369	4	4.9	4	7.7
5	3112	5	4.9	5	7.9
6	3267	6	4.7	6	8.0
7	3437	7	4.8	7	8.0
8	3490	8	4.6	8	8.3
9	3418	9	4.5	9	7.9
10	2987	10	4.5	10	8.1
11	3328	11	2.9	11	7.8
12	3066	12	1.0	12	8.1
13	3161	13	1.7	13	8.0
14	3399	14	3.2	14	8.2
15	3384	15	1.8	15	7.5
16	3494	16	2.1	16	8.1
17	3343	17	2.6	17	7.7
18	3496	18	2.7	18	7.7
19	3456	19	3.5	19	7.7
20	3513	20	4.4	20	7.9
21	3483	21	3.7	21	7.6
22	2771	22	2.3	22	7.5
23	3381	23	3.7	23	8.0
24	3312	24	4.8	24	8.1
25	3180	25	4.9	25	8.4
26	3127	26	4.0	26	8.4
27	3282	27	3.3	27	8.1
28	3229	28	4.6	28	7.9
29	3509	29	4.0	29	7.9
30	3210	30	3.0	30	8.2
31	3937.0	31	2.9	31	8.4
Total:	103131				

(002) DAILY FLOW'S	
Day	M^3
1	170
2	492
3	220
4	712
5	72
6	594
7	1382
8	538
9	439
10	693
11	375
12	579
13	174
14	500
15	276
16	481
17	254
18	685
19	284
20	591
21	288
22	628
23	1635
24	310
25	182
26	269
27	216
28	284
29	91
30	125
31	223.4
Total:	13761

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.185	0.000	0.000
0.141	0.000	0.000
0.103	0.000	0.000
0.134	0.000	0.000
0.09	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Kreg Low Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jan-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	4.0	12.70	1.6	5.1	0.0	20.5	0.246	0.780	0.0005	0.0016	0.000	0.000	0.000	0.000
13	5.0	16.9	1.7	5.7	0.0	27.3	0.092	0.310	0.0005	0.0017	0.000	0.000	0.000	0.000
20	1.5	4.8	2.3	7.4	0.0	28.4	0.154	0.500	0.0005	0.0016	0.000	0.000	0.000	0.000
27	5.0	17.0	2.4	8.2	0.0	29.8	0.129	0.440	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M3	Day	NTU's	Day	pH
1	3619	1	2.7	1	8.3
2	3066	2	3.5	2	8.2
3	3214	3	3.8	3	7.8
4	3206	4	3.3	4	8.2
5	2710	5	3.2	5	7.9
6	3176	6	5.4	6	8.0
7	3248	7	3.2	7	8.1
8	3123	8	2.6	8	8.4
9	3585	9	3.5	9	8.1
10	3233	10	3.2	10	7.8
11	3271	11	3.7	11	7.8
12	3271	12	3.6	12	8.2
13	3373	13	2.7	13	7.9
14	3676	14	3.5	14	7.8
15	3252	15	4.5	15	7.5
16	2941	16	3.3	16	7.8
17	3237	17	5.2	17	8.0
18	3081	18	4.6	18	8.3
19	3161	19	4.1	19	8.2
20	3229	20	5.1	20	7.9
21	3381	21	5.2	21	7.7
22	3331	22	6.0	22	8.0
23	3430	23	5.0	23	7.9
24	3691	24	4.1	24	7.8
25	2847	25	5.4	25	7.9
26	3358	26	4.8	26	7.7
27	3399	27	4.6	27	7.9
28	3309	28	4.8	28	7.9
29	3498	29	4.8	29	8.2
30	3142	30	5.1	30	7.9
31	3309	31	4.9	31	7.9
Total:	101367				

(002) DAILY FLOWS	
Day	M3
1	223
2	481
3	227
4	511
5	42
6	201
7	87
8	76
9	337
10	344
11	341
12	341
13	242
14	927
15	257
16	223
17	598
18	167
19	102
20	723
21	507
22	674
23	462
24	246
25	53
26	375
27	447
28	295
29	57
30	197
31	685
Total:	10448

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl2 Free Available Daily Max mg/L	Cl2 Free Available Monthly Avg. mg/L
0.304	0.000	0.000
0.144	0.000	0.000
0.147	0.000	0.000
0.140	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Feb-05 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
3	6.0	19.31	30.4	97.8	9.8	31.6	0.105	0.340	0.0005	0.0016	0.000	0.000	0.000	0.000
10	5.0	16.6	1.3	4.3	8.4	27.8	0.078	0.260	0.0005	0.0017	0.000	0.000	0.000	0.000
17	1.5	5.7	0.7	2.7	7.3	28.1	0.072	0.280	0.0005	0.0019	0.000	0.000	0.000	0.000
24	4.0	13.5	2.3	7.7	8.1	27.3	0.157	0.530	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3381	1	4.6	1	7.8
2	3540	2	7.9	2	7.9
3	3218	3	6.2	3	7.8
4	3619	4	16.9	4	8.1
5	3396	5	7.6	5	8.1
6	3282	6	7.8	6	8.1
7	3305	7	5.2	7	8.1
8	3278	8	6.0	8	7.5
9	3422	9	6.3	9	7.5
10	3324	10	4.6	10	7.8
11	3275	11	5.3	11	7.8
12	3407	12	6.7	12	7.9
13	3172	13	8.2	13	7.7
14	3328	14	6.1	14	7.7
15	3328	15	6.4	15	8.1
16	2975	16	4.2	16	7.8
17	3823	17	4.7	17	7.7
18	3354	18	6.9	18	7.6
19	2922	19	5.7	19	7.9
20	3471	20	6.7	20	8.0
21	3309	21	6.9	21	7.6
22	3233	22	6.2	22	7.8
23	3021	23	6.7	23	8.1
24	3369	24	4.5	24	7.7
25	3464	25	4.9	25	8.0
26	3112	26	5.4	26	7.7
27	3369	27	5.9	27	7.7
28	3282	28	6.3	28	8.0
Total:	92978				

(002) DAILY FLOW'S	
Day	M^3
1	174
2	553
3	220
4	344
5	250
6	397
7	64
8	231
9	110
10	212
11	303
12	178
13	424
14	208
15	299
16	238
17	310
18	231
19	352
20	212
21	363
22	326
23	492
24	204
25	333
26	269
27	322
28	246
Total:	7867

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.109	0.000	0.000
0.071	0.000	0.000
0.163	0.000	0.000
0.100	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Barry Sid for Siltronic	DATE	Telephone
Tom McCue	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	8/28/07	503-243-2020
TYPED OR PRINTED			

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Mar-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
3	4.0	12.36	1.6	4.9	7.5	23.2	0.109	0.337	0.0005	0.0015	0.000	0.000	0.000	0.000
10	4.0	13.0	2.4	7.8	6.8	22.1	0.158	0.514	0.001	0.0033	0.000	0.000	0.000	0.000
17	1.5	4.3	1.6	4.6	6.9	19.7	0.154	0.441	0.0005	0.0014	0.000	0.000	0.000	0.000
24	3.0	8.7	2.2	6.4	6.5	18.9	0.110	0.319	0.0005	0.0015	0.000	0.000	0.000	0.000
31	5.0	16.2	0.5	1.6	8.1	26.2	0.104	0.336	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3282	1	3.9	1	8.0
2	2983	2	3.3	2	8.0
3	3089	3	3.6	3	7.5
4	3346	4	3.8	4	7.6
5	2972	5	4.0	5	8.0
6	3206	6	3.5	6	8.1
7	3097	7	3.8	7	8.2
8	3358	8	3.8	8	8.0
9	3142	9	4.5	9	7.8
10	3252	10	4.0	10	7.9
11	3172	11	3.5	11	7.6
12	3290	12	4.0	12	7.4
13	3002	13	3.3	13	7.7
14	3267	14	2.4	14	7.7
15	3093	15	3.4	15	7.7
16	3248	16	3.7	16	7.9
17	2862	17	4.3	17	7.9
18	3180	18	5.4	18	8.0
19	3131	19	5.0	19	8.1
20	3222	20	4.0	20	7.8
21	3479	21	4.3	21	8.2
22	3214	22	4.0	22	7.7
23	3195	23	4.7	23	8.2
24	2904	24	4.0	24	7.7
25	3346	25	4.1	25	8.3
26	3252	26	3.6	26	8.1
27	3331	27	4.0	27	7.9
28	3328	28	3.1	28	8.2
29	3430	29	3.2	29	8.0
30	3312	30	3.3	30	7.9
31	3233	31	4.0	31	8.0
Total:	99217				

(002) DAILY FLOW'S	
Day	M^3
1	38
2	273
3	269
4	254
5	102
6	231
7	42
8	250
9	68
10	95
11	174
12	174
13	121
14	106
15	110
16	144
17	148
18	212
19	64
20	212
21	79
22	182
23	102
24	170
25	132
26	148
27	95
28	189
29	72
30	212
31	197
Total:	4664

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.139	0.000	0.000
0.15	0.000	0.000
0.089	0.000	0.000
0.230	0.000	0.000
0.134	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Kyen Lai for Siltronic	8/20/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Apr-05 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001															
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
7	5.0	18.61	1.5	5.6	7.3	27.2	0.101	0.380	0.001	0.0037	0.000	0.000	0.000	0.000
14	4.0	12.1	2.0	6.1	7.4	22.3	0.117	0.350	0.002	0.0061	0.000	0.000	0.000	0.000
21	3.0	8.3	1.8	5.0	10.8	29.9	0.056	0.160	0.0005	0.0014	0.000	0.000	0.000	0.000
28	4.0	13.1	1.8	5.7	10.6	34.8	0.129	0.420	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	2904	1	4.6	1	8.2
2	3142	2	3.1	2	8.0
3	3127	3	4.0	3	8.1
4	3134	4	3.9	4	7.8
5	2843	5	6.2	5	7.8
6	3169	6	4.8	6	8.0
7	3721	7	3.9	7	8.1
8	3309	8	3.7	8	7.9
9	2991	9	2.2	9	7.7
10	3169	10	2.8	10	7.8
11	3150	11	3.3	11	8.1
12	2885	12	2.6	12	7.9
13	3373	13	3.2	13	8.3
14	3028	14	2.5	14	7.8
15	3044	15	3.5	15	7.6
16	2938	16	3.1	16	8.3
17	2919	17	3.2	17	8.0
18	3112	18	2.8	18	8.2
19	3293	19	3.4	19	8.3
20	2692	20	3.1	20	8.2
21	2771	21	3.0	21	8.1
22	3362	22	1.6	22	7.5
23	3468	23	2.4	23	7.5
24	3888	24	2.9	24	8.0
25	3487	25	2.8	25	8.3
26	3471	26	1.8	26	8.0
27	3536	27	1.9	27	7.7
28	3282	28	2.6	28	7.8
29	3509	29	2.7	29	8.0
30	3532	30	2.5	30	8.0
Total:	96245				

(002) DAILY FLOW'S	
Day	M^3
1	136
2	242
3	76
4	182
5	15
6	303
7	49
8	220
9	87
10	201
11	53
12	250
13	68
14	79
15	242
16	257
17	53
18	273
19	83
20	212
21	34
22	250
23	204
24	42
25	125
26	136
27	38
28	299
29	42
30	250
Total:	4501

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.176	0.000	0.000
0.344	0.000	0.000
0.144	0.000	0.000
0.756	0.000	0.000

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Tom McCue		Karen Lail for Siltronic	8/28/05	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **May-05 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	4.0	13.10	0.8	2.6	8.1	26.5	0.241	0.790	0.0005	0.0016	0.000	0.000	0.000	0.000
12	5.0	16.0	0.3	1.0	8.7	27.8	0.082	0.260	0.001	0.0032	0.000	0.000	0.000	0.000
19	4.0	12.9	0.7	2.2	8.0	25.7	0.085	0.270	0.0005	0.0016	0.000	0.000	0.000	0.000
26	5.0	16.2	1.5	4.8	8.0	25.9	0.106	0.340	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3093	1	2.4	1	7.8
2	3441	2	2.9	2	8.1
3	3085	3	2.3	3	7.6
4	3172	4	2.0	4	8.1
5	3275	5	2.1	5	8.0
6	3244	6	2.8	6	7.8
7	3146	7	3.6	7	8.1
8	3059	8	3.4	8	7.6
9	3623	9	3.4	9	8.1
10	3498	10	4.2	10	8.2
11	3714	11	4.4	11	7.8
12	3191	12	2.7	12	8.2
13	3415	13	3.8	13	8.2
14	3505	14	2.9	14	8.3
15	3293	15	3.1	15	8.3
16	3172	16	2.9	16	7.9
17	3244	17	3.9	17	8.1
18	3365	18	3.7	18	8.4
19	3214	19	2.9	19	8.1
20	3377	20	3.8	20	8.3
21	3263	21	3.7	21	7.9
22	3252	22	4.1	22	8.2
23	3373	23	4.3	23	8.1
24	3290	24	5.0	24	8.1
25	3036	25	5.4	25	7.9
26	3233	26	3.3	26	7.6
27	3010	27	3.2	27	7.7
28	3206	28	2.7	28	8.1
29	3059	29	1.9	29	8.0
30	3248	30	2.5	30	8.1
31	3479	31	2.5	31	8.1
Total:	101576				

(002) DAILY FLOWS	
Day	M^3
1	38
2	254
3	148
4	57
5	148
6	223
7	178
8	280
9	151
10	182
11	291
12	57
13	242
14	42
15	257
16	57
17	276
18	53
19	337
20	57
21	235
22	125
23	204
24	83
25	148
26	189
27	178
28	83
29	98
30	329
31	45
Total:	5046

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.103	0.000	0.000
0.165	0.000	0.000
0.255	0.000	0.000
0.104	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION; INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Karen Gail for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jun-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	3.0	9.34	2.3	7.2	6.5	20.1	0.085	0.260	0.0005	0.0016	0.000	0.000	0.000	0.000
9	3.0	10.2	1.5	5.1	7.1	24.1	0.109	0.370	0.0005	0.0017	0.000	0.000	0.000	0.000
16	1.5	5.1	0.7	2.4	6.9	23.5	0.066	0.220	0.0005	0.0017	0.000	0.000	0.000	0.000
23	4.0	14.1	1.3	4.6	6.4	22.6	0.224	0.790	0.003	0.0106	0.000	0.000	0.000	0.000
30	5.0	16.5	1.9	6.3	5.3	17.3	0.184	0.610	0.002	0.0066	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3577	1	2.4	1	7.7
2	3112	2	2.7	2	8.1
3	3271	3	3.8	3	7.7
4	3490	4	2.7	4	7.5
5	3176	5	3.7	5	8.2
6	3214	6	3.7	6	8.3
7	2911	7	4.5	7	8.2
8	3550	8	4.3	8	7.9
9	3399	9	3.3	9	8.0
10	3422	10	3.4	10	8.0
11	3301	11	2.6	11	7.9
12	3252	12	2.5	12	7.7
13	3138	13	3.4	13	8.1
14	3377	14	2.4	14	7.6
15	3259	15	2.8	15	7.8
16	3403	16	1.7	16	7.9
17	3502	17	2.1	17	8.2
18	3142	18	2.8	18	8.1
19	3104	19	2.7	19	7.3
20	3456	20	3.1	20	7.8
21	3426	21	3.3	21	7.9
22	3358	22	3.1	22	7.8
23	3536	23	3.7	23	8.0
24	3271	24	3.1	24	8.0
25	3278	25	1.7	25	7.9
26	3335	26	2.3	26	7.9
27	3286	27	1.9	27	7.9
28	3119	28	2.2	28	8.1
29	3487	29	1.5	29	8.1
30	3293	30	1.4	30	7.9
Total:	99447				

(002) DAILY FLOW'S	
Day	M^3
1	235
2	42
3	344
4	204
5	269
6	95
7	42
8	303
9	189
10	216
11	125
12	212
13	49
14	291
15	257
16	117
17	424
18	746
19	693
20	79
21	655
22	965
23	909
24	575
25	746
26	814
27	810
28	553
29	768
30	488
Total:	12216

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.12	0.000	0.000
0.093	0.000	0.000
0.054	0.000	0.000
0.109	0.000	0.000
0.307	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jul-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
7	4.0	13.89	1.6	5.6	4.8	16.8	0.115	0.399	0.001	0.0035	0.000	0.000	0.000	0.000
13	4.0	14.5	1.7	6.2	7.6	27.4	0.125	0.452	0.002	0.0072	0.000	0.000	0.000	0.000
21	5.0	16.4	0.8	2.6	6.9	22.6	0.045	0.148	0.001	0.0033	0.000	0.000	0.000	0.000
28	4.0	13.4	1.5	5.0	7.6	25.5	0.085	0.285	0.001	0.0034	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3411	1	2.4	1	8.2
2	3392	2	2.2	2	7.7
3	3422	3	1.5	3	8.0
4	3369	4	2.2	4	8.0
5	3180	5	1.5	5	8.1
6	3452	6	1.4	6	8.0
7	3471	7	1.6	7	7.4
8	3399	8	1.8	8	7.6
9	3282	9	1.7	9	8.0
10	3687	10	1.9	10	8.1
11	3358	11	2.2	11	8.1
12	3411	12	2.1	12	7.8
13	3619	13	2.3	13	8.0
14	3396	14	2.8	14	7.9
15	3358	15	3.2	15	7.7
16	3475	16	2.6	16	7.8
17	3399	17	2.7	17	7.8
18	3358	18	2.7	18	7.9
19	3392	19	2.3	19	7.7
20	3358	20	1.8	20	8.1
21	3282	21	3.0	21	7.9
22	3142	22	3.3	22	7.9
23	3452	23	2.8	23	7.9
24	3509	24	1.4	24	7.6
25	3403	25	1.7	25	7.8
26	3365	26	2.1	26	7.5
27	3434	27	2.6	27	8.0
28	3350	28	1.6	28	8.0
29	3566	29	1.5	29	7.9
30	3244	30	2.2	30	8.0
31	3521	31	4.2	31	7.7
Total:	105460				

(002) DAILY FLOW'S	
Day	M^3
1	132
2	307
3	136
4	117
5	95
6	170
7	178
8	220
9	178
10	121
11	121
12	163
13	57
14	151
15	114
16	91
17	182
18	151
19	129
20	114
21	182
22	114
23	140
24	140
25	121
26	87
27	170
28	371
29	136
30	117
31	136
Total:	4641

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.262	0.000	0.000
0.25	0.000	0.000
0.143	0.000	0.000
0.097	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	DATE	Telephone
Tom McCue		8/28/07		503-243-2020
TYPED OR PRINTED				

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Aug-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	5.0	18.47	1.7	6.3	7.6	28.1	0.097	0.358	0.001	0.0037	0.000	0.000	0.000	0.000
11	4.0	14.3	3.3	11.8	7.4	26.4	0.095	0.339	0.0005	0.0018	0.000	0.000	0.000	0.000
18	4.0	15.1	2.2	8.3	7.2	27.2	0.145	0.546	0.0005	0.0019	0.000	0.000	0.000	0.000
25	3.0	10.4	1.6	5.5	5.2	17.9	0.104	0.360	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3608	1	2.9	1	7.8
2	3547	2	2.6	2	8.2
3	3494	3	3.2	3	7.7
4	3695	4	3.6	4	7.8
5	3384	5	4.6	5	7.8
6	3706	6	3.4	6	7.7
7	3767	7	4.0	7	7.9
8	3604	8	3.2	8	7.5
9	3547	9	4.2	9	7.4
10	3759	10	3.8	10	7.9
11	3570	11	3.4	11	7.8
12	3805	12	3.1	12	7.6
13	3710	13	2.3	13	7.5
14	3441	14	3.1	14	7.6
15	3475	15	4.9	15	7.9
16	3475	16	3.3	16	7.9
17	3430	17	2.9	17	7.8
18	3763	18	3.5	18	7.7
19	3566	19	3.3	19	7.7
20	3381	20	4.6	20	7.9
21	3585	21	3.1	21	7.9
22	3324	22	2.5	22	7.5
23	3392	23	2.5	23	7.6
24	3615	24	3.0	24	7.5
25	3460	25	2.3	25	7.6
26	3615	26	1.9	26	8.2
27	3399	27	2.1	27	7.6
28	3430	28	3.1	28	7.6
29	3854	29	3.1	29	8.0
30	3702	30	2.2	30	7.9
31	3373	31	2.5	31	8.2
Total:	110476				

(002) DAILY FLOW'S	
Day	M^3
1	163
2	87
3	140
4	68
5	178
6	136
7	117
8	125
9	132
10	79
11	216
12	91
13	140
14	72
15	159
16	72
17	91
18	110
19	114
20	117
21	148
22	117
23	136
24	106
25	85
26	201
27	76
28	91
29	155
30	106
31	121
Total:	3749

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.107	0.000	0.000
0.125	0.000	0.000
0.21	0.000	0.000
0.191	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Roger Lail for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Sep-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	5.0	17.43	1.1	3.8	5.6	19.5	0.398	1.388	0.0005	0.0017	0.000	0.000	0.000	0.000
8	3.0	10.9	1.5	5.5	7.4	27.0	0.098	0.356	0.004	0.0145	0.000	0.000	0.000	0.000
15	3.0	11.1	1.7	6.3	7.4	27.5	0.152	0.564	0.001	0.0037	0.000	0.000	0.000	0.000
22	4.0	13.9	1.6	5.6	8.0	27.9	0.091	0.317	0.001	0.0035	0.000	0.000	0.000	0.000
29	3.0	10.9	1.4	5.1	7.9	28.6	0.146	0.528	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3487	1	2.4	1	7.8
2	3551	2	2.3	2	8.0
3	3702	3	2.1	3	7.9
4	3475	4	1.9	4	8.0
5	3475	5	2.3	5	7.9
6	3373	6	2.1	6	7.9
7	3063	7	2.1	7	7.8
8	3634	8	1.5	8	8.1
9	3365	9	1.4	9	7.6
10	3278	10	1.8	10	7.4
11	3123	11	1.3	11	7.8
12	3536	12	3.7	12	7.7
13	3505	13	1.5	13	7.8
14	3680	14	1.2	14	7.7
15	3710	15	1.5	15	7.7
16	3672	16	2.1	16	7.7
17	3786	17	1.5	17	7.6
18	3733	18	1.4	18	7.9
19	3585	19	1.5	19	7.9
20	3449	20	2.0	20	7.7
21	3490	21	2.6	21	7.8
22	3487	22	2.5	22	7.5
23	3627	23	2.1	23	7.8
24	3555	24	2.2	24	7.9
25	3846	25	2.3	25	7.7
26	3403	26	1.8	26	7.9
27	3498	27	1.5	27	7.7
28	3259	28	1.7	28	7.8
29	3619	29	3.0	29	8.2
30	3418	30	5.5	30	8.3
Total:	105384				

(002) DAILY FLOW'S	
Day	M^3
1	132
2	72
3	197
4	288
5	87
6	178
7	136
8	132
9	129
10	91
11	151
12	114
13	106
14	102
15	170
16	49
17	159
18	102
19	67
20	106
21	197
22	201
23	45
24	155
25	167
26	68
27	102
28	102
29	68
30	106
Total:	3780

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.114	0.000	0.000
0.161	0.000	0.000
0.176	0.000	0.000
0.373	0.000	0.000
0.058	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §.1001 AND 33 U.S.C. §.1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	[signature] for Siltronic	DATE 8/28/07	Telephone
Tom McCue			503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Oct-05 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	3.0	10.68	1.7	6.0	8.2	29.2	0.074	0.260	0.0005	0.0018	0.000	0.000	0.000	0.000
13	3.0	10.3	1.5	5.1	9.3	31.8	0.103	0.350	0.0005	0.0017	0.000	0.000	0.000	0.000
20	7.0	23.3	4.5	15.0	8.5	28.4	0.143	0.480	0.0005	0.0017	0.000	0.000	0.000	0.000
27	4.0	14.0	1.3	4.6	7.5	26.1	0.089	0.310	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3823	1	2.9	1	8.5
2	3668	2	3.5	2	8.3
3	3717	3	3.4	3	7.8
4	3078	4	3.2	4	7.8
5	3593	5	2.4	5	8.0
6	3558	6	1.7	6	8.2
7	3165	7	2.3	7	7.9
8	3729	8	2.0	8	8.1
9	3468	9	2.3	9	7.9
10	3396	10	2.2	10	8.3
11	3562	11	1.5	11	8.0
12	3104	12	1.1	12	7.9
13	3430	13	1.8	13	8.0
14	3589	14	3.2	14	7.9
15	3570	15	1.9	15	7.6
16	3767	16	2.2	16	7.7
17	3540	17	1.7	17	7.6
18	3210	18	1.5	18	7.6
19	3513	19	2.0	19	7.9
20	3324	20	1.6	20	7.7
21	3646	21	1.7	21	8.1
22	3452	22	3.4	22	8.0
23	3513	23	3.7	23	7.8
24	3524	24	3.3	24	8.2
25	3611	25	1.9	25	8.0
26	3555	26	1.3	26	7.9
27	3509	27	2.0	27	7.6
28	3381	28	2.0	28	8.0
29	3460	29	2.0	29	7.9
30	3661	30	2.0	30	7.9
31	3301	31	1.9	31	7.8
Total:	108416				

(002) DAILY FLOW'S	
Day	M^3
1	129
2	121
3	110
4	125
5	106
6	68
7	129
8	231
9	68
10	159
11	79
12	117
13	148
14	87
15	144
16	91
17	163
18	148
19	87
20	132
21	102
22	121
23	144
24	79
25	110
26	110
27	117
28	155
29	72
30	110
31	117
Total:	3680

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.094	0.000	0.000
0.171	0.000	0.000
0.125	0.000	0.000
0.171	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Nov-05 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	6.8	24.89	1.5	5.5	6.8	24.9	0.134	0.490	0.0005	0.0018	0.000	0.000	0.000	0.000
10	4.5	15.9	2.8	9.9	7.3	25.9	0.195	0.690	0.0005	0.0018	0.000	0.000	0.000	0.000
14	3.9	14.3	2.6	9.5	6.4	23.4	0.167	0.610	0.0009	0.0033	0.000	0.000	0.000	0.000
22	7.1	25.6	3.0	10.8	8.6	31.1	0.234	0.850	0.0004	0.0014	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3543	1	2.3	1	7.7
2	3452	2	1.9	2	7.7
3	3558	3	1.5	3	7.9
4	3661	4	1.7	4	7.8
5	3415	5	2.2	5	8.2
6	3642	6	1.9	6	8.3
7	3547	7	2.0	7	7.9
8	3664	8	1.5	8	7.8
9	3471	9	1.5	9	7.9
10	3543	10	1.8	10	8.1
11	3532	11	2.0	11	7.9
12	3714	12	1.8	12	8.2
13	3596	13	1.6	13	8.1
14	3657	14	1.6	14	8.2
15	3116	15	1.7	15	7.7
16	3490	16	2.2	16	8.5
17	3028	17	1.5	17	8.2
18	2646	18	1.7	18	7.8
19	3426	19	2.8	19	7.9
20	3365	20	2.1	20	7.7
21	3596	21	2.2	21	8.1
22	3611	22	1.4	22	7.9
23	3377	23	1.5	23	8.1
24	3555	24	1.5	24	7.8
25	3604	25	1.9	25	7.9
26	3767	26	1.4	26	7.9
27	3479	27	1.8	27	8.1
28	3426	28	1.6	28	7.7
29	3680	29	1.6	29	7.8
30	3502	30	1.6	30	8.0
Total:	104565				

(002) DAILY FLOW'S	
Day	M^3
1	87
2	151
3	83
4	125
5	257
6	102
7	159
8	155
9	197
10	291
11	288
12	352
13	155
14	136
15	129
16	57
17	45
18	167
19	140
20	140
21	68
22	72
23	129
24	117
25	174
26	163
27	57
28	280
29	662
30	742
Total:	5682

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.199	0.000	0.000
0.366	0.000	0.000
0.127	0.000	0.000
0.167	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Brent Jaid for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Dec-05 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	6.9	23.61	3.6	12.3	7.7	26.1	0.378	1.29	0.00289	0.0098	0.000	0.000	0.000	0.000
8	4.8	16.7	2.8	9.8	7.7	26.9	0.475	1.66	0.0005	0.0017	0.000	0.000	0.000	0.000
15	4.3	15.2	1.3	4.6	7.9	27.8	0.298	1.05	0.0005	0.0018	0.000	0.000	0.000	0.000
22	5.6	19.0	1.9	6.4	8.0	26.9	0.287	0.97	0.0005	0.0017	0.000	0.000	0.000	0.000
29	5.5	19.9	1.4	5.1	6.8	24.8	0.077	0.28	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3407	1	1.3	1	8.0
2	3551	2	1.4	2	8.2
3	3335	3	1.3	3	7.8
4	3494	4	1.9	4	7.9
5	3331	5	1.6	5	8.1
6	3335	6	1.1	6	8.1
7	3407	7	1.2	7	8.0
8	3498	8	1.4	8	7.6
9	3517	9	1.4	9	7.7
10	3608	10	1.3	10	8.0
11	3699	11	1.5	11	8.0
12	3502	12	1.7	12	8.0
13	3293	13	1.5	13	8.0
14	3369	14	1.6	14	7.8
15	3513	15	1.8	15	7.9
16	3577	16	1.6	16	7.7
17	3169	17	1.6	17	7.8
18	3381	18	1.6	18	7.8
19	3146	19	1.5	19	7.9
20	3373	20	1.4	20	8.1
21	3524	21	1.3	21	7.8
22	3377	22	1.9	22	7.9
23	3736	23	1.3	23	8.2
24	3328	24	1.4	24	8.3
25	3615	25	1.2	25	8.1
26	3358	26	1.5	26	8.1
27	3422	27	1.3	27	7.9
28	3464	28	2.1	28	8.4
29	3634	29	1.6	29	8.2
30	3638	30	1.9	30	8.2
31	4179.3	31	1.8	31	8.3
Total:	107780				

(002) DAILY FLOW'S	
Day	M^3
1	121
2	106
3	114
4	140
5	61
6	144
7	102
8	121
9	151
10	53
11	121
12	125
13	110
14	167
15	95
16	163
17	102
18	91
19	76
20	106
21	102
22	132
23	95
24	117
25	102
26	125
27	98
28	91
29	197
30	163
31	79.5
Total:	3570

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.128	0.000	0.000
0.187	0.000	0.000
0.172	0.000	0.000
0.176	0.000	0.000
0.296	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Karen Ski for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jan-06 Discharge Data

Outfall # 001															
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	2.0	7.04	2.3	8.1	7.3	25.7	0.086	0.303	0.0005	0.0018	0.000	0.000	0.000	0.000
12	2.0	6.9	3.6	12.5	8.4	29.2	0.125	0.434	0.0005	0.0017	0.000	0.000	0.000	0.000
19	2.0	6.8	1.9	6.4	8.6	29.1	0.174	0.589	0.0005	0.0017	0.000	0.000	0.000	0.000
26	4.0	15.1	3.6	13.5	7.3	27.2	0.103	0.386	0.0005	0.0019	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M3	Day	NTU's	Day	pH
1	3577	1	1.6	1	7.9
2	3536	2	1.7	2	8.1
3	3646	3	1.4	3	8.1
4	3812	4	1.3	4	8.1
5	3521	5	1.5	5	8.1
6	3381	6	1.4	6	8.5
7	3710	7	1.0	7	8.4
8	3611	8	1.3	8	8.3
9	3540	9	1.4	9	7.8
10	3339	10	1.3	10	7.8
11	3180	11	1.7	11	8.2
12	3471	12	1.0	12	8.3
13	3748	13	1.5	13	8.5
14	3331	14	1.6	14	8.1
15	3297	15	1.7	15	8.1
16	2824	16	1.6	16	8.1
17	3570	17	1.3	17	8.3
18	3377	18	1.0	18	8.4
19	3384	19	1.6	19	7.9
20	2245	20	1.8	20	8.3
21	3638	21	1.8	21	8.2
22	3403	22	2.1	22	8.1
23	3078	23	3.2	23	8.0
24	3774	24	5.6	24	8.0
25	3577	25	4.5	25	7.8
26	3744	26	3.7	26	8.1
27	3176	27	4.4	27	7.8
28	3407	28	3.8	28	8.3
29	3441	29	3.9	29	8.3
30	3778	30	3.9	30	8.6
31	3714	31	1.9	31	8.1
Total:	106830				

(002) DAILY FLOWS	
Day	M3
1	125
2	110
3	106
4	125
5	72
6	68
7	91
8	102
9	121
10	102
11	110
12	110
13	102
14	715
15	242
16	68
17	174
18	83
19	106
20	57
21	269
22	174
23	68
24	424
25	38
26	95
27	178
28	140
29	38
30	38
31	261
Total:	4512

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl2 Free Available Daily Max mg/L	Cl2 Free Available Monthly Avg. mg/L
0.147	0.000	0.000
0.138	0.000	0.000
0.283	0.000	0.000
0.167	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Kay Lee for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
February-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	4.3	15.95	1.4	5.15	6.6	24.26	0.072	0.26	0.0005	0.0018	0.000	0.000	0.000	0.000
9	2.0	6.99	5.2	18.17	7.0	24.46	0.087	0.30	0.0005	0.0017	0.000	0.000	0.000	0.000
16	9.3	31.34	3.1	10.49	5.8	19.63	0.102	0.35	0.0005	0.0017	0.000	0.000	0.000	0.000
23	4.8	16.72	3.6	12.59	8.7	30.43	0.122	0.43	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3763	1	2.4	1	8.4
2	3676	2	4.0	2	7.9
3	3517	3	4.7	3	8.3
4	3153	4	4.3	4	8.4
5	3521	5	1.7	5	8.1
6	3581	6	2.4	6	8.2
7	3770	7	3.0	7	8.2
8	3551	8	3.2	8	8.2
9	3494	9	3.1	9	8.1
10	3373	10	4.2	10	8.1
11	4471	11	4.0	11	7.8
12	3225	12	4.2	12	7.9
13	3479	13	5.0	13	7.9
14	3471	14	4.6	14	8.3
15	3320	15	5.2	15	7.8
16	3384	16	6.3	16	8.2
17	3574	17	5.5	17	8.1
18	3169	18	5.4	18	7.8
19	3407	19	4.2	19	8.1
20	3468	20	5.0	20	8.1
21	3403	21	4.4	21	7.6
22	3513	22	3.9	22	7.9
23	3498	23	5.1	23	8.1
24	3373	24	4.3	24	8.0
25	3305	25	5.9	25	7.8
26	3562	26	4.7	26	7.6
27	3222	27	5.7	27	8.0
28	3248	28	5.2	28	8.2
Total:	100930				

(002) DAILY FLOW'S	
Day	M^3
1	197
2	64
3	61
4	170
5	68
6	140
7	121
8	72
9	163
10	76
11	114
12	167
13	83
14	148
15	64
16	76
17	140
18	356
19	136
20	129
21	102
22	95
23	125
24	72
25	178
26	83
27	114
28	132
Total:	3445

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.433	0.000	0.000
0.101	0.000	0.000
0.185	0.000	0.000
0.413	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Kirgan Lail for Siltronic	DATE 8/28/07	Telephone
Tom McCue			503-243-2020
TYPED OR PRINTED	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
March-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	2.0	6.34	3.6	11.4	8.3	26.3	0.096	0.300	0.0005	0.0016	0.000	0.000	0.000	0.000
9	4.0	14.1	2.1	7.4	7.9	27.9	0.133	0.470	0.0005	0.0018	0.000	0.000	0.000	0.000
16	4.7	16.8	2.5	8.9	6.7	24.0	0.106	0.380	0.0005	0.0018	0.000	0.000	0.000	0.000
23	2.0	6.6	1.4	4.6	7.9	26.0	0.118	0.390	0.0005	0.0017	0.000	0.000	0.000	0.000
30	5.7	20.3	2.0	7.1	7.4	26.3	0.135	0.480	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3619	1	4.6	1	8.1
2	3169	2	5.2	2	8.0
3	3547	3	8.8	3	8.0
4	3066	4	2.6	4	8.2
5	3191	5	3.8	5	8.4
6	2968	6	4.4	6	8.3
7	3403	7	5.4	7	7.9
8	3487	8	6.1	8	8.2
9	3536	9	4.8	9	8.0
10	3581	10	6.2	10	8.5
11	3396	11	5.1	11	7.9
12	3328	12	5.6	12	8.2
13	3218	13	5.3	13	8.2
14	3574	14	5.4	14	8.3
15	3441	15	5.0	15	8.3
16	3566	16	5.4	16	7.8
17	3733	17	5.7	17	7.7
18	3725	18	5.2	18	8.2
19	3498	19	4.1	19	7.9
20	3611	20	4.4	20	8.0
21	3373	21	4.3	21	8.2
22	3301	22	4.5	22	8.3
23	3309	23	4.2	23	8.1
24	3426	24	4.0	24	7.8
25	3524	25	4.6	25	8.2
26	3199	26	4.2	26	8.3
27	3316	27	5.0	27	8.2
28	3464	28	3.9	28	8.1
29	3558	29	4.2	29	7.7
30	3574	30	4.3	30	7.8
31	3574	31	4.7	31	8.0
Total:	106273				

(002) DAILY FLOW'S	
Day	M^3
1	83
2	140
3	68
4	106
5	246
6	76
7	132
8	129
9	72
10	174
11	79
12	72
13	178
14	76
15	136
16	129
17	72
18	197
19	102
20	102
21	159
22	231
23	182
24	79
25	110
26	129
27	95
28	140
29	125
30	129
31	132
Total:	3880

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.07	0.000	0.000
0.071	0.000	0.000
0.116	0.000	0.000
0.226	0.000	0.000
0.195	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Roger Lail for Siltronic	DATE	Telephone
Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

. SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **April-06 Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	6.1	21.11	3.5	12.1	6.7	23.2	0.072	0.25	0.00519	0.0180	0.000	0.000	0.000	0.000
13	4.8	17.1	2.8	10.0	7.6	27.0	0.304	1.09	0.0005	0.0018	0.000	0.000	0.000	0.000
20	5.7	19.3	3.5	11.9	6.8	23.0	0.254	0.86	0.0005	0.0017	0.000	0.000	0.000	0.000
27	2.0	7.5	1.8	6.7	6.2	23.3	0.127	0.47	0.0005	0.0019	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3464	1	3.9	1	7.9
2	3256	2	4.1	2	8.1
3	3521	3	4.0	3	8.1
4	3494	4	3.9	4	8.1
5	3521	5	3.7	5	8.1
6	3460	6	3.6	6	8.5
7	3252	7	3.6	7	8.4
8	3577	8	5.8	8	8.3
9	3600	9	5.7	9	7.8
10	3195	10	5.9	10	7.8
11	3646	11	7.2	11	8.2
12	3562	12	9.4	12	8.3
13	3570	13	6.9	13	8.5
14	3630	14	9.4	14	8.1
15	3407	15	6.4	15	8.1
16	3687	16	5.0	16	8.1
17	3502	17	7.7	17	8.3
18	3358	18	11.2	18	8.4
19	3131	19	6.9	19	7.9
20	3403	20	5.5	20	8.3
21	3702	21	6.8	21	8.2
22	3717	22	6.6	22	8.1
23	3475	23	5.5	23	8.0
24	3487	24	3.8	24	8.0
25	3509	25	5.7	25	7.8
26	3267	26	5.2	26	8.1
27	3729	27	8.3	27	7.8
28	2820	28	9.2	28	8.3
29	3733	29	10.9	29	8.3
30	3630	30	6.6	30	8.6
Total:	108770				

(002) DAILY FLOW'S	
Day	M^3
1	79
2	208
3	129
4	742
5	163
6	98
7	132
8	102
9	42
10	182
11	87
12	144
13	132
14	53
15	170
16	87
17	79
18	182
19	49
20	121
21	129
22	307
23	189
24	72
25	95
26	178
27	68
28	303
29	79
30	68
Total:	4471

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.105	0.000	0.000
0.286	0.000	0.000
0.283	0.000	0.000
0.209	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		8/28/07		503-243-2020
TYPED OR PRINTED	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT			

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **May-06** **Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	4.3	13.97	3.8	12.3	8.1	26.4	0.067	0.220	0.0005	0.0016	0.000	0.000	0.000	0.000
11	2.0	7.2	4.7	17.0	7.8	28.1	0.173	0.370	0.0005	0.0018	0.000	0.000	0.000	0.000
18	4.1	15.1	3.9	14.4	5.6	20.5	0.221	0.820	0.0005	0.0018	0.000	0.000	0.000	0.000
15	4.1	14.9	2.1	7.6	6.1	22.1	0.198	0.700	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3358	1	3.2	1	7.9
2	3157	2	3.5	2	8.1
3	3293	3	2.6	3	8.1
4	3248	4	7.3	4	8.1
5	3551	5	10.9	5	8.1
6	3562	6	11.2	6	8.5
7	3733	7	13.6	7	8.4
8	3699	8	15.1	8	8.3
9	3770	9	15.0	9	7.8
10	3543	10	12.3	10	7.8
11	3608	11	11.4	11	8.2
12	3222	12	9.3	12	8.3
13	3604	13	5.2	13	8.5
14	3596	14	5.6	14	8.1
15	3630	15	5.3	15	8.1
16	3547	16	5.3	16	8.1
17	3676	17	6.1	17	8.3
18	3691	18	3.3	18	8.4
19	3842	19	5.3	19	7.9
20	3630	20	6.6	20	8.3
21	3331	21	8.8	21	8.2
22	3672	22	5.1	22	8.1
23	3551	23	7.2	23	8.0
24	3634	24	7.7	24	8.0
25	3558	25	7.9	25	7.8
26	3505	26	7.4	26	8.1
27	3566	27	7.8	27	7.8
28	3434	28	7.6	28	8.3
29	3309	29	5.6	29	8.3
30	3286	30	6.6	30	8.6
31	3335	31	7.2	31	8.1
Total:	109143				

(002) DAILY FLOW'S	
Day	M^3
1	174
2	231
3	401
4	231
5	79
6	178
7	329
8	95
9	140
10	45
11	140
12	132
13	295
14	140
15	189
16	238
17	337
18	363
19	333
20	167
21	95
22	182
23	132
24	151
25	121
26	185
27	163
28	114
29	159
30	91
31	106
Total:	5739

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.222	0.000	0.000
0.248	0.000	0.000
0.177	0.000	0.000
0.122	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Tony Lee for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
June-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	2.0	6.54	3.7	12.1	6.0	19.6	0.090	0.290	0.00087	0.0028	0.000	0.000	0.000	0.000
8	4.5	14.3	4.0	12.6	6.2	19.6	0.114	0.360	0.0005	0.0016	0.000	0.000	0.000	0.000
15	4.4	12.6	4.9	14.0	5.9	16.9	0.077	0.220	0.0033	0.0094	0.000	0.000	0.000	0.000
22	2.0	6.5	3.5	11.4	6.0	19.6	0.176	0.570	0.001	0.0033	0.000	0.000	0.000	0.000
29	2.0	6.5	6.5	21.0	5.2	16.8	0.115	0.370	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3271	1	8.9	1	7.9
2	3244	2	8.8	2	8.1
3	3468	3	6.2	3	8.1
4	3574	4	6.8	4	8.1
5	3278	5	6.6	5	8.1
6	3392	6	7.4	6	8.5
7	3316	7	8.4	7	8.4
8	3157	8	4.7	8	8.3
9	3324	9	4.8	9	7.8
10	3013	10	6.4	10	7.8
11	3203	11	6.4	11	8.2
12	2798	12	6.5	12	8.3
13	3063	13	7.6	13	8.5
14	3346	14	6.6	14	8.1
15	2862	15	5.7	15	8.1
16	3649	16	5.5	16	8.1
17	3324	17	7.2	17	8.3
18	3010	18	8.2	18	8.4
19	3229	19	7.9	19	7.9
20	3339	20	6.9	20	8.3
21	3990	21	5.5	21	8.2
22	3256	22	6.5	22	8.1
23	3396	23	6.4	23	8.0
24	3377	24	4.8	24	8.0
25	3335	25	5.7	25	7.8
26	3399	26	6.7	26	8.1
27	3422	27	8.9	27	7.8
28	3286	28	7.5	28	8.3
29	3237	29	6.5	29	8.3
30	3119	30	7.1	30	8.6
Total:	98676				

(002) DAILY FLOW'S	
Day	M^3
1	257
2	180
3	121
4	136
5	136
6	121
7	102
8	53
9	132
10	72
11	136
12	129
13	303
14	307
15	91
16	182
17	91
18	79
19	155
20	79
21	189
22	76
23	79
24	140
25	68
26	121
27	136
28	106
29	208
30	216
Total:	4204

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.334	0.000	0.000
0.61	0.000	0.000
0.376	0.000	0.000
0.238	0.000	0.000
0.279	0.000	0.000

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Tom McCue			503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
July-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	2.0	6.70	4.2	14.1	7.5	25.1	0.080	0.268	0.0005	0.0017	0.000	0.000	0.000	0.000
13	2.0	6.8	3.2	10.8	5.2	17.6	0.118	0.399	0.0005	0.0017	0.000	0.000	0.000	0.000
19	2.0	6.6	3.4	11.2	6.8	22.4	0.454	1.499	0.0005	0.0017	0.000	0.000	0.000	0.000
27	4.4	16.1	4.3	15.7	7.8	28.5	0.147	0.536	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	4088	1	5.5	1	7.9
2	3577	2	4.4	2	7.9
3	3278	3	6.5	3	8.1
4	3426	4	5.3	4	8.1
5	3479	5	4.8	5	7.5
6	3350	6	5.2	6	7.4
7	3324	7	3.5	7	7.8
8	3070	8	3.3	8	8.1
9	3407	9	4.1	9	7.9
10	3392	10	2.9	10	7.9
11	3275	11	4.0	11	7.4
12	3301	12	3.3	12	7.8
13	3381	13	1.2	13	8.0
14	3540	14	1.0	14	7.9
15	3812	15	0.9	15	7.8
16	3562	16	0.8	16	7.8
17	3381	17	0.8	17	8.1
18	3725	18	0.9	18	8.0
19	3301	19	0.7	19	8.1
20	3664	20	1.2	20	7.9
21	3861	21	1.7	21	7.8
22	3577	22	1.4	22	7.8
23	3543	23	1.5	23	7.8
24	3752	24	1.3	24	7.7
25	3187	25	1.7	25	7.9
26	3668	26	1.5	26	8.0
27	3649	27	1.3	27	8.1
28	3649	28	1.7	28	7.8
29	3649	29	1.6	29	8.1
30	3604	30	1.3	30	7.9
31	3611	31	1.4	31	7.8
Total:	109086				

(002) DAILY FLOWS	
Day	M^3
1	216
2	110
3	110
4	208
5	140
6	87
7	167
8	106
9	144
10	185
11	61
12	174
13	98
14	136
15	98
16	136
17	140
18	148
19	144
20	155
21	151
22	163
23	136
24	151
25	367
26	333
27	212
28	212
29	197
30	212
31	144
Total:	5042

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.201	0.000	0.000
0.238	0.000	0.000
0.131	0.000	0.000
0.345	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue			8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Aug-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	2.0	7.36	2.2	8.1	6.0	22.1	0.182	0.670	0.0005	0.0018	0.000	0.000	0.000	0.000
10	5.4	19.6	3.4	12.3	7.2	26.1	0.167	0.606	0.0005	0.0018	0.000	0.000	0.000	0.000
17	2.0	7.4	3.0	11.1	8.9	33.0	0.112	0.416	0.001	0.0037	0.000	0.000	0.000	0.000
24	4.0	13.9	3.5	12.1	8.1	28.0	0.250	0.865	0.0005	0.0017	0.000	0.000	0.000	0.000
31	2.0	5.0	1.3	3.2	6.2	15.4	0.065	0.162	0.00114	0.0028	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3611	1	1.6	1	7.9
2	3680	2	1.4	2	7.6
3	3403	3	2.3	3	7.9
4	3263	4	2.2	4	7.9
5	3725	5	2.5	5	8.0
6	3623	6	1.9	6	8.0
7	3611	7	1.7	7	7.8
8	3581	8	1.6	8	7.7
9	3475	9	1.4	9	7.8
10	3630	10	2.2	10	7.8
11	3623	11	1.7	11	7.9
12	3596	12	1.4	12	7.8
13	3381	13	1.5	13	7.5
14	3498	14	2.3	14	7.8
15	3509	15	2.0	15	8.1
16	3475	16	1.9	16	8.0
17	3710	17	2.3	17	7.8
18	3471	18	2.2	18	7.7
19	3755	19	1.5	19	7.6
20	3271	20	1.5	20	7.8
21	3929	21	1.7	21	7.5
22	3403	22	2.1	22	7.8
23	3577	23	2.3	23	7.7
24	3460	24	2.4	24	7.9
25	3483	25	2.0	25	7.6
26	3581	26	2.1	26	7.8
27	3150	27	2.4	27	7.9
28	3619	28	2.1	28	7.7
29	3524	29	1.8	29	7.8
30	3305	30	1.3	30	7.7
31	2491	31	0.9	31	7.9
Total:	108416				

(002) DAILY FLOWS	
Day	M^3
1	125
2	189
3	110
4	167
5	185
6	102
7	220
8	148
9	140
10	159
11	144
12	125
13	197
14	148
15	197
16	178
17	250
18	140
19	121
20	182
21	185
22	148
23	189
24	155
25	144
26	159
27	155
28	208
29	83
30	148
31	144
Total:	4944

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.197	0.000	0.000
0.138	0.000	0.000
0.292	0.000	0.000
0.165	0.000	0.000
0.431	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Kreyclosed for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Sep-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	2.0	6.69	5.2	17.4	7.5	25.2	0.132	0.441	0.00163	0.0054	0.000	0.000	0.000	0.000
14	2.0	7.4	3.6	13.4	8.2	30.6	0.357	1.328	0.0005	0.0019	0.000	0.000	0.000	0.000
21	2.0	7.2	2.9	10.5	7.9	28.6	0.289	1.042	0.00114	0.0041	0.000	0.000	0.000	0.000
25	2.0	7.6	2.5	9.5	9.4	35.7	0.187	0.711	0.00123	0.0047	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S	
Day	M^3
1	2843
2	2862
3	3180
4	2813
5	3755
6	3343
7	3437
8	3770
9	3800
10	3206
11	3593
12	3434
13	3498
14	3721
15	3543
16	3570
17	3418
18	3517
19	3611
20	3078
21	3604
22	2858
23	3460
24	3479
25	3801
26	3524
27	3191
28	3078
29	3551
30	3540
Total:	101878

(001) Turbidity Daily Avg	
Day	NTU's
1	0.9
2	1.4
3	1.4
4	1.6
5	2.0
6	2.0
7	1.4
8	1.8
9	2.2
10	1.5
11	1.2
12	1.2
13	1.4
14	1.7
15	1.8
16	2.7
17	1.6
18	1.2
19	1.3
20	2.0
21	2.1
22	2.6
23	1.4
24	1.4
25	2.4
26	1.7
27	2.5
28	2.3
29	2.5
30	2.2

(001) pH Daily Avg	
Day	pH
1	7.7
2	8.0
3	7.9
4	8.1
5	8.1
6	8.1
7	8.1
8	8.5
9	8.4
10	8.3
11	7.8
12	7.8
13	8.2
14	8.3
15	8.5
16	8.1
17	8.1
18	8.1
19	8.3
20	8.4
21	7.9
22	8.3
23	8.2
24	8.1
25	8.0
26	8.0
27	7.8
28	8.1
29	7.8
30	8.3

(002) DAILY FLOW'S	
Day	M^3
1	167
2	299
3	362
4	202
5	214
6	136
7	178
8	420
9	564
10	382
11	326
12	235
13	246
14	155
15	269
16	185
17	197
18	231
19	242
20	197
21	220
22	197
23	257
24	265
25	204
26	204
27	261
28	129
29	106
30	61
Total:	7111

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.453	0.000	0.000
0.575	0.000	0.000
0.703	0.000	0.000
0.502	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		8/28/07		503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Oct-06** **Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	4.6	15.74	3.4	11.6	6.8	23.1	0.143	0.489	0.0005	0.0017	0.000	0.000	0.000	0.000
12	6.9	26.1	3.5	13.2	6.7	25.3	0.274	1.036	0.0005	0.0019	0.000	0.000	0.000	0.000
17	5.6	20.5	2.9	10.6	6.9	25.5	0.236	0.866	0.0005	0.0018	0.000	0.000	0.000	0.000
26	7.5	22.9	3.9	11.9	3.2	9.9	0.798	2.438	0.0005	0.0015	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		(01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3206	1	1.5	1	8.0
2	3354	2	1.3	2	8.1
3	3717	3	1.0	3	7.9
4	3028	4	1.0	4	8.1
5	3422	5	1.5	5	8.1
6	4013	6	1.4	6	8.1
7	3426	7	1.4	7	8.1
8	3403	8	1.7	8	8.5
9	3316	9	1.4	9	8.4
10	3271	10	1.4	10	8.3
11	3596	11	1.8	11	7.8
12	3782	12	1.7	12	7.8
13	3426	13	1.5	13	8.2
14	3551	14	1.4	14	8.3
15	3585	15	1.4	15	8.5
16	3513	16	1.2	16	8.1
17	3668	17	1.7	17	8.1
18	3664	18	1.8	18	8.1
19	3483	19	1.9	19	8.3
20	3509	20	1.2	20	8.4
21	3028	21	1.4	21	7.9
22	2419	22	0.7	22	8.3
23	2093	23	0.7	23	8.2
24	2279	24	0.8	24	8.1
25	2037	25	1.0	25	8.0
26	3055	26	3.1	26	8.0
27	3551	27	1.9	27	7.8
28	3725	28	1.2	28	8.1
29	3615	29	1.1	29	7.8
30	3191	30	1.1	30	8.3
31	3392	31	1.0	31	8.3
Total:	102321				

(002) DAILY FLOW'S	
Day	M^3
1	61
2	273
3	201
4	151
5	189
6	151
7	193
8	231
9	170
10	163
11	178
12	216
13	197
14	201
15	151
16	204
17	216
18	185
19	220
20	254
21	223
22	193
23	204
24	401
25	238
26	363
27	545
28	333
29	337
30	257
31	178
Total:	7079

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.717	0.000	0.000
0.375	0.000	0.000
0.700	0.000	0.000
1.016	0.000	0.000

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Tom McCue		Karen Lord for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **Nov-06** **Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
2	2.0	7.15	3.1	11.1	7.6	27.3	0.198	0.708	0.0005	0.0018	0.000	0.000	0.000	0.000
9	6.3	22.5	1.7	6.1	7.3	26.2	0.157	0.565	0.0005	0.0018	0.000	0.000	0.000	0.000
16	2.0	7.3	1.8	6.5	8.5	31.0	0.341	1.237	0.0005	0.0018	0.000	0.000	0.000	0.000
23	7.0	23.3	1.6	5.3	9.1	30.3	0.310	1.032	0.0005	0.0017	0.000	0.000	0.000	0.000
30	5.9	20.6	2.8	9.8	7.1	24.8	0.224	0.782	0.0005	0.0017	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3725	1	1.0	1	7.9
2	3574	2	0.9	2	8.1
3	3861	3	0.9	3	8.1
4	3551	4	0.7	4	8.1
5	3574	5	0.8	5	8.1
6	3490	6	0.8	6	8.5
7	4308	7	0.7	7	8.4
8	3356	8	0.7	8	8.3
9	3596	9	0.8	9	7.8
10	3532	10	1.0	10	7.8
11	3691	11	1.1	11	8.2
12	3309	12	0.7	12	8.3
13	3543	13	0.7	13	8.5
14	3229	14	1.0	14	8.1
15	3505	15	1.1	15	8.1
16	3627	16	1.2	16	8.1
17	3786	17	1.1	17	8.3
18	3498	18	1.1	18	8.4
19	3702	19	1.5	19	7.9
20	3672	20	0.9	20	8.3
21	3729	21	0.9	21	8.2
22	3683	22	0.8	22	8.1
23	3328	23	0.8	23	8.0
24	3979	24	0.9	24	8.0
25	3259	25	0.7	25	7.8
26	3509	26	0.8	26	8.1
27	3494	27	0.8	27	7.8
28	3392	28	1.0	28	8.3
29	3479	29	1.3	29	8.3
30	3490	30	1.1	30	8.6
Total:	107474				

(002) DAILY FLOWS	
Day	M^3
1	223
2	269
3	307
4	269
5	208
6	326
7	148
8	163
9	132
10	136
11	140
12	148
13	212
14	216
15	204
16	182
17	333
18	167
19	273
20	560
21	329
22	280
23	208
24	242
25	136
26	117
27	129
28	163
29	216
30	197
Total:	6632

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.767	0.000	0.000
0.683	0.000	0.000
1.069	0.000	0.000
0.679	0.000	0.000
0.472	0.000	0.000

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Tom McCue		Karen Gail for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Dec-06 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
6	9.0	29.37	4.3	14.1	7.9	25.7	0.144	0.471	0.0005	0.0016	0.000	0.000	0.000	0.000
14	5.9	19.6	5.7	18.9	6.8	22.5	0.172	0.570	0.00151	0.0050	0.000	0.000	0.000	0.000
21	8.2	25.7	4.1	12.8	6.6	20.6	0.187	0.585	0.0005	0.0016	0.000	0.000	0.000	0.000
28	5.2	18.3	4.4	15.4	5.8	20.3	0.185	0.647	0.00217	0.0076	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3490	1	1.0	1	8.1
2	3373	2	1.3	2	8.4
3	3225	3	1.3	3	7.9
4	3263	4	1.3	4	8.1
5	3418	5	1.4	5	8.1
6	3271	6	1.5	6	8.1
7	3214	7	1.9	7	8.1
8	3471	8	2.1	8	8.5
9	3540	9	1.9	9	8.4
10	3237	10	1.6	10	8.3
11	3305	11	1.6	11	7.8
12	3653	12	1.6	12	7.8
13	3524	13	1.9	13	8.2
14	3312	14	1.9	14	8.3
15	3710	15	1.6	15	8.5
16	3793	16	2.7	16	8.1
17	3225	17	2.1	17	8.1
18	3399	18	1.8	18	8.1
19	3165	19	2.3	19	8.3
20	4013	20	2.5	20	8.4
21	3127	21	2.2	21	7.9
22	3513	22	2.4	22	8.3
23	3532	23	2.1	23	8.2
24	3460	24	2.0	24	8.1
25	3706	25	2.0	25	8.0
26	2866	26	2.2	26	8.0
27	3861	27	1.8	27	7.8
28	3498	28	1.5	28	8.1
29	3619	29	2.3	29	7.8
30	3861	30	2.6	30	8.3
31	3528.2	31	2.8	31	8.3
Total:	107174				

(002) DAILY FLOWS	
Day	M^3
1	174
2	265
3	102
4	223
5	87
6	261
7	57
8	269
9	102
10	178
11	91
12	151
13	185
14	98
15	148
16	174
17	132
18	102
19	231
20	189
21	151
22	269
23	625
24	477
25	178
26	182
27	106
28	193
29	136
30	167
31	177.9
Total:	5883

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.443	0.000	0.000
0.137	0.000	0.000
0.148	0.000	0.000
0.358	0.000	0.000

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Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Jan-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
4	11.6	41.23	5.4	19.2	6.3	22.4	0.211	0.75	0.00106	0.0038	0.000	0.000	0.000	0.000
11	2.0	7.4	3.6	13.4	4.0	14.9	0.061	0.23	0.0005	0.0019	0.000	0.000	0.000	0.000
18	4.3	14.2	5.0	16.5	4.7	15.6	0.107	0.35	0.0005	0.0017	0.000	0.000	0.000	0.000
25	4.5	14.7	5.3	17.2	5.3	17.0	0.108	0.35	0.0005	0.0016	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M3	Day	NTU's	Day	pH
1	3733	1	2.5	1	8.1
2	3362	2	2.1	2	8.2
3	3646	3	2.4	3	8.4
4	3555	4	2.3	4	8.3
5	3483	5	2.3	5	8.1
6	3206	6	2.0	6	8.2
7	3551	7	1.9	7	8.1
8	3558	8	2.2	8	8.0
9	3570	9	3.0	9	8.2
10	3547	10	2.5	10	8.0
11	3717	11	1.6	11	8.0
12	3324	12	1.8	12	8.2
13	3339	13	2.4	13	8.2
14	3418	14	2.9	14	8.3
15	3316	15	3.1	15	8.2
16	3150	16	2.2	16	8.4
17	3142	17	2.1	17	8.3
18	3305	18	2.7	18	8.2
19	3839	19	2.5	19	8.1
20	3127	20	2.2	20	8.1
21	3479	21	2.1	21	8.2
22	3093	22	2.0	22	8.2
23	3362	23	2.1	23	8.2
24	3203	24	2.7	24	8.2
25	3240	25	2.8	25	8.0
26	3142	26	2.5	26	8.0
27	3316	27	1.7	27	8.3
28	3293	28	1.5	28	8.3
29	3528	29	1.6	29	8.3
30	3604	30	0.9	30	8.2
31	3418	31	1.0	31	8.0
Total:	105566				

(002) DAILY FLOWS	
Day	M3
1	167
2	250
3	212
4	242
5	204
6	772
7	254
8	117
9	197
10	106
11	102
12	174
13	795
14	742
15	988
16	973
17	1068
18	1632
19	397
20	6530
21	4637
22	3664
23	257
24	227
25	182
26	178
27	212
28	246
29	193
30	185
31	288
Total:	26193

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl2 Free Available Daily Max mg/L	Cl2 Free Available Monthly Avg. mg/L
0.308	0.000	0.000
0.062	0.000	0.000
0.062	0.000	0.000
0.062	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SCOEPA00029337

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
Feb-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	0.0	0.00	2.1	6.97	6.1	20.29	0.066	0.22	0.0005	0.0017	0.000	0.000	0.000	0.000
8	4.5	15.96	4.9	17.46	6.1	21.66	0.128	0.46	0.0005	0.0018	0.000	0.000	0.000	0.000
15	2.0	6.13	1.7	5.21	6.7	20.37	0.107	0.33	0.0005	0.0015	0.000	0.000	0.000	0.000
22	2.0	7.27	2.4	8.72	5.8	21.08	0.086	0.31	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3320	1	1.2	1	8.2
2	3316	2	1.6	2	8.2
3	3680	3	1.3	3	8.2
4	3403	4	1.3	4	8.1
5	3085	5	1.5	5	8.2
6	3301	6	1.8	6	8.2
7	3309	7	1.9	7	8.2
8	3562	8	1.8	8	8.2
9	2926	9	1.4	9	8.4
10	3574	10	1.2	10	8.3
11	3437	11	1.4	11	8.1
12	3407	12	1.2	12	8.2
13	3316	13	1.0	13	8.1
14	3437	14	1.1	14	8.1
15	3063	15	1.4	15	8.0
16	3343	16	2.3	16	8.1
17	3377	17	0.9	17	8.1
18	3339	18	1.1	18	8.2
19	3494	19	1.1	19	8.2
20	3384	20	1.2	20	8.3
21	3229	21	1.3	21	8.1
22	3634	22	1.1	22	7.9
23	3358	23	1.2	23	8.0
24	3339	24	1.2	24	8.1
25	3199	25	1.4	25	8.4
26	3487	26	1.5	26	8.3
27	3683	27	1.5	27	8.2
28	3187	28	1.0	28	8.0
Total:	94190				

(002) DAILY FLOWS	
Day	M^3
1	163
2	197
3	204
4	572
5	148
6	140
7	182
8	167
9	170
10	238
11	129
12	106
13	257
14	170
15	216
16	114
17	155
18	223
19	193
20	208
21	114
22	144
23	201
24	129
25	155
26	163
27	159
28	163
Total:	5179

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.081	0.000	0.000
0.092	0.000	0.000
0.096	0.000	0.000
0.175	0.000	0.000

Note:
BOD February 1st: Outside lab reported contamination of dilution water, resulting in high DO depletion of the blank and high (over-limit) spike results. Therefore, no valid results were obtained.

The 001 daily flow difference from original supplemental data submisssion is due to formula averaging 28 days instead of 30 days.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
March-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
1	2.0	7.14	1.8	6.4	6.0	21.4	0.108	0.39	0.0005	0.0018	0.000	0.000	0.000	0.000
8	4.7	17.3	3.2	11.8	7.4	27.3	0.086	0.32	0.0005	0.0018	0.000	0.000	0.000	0.000
15	2.0	6.6	3.3	10.8	6.2	20.3	0.092	0.30	0.0005	0.0016	0.000	0.000	0.000	0.000
22	2.0	7.4	3.2	11.8	6.9	25.4	0.125	0.46	0.0005	0.0018	0.000	0.000	0.000	0.000
28	4.7	17.1	1.7	6.2	8.2	29.9	0.128	0.47	0.0005	0.0018	0.000	0.000	0.000	0.000

(001) DAILY FLOWS		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3570	1	1.5	1	8.0
2	3350	2	1.5	2	8.3
3	3767	3	1.3	3	8.5
4	3593	4	1.0	4	8.5
5	3248	5	1.2	5	8.2
6	3555	6	1.4	6	8.2
7	3767	7	1.6	7	8.2
8	3687	8	1.9	8	8.2
9	3596	9	2.5	9	8.1
10	3524	10	2.4	10	8.2
11	3142	11	2.5	11	8.2
12	3354	12	1.9	12	8.3
13	3119	13	1.7	13	8.2
14	3558	14	1.8	14	8.0
15	3278	15	1.9	15	8.1
16	3418	16	1.9	16	8.0
17	3804	17	2.1	17	7.9
18	3517	18	1.7	18	8.0
19	3301	19	1.6	19	8.1
20	3464	20	2.4	20	8.1
21	3558	21	1.9	21	8.2
22	3676	22	1.6	22	8.1
23	3551	23	2.2	23	8.4
24	3403	24	2.7	24	8.3
25	3748	25	2.4	25	8.5
26	3649	26	1.6	26	8.2
27	3517	27	1.7	27	8.2
28	3600	28	1.8	28	8.3
29	3358	29	2.5	29	8.2
30	3725	30	2.4	30	8.2
31	3547	31	1.6	31	8.0
Total:	108745				

(002) DAILY FLOWS	
Day	M^3
1	197
2	201
3	284
4	151
5	223
6	375
7	197
8	280
9	322
10	284
11	337
12	163
13	223
14	151
15	178
16	227
17	114
18	208
19	163
20	185
21	174
22	106
23	295
24	144
25	178
26	246
27	129
28	212
29	140
30	170
31	212
Total:	6470

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.097	0.000	0.000
0.407	0.000	0.000
0.056	0.000	0.000
0.079	0.000	0.000
0.215	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Karen Lai for Siltronic	DATE	Telephone
Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
April-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	9.6	28.14	3.6	12.5	6.0	20.8	0.134	0.47	0.0005	0.0017	0.000	0.000	0.000	0.000
12	7.9	26.5	3.4	11.4	7.2	24.2	0.189	0.63	0.0005	0.0017	0.000	0.000	0.000	0.000
19	4.4	16.3	3.1	10.9	6.5	22.8	0.154	0.54	0.0005	0.0018	0.000	0.000	0.000	0.000
26	4.1	12.6	2.8	8.2	6.1	23.8	0.070	0.21	0.0005	0.0015	0.000	0.000	0.000	0.000
5	6.7	n/a							0.0005	n/a	0.000	0.000	0.000	0.000
19	4.8	n/a							0.0005	n/a				
26	4.5	n/a							0.0005	n/a				

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3710	1	1.5	1	8.2
2	3566	2	1.4	2	8.1
3	3547	3	1.9	3	8.3
4	3210	4	2.4	4	8.0
5	3471	5	2.7	5	8.1
6	3668	6	2.1	6	8.2
7	3445	7	1.8	7	8.2
8	3422	8	2.0	8	8.3
9	3411	9	1.8	9	8.3
10	3604	10	1.7	10	8.1
11	3475	11	1.9	11	8.1
12	3358	12	1.6	12	7.9
13	3365	13	1.5	13	8.1
14	3343	14	1.8	14	8.2
15	3468	15	1.8	15	8.2
16	3358	16	1.5	16	8.3
17	3172	17	1.5	17	8.2
18	3490	18	1.3	18	8.3
19	3513	19	1.4	19	8.2
20	3373	20	1.1	20	8.1
21	3411	21	1.2	21	8.4
22	3536	22	1.9	22	8.2
23	3490	23	1.4	23	8.0
24	3449	24	0.7	24	7.7
25	3362	25	0.8	25	7.9
26	2934	26	0.9	26	7.9
27	3381	27	1.0	27	7.9
28	3558	28	1.0	28	7.9
29	3161	29	0.9	29	7.9
30	3309	30	0.8	30	7.8
Total:	102559				

(002) DAILY FLOW'S	
Day	M^3
1	125
2	170
3	144
4	140
5	227
6	163
7	197
8	197
9	159
10	227
11	132
12	204
13	185
14	238
15	220
16	185
17	246
18	242
19	148
20	189
21	178
22	170
23	223
24	265
25	95
26	227
27	591
28	314
29	136
30	212
Total:	6152

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.084	0.000	0.000
0.094	0.000	0.000
0.122	0.000	0.000
0.067	0.000	0.000

For Bod & Total Cr samples: The calculation for the loading includes averaging both samples for the 5th, 19th and the 26th (qualifying alternate lab).

The 001 daily flow difference from original supplemental data submission is due to formula averaging 31 days instead of 30 days.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue			8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
May-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
3	2.0	14.30	2.4	8.2	5.6	19.2	0.116	0.40	0.0005	0.0284	0.000	0.000	0.000	0.000
10	6.3	18.1	1.9	6.0	6.0	19.0	0.272	0.86	0.0005	0.0015	0.000	0.000	0.000	0.000
18	8.9	32.0	2.1	7.5	6.8	24.4	0.095	0.34	0.0005	0.0018	0.000	0.000	0.000	0.000
24	2.0	6.7	1.9	6.3	5.2	17.3	0.091	0.30	0.0005	0.0017	0.000	0.000	0.000	0.000
30	2.0	6.7	1.4	4.7	7.4	24.9	0.197	0.66	0.0005	0.0017	0.000	0.000	0.000	0.000
3	6.3	n/a							0.016	n/a				
10	5.2	n/a							0.00045	n/a				

(001) DAILY FLOWS	
Day	M^3
1	3301
2	3252
3	3437
4	3456
5	3233
6	3354
7	3246
8	3899
9	3396
10	3165
11	3350
12	3422
13	3494
14	3403
15	3483
16	3373
17	3494
18	3589
19	3403
20	3562
21	3418
22	3638
23	3403
24	3328
25	3070
26	3540
27	3339
28	3415
29	3335
30	3369
31	3468
Total:	105637

(001) Turbidity Daily Avg	
Day	NTU's
1	0.9
2	1.1
3	0.8
4	0.9
5	0.8
6	0.8
7	0.7
8	0.8
9	0.8
10	0.8
11	0.8
12	0.8
13	1.1
14	0.9
15	0.8
16	1.1
17	1.0
18	0.6
19	0.6
20	0.7
21	0.7
22	0.7
23	0.6
24	0.7
25	0.9
26	0.9
27	0.6
28	0.5
29	0.5
30	0.6
31	0.7

(001) pH Daily Avg	
Day	pH
1	7.8
2	8.5
3	8.1
4	8.1
5	7.8
6	7.8
7	7.9
8	7.8
9	7.9
10	7.8
11	7.8
12	7.7
13	8.1
14	7.8
15	7.8
16	7.8
17	7.8
18	7.8
19	7.8
20	8.2
21	7.9
22	7.6
23	8.0
24	7.7
25	7.8
26	8.2
27	8.2
28	8.3
29	8.3
30	7.9
31	7.8

(002) DAILY FLOWS	
Day	M^3
1	182
2	303
3	314
4	117
5	530
6	273
7	129
8	212
9	140
10	212
11	129
12	193
13	178
14	189
15	273
16	659
17	185
18	201
19	250
20	212
21	299
22	227
23	299
24	257
25	220
26	409
27	182
28	326
29	216
30	318
31	288
Total:	7920

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.098	0.000	0.000
0.302	0.000	0.000
0.151	0.000	0.000
0.186	0.000	0.000
0.137	0.000	0.000

For Bod & Total Cr samples: The calculation for the loading includes both samples for the 3rd and the 10th (qualifying alternate lab).

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)	Karen Laird for Tom McCue	DATE 8/28/07	Telephone
Tom McCue			503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
June-07 Discharge Data

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
7	4.3	15.57	1.9	8.6	6.4	22.4	0.176	0.62	0.0005	0.0026	0.000	0.000	0.000	0.000
14	6.5	19.6	1.9	6.3	8.9	29.3	0.156	0.51	0.0005	0.0025	0.000	0.000	0.000	0.000
21	4.5	12.9	48.5	192.8	4.9	19.5	0.083	0.33	0.0005	0.0039	0.000	0.000	0.000	0.000
28	2.9	10.6	2.4	8.6	5.8	20.9	0.157	0.57	0.0005	0.0018	0.000	0.000	0.000	0.000
7	4.6	n/a							0.00102	n/a				
14	5.4	n/a							0.00102	n/a				
21	2.0	n/a							0.00148	n/a				

(001) DAILY FLOW'S		(001) Turbidity Daily Avg		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3782	1	1.1	1	7.7
2	3456	2	1.2	2	7.8
3	3517	3	1.1	3	8.0
4	3422	4	0.9	4	8.1
5	3521	5	0.6	5	8.2
6	3396	6	0.6	6	8.2
7	3498	7	0.5	7	8.1
8	3331	8	0.7	8	7.9
9	3680	9	0.5	9	8.0
10	3445	10	0.5	10	8.1
11	3509	11	0.5	11	8.0
12	3509	12	0.8	12	7.9
13	3596	13	0.6	13	7.9
14	3290	14	0.6	14	8.0
15	3710	15	0.5	15	8.2
16	3471	16	0.5	16	8.0
17	3468	17	0.4	17	8.0
18	3460	18	0.5	18	8.1
19	3445	19	1.0	19	8.2
20	3191	20	1.2	20	8.3
21	3975	21	1.9	21	8.1
22	2938	22	0.7	22	8.0
23	3797	23	0.7	23	8.0
24	3430	24	1.0	24	8.1
25	3430	25	0.7	25	8.0
26	4051	26	0.7	26	8.2
27	3471	27	0.5	27	7.9
28	3600	28	0.7	28	8.0
29	3676	29	0.7	29	8.0
30	3244	30	0.6	30	8.1
Total:	105308				

(002) DAILY FLOW'S	
Day	M^3
1	238
2	424
3	303
4	473
5	174
6	314
7	341
8	189
9	337
10	386
11	371
12	413
13	386
14	242
15	295
16	333
17	382
18	466
19	291
20	439
21	337
22	314
23	397
24	409
25	326
26	326
27	314
28	522
29	647
30	420
Total:	10812

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.078	0.000	0.000
0.102	0.000	0.000
0.057	0.000	0.000
0.098	0.000	0.000

For Bod & Total Cr samples: The calculation for the loading includes averaging both samples for the 7th, 14th and the 21th (qualifying alternate lab).

The 001 daily flow difference from original supplemental data submisssion is due to formula averaging 31 days instead of 30 days.

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		for Siltronic	8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450 **Permit Number: 101128**
7200 NW Front Avenue **July-07** **Discharge Data**
Portland, Oregon 97210-3676

Outfall # 001														
Date	BOD mg/L	BOD Loading kg/day	TSS mg/L	TSS Loading kg/day	Fluoride mg/L	Fluoride Loading kg/day	Phosphate mg/l	Phosphate Loading kg/day	Total Cr mg/L	Total Cr Loading kg/day	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg
5	4.3	14.60	1.2	4.1	6.4	21.7	0.117	0.40	0.0005	0.0017	0.000	0.000	0.000	0.000
12	6.0	19.6	1.5	4.9	7.2	23.5	0.108	0.35	0.0005	0.0016	0.000	0.000	0.000	0.000
19	2.9	9.0	2.9	9.0	8.1	25.2	0.257	0.80	0.0005	0.0016	0.000	0.000	0.000	0.000
26	1.0	3.8	3.5	13.4	7.8	29.8	0.229	0.87	0.0005	0.0019	0.000	0.000	0.000	0.000

(001) DAILY FLOW'S		01) Turbidity Daily A		(001) pH Daily Avg	
Day	M^3	Day	NTU's	Day	pH
1	3381	1	0.7	1	8.0
2	3248	2	0.6	2	7.8
3	3509	3	0.6	3	7.7
4	3407	4	0.5	4	7.6
5	3396	5	0.6	5	7.7
6	3362	6	0.6	6	7.6
7	3396	7	0.8	7	7.3
8	3558	8	0.7	8	7.1
9	3630	9	23.2	9	7.8
10	3195	10	1.4	10	7.4
11	3328	11	0.8	11	7.2
12	3263	12	0.6	12	7.4
13	3521	13	2.1	13	7.4
14	3373	14	1.0	14	7.5
15	3172	15	0.9	15	7.5
16	3206	16	0.6	16	7.3
17	3452	17	0.7	17	7.6
18	3312	18	0.5	18	8.0
19	3108	19	0.7	19	8.1
20	3297	20	0.7	20	7.7
21	3449	21	0.8	21	7.8
22	3577	22	0.7	22	7.7
23	3649	23	0.8	23	7.7
24	3702	24	1.3	24	8.1
25	3543	25	0.8	25	7.8
26	3820	26	0.6	26	7.4
27	4039	27	0.6	27	7.6
28	3687	28	0.5	28	7.1
29	3490	29	0.5	29	7.4
30	3233	30	0.5	30	7.5
31	2862	31	0.6	31	7.7
Total:	106167				

(002) DAILY FLOW'S	
Day	M^3
1	511
2	295
3	458
4	450
5	447
6	685
7	697
8	628
9	647
10	598
11	700
12	644
13	593
14	618
15	587
16	541
17	587
18	1022
19	572
20	500
21	413
22	674
23	564
24	439
25	613
26	534
27	765
28	333
29	780
30	541
31	575
Total:	18012

Outfall # 002	Outfall # 003	
Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
0.219	0.000	0.000
0.147	0.000	0.000
0.249	0.000	0.000
0.213	0.000	0.000

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. § 1001 AND 33 U.S.C. § 1319. (Penalties under these statutes may include fines up to $10,000 and/or maximum imprisonment of between 6 months and 5 years.)		DATE	Telephone
Tom McCue		8/28/07	503-243-2020
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☒ Agent ☐ Addressee

B. Received by (Printed Name): Troy Miller
C. Date of Delivery: 7.13

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label): 7003 2260 0003 1472 9857

PS Form 3811, February 2004 Domestic Return Receipt #040 102595-02-M-1540

SCOEPA00029344

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue M/S 30
Portland, OR 97210-3676

SCOEPA00029345

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X DEQ/NWR ☐ Agent ☐ Addressee

B. Received by (Printed Name) Schreich
C. Date of Delivery 7/13/07

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7003 2260 0003 1472 9840

PS Form 3811, February 2004 Domestic Return Receipt #040 102595-02-M-1540

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Koreen Lail
Siltronic Corporation
7200 NW Front Avenue
Portland, OR 97210-3676

M/S 30

SCOEPA00029347

7003 2260 0003 1472 9840

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OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

040

Sen

Dr. Elliot Zais
Water Quality Source Control, DEQ
2020 SW 4th Ave., Suite 400
Portland, OR 97201-4987

Stre
or F
City

PS F

nstructions

7003 2260 0003 1472 9857

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

Postage	$
Certified Fee	
Return Reciept Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.38

Postmark Here

040

Sent T
Street or PO
City, S

Oregon DEQ
WQ-DMR Processing
811 SW 6th Ave.
Portland, Oregon 97204-1390

PS Form ... Instructions

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 001 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-23)	MO (24-25)	DAY (26-27)	TO YEAR (28-29)	MO (30-31)	DAY (32-33)
2007	6	1	2007	6	30

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (62-69) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-69)	SAMPLE TYPE (70-71)
Process Waste Water Flow	SAMPLE MEASUREMENT	3,397	4,051	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--			totalizing	recorder
BOD	SAMPLE MEASUREMENT	15.2	21.4	kg/day	--	4.3	6.5	mg/L		1/7	24HC
	PERMIT REQUIREMENT	154	342		--	15	30				
TSS	SAMPLE MEASUREMENT	53.6	192.8	kg/day	--	13.7	48.5	mg/L		1/7	24HC
	PERMIT REQUIREMENT	236	695		--	23	61				
Cr^{+6} (1)	SAMPLE MEASUREMENT			kg/day	--			mg/L			
	PERMIT REQUIREMENT	0.05	0.12		--	0.02	0.05				
Cr^{Total}	SAMPLE MEASUREMENT	<0.004	0.006	kg/day	--	<0.001	0.001	mg/L		1/7	24HC
	PERMIT REQUIREMENT	0.2	0.6		--	0.3	1.0				
Fluoride	SAMPLE MEASUREMENT	23.0	29.3	kg/day	--	6.5	8.9	mg/L		1/7	24HC
	PERMIT REQUIREMENT	178	365		--	17.4	32				
Total Phosphate	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.2	mg/L		1/7	24HC
	PERMIT REQUIREMENT	--	--		--	10	15				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319. [illegible]

Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503 — NUMBER 243-2020

DATE: YEAR 07 — MO 7 — DAY 11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

(1) Chrome batches are no longer being treated on site. pH outage: 06/29/07 for 6 minutes at 5.79.

SCOEPA00029350

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16): 101128 — PERMIT NUMBER

(17-19): Outfall 001 — DISCHARGE NUMBER

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	6	1	TO	2007	6	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE (54-61)	MAXIMUM	UNITS	NO. EX (62-65)	FREQUENCY OF ANALYSIS (66-68)	SAMPLE TYPE (69-70)
TTO	SAMPLE MEASUREMENT	--	--	kg/day	--	--	<0.02	mg/L		1/ 30	Grab
	PERMIT REQUIREMENT	--	--		--	--	1.37				
Turbidity	SAMPLE MEASUREMENT					0.7	4.2	NTC		6/1	Grab
	PERMIT REQUIREMENT									One sample every 4 hours	
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	monthly	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC § 1001 AND 33 USC § 1319. (Penalties under these statutes may include fines up to $10,000 and/or imprisonment of between 6 months and 5 years.)

Siltronic Corp by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 503 NUMBER 243-2020

DATE: YEAR 07 MO 7 DAY 11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029351

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation — Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

PERMIT NUMBER (2-16): 101128

DISCHARGE NUMBER (17-19): Outfall 002

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM	2007	6	1	TO	2007	6	30
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING (46-53) AVERAGE	MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	AVERAGE	MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
MV-3 Flow	SAMPLE MEASUREMENT	360	647	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
MV-3 Total phosphates	SAMPLE MEASUREMENT	--	--	--	--	0.1	0.1	mg/L		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	10	15				
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE		DATE		
503	243-2020	07	7	11
AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029352

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if different)

NAME: Siltronic Corporation Site ID 93450

ADDRESS: 7200 NW Front Ave.
Portland, OR 97210-3676

FACILITY

LOCATION

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
101128	Outfall 003

Form Approved.
OMB No. 2040-0004
Approval expires 10-31-94

MONITORING PERIOD

FROM YEAR (20-21)	MO (22-23)	DAY (24-25)	TO YEAR (26-27)	MO (28-29)	DAY (30-31)
2007	6	1	2007	6	30

NOTE: Read instructions before completing this form.

PARAMETER (32-37)		(3 Card Only) (46-53) QUANTITY OR LOADING (54-61) AVERAGE	MAXIMUM	UNITS	(4 Card Only) (38-45) QUALITY OR CONCENTRATION (46-53) MINIMUM	AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Outfall flow	SAMPLE MEASUREMENT	3,746	4,376	m^3/day	--	--	--	--		Continuous	
	PERMIT REQUIREMENT	--	--		--	--	--				
Outfall temperature	SAMPLE MEASUREMENT	--	--	--	--	--	78.0	°F		1/ 7	Grab
	PERMIT REQUIREMENT	--	--		--	--	85				
Outfall pH	SAMPLE MEASUREMENT	--	--	--	5.79	7.34	8.60			Continuous	
	PERMIT REQUIREMENT	--	--		6.0	--	9.0				
pH excursions > 60 minutes	SAMPLE MEASUREMENT								0	Daily average	
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Tom McCue
Environmental Manager

TYPED OR PRINTED

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Siltronic Corp. by:

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE AREA CODE	NUMBER	DATE YEAR	MO	DAY
503	243-2020	07	7	11

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

SCOEPA00029353

SUPPLEMENTAL DATA

Siltronic Corporation Site ID 93450
7200 NW Front Avenue
Portland, Oregon 97210-3676

Permit Number: 101128
June-07 Discharge Data

Outfall #001													Outfall # 002	Outfall # 003	
Date	BOD mg/L	BOD Weekly Loading kg	TSS mg/L	TSS Weekly Loading kg	Fluoride mg/L	Fluoride Weekly Loading kg	Total Cr mg/L	Total Cr Weekly Loading kg	Cr^{+6} mg/L Daily Avg.	Cr^{+6} mg/L Monthly Avg.	Cr^{+6} Loading Monthly Avg. kg	Cr^{+6} Loading Daily Max kg	Phosphate mg/L	Cl_2 Free Available Daily Max mg/L	Cl_2 Free Available Monthly Avg. mg/L
7	4.3	15.57	1.9	6.6	6.4	22.4	0.0005	0.0026	0.000	0.000	0.000	0.000	0.078	0.000	0.000
14	6.5	19.6	1.9	6.3	8.9	29.3	0.0005	0.0025	0.000	0.000	0.000	0.000	0.102	0.000	0.000
21	4.5	12.9	48.5	192.8	4.9	19.5	0.0005	0.0039	0.000	0.000	0.000	0.000	0.057	0.000	0.000
28	2.9	10.6	2.4	8.6	5.8	20.9	0.0005	0.0018	0.000	0.000	0.000	0.000	0.098	0.000	0.000
7	4.6	n/a					0.00102	n/a							
14	5.4	n/a					0.00102	n/a							
21	2.0	n/a					0.00148	n/a							

(001) DAILY FLOW'S	
Day	M
1	4020
2	3880
3	3820
4	3895
5	3695
6	3710
7	3839
8	3521
9	4017
10	3831
11	3880
12	3922
13	3982
14	3532
15	4005
16	3805
17	3850
18	3926
19	3736
20	3630
21	4312
22	3252
23	4194
24	3839
25	3755
26	4376
27	3786
28	4123
29	4323
30	3664
31	n/a
Total:	116120

(001) Turbidity Daily Avg	
Day	NTU's
1	1.1
2	1.2
3	1.1
4	0.9
5	0.6
6	0.6
7	0.5
8	0.7
9	0.5
10	0.5
11	0.5
12	0.8
13	0.6
14	0.6
15	0.5
16	0.5
17	0.4
18	0.5
19	1.0
20	1.2
21	1.9
22	0.7
23	0.7
24	1.0
25	0.7
26	0.7
27	0.5
28	0.7
29	0.7
30	0.6
31	n/a

(001) pH Daily Avg	
Day	pH
1	7.7
2	7.8
3	8.0
4	8.1
5	8.2
6	8.2
7	8.1
8	7.9
9	8.0
10	8.1
11	8.0
12	7.9
13	7.9
14	8.0
15	8.2
16	8.0
17	8.0
18	8.1
19	8.2
20	8.3
21	8.1
22	8.0
23	8.0
24	8.1
25	8.0
26	8.2
27	7.9
28	8.0
29	8.0
30	8.1
31	n/a

(002) DAILY FLOW'S	
Day	M
1	238
2	424
3	303
4	473
5	174
6	314
7	341
8	189
9	337
10	386
11	371
12	413
13	386
14	242
15	295
16	333
17	382
18	466
19	291
20	439
21	337
22	314
23	397
24	409
25	326
26	326
27	314
28	522
29	647
30	420
31	n/a
Total:	10812

For Bod & Total Cr samples: The calculation for the loading includes averaging both samples for the 7th, 14th and the 21th (qualifying alternate lab).