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SAF-RC-084
RCBRA-Inter-Areas Shoreline Assessment – Pore & Surface Water Sampling
FINAL DATA PACKAGE

COMPLETE COPY OF DATA PACKAGE TO:

Jackie Queen H4-22 KW 2/5/07
Initials/Date

COMMENTS:

SDG BC1752 SAF-RC-084

Rad only X Chem only Rad & Chem

X Complete Partial

WASTE SITE: RCBRA 4c Aq, SURFACE WATER

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BIOASSAY REPORT
CHRONIC SCREENING BIOASSAYS
Conducted January 19 through 26, 2007.

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD
RICHLAND, WASHINGTON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

January 30, 2007
Lab I.D Number B1752-01
SDG NUMBER BC1752

RC-084

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INTRODUCTION

CH2M HILL conducted a single chronic screening bioassay test using the water flea (*Ceriodaphnia dubia*) on a water sample provided by ELR Consulting for Washington Closure Hanford, Richland, Washington. The test was conducted from January 19 through 26, 2007.

METHODS AND MATERIALS

TEST METHODS

Ceriodaphnia dubia chronic three brood toxicity test method is adapted from *Standard Guide for Conducting Three-Brood, Renewal Toxicity Tests with Ceriodaphnia dubia*, ASTM, designation: E1295-01 (2002); and *Short-Term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Freshwater Organisms,* EPA Method 1002.0 "*Ceriodaphnia* Survival and Reproduction Test," EPA-821-R-02-013 (2002).

Additional guidance for test interpretation was provided by: *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System Program*, (EPA June 2000), EPA 833-R-00-003: and *Method Guidance and Recommendations for Whole Effluent Toxicity (WET) Testing (40 CFR Part 136)*, (EPA July 2000), EPA 821-B-00-004.

TEST ORGANISMS

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

DILUTION WATER

The specific hardness and alkalinity of the dilution water used with each test is listed in Table 2 below.

TEST CONCENTRATIONS

The concentration tested in the chronic test was 100 percent porewater sample with dilution water alone for the control. For the *Ceriodaphnia* chronic test, 1 organism per chamber with 10 chambers per concentration for a total of 10 organisms per concentration was used.

SAMPLE COLLECTION

The sample was delivered to CH2M HILL's Corvallis Aquatic Toxicology Laboratory by Federal Express. The sample was 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 sample identification and collection, receipt, and testing dates are listed in Table 1 below.

Table 1
Sample Collection and Cross-Reference Data

Client I.D	SAMPLE DATE	RECEIPT DATE	LAB SDG I.D.	ANALYSIS DATE
J13W35	01-15-2007	01-18-2007	B1752-01	01-19-2007

SAMPLE PREPARATION

Temperature was adjusted on the sample used during the test prior to each daily renewal.

MONITORING OF BIOASSAYS

The sample was monitored on arrival for hardness, alkalinity, total residual chlorine, ammonia, and temperature.

For the chronic test, pre- and post-renewal solutions were monitored for dissolved oxygen and pH daily in the control and all concentrations tested. Conductivity was measured at test initiation. Temperature was monitored continuously throughout the testing period.

Ceriodaphnia dubia survival and neonate production were measured daily in the chronic tests. In accordance with ASTM E1295-01, survival data were determined as the number of 1st generation organisms surviving at day 7. In accordance with ASTM E1295-01 and EPA-821-R-02-013, the collection of reproduction data were complete when 60 percent of the control organisms have produced a third brood (day 6 or day 7). Reproduction data are defined as the total neonates produced in the first three broods by the 1st generation test organism.

DATA ANALYSIS

The effects measured during the *Ceriodaphnia dubia* chronic test included survival and reproduction over the 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 Method 1002.0 "*Ceriodaphnia* Survival and Reproduction Test," EPA-821-R-02-013 (2002), using CETIS version I.1.2. Fisher Exact test was used to compare the survival data between the control and each sample treatment. Equal variance t Two-Sample test was used to compare the reproduction data between the control and each sample treatment When the assumptions of normality or homogeneity of variance necessary for Equal variance t Two-Sample test could not be met, Unequal variance t Two-Sample test or Wilcoxon Two-Sample Test was used to analyze the data.

RESULTS AND DISCUSSION

CHRONIC BIOASSAYS

Table 2 summarizes the survival and reproduction data, statistical results, and water chemistry data for the *Ceriodaphnia dubia* chronic test.

The J13W35 sample indicated no statistically significant reduction in either survival or in reproduction when compared to the laboratory control. The no observed effect concentration (NOEC) and the lowest observed effect concentration (LOEC) were 100 and greater than 100 percent for the sample, respectively.

The dissolved oxygen levels in the chronic test remained above 4 mg/L throughout the test period and test temperatures remained at 25±1°C. The test proceeded without any interruption that could have affected test results.

Table 2: *Ceriodaphnia dubia* Chronic Test Results for Washington Closure Hanford

F, significantly different from control by use of Fisher's Exact test; E, significantly different from lab control by use of Equal Variance Two-Sample t Test ns indicates a non significant result; *, indicates significant at alpha (p) = 0.05; –, indicates no statistical test performed.

Lab ID: Sample Number:	*Ceriodaphnia dubia* Survival Endpoint Percent Survival	Significantly different compared to Lab Control?	*Ceriodaphnia dubia* Reproduction Endpoint Young per female	Significantly different compared to Lab Control?	Total Residual Chlorine (mg/L)	Ammonia (mg/L as NH_3-N)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
Tests initiated on Jan 19, 2007								
Laboratory Control	100	–	33.2	–	na	na	90	66
B1752-01 J13W35	100	ns	32.9	ns	0.02	<0.2	104	82

REFERENCE TOXICANT TESTS

The results of monthly reference toxicant test conducted with sodium chloride indicate that the test organisms were within their respective sensitivity range based on EPA guidelines. The IC_{25} values, and Control Chart Limits are listed in Table 3 below. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 3
Chronic Reference Toxicant Tests (g/L)

Species (test)	IC_{25}	Control Chart limits
Ceriodaphnia dubia (survival)	1.53	1.33 to 1.81
Ceriodaphnia dubia (reproduction)	0.54	0.30 to 0.79

CERTIFICATION STATEMENT

I certify that this data package is in compliance with the Statement of Work, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature:

April J. Stanaway

APPENDIX A
RAW DATA SHEETS

CH2M HILL *TOXICITY TEST ORGANISM AND WATER QUALITY DATA*

Client: ELR - Washington Closure Hanford

Test Initiation: Date 1-19-2007 Test Termination: Date 1-26-07 1440

Contact:

Technician: Winn, Pittenger, Johnson, Dalton-Atha

Test Species/ID: *Ceriodaphnia dubia* / Cd 2023 /

/ /

Sample Information								Test Species Information	ID# Cd 2023	ID#	ID#	ID#
Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$		Chronic			
B1752-01	J13W35	1-5-07	1315	0.02 / -	<0.2	104	82	Organism Age at Initiation	< 24 hours within an 8 hour span			
				/				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#	2756			
				/				Acclimation Period	<24 hrs			
				/				Test Location	# 5			
				/				Organism Source	In-House			
				/				Size (mm)	-	-	-	-
				/				Loading Rate	-	-	-	-

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Recon MH (FHM)	2756	90	66	7.6

Comments: ☑ Indicates the following action was taken, (☐ Indicates action not taken):

☐ Sample(s) filtered through 60 µm mesh prior to use.

Water Quality Meters Used/ID#

Dissolved Oxygen #2 pH #3 Conductivity #2

Randomization chart for *Ceriodaphnia* tests initiated on 1-19-2007

Lab ID:	Field ID	Alternate ID	Random number	Random position	Board ID	Postion on Board	Sample Number
Lab Control	ReconMH only		0.326073778	1	XVII	# 1	XVII # 1
B1752-01	J13W35		0.157008886	2	XVII	# 2	XVII # 2
					XVII	#	XVII #
					XVII	#	XVII #
					XVII	#	XVII #
					XVII	#	XVII #

Test Board Slot Location Information

Board ID: XVII

	Slot #	Sample #	Slot #	Sample #	Slot #	Sample #	Slot #	Sample #	Slot #	Sample #	Slot #	Sample #
rep A	1	XVII #	11	XVII #	21	XVII #	31	XVII #	41	XVII #	51	XVII #
rep B	2	XVII #	12	XVII #	22	XVII #	32	XVII #	42	XVII #	52	XVII #
rep C	3	XVII #	13	XVII #	23	XVII #	33	XVII #	43	XVII #	53	XVII #
rep D	4	XVII #	14	XVII #	24	XVII #	34	XVII #	44	XVII #	54	XVII #
rep E	5	XVII #	15	XVII #	25	XVII #	35	XVII #	45	XVII #	55	XVII #
rep F	6	XVII #	16	XVII #	26	XVII #	36	XVII #	46	XVII #	56	XVII #
rep G	7	XVII #	17	XVII #	27	XVII #	37	XVII #	47	XVII #	57	XVII #
rep H	8	XVII #	18	XVII #	28	XVII #	38	XVII #	48	XVII #	58	XVII #
rep I	9	XVII #	19	XVII #	29	XVII #	39	XVII #	49	XVII #	59	XVII #
rep J	10	XVII #	20	XVII #	30	XVII #	40	XVII #	50	XVII #	60	XVII #

CH2M HILL

Ceriodaphnia dubia
Survival and Reproduction
Test Data Summary

Client: ELR - Washington Closure Hanford

Test Start Date: 1-19-07

Sample Description:

Sample ID#: see randomization chart

Ceriodaphnia Lot#: Cd 2023

Statistician: [illegible]

Percent or Concentration	Total Live Young Produced in First 3 Broods per Replicate										# Alive Adults	Total Live Young	Ave.
	A	B	C	D	E	F	G	H	I	J			
XVII # 1	33	35	36	21	32	32	37	0/AM	40	33	9	299	33.2
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?			
XVII # 2	30	37	38	~~2~~ 28 DW	36	32	32	32	31	33	10	329	32.9
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?			
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?			
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?			
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?			
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?			

AM- Adult Missing, remove from stats!

Test Organism Mortality (Adult dead) = AD? ✓

Test Organism identified as Male = AD? M

Test Organism Injured during test = AD? I

# of Alive Adults = Number of test organism alive at termination (for WDOE only, = Number of test organisms alive at Day 7)

Total Live Young = Total neonates produced in first 3 broods

Footnote: As per EPA-821-R-02-013 (13.10.9.1), *Ceriodaphnia dubia* test should be terminated when 60% of the surviving control organisms have produced their third brood, or at the end of eight days, whichever occurs first.

Also as per EPA-821-R-02-013 (13.10.9.1), "In this three-brood test, offspring from fourth or higher broods should not be counted and should not be included in the total number of neonates produced during the test."

Observations:

CH2M HILL

CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client: ELR - Washington Closure Hanford Test Initiation: Date: 1-19-07 Time: 1030

Sample Description: B1752-01 Test Termination: Date: 1-26-07 Time: 1440

Initial Sample ID #: see randomization chart Ceriodaphnia Lot#: Cd 2023

Technician: Day 1 MN Day 2 NJ Day 3 TP Day 4 DW Day 5 TP Day 6 DW Day 7 DW

Time: Day 1 1425 Day 2 1310 Day 3 1300 Day 4 0820 Day 5 0900 Day 6 0920 Day 7 1440

Percent	Day	Daily Number of Live Young for each Replicate										No. Live Adults	Daily Total Live Young
		A	B	C	D	E	F	G	H	I	J		
XVII # 1	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	AM	0	0	TP 10	0
	3	5	0	0	0	0	0	0		0	0	9	5
	4	0	4	5	5	5	6	6		7	5	9	43
	5	13	14	13	9	13	11	13		16	12	9	114
	6	15	0	18	7	0	15	18		0	0	9	73
	7	0	17	0	0	14	0	0		17	16	9	64
XVII # 2	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	5	6	0	0	5	0	0	10	16
	4	5	6	6	0	0	5	6	0	6	4	10	38
	5	10	14	14	11	14	10	9	11	10	0	10	103
	6	15	17	0	0	16	0	17	16	0	16	10	97
	7	0	0	18	12	0	17	0	0	15	13	10	75
	1												
	2												
	3												
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	2												
	3												
	4												
	5												
	6												
	7												

"AD" = Adult Dead, "AY" = Aborted young, "M" = male organism, " / " = split brood (carry-over brood / current day brood)
"Inj" = Adult Injured during test solution renewal, replicate removed from analysis. "AM" = Adult missing. "F" = Female

Footnote: As per EPA, *Ceriodaphnia dubia* test should be terminated when 60% of the surviving control organisms have produced their third brood, or at the end of eight days, whichever occurs first.

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: ELR - Washington Closure Hanford
Initiated Date: 1-19-07 Time: 1030
Adults Isolated Date: 1-18-07 Time: 2245
Sample Description: see randomization chart
Initial Sample ID #: B1752-01
Neo's Collected Date: 1-19-07 Time: 0630

Technician: Day 0 DW; Day 1 ~~NJ~~ NJ; Day 2 ~~TP~~ NJ; Day 3 TP; Day 4 DW ~~NJ~~ NJ; Day 5 TP; Day 6 DW; Day 7 DW

Time: Day 0 1030; Day 1 ~~1310~~; Day 2 ~~1300~~ 1310; Day 3 1300; Day 4 ~~1310~~ 0820; Day 5 0900; Day 6 0920; Day 7 1440

Percent	Dissolved Oxygen (mg/l) Day 0	1	2	3	4	5	6	7	pH Day 0	1	2	3	4	5	6	7	Temperature (°C) / Conductivity (µmhos/cm) Day 0	1	2	3	4	5	6	7
XVII # 1	7.9	7.9 / 7.8	7.7 / 7.8	8.0 / 7.9	7.7 / 7.9	8.1 / 8.0	7.8 / 7.8	7.8	7.7	7.8 / 7.6	7.8 / 7.6	7.8 / 7.6	7.6 / 7.5	7.7 / 7.6	7.7 / 7.6	7.9	24.3 / 288	24.6	25.2	25.2	24.9	25.1	25.3	24.7
XVII # 2	8.1	8.0 / 8.0	7.9 / 8.3	8.1 / 7.9	7.8 / 8.2	8.1 / 8.0	7.7 / 7.9	7.8	7.6	7.9 / 7.8	7.7 / 7.5	8.0 / 7.6 ~~7.58~~	7.7 / 7.6	7.8 / 7.6	7.8 / 7.5	7.9	24.4 / 197	24.4	25.6	25.6	25.4	24.8	25.6	25.2

Comments:

CETIS Test Summary

Report Date: 29 Jan-07 4:48 PM
Test Link: 07-9784-3328

Ceriodaphnia 7-d Survival and Reproduction Test — **CH2M Hill**

Test No:	10-6094-3780	**Test Type:**	Reproduction-Survival (7d)	**Duration:**	7d 4h
Start Date:	19 Jan-07 10:30 AM	**Protocol:**	EPA/821/R-02-013 (2002)	**Species:**	Ceriodaphnia dubia
Ending Date:	26 Jan-07 02:40 PM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	19 Jan-07 10:30 AM	**Brine:**			

Comments: Survival and reproduction thru 3 broods (Day 7). Control rep H adult missing on Day 2 renewal, replicate removed form analysis. BM

Sample No:	07-9146-7079	**Code:**	B1752-01	**Client:**	
Sample Date:	15 Jan-07 01:15 PM	**Material:**	Unknown	**Project:**	
Receive Date:		**Source:**	ELR-Washington Closure Hanford		
Sample Age:	93h	**Station:**			

Comments: J13W35

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-6613-3859	7d Proportion Survived	100	> 100	N/A	N/A	Fisher Exact
02-5746-8917	Reproduction	100	> 100	N/A	10.35%	Equal Variance t Two-Sample

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	TAC Range	Overlap	Decision
09-6613-3859	7d Proportion Survived	Control Response	1	0.8 - NL	Yes	Passes acceptability criteria
02-5746-8917	Reproduction	Control Response	33.2222	15 - NL	Yes	Passes acceptability criteria
02-5746-8917	Reproduction	PMSD	0.10347	0.13 - 0.47	Yes	Fails acceptability criteria

7d Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	9	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

Reproduction Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	9	33.222	21	40	1.7621	5.2863	15.91%
100		10	32.9	28	38	1.005	3.1780	9.66%

7d Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	
100		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000

Reproduction Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	33	35	36	21	32	32	37	40	33	
100		30	37	38	28	36	32	32	32	31	33

CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Comparison	07-9784-3328	07-9784-3328	29 Jan-07 4:48 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		100	>100	1	N/A	

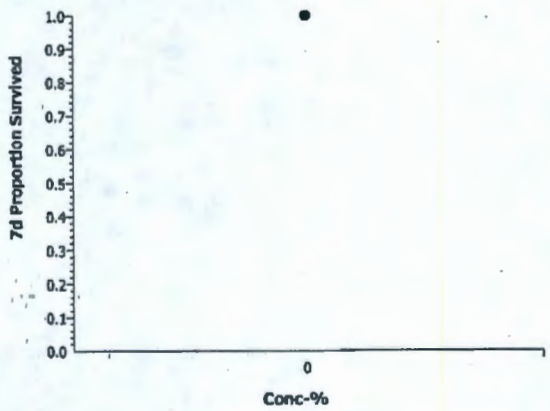
Group Comparisons

Control	vs	Conc-%	Statistic	P-Value	Decision(0.05)
Dilution Water		100	1.00000	1.00000	Non-Significant Effect

Data Summary

Conc-%	Control Type	Non-Responders	Responders	Total Observed
0	Dilution Water	9	0	9
100		10	0	10

Graphics



CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Comparison	07-9784-3328	07-9784-3328	29 Jan-07 4:48 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	10.35%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Water		100	0.16306	1.73961	0.4362	3.43765	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4918129	0.491813	1	0.03	0.87239	Non-Significant Effect
Error	314.4556	18.49739	17			
Total	314.947379	18.989198	18			

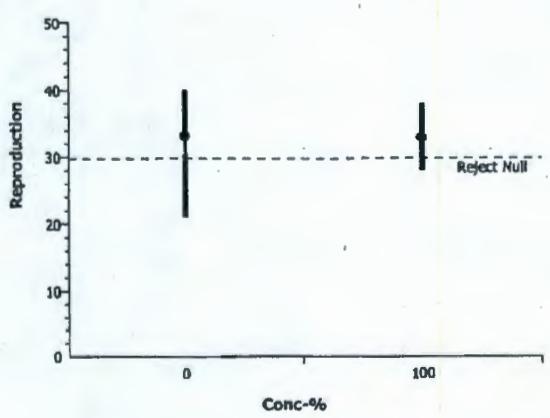
ANOVA Assumptions

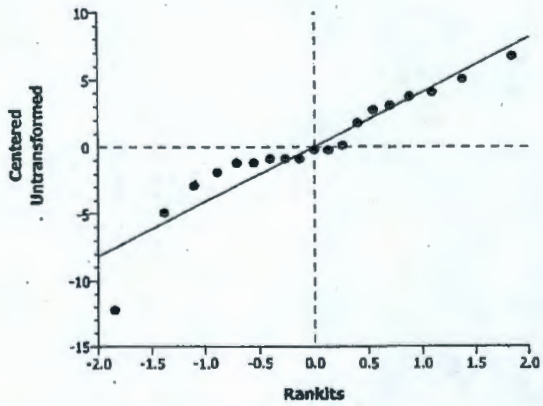
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.76678	6.69330	0.15083	Equal Variances
Distribution	Shapiro-Wilk W	0.90587		0.06221	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Water	9	33.222	21	40	5.2863				
100		10	32.9	28	38	3.1780				

Graphics





APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2M HILL

Ceriodaphnia dubia
Survival and Reproduction
Test Data Summary

Client: QA / QC - January Test Start Date: 1-9-2007

Sample Description: NaCl 50 g/L STOCK Sample ID#: 1B057-02

Ceriodaphnia Lot#: Cd 2018 Statistician: TP

Percent or Concentration	Total Live Young Produced in First 3 Broods per Replicate										# Alive Adults	Total Live Young
	A	B	C	D	E	F	G	H	I	J		
Control	29	31	39	32	29	17	34	4	39	37	10	291
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
0.25 g/L	22	34	28	18	29	13	19	26	22	28	9	239
	AD?	AD?	AD?	AD?	AD?	AD? ✓	AD?	AD?	AD?	AD?		
0.50 g/L	23	23	23	20	22	26	27	25	21	20	10	230
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD?		
1.0 g/L	7	21	12	15	14	1	4	0	14	0	8	88
	AD?	AD?	AD?	AD?	AD?	AD?	AD?	AD? ✓	AD?	AD? ✓		
1.5 g/L	4	2	0	5	1	0	0	1	0	5	7	18
	AD?	AD?	AD?	AD?	AD?	AD? AM	AD? ✓	AD?	AD? ✓	AD?		
2.0 g/L	0	0	0	0	0	0	0	0	0	0	3	0
	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD?	AD?	AD?	AD? ✓		
4.0 g/L	0	0	0	0	0	0	0	0	0	0	0	0
	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓	AD? ✓		

Test Organism Mortality (Adult dead) = AD? ✓

Test Organism identified as Male = AD? M

Test Organism Injured during test = AD? I

# of Alive Adults = Number of test organism alive at termination (for WDOE only, = Number of test organisms alive at Day 7)

Total Live Young = Total neonates produced in first 3 broods

Footnote: As per EPA-821-R-02-013 (13.10.9.1), *Ceriodaphnia dubia* test should be terminated when 60% of the surviving control organisms have produced their third brood, or at the end of eight days, whichever occurs first.

Also as per EPA-821-R-02-013 (13.10.9.1), "In this three-brood test, offspring from fourth or higher broods should not be counted and should not be included in the total number of neonates produced during the test."

Endpoint	IC25	Cusum Chart Limits
Survival	1.53	1.53 to 1.81
Reproduction	0.54	0.50 to 0.79

Task Manager: Doug Wilson

Project Manager: [signature]

QA Officer: [signature]

CH2M HILL

CERIODAPHNIA 7-DAY SURVIVAL AND REPRODUCTION DATA

Client: QA / QC – January Test Initiation: Date: 1-9-2007 Time: 1000

Sample Description: 50 g/L STOCK NaCl Test Termination: Date: 1-16-07 Time: 1015

Initial Sample ID #: 1B057-02 Ceriodaphnia Lot#: Cd 2018

Technician: Day 1 DW Day 2 DW Day 3 [illegible] Day 4 [illegible] Day 5 [illegible] Day 6 [illegible] Day 7 DW

Time: Day 1 1010 Day 2 0930 Day 3 1040 Day 4 1130 Day 5 1530 Day 6 1330 Day 7 1015

Concentration (g/L)	Day	Daily Number of Live Young for each Replicate										No. Live Adults	Daily Total Live Young
		A	B	C	D	E	F	G	H	I	J		
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	4	0	0	4	0	0	10	8
	4	6	5	6	6	0	2	3	AY	6	6	10	40
	5	0	0	13	11	9	6	11	0	13	14	10	77
	6	12	11	20	0	16	9	20	0 AY	20	0	10	108
	7	11	15	0	15	0	0	0	0	0	17	10	58
0.25 g/L	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	4	0	0	4	0	0	0	10	8
	4	3	6	4	4	2	4	4	5	6	4	10	42
	5	0	10	8	10	10	9	11	6	9	0	10	73
	6	8	0	0	0	17	0 AD	0	15	7	10	9	57
	7	11	18	16	15	0	6	19	0	0	14	9	93
0.50 g/L	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	4	0	0	0	10	4
	4	4	3	4	2	4	0	0	3	3	3	10	26
	5	8	7	8	9	6	5	9	10	8	6	10	76
	6	0	0	11	9	12	9	14	0	10	0	10	65
	7	11	13	0	0	0	12	0	12	0	11	10	59
1.0 g/L	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	AD/0	0	0	9	0
	4	4	6	2	2	1	0	4	|	3	AY	9	22
	5	0	3	3	5	5	1	0	|	5	0 AD	9	27
	6	3	0	0	0	0	0	0	|	0	|	8	3
	7	0	7	7	8	8	0	0	|	6	|	8	36
1.5 g/L	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0/AD	0	0	0	9	0
	3	0	0	0	0	0	AM	|	0	0	0	9	0
	4	3	1	0	1	0	|	|	0	0/AD	3	7	8
	5	0	0	0	4	1	|	|	0	|	0	7	5
	6	1	1	0	0	0	|	|	1	|	0	7	3
	7	0	0	0	0	0	|	|	0	|	2	7	2
2.0 g/L	1	0	0	0	0	0	0	0	0	0	0/AD	9	0
	2	0	0	0	0/AD	0/AD	0	0	0	0	|	7	0
	3	AD/0	0	0	|	|	0	0	0	0	|	6	0
	4	|	0	0/AD	|	|	0	0	0	0	|	5	0
	5	|	0	|	|	|	0	0	0	0	|	5	0
	6	|	0 AD	|	|	|	0 AD	0	0	0	|	3	0
	7	|	L	|	|	|	L	0	0	0	|	3	0
4.0 g/L	1	0/AD	0/AD	0/AD	0/AD	0/AD	0/AD	0/AD	0/AD	0/AD	0/AD	0	0
	2												
	3												

"AD" = Adult Dead, "AY" = Aborted young, "M" = male organism, " / " = split brood (carry-over brood / current day brood)
"Inj" = Adult Injured during test solution renewal, replicate removed from analysis. "AM" = Adult missing.

Footnote: As per EPA, *Ceriodaphnia dubia* test should be terminated when 60% of the surviving control organisms have produced their third brood, or at the end of eight days, whichever occurs first.

CH2M HILL

CERIODAPHNIA WATER QUALITY DATA

Client: QA / QC – January

Initiated Date: 1-9-07 Time: 1000

Adults Isolated Date: 1-8-07 Time: 1550

Sample Description: NaCl (50 g/L stock)

Reagent Log #: 1B057-02

Neo's Collected Date: 1-8-07 Time: 2310

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Technician	DW	DW	DW	[illegible]	[illegible]	[illegible]	[illegible]	DW
Time	1000	1010	0930	1120	1130	1605	1345	1015

Percent or Concentration	Dissolved Oxygen (mg/l) Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	8.0	7.9 / 8.2	7.9 / 8.0	7.9 / 8.1	7.8 / 8.0	7.7 / 7.6	7.7 / 7.4	7.8
0.25 g/L	8.0	7.9 / 8.2	7.9 / 8.0	8.0 / 8.1	7.7 / 7.9	7.7 / 7.4	7.6 / 7.3	7.7
0.50 g/L	8.0	7.9 / 8.2	7.9 / 8.0	8.0 / 8.0	7.8 / 7.8	7.7 / 7.3	7.6 / 7.2	7.7
1.0 g/L	8.0	7.9 / 8.2	7.9 / 8.0	8.0 / 7.9	7.8 / 8.0	7.8 / 7.3	7.5 / 7.4	7.6
1.5 g/L	8.0	7.8 / 8.2	7.9 / 8.0	8.1 / 8.0	7.7 / 8.0	7.8 / 7.4	7.4 / 7.6	7.5
2.0 g/L	8.0	7.8 / 8.1	7.9 / 8.0	8.1 / 8.3	7.8 / 8.1	7.9 / 7.5	7.5 / 7.9	7.5
4.0 g/L	8.0	7.8 / –	– / –	– / –	– / –			

Percent or Concentration	pH Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	7.7	7.8 / 8.0	7.8 / 7.9	7.8 / 7.9	7.7 / 7.8	7.8 / 7.6	7.8 / 7.8	7.7
0.25 g/L	7.6	7.8 / 7.8	7.8 / 7.8	7.7 / 7.7	7.7 / 7.7	7.8 / 7.4	7.7 / 7.6	7.7
0.50 g/L	7.6	7.8 / 7.8	7.8 / 7.7	7.7 / 7.7	7.7 / 7.7	7.7 / 7.3	7.7 / 7.5	7.7
1.0 g/L	7.7	7.8 / 7.8	7.8 / 7.7	7.7 / 7.6	7.8 / 7.6	7.7 / 7.2	7.7 / 7.5	7.7
1.5 g/L	7.7	7.8 / 7.7	7.9 / 7.7	7.7 / 7.6	7.8 / 7.6	7.7 / 7.2	7.7 / 7.5	7.7
2.0 g/L	7.7	7.8 / 7.7	7.9 / 7.7	7.8 / 7.6	7.8 / 7.7	7.2 / 7.3	7.8 / 7.5	7.7
4.0 g/L	7.6	7.9 / –	– / –	– / –	– / –			

Percent or Concentration	Temperature (C) / Conductivity (µmhos/cm) Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	24.1 / 326	25.7 / 307	25.4 / 290	24.6 / 290	24.7 / 272 / 370	24.6 / 225	24.7 / 283	24.5
0.25 g/L	24.3 / 750	25.8 / 757	24.7 / 724	24.7 / 728	24.9 / 756	24.3 / 744	24.5 / 648	24.7
0.50 g/L	23.9 / 1200	25.5 / 1212	25.0 / 1201	24.6 / 1166	25.2 / 1210	24.2 / 1207	24.9 / 1213	24.4
1.0 g/L	24.3 / 2030	25.8 / 2120	24.5 / 2070	24.7 / 2100	24.9 / 2100	25.3 / 2100	24.8 / 1715	24.7
1.5 g/L	24.1 / 2990	25.4 / 2840	25.1 / 2930	24.7 / 2780	24.5 / 2990	25.5 / 2480	24.9 / 2420	24.8
2.0 g/L	24.1 / 3830	25.7 / 3590	24.6 / 3770	24.1 / 3810	24.1 / 3860	24.3 / 3920	24.2 / 3090	25.1
4.0 g/L	23.8 / 7010	25.5 / –	– / –	– / –	– / –			

COMMENTS:

Note: All Day 0 data represents conditions at initiation. All other days: numerator represents pre-renewal conditions, denominator represents post-renewal conditions.

CETIS Test Summary

Report Date: 19 Jan-07 8:25 AM
Test Link: 17-9495-4319/rcdc2018

Ceriodaphnia 7-d Survival and Reproduction Test — CH2M Hill

Test No:	12-8952-6466	Test Type:	Reproduction-Survival (7d)	Duration:	7d 0h
Start Date:	09 Jan-07 10:00 AM	Protocol:	EPA/821/R-02-013 (2002)	Species:	Ceriodaphnia dubia
Ending Date:	16 Jan-07 10:15 AM	Dil Water:		Source:	In-House Culture
Setup Date:	09 Jan-07 10:00 AM	Brine:			

Sample No:	10-2151-1140	Code:	1B057-02	Client:	
Sample Date:	13 Nov-06	Material:	Sodium chloride	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	57d 10h	Station:			

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-gm/L	95% LCL	95% UCL	Method
15-0883-7194	7d Proportion Survived	25	1.52907	0.8157895	1.681818	Linear Interpolation
09-0729-8341	Reproduction	25	0.5413733	0.1853261	0.709434	Linear Interpolation

Test Acceptability

Analysis	Endpoint	Attribute	Statistic	TAC Range	Overlap	Decision
15-0883-7194	7d Proportion Survived	Control Response	1	0.8 - NL	Yes	Passes acceptability criteria
09-0729-8341	Reproduction	Control Response	29.1	15 - NL	Yes	Passes acceptability criteria

7d Proportion Survived Summary

Conc-gm/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0.25		10	0.90000	0.00000	1.00000	0.10000	0.31623	35.14%
0.5		10	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
1		10	0.80000	0.00000	1.00000	0.13333	0.42164	52.70%
1.5		9	0.77778	0.00000	1.00000	0.14699	0.44096	56.69%
2		10	0.30000	0.00000	1.00000	0.15275	0.48305	161.02
4		10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Reproduction Summary

Conc-gm/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	10	29.1	4	39	3.4495	10.908	37.49%
0.25		10	23.9	13	34	1.9746	6.2441	26.13%
0.5		10	23	20	27	0.7601	2.4037	10.45%
1		10	8.8	0	21	2.3419	7.4057	84.16%
1.5		9	2	0	5	0.7071	2.1213	106.07
2		10	0	0	0	0	0	0.00%
4		10	0	0	0	0	0	0.00%

CETIS Test Summary

Report Date: 19 Jan-07 8:25 AM
Test Link: 17-9495-4319/rcdc2018

7d Proportion Survived Detail

Conc-gm/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0.25		1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	1.00000
0.5		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000
1.5		1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000	1.00000	
2		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	1.00000	1.00000	0.00000
4		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Reproduction Detail

Conc-gm/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	29	31	39	32	29	17	34	4	39	37
0.25		22	34	28	18	29	13	19	26	22	28
0.5		23	23	23	20	22	26	27	25	21	20
1		7	21	12	15	14	1	4	0	14	0
1.5		4	2	0	5	1	0	1	0	5	
2		0	0	0	0	0	0	0	0	0	0
4		0	0	0	0	0	0	0	0	0	0

CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
7d Proportion Survived	Linear Interpolation	17-9495-4319	17-9495-4319	19 Jan-07 8:24 AM	CETISv1.1.2

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	5334240	280	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-gm/L	95% LCL	95% UCL
25	1.52907	0.8157895	1.681818

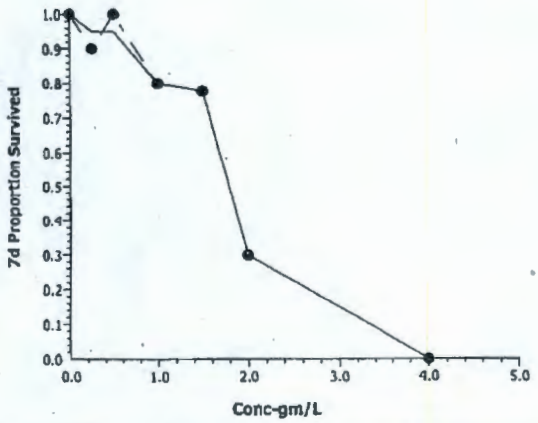
Data Summary

			Calculated Variate(A/B)						
Conc-gm/	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Dilution Water	10	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
0.25		10	0.90000	0.00000	1.00000	0.06455	0.31623	9	10
0.5		10	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
1		10	0.80000	0.00000	1.00000	0.08607	0.42164	8	10
1.5		9	0.77778	0.00000	1.00000	0.09001	0.44096	7	9
2		10	0.30000	0.00000	1.00000	0.09860	0.48305	3	10
4		10	0.00000	0.00000	0.00000	0.00000	0.00000	0	10

Data Detail

Conc-gm/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
0.25		1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	1.00000	1.00000	1.00000
0.5		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
1		1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000
1.5		1.00000	1.00000	1.00000	1.00000	1.00000	0.00000	1.00000	0.00000	1.00000	
2		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000	1.00000	1.00000	0.00000
4		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Graphics



CETIS Analysis Detail

Ceriodaphnia 7-d Survival and Reproduction Test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Reproduction	Linear Interpolation	17-9495-4319	17-9495-4319	19 Jan-07 8:24 AM	CETISv1.1.2

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	5334240	280	Yes	Two-Point Interpolation

Point Estimates

% Effect	Conc-gm/L	95% LCL	95% UCL
25	0.5413733	0.1853261	0.709434

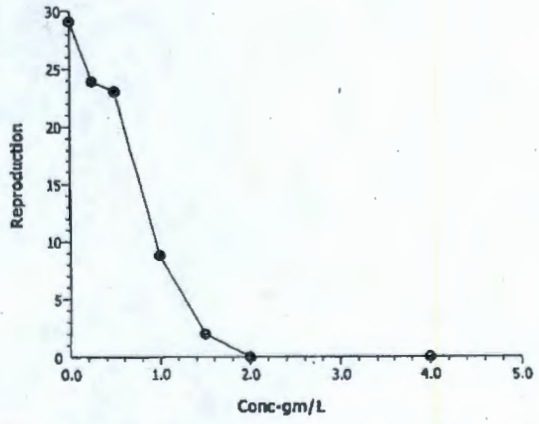
Data Summary

			Calculated Variate				
Conc-gm/	Control Type	Count	Mean	Minimum	Maximum	SE	SD
0	Dilution Water	10	29.1	4	39	2.22663	10.9082
0.25		10	23.9	13	34	1.27457	6.24411
0.5		10	23	20	27	0.49065	2.40370
1		10	8.8	0	21	1.51168	7.40570
1.5		9	2	0	5	0.43301	2.12132
2		10	0	0	0	0	0
4		10	0	0	0	0	0

Data Detail

Conc-gm/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	29	31	39	32	29	17	34	4	39	37
0.25		22	34	28	18	29	13	19	26	22	28
0.5		23	23	23	20	22	26	27	25	21	20
1		7	21	12	15	14	1	4	0	14	0
1.5		4	2	0	5	1	0	1	0	5	
2		0	0	0	0	0	0	0	0	0	0
4		0	0	0	0	0	0	0	0	0	0

Graphics



APPENDIX C
CHAIN OF CUSTODY

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-084-82	Page 1 of 1

Collector B. TILLER Jeb	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code Air Quality ☐	Data Turnaround 21 Days
Project Designation RCBRA-Inter-Areas Shoreline Assessment - Pore & Surface	Sampling Location RCBRA 4c Aq, SURFACE WATER		SAF No. RC-084		
Ice Chest No. ERC-99-003	Field Logbook No. EL-1612	COA BESBEA6520	Method of Shipment ~~GROUND TRANSPORT~~ Fed Ex RW 1/16/07		
Shipped To CH2MHill - Corvallis	Offsite Property No. A070135		Bill of Lading/Air Bill No. See OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None										
Type of Container	P/G										
No. of Container(s)	1										
Volume	2gal										
SAMPLE ANALYSIS	See item (1) in Special Instructions.								Q07-01744		

Sample No.	Matrix *	Sample Date	Sample Time									
J13W35	WATER	01-15-07	1315	X								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From JAMES BERNHARD	1530 1-15-07	Received By/Stored In EAS locked storage	1530 1-15-07
Relinquished By/Removed From EAS Locked Storage	0830 1-16-07	Received By/Stored In Rob Voeks 1/16/07	0830
Relinquished By/Removed From Rob Voeks 1/16/07	0900	Received By/Stored In RW 1/16/07 Fed Ex	
Relinquished By/Removed From Fed Ex		Received By/Stored In	1/18/07 1200
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

(1) Water Toxicity Ceriodaphnia dubia ASTM E1295; Water Frog Embryo Teratogenesis ASTM E1439

750

800

Temp on arrival 10.5°C

B1752-01

ORIGINAL COPY RW 1/16/07

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title Environmental Scientist	Date/Time 1/18/07 1200
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

BHI-EE-011 (08/29/2005)

RECEIVED
FEB 2007

AMPHIBIAN BIOASSAY REPORT

FROG EMBRYO TERATOGENESIS ASSAY – *XENOPUS* (FETAX)

Conducted December 16, 2006 through January 15, 2007

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD
RICHLAND, WASHINGTON

Prepared by

FORT ENVIRONMENTAL LABORATORIES, INC.
515 S. Duncan Street
Stillwater, Oklahoma 74074

January 31, 2007
SDG 00134

BC1752
DC 084

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- TEST ORGANISMS 3
- SAMPLE COLLECTION 3
- SAMPLE PREPARATION 4
- SAMPLE MONITORING 4
- DATA ANALYSIS 4

QUALITY ASSURANCE / QUALITY CONTROL 4

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INTRODUCTION

As a component of an ecological hazard assessment battery, Frog Embryo Teratogenesis Assay – *Xenopus* (FETAX) was chosen as a biomonitoring test to evaluate potentially adverse effects of pore water on the amphibian, *Xenopus laevis*. Fort Environmental Laboratories (FEL) was contracted to conduct FETAX screening on water samples from Washington Closure Hanford (WCH), Richland, Washington. The methods used and the results and conclusions derived from the FETAX tests are presented in this report.

METHODS AND MATERIALS

TEST METHODS

The 96-hour whole embryo assay was performed in accordance with ASTM E1439-98 (Reapproved 2004), *Standard Guide for Conducting the Frog Embryo Teratogenesis Assay – Xenopus (FETAX)* (1) with minor modification. The aqueous field samples were tested in replicates of 4, using test vessels containing 25 embryos and 100 mL of each test sample. Embryos were cultured at 23±3°C. All dishes were renewed every 24-hours of the 4-day test by removing dead embryos and spent water, and adding back fresh sample. A summary of test conditions for FETAX is presented in Table 1. At the end of the 4 days of exposure (larvae reaching developmental stage 46 [2]), larvae were preserved in 3% formalin, and the numbers of live, malformed larvae determined using a dissecting microscope. FETAX solution water was used as the laboratory control for the bioassay. FETAX solution is purified water of uniform quality, which has been ionically balanced to provide satisfactory survival without affecting test results (1). Two concentrations (2,500 mg/L and 5.5 mg/L) of the chemical 6-aminonicotinamide (6-AN) were used as positive controls for embryo-lethality and malformation endpoints, respectively. The FETAX endpoints included: mortality, malformation, and growth.

TEST ORGANISMS

The *Xenopus laevis* (South African clawed frog) larvae used for the FETAX screens were obtained from in-house cultures originally purchased from *Xenopus* I (Dexter, MI.). Adult care and breeding were conducted in accordance with modified standard guidelines (1). To induce breeding, adult female and male breeding stock were injected with human chorionic gonadotropin (hCG). Essentially, 4 to 6 h prior to breeding, female and male specimens were injected with approximately 800 and 600 IU, respectively, of hCG dissolved in 0.9% sterile saline solution. Fertilized egg collection was performed as described in ASTM E1439-98 (1) and the *Atlas of Abnormalities: A Guide for the Performance of FETAX* (3).

SAMPLE COLLECTION

Twelve water samples were collected by WCH personnel, shipped via commercial carrier by CH2M Hill, and received at FEL on December 21, 2006 through January 23, 2007. Copies of the sample chains of custody are provided in Appendix A. Samples were recorded in the laboratory check-in log book and laboratory tracking numbers 00134-001 through 00134-012

were assigned. Samples measured from 1°C to 5°C upon receipt and were stored at 4°C ± 1° throughout the holding period. The chronological timelines for sample collection, receipt, and testing are presented in Table 2.

SAMPLE PREPARATION

FETAX screens were conducted using 100% sample volumes without dilution. Sample temperatures were adjusted to 23°C ± 3°C prior to each test setup and daily renewal.

SAMPLE MONITORING

Temperature, pH, and dissolved oxygen (DO) were measured daily on each sample throughout the FETAX screens. General water chemistry (hardness, conductivity, alkalinity, ammonia-nitrogen, and residual oxidants) was also performed on each sample (Appendix B).

DATA ANALYSIS

Mortality and malformation frequencies were determined for each sample tested. Head-to-tail lengths of the surviving larvae were measured as an index of growth (sample growth over control growth, expressed as a percentage) using a personal computer, digital camera, and SigmaScanPro® 5.0 image analysis software (SPSS®, Inc., Chicago, IL). Kruskal-Wallis (KW) ANOVA or ANOVA with multiple comparison tests (Dunn's Method or Bonferroni t-test, $P < 0.05$), as appropriate, were performed on the FETAX screens to determine if statistically significant differences existed between the FETAX solution control and each of the water samples at 100% concentrations. All statistical calculations were performed using SigmaStat® 2.03 statistical software (SPSS® Inc., Chicago, IL). The raw data (mortality counts, malformation scores, growth measurements, and growth, mortality, and malformation statistics) from the FETAX screens are presented in Appendix C.

QUALITY ASSURANCE / QUALITY CONTROL

All data, documents, and final report generated for the WCH Project have been reviewed and meet the criteria set forth in the FEL Quality Management Program (QMP). Specifically, the goals of FEL are to ensure the accuracy and precision of all laboratory operations, including data generation, collection, and presentation.

RESULTS AND DISCUSSION

LABORATORY CONTROLS AND REFERENCES

Three individual FETAX tests were required to screen the 12 water samples. The results of the FETAX screens conducted on the laboratory control (FETAX solution water) and reference samples are presented in Table 3. The FETAX solution controls induced 0.0% mortality and malformation frequencies that ranged from 0.0% to 6.0%. These results were within the

acceptable limits (≤10.0%) for mortality and malformation as outlined in ASTM E1439-98 (1). The 6-AN positive reference samples produced acceptable results with 100.0% mortality induced by the 2,500 mg/L concentrations and a range of 48.6% to 59.1% malformation induced by the 5.5 mg/L concentrations.

WATER SAMPLES

The results of the 3 FETAX screens conducted on the 12 water samples are presented in Table 4. The frequencies of mortality ranged from 0.0% to 11.0% with the exception of samples J13V89 and J13V90, which induced 13.0% ($P = 0.036$) and 20.0% ($P = 0.008$) mortality, respectively; and were significantly greater than the respective laboratory control (ANOVA with Bonferroni t-test, $P < 0.05$). The frequencies of malformation for the water samples ranged from 2.0% to 26.3%. Samples J13V91 ($P = 0.041$) and J13V90 ($P < 0.001$) induced significantly greater frequencies of malformation than the respective laboratory controls (K-W ANOVA with Dunn's Method and ANOVA with Bonferroni t-test, $P < 0.05$, respectively). The percent growth (mean sample length [cm] divided by mean laboratory control length) of the test organisms exposed to each of the water samples ranged from 90.7% to 103.5% of the respective laboratory controls. Growth of organisms exposed to sample J13W65 ($P = 0.016$) was determined to be significantly less than the respective laboratory control growth (K-W ANOVA with Dunn's Method, $P < 0.05$).

In summary, statistical analysis of the major endpoints (mortality, malformation, and growth) indicated that 4 of the 12 water samples tested were significantly different from their respective laboratory controls. Measurements of larvae from sample J13W65 indicated mean growth (96.5%) that was significantly less than the laboratory control. Sample J13V91 induced a frequency of malformation (8.0%) that was significantly greater than the control (0.0%). Sample J13V89 induced an incidence of mortality (13.0%) that was significantly greater than the control (0.0%). Sample J13V90 induced mortality (20.0%) and malformation (26.3%) frequencies that were significantly greater than the control (0.0% and 6.0%, respectively). Of these 4 water samples, sample J13V90 seemed to demonstrate the greatest potential for toxicity. If you have any questions concerning this report, please do not hesitate to contact me at 405-624-6771, or by e-mail at djfort@fortlabs.com.

I certify that this data package is in compliance with the Statement of Work (SOW), both technically and for completeness, for other than the conditions detailed above. The Laboratory Director or designee, as verified by the following signature, has authorized release of the data contained in this data package.

Douglas J. Fort, Ph.D.
President

REFERENCES

1. Standard Guide for Conducting the Frog Embryo Teratogenesis Assay - *Xenopus* (FETAX). American Society for Testing and Materials (ASTM), E 1439-98, 1998 (Reapproved 2004).

2. Nieuwkoop, P.D. and Faber, J. Normal Tables of *Xenopus laevis* (Daudin). Garland Publishing, London, 1994.

3. Bantle, J.A., Dumont, J.N., Finch, R.A., and Linder, G., Fort, D.J., *Atlas of abnormalities: a guide for the performance of FETAX*, 2nd Ed., Oklahoma State Publications Department, 1998.

Table 1
Summary of Test Conditions for WCH FETAX Screens

Test Parameter	Test Condition
Test type:	Static renewal
Renewal frequency	Daily
Temperature:	23°C ± 3°C
Light quality:	Ambient laboratory
Light intensity:	50 to 100 foot-candles (ambient levels)
Photoperiod:	12 h light, 12 h. dark
Test chamber size:	500 mL chamber
Test water volume:	100 mL
Larval mortality counts:	Daily
Overlying water type:	Site water
Age of organisms:	Small cell blastula (Stage 8-10)
Number of organisms per vessel:	25
Number of replicate test vessels per concentration:	4
Feeding:	None
Laboratory control water:	FETAX solution (reconstituted laboratory water)
Sample test concentrations:	100%
Dilution factor:	None
Test duration:	96 h
Overlying water quality:	Temperature, pH and dissolved oxygen daily
Effects measured (endpoints):	Mortality, malformation, growth (length)
Test validation:	90% survival and less than or equal to 10 percent malformation in control

Table 2
Chronological Timelines for WCH Sample Collection, Receipt, and Testing

WCH Field Sample No.	FEL Lab No.	Sample Date	FEL Receipt Date	Test Initiation Date	Test Termination Date
J13W64	00134-001	12/16/06	12/21/06	12/22/06	12/26/06
J13W65	00134-002	12/16/06	12/21/06	12/22/06	12/26/06
J13V94	000134-003	12/16/06	12/22/06	12/22/06	12/26/06
J13V93	00134-004	12/16/06	12/22/06	12/22/06	12/26/06
J13V92	00134-005	12/16/06	12/22/06	12/22/06	12/26/06
J13V91	00134-006	12/16/06	12/22/06	12/22/06	12/26/06
J13VP3	00134-007	1/3/07	1/9/07	1/15/07	1/19/07
J13VP4	00134-008	1/3/07	1/9/07	1/15/07	1/19/07
J13V89	00134-009	1/4/07	1/10/07	1/15/07	1/19/07
J13V90	00134-010	1/4/07	1/10/07	1/15/07	1/19/07
J13VP2	00134-011	1/8/07	1/15/07	1/15/07	1/19/07
J13W35	00134-012	1/15/07	1/23/07	1/23/07	1/27/07

Table 3
Results of WCH FETAX Screens on
Laboratory Control and Reference Samples

Sample ID	Test Initiation Date	Mean Mortality (%)	Mean Malformations (%)
FETAX Laboratory Control	12/22/06	0.0	0.0
6-AN Reference (2,500 mg/L)		100.0	-
6-AN Reference (5.5 mg/L)		0.0	52.0
FETAX Laboratory Control	1/15/07	0.0	6.0
6-AN Reference (2,500 mg/L)		100.0	-
6-AN Reference (5.5 mg/L)		30.0	48.6
FETAX Laboratory Control	1/23/07	0.0	1.0
6-AN Reference (2,500 mg/L)		100.0	-
6-AN Reference (5.5 mg/L)		12.0	59.1

Table 4
Results of FETAX Screens on WCH Water Samples

WCH Field Sample No.	Mean Mortality (%)	Mean Malformation (%)	Mean Growth[1] (%)	Mortality Significantly Greater Than Control[2]	Malformation Significantly Greater Than Control[2]	Growth Significantly Less Than Control[2]
Lab Control	0.0	0.0	-	-	-	-
J13W64	3.0	5.2	100.5	No	No	No
J13W65	0.0	2.0	96.5	No	No	Yes (P=0.016)
J13V94	5.0	5.3	99.8	No	No	No
J13V93	4.0	6.3	99.2	No	No	No
J13V92	0.0	5.0	100.7	No	No	No
J13V91	0.0	8.0	101.3	No	Yes (P=0.041)	No
Lab Control	0.0	6.0	-	-	-	-
J13VP3	6.0	8.5	103.5	No	No	No
J13VP4	3.0	8.2	102.8	No	No	No
J13V89	13.0	12.6	98.3	Yes (P=0.036)	No	No
J13V90	20.0	26.3	90.7	Yes (P=0.008)	Yes (P<0.001)	No
J13VP2	11.0	10.1	103.5	No	No	No
Lab Control	0.0	1.0	-	-	-	-
J13W35	0.0	5.0	98.7	No	No	No

[1] Mean sample length (cm) divided by mean laboratory control length (cm), expressed as % growth.
[2] Results based on statistical analysis using K-W ANOVA or ANOVA with Dunn's Method (non-parametric data, P<0.05) or Bonferroni t-test (parametric data, P<0.05), respectively, as appropriate.

Appendix A

Chain of Custody Forms

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: CH2m Hill
Address: 2CR- WASH CLOSURE HANFORD

Contact Person:
Phone:
CH2M HILL Project #: 112534-HC.66

NPDES#:
Composite Sample Information:
Samples/Hour: Volume/Sample:
Total Hours: Total Volume:
Initiated: Date: Time:
Ended: Date: Time:
Chilled During Collection: Yes ☐ No ☐

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (541) 752-4271 Ext. 3160
Message: (541) 758-0235 Ext. 3160

P. O.#:
Check Chlorine (Y/N):
Temp. Upon Arrival (°C): 3°C at FEL
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	FE TAX			Concentrations and/or Comments
J13W64	12-16-06	1550		X	1	31741-01															X			CH2M05-00134-001
J13W65	12-16-06	1900		X	1	1 -02															X			" " 002

Sampled By & Title (Please sign and print name) Brett Mackey	Date/Time 12-20-06 1455	Relinquished By (Please sign and print name)	Date/Time 12-20-06 1500
Received By (Please sign and print name) Robert Rogers ROBERT ROGERS	Date/Time 12/21/06 - 1400	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 X Hand ___ Other ___	Shipping #
Work Authorized By (Please sign and print name)	Remarks Subsamples collected 12-20-06 by Brett Mackey		

Rev. 10/97

CH2MHILL **Applied Sciences Lab**
CHAIN OF CUSTODY RECORD
AND AGREEMENT TO PERFORM SERVICES

CVO 2300 NW Walnut Boulevard
Corvallis, OR 97330-3538
(541) 752-4271 FAX (541) 752-0276

COC # _____

Project # 112534.HC.06	Purchase Order #
Project Name ELR - Washington Closure	
Company Name CH2M HILL	
Report to: Mike Stanaway	Phone No: 541-768-3161
Requested Completion Date: Normal	Sample Disposal: Dispose ☐ Return ☐

Requested Analytical Method # / Preservative

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	Matrix Other	CLIENT SAMPLE ID (8 CHARACTERS)	LAB QC	TOTAL # OF CONTAINERS	FETAX	ICE	Alternate Description	Lab ID
12-16-06	1300			X				J 1 3 V 9 4		1	X	X	B1741-03	CH2M05-00134-003
12-16-06	1620			X				J 1 3 V 9 3		1	X	X	-04	004
12-16-06	1745			X				J 1 3 V 9 2		1	X	X	-05	005
12-16-06	1845			X				J 1 3 V 9 1		1	X	X	-06	006

THIS AREA FOR LAB USE ONLY

Lab # | Page | of

1°C upon arrival @ FEL-RI

EPA Tier QC Level: 1 (Screening) 2 3 4

Relinquished By: Mike Stanaway (Please sign and print name)	Date/Time 1400 12-21-06	Received By: Robert Rogers (Please sign and print name) ROBERT ROGERS	Date/Time 12/22/06 - 0930
Sampled By and Title (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	Relinquished By (Please sign and print name)	Date/Time
Received By (Please sign and print name)	Date/Time	Shipped Via: UPS Fed-Ex Other _____	Shipping #

Special Instructions:

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client
Rev 2/01 Lab form 340

CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client Washington Closure Hanford NPDES# _____

Address _____

Composite Sample Information _____

Samples/Hour _____ Volume/Sample _____

Total Hours _____ Total Volume _____

Contact Person: Mike Stanaway

Phone: 541 752-4271 ext 5161

Initiated: Date _____ Time _____

Ended: Date _____ Time _____

Chilled During Collection Yes ☐ No ☐

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (541) 752-4271 Ext. 3160
Message: (541) 758-0235 Ext. 3160

P. O.#

Check Chlorine (Y/N) _____

Temp. Upon Arrival (°C) 3°C at FEL

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

CH2M HILL Project # _____

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
J13VP3	1/3/07	1150			1																			CH2MØ5-00134-007
J13VP4	1/3/07	1315			1																			CH2MØ5-00134-008

Sampled By & Title (Please sign and print name) Troy Pittenger CH2M HILL	Date/Time 1/8/07 1345	Relinquished By (Please sign and print name) Troy Pittenger	Date/Time 1/8/07 1400
Received By (Please sign and print name) Robert Rogers ROBERT ROGERS	Date/Time 1/9/07 0945	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 The above dates and times are the original field sample times, sampled by WCH personnel.		

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CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: ELR - HANFORD
Address:
Contact Person: Mike Stanaway
Phone: 541-768-3161
CH2M HILL Project #:

NPDES#:
Composite Sample Information:
Samples/Hour: Volume/Sample:
Total Hours: Total Volume:
Initiated: Date: Time:
Ended: Date: Time:
Chilled During Collection: Yes ☐ No ☐

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (541) 752-4271 Ext. 3160
Message: (541) 758-0235 Ext. 3160
P. O.#:
Check Chlorine (Y/N):
Temp. Upon Arrival (°C): 5°C at FEL
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	Ceriio Acute	Ceriio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	FETAX			Concentrations and/or Comments
J13V89	1-4-07	1340																			X			CH2MØ5-00134-009
J13V90	1-4-07	1200																			X			CH2MØ5-00134-010

Sampled By & Title (Please sign and print name): Brett Muckey, Assoc. Sci	Date/Time: Jan 9, 2007 11:30	Relinquished By (Please sign and print name):	Date/Time: Jan 09, 2007 11:45
Received By (Please sign and print name): Fed Ex	Date/Time:	Relinquished By (Please sign and print name):	Date/Time:
Received By (Please sign and print name): Matthew Burnes	Date/Time: Jan 10, 2007 11:30	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: Subsamples collected by CH2M on Jan 9, 2007.		

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CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client: ELR-HANFORD
Address:
Contact Person:
Phone:
CH2M HILL Project #

NPDES#
Composite Sample Information
Samples/Hour ____ Volume/Sample ____
Total Hours ____ Total Volume ____
Initiated: Date ____ Time ____
Ended: Date ____ Time ____
Chilled During Collection Yes ☐ No ☐

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (541) 752-4271 Ext. 3160
Message: (541) 758-0235 Ext. 3160
P. O.#
Check Chlorine (Y/N) ____
Temp. Upon Arrival (°C) 5°C at FEL
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	Ceriio Acute	Ceriio Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	FLTX			Concentrations and/or Comments
J13VP2	1-8-07	1300																			X			CH2M05-00134-011

Sampled By & Title (Please sign and print name) Brett Muckey Assoc. Sci.	Date/Time 1-12-07 11:20	Relinquished By (Please sign and print name)	Date/Time 1-12-07 1120
Received By (Please sign and print name) Robert Rogers ROBERT ROGERS	Date/Time 1/15/07 - 1115	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 # SUBSAMPLE COLLECTED BY CH2M on 1-12-07, ORIGINALLY SAMPLED 1-8-07		

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CH2MHILL CHAIN OF CUSTODY RECORD FOR NPDES COMPLIANCE BIOMONITORING

Client ELR - Washington Closure
Address
Contact Person:
Phone:
CH2M HILL Project #

NPDES#
Composite Sample Information
Samples/Hour _____ Volume/Sample _____
Total Hours _____ Total Volume _____
Initiated: Date _____ Time _____
Ended: Date _____ Time _____
Chilled During Collection Yes ☐ No ☐

Ship Samples to: CH2M HILL, Inc.
Attention: Aquatic Toxicology Laboratory
2300 NW Walnut Blvd.
Corvallis, OR 97330
Phone: (541) 752-4271 Ext. 3160
Message: (541) 758-0235 Ext. 3160
P. O.#
Check Chlorine (Y/N) _____
Temp. Upon Arrival (°C) 3°C @ FEL
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	Ceriodaphnia Acute	Ceriodaphnia Chronic	Daphnia Acute	Trout Acute	SHM Acute	SHM Chronic	MB Acute	MB Chronic	MYS Acute	MYS Chronic	Algae	Haz Waste	FETAX			Concentrations and/or Comments
J13W35	01-15-07	1315			1																✓			CH2M05-0134-012

~~Sampled By & Title~~ SOO (Please sign and print name) Troy Pittenger (CH2M HILL)	Date/Time 1/18/2007 1230	Relinquished By (Please sign and print name) Troy Pittenger	Date/Time 1/22/07 1200
Received By (Please sign and print name) Robert Rogers ROBERT ROGERS	Date/Time 1/23/07 0935	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		

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Appendix B

General Water Chemistry

CH2M05-00134
Washington Closure Hanford
FORT ENVIRONMENTAL LABORATORIES

GENERAL WATER CHEMISTRY

Analysis Date	Tech Initials	FEL W.O.	Sample ID	Temp (C)	pH (su)	DO (mg/L)	Conduct. (µS/cm)	Hardness (mg/L)	Alkalinity (mg/L)	NH_3-N (mg/L)	Residual Oxidants (mg/L)
12/22/06	MLB	-	FETAX Control	19.0	7.9	8.3	1695	102	50	<0.06	<0.01
		001	J13W64 Water	22.0	8.0	9.2	368	158	92	<0.06	0.05
		002	J13W65 Water	22.0	7.5	9.3	268	116	64	<0.06	0.02
		003	J13V94 Water	23.4	6.7	11.2	290	106	43	<0.06	0.01
		004	J13V93 Water	23.6	7.8	11.6	228	90	68	<0.06	0.02
		005	J13V92 Water	23.4	7.6	11.0	300	122	92	0.14	0.52
		006	J13V91 Water	23.7	7.8	11.3	606	248	90	<0.06	0.01
12/23/06	BB	-	FETAX Control	22.3	8.0	8.0	-	-	-	-	-
		001	J13W64 Water	22.5	8.0	8.9	-	-	-	-	-
		002	J13W65 Water	22.5	7.6	9.2	-	-	-	-	-
		003	J13V94 Water	22.5	6.7	10.6	-	-	-	-	-
		004	J13V93 Water	22.4	7.9	11.0	-	-	-	-	-
		005	J13V92 Water	22.7	7.5	11.1	-	-	-	-	-
		006	J13V91 Water	22.3	7.8	11.0	-	-	-	-	-
12/24/06	BB	-	FETAX Control	23.1	8.0	7.3	-	-	-	-	-
		001	J13W64 Water	23.2	8.2	7.4	-	-	-	-	-
		002	J13W65 Water	23.1	7.5	7.7	-	-	-	-	-
		003	J13V94 Water	23.4	6.8	9.2	-	-	-	-	-
		004	J13V93 Water	22.9	7.8	8.4	-	-	-	-	-
		005	J13V92 Water	23.0	7.6	8.9	-	-	-	-	-
		006	J13V91 Water	22.8	7.9	7.9	-	-	-	-	-
12/25/06	MLB	-	FETAX Control	22.0	7.9	8.9	-	-	-	-	-
		001	J13W64 Water	22.5	8.1	9.0	-	-	-	-	-
		002	J13W65 Water	22.5	7.8	9.0	-	-	-	-	-
		003	J13V94 Water	22.4	7.3	8.9	-	-	-	-	-
		004	J13V93 Water	22.6	7.9	9.1	-	-	-	-	-
		005	J13V92 Water	22.6	7.8	8.7	-	-	-	-	-
		006	J13V91 Water	22.5	8.0	9.0	-	-	-	-	-
01/09/07	BB	-	FETAX Control	-	-	-	1799	116	52	<0.06	0.01
		007	J13VP3 Water	-	-	-	171.3	88	80	<0.06	0.01
		008	J13VP4 Water	-	-	-	206	106	81	<0.06	0.03
01/10/07	MB	-	FETAX Control	-	-	-	1803	110	52	<0.06	0.01
		009	J13V89 Water	-	-	-	171.5	76	58	<0.06	0.01
		010	J13V90 Water	-	-	-	295	135	114	1.91	0.01

CH2M05-00134
Washington Closure Hanford
FORT ENVIRONMENTAL LABORATORIES

GENERAL WATER CHEMISTRY

Analysis Date	Tech Initials	FEL W.O.	Sample ID	Temp (C)	pH (su)	DO (mg/L)	Conduct. (µS/cm)	Hardness (mg/L)	Alkalinity (mg/L)	NH_3-N (mg/L)	Residual Oxidants (mg/L)
01/15/07	MLB	-	FETAX Control	22.3	8.1	9.2	1769	112	52	<0.06	0.01
		007	J13VP3 Water	22.3	8.1	10.6	-	-	-	-	-
		008	J13VP4 Water	22.0	7.9	10.9	-	-	-	-	-
		009	J13V89 Water	22.0	7.9	9.8	-	-	-	-	-
		010	J13V90 Water	22.0	7.7	10.1	-	-	-	-	-
		011	J13VP2 Water	22.1	7.9	10.7	166.8	72	63	<0.06	0.01
01/16/07	MLB	-	FETAX Control	23.2	8.1	9.2	-	-	-	-	-
		007	J13VP3 Water	24.4	8.2	8.9	-	-	-	-	-
		008	J13VP4 Water	24.8	8.0	9.1	-	-	-	-	-
		009	J13V89 Water	24.2	7.9	8.7	-	-	-	-	-
		010	J13V90 Water	24.0	7.8	8.8	-	-	-	-	-
		011	J13VP2 Water	24.3	7.9	9.0	-	-	-	-	-
01/17/06	MB	-	FETAX Control	22.4	8.1	7.4	-	-	-	-	-
		007	J13VP3 Water	22.2	8.5	7.5	-	-	-	-	-
		008	J13VP4 Water	22.5	8.3	7.5	-	-	-	-	-
		009	J13V89 Water	22.2	8.2	7.6	-	-	-	-	-
		010	J13V90 Water	22.3	8.1	7.5	-	-	-	-	-
		011	J13VP2 Water	22.3	8.2	7.6	-	-	-	-	-
01/18/06	BB	-	FETAX Control	22.8	7.2	8.5	-	-	-	-	-
		007	J13VP3 Water	22.9	7.3	9.2	-	-	-	-	-
		008	J13VP4 Water	22.8	7.4	9.0	-	-	-	-	-
		009	J13V89 Water	22.9	7.5	9.2	-	-	-	-	-
		010	J13V90 Water	22.9	7.5	9.7	-	-	-	-	-
		011	J13VP2 Water	22.8	7.6	9.8	-	-	-	-	-
01/23/07	BB	-	FETAX Control	23.0	7.4	9.2	1800	112	52	<0.06	0.02
		012	J13W35 Water	24.0	7.4	9.7	231	92	79	<0.06	0.02
01/24/07	MB	-	FETAX Control	24.0	7.8	7.2	-	-	-	-	-
		012	J13W35 Water	25.0	7.7	7.4	-	-	-	-	-
01/25/07	BB	-	FETAX Control	23.0	7.6	7.8	-	-	-	-	-
		012	J13W35 Water	23.0	7.7	7.7	-	-	-	-	-
01/26/07	MB	-	FETAX Control	23.1	8.0	7.7	-	-	-	-	-
		012	J13W35 Water	23.8	8.1	7.4	-	-	-	-	-

Appendix C

Raw and Statistical Data

FETAX SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	12/22/06
Test Material:	Controls	FEL Sample No.:	001-006	Test End Date:	12/26/06
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/10/07

Malformation:	Sample ID/Concentration *(unit)*															
	FETAX Ctl												5.5mg/L 6AN		2500mg/L 6AN	
Stunted																
Edema																
Blister																
Head/Facial													13	13		
Jaw																
Mouth													13	13		
Eye													4	5		
Brain																
Cardiac																
Gut													13	13		
Hemorrhage																
Tail/Myotome																
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	0	0	0	0									13	13	-	-
Total Survived	25	25	25	25									25	25	0	0
Total Tested	25	25	25	25									25	25	25	25
% Mortality	0.0	0.0	0.0	0.0									0.0	0.0	100.0	100.0
% Malformed	0.0	0.0	0.0	0.0									52.0	52.0	-	-
Avg % Mortality	0.0												0.0		100.0	
SEM (Mortality)	0.0												0.00		0.00	
Avg % Malformed	0.0												52.0		-	
SEM (Malformed)	0.0												0.00		-	

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																	
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
FETAX Ctl	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
5.5mg/L 6AN	1	13	0	0	0	13	0	13	4	0	0	13	0	0	0	0	0	0	0	0	0
	2	13	0	0	0	13	0	13	5	0	0	13	0	0	0	0	0	0	0	0	0
Total Survived	50																				
Total Malformed		26	0	0	0	26	0	26	9	0	0	26	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	52.00	0.00	52.00	18.00	0.00	0.00	52.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	0.00	na	0.00	3.93	na	na	0.00	na	na	na	na	na	na	na	na	na
2500mg/L 6AN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Survived	0																				
Total Malformed		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Malformed			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Var (S2)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CV (%)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	12/22/06
Test Material:	Pore Water	FEL Sample No.:	001-006	Test End Date:	12/26/06
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/10/07

Malformation:	Sample No./Sample ID/Concentration *(unit)*															
	J13W64				J13W65				J13V94				J13V93			
Stunted																
Edema									1							
Blister																
Head/Facial	1	2	1	1		1	1		1		2	2	2	1	3	
Jaw																
Mouth	1	2	1	1		1	1		1		2	2	2	1	3	
Eye		1							1		1		1		2	
Brain																
Cardiac																
Gut	1		1	1		1	1		1		2	2	2	1	3	
Hemorrhage																
Tail/Myotome																
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	1	2	1	1	0	1	1	0	1	0	2	2	2	1	3	0
Total Survived	22	25	25	25	25	25	25	25	25	20	25	25	25	24	24	23
Total Tested	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
% Mortality	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	4.0	4.0	8.0
% Malformed	4.5	8.0	4.0	4.0	0.0	4.0	4.0	0.0	4.0	0.0	8.0	8.0	8.0	4.2	12.5	0.0
Avg % Mortality	3.0				0.0				5.0				4.0			
SEM (Mortality)	3.0				0.0				5.0				1.6			
Avg % Malformed	5.2				2.0				5.3				6.3			
SEM (Malformed)	1.0				1.2				1.9				2.7			

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																	
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
J13W64	1	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	2	2	0	0	0	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
	3	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	4	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Total Survived	97																				
Total Malformed		5	0	0	0	5	0	5	1	0	0	3	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	5.15	0.00	5.15	1.03	0.00	0.00	3.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	9.70	na	9.70	48.50	na	na	16.17	na	na	na	na	na	na	na	na	na
J13W65	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	3	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		2	0	0	0	2	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	2.00	0.00	2.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	0.33	0.00	0.33	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.29	0.00	0.29	0.00	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	28.87	na	28.87	na	na	na	28.87	na	na	na	na	na	na	na	na	na
J13V94	1	1	0	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	2	0	0	0	2	0	2	1	0	0	2	0	0	0	0	0	0	0	0	0
	4	2	0	0	0	2	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0
Total Survived	95																				
Total Malformed		5	0	1	0	5	0	5	2	0	0	5	0	0	0	0	0	0	0	0	0
% Malformed			0.00	1.05	0.00	5.26	0.00	5.26	2.11	0.00	0.00	5.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.25	0.00	0.92	0.00	0.92	0.33	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.25	0.00	0.48	0.00	0.48	0.29	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	47.50	na	18.19	na	18.19	27.42	na	na	18.19	na	na	na	na	na	na	na	na	na
J13V93	1	2	0	0	0	2	0	2	1	0	0	2	0	0	0	0	0	0	0	0	0
	2	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	3	3	0	0	0	3	0	3	2	0	0	3	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survived	98																				
Total Malformed		6	0	0	0	6	0	6	3	0	0	6	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	6.25	0.00	6.25	3.13	0.00	0.00	6.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	1.67	0.00	1.67	0.92	0.00	0.00	1.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.65	0.00	0.65	0.48	0.00	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	20.66	na	20.66	30.64	na	na	20.66	na	na	na	na	na	na	na	na	na

SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	12/22/06
Test Material:	Pore Water	FEL Sample No.:	001-006	Test End Date:	12/26/06
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/10/07

Malformation:	Sample No./Sample ID/Concentration *(unit)*															
	J13V92				J13V91											
Stunted																
Edema						1	1									
Blister																
Head/Facial	1	2	1	1	2	3	1	2								
Jaw																
Mouth	1	2	1	1	2	3	1	2								
Eye		1														
Brain																
Cardiac																
Gut	1	1		1	2	3	1	2								
Hemorrhage						1		1								
Tail/Myotome					1	1										
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	1	2	1	1	2	3	1	2								
Total Survived	25	25	25	25	25	25	25	25								
Total Tested	25	25	25	25	25	25	25	25								
% Mortality	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0								
% Malformed	4.0	8.0	4.0	4.0	8.0	12.0	4.0	8.0								
Avg % Mortality	0.0				0.0											
SEM (Mortality)	0.0				0.0											
Avg % Malformed	5.0				8.0											
SEM (Malformed)	1.0				1.6											

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																	
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
J13V92	1	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	2	2	0	0	0	2	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0
	3	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		5	0	0	0	5	0	5	1	0	0	3	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	5.00	0.00	5.00	1.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	10.00	na	10.00	50.00	na	na	16.67	na	na	na	na	na	na	na	na	na
J13V91	1	2	0	0	0	2	0	2	0	0	0	2	0	1	0	0	0	0	0	0	0
	2	3	0	1	0	3	0	3	0	0	0	3	1	1	0	0	0	0	0	0	0
	3	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	4	2	0	0	0	2	0	2	0	0	0	2	1	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		8	0	2	0	8	0	8	0	0	0	8	2	2	0	0	0	0	0	0	0
% Malformed			0.00	2.00	0.00	8.00	0.00	8.00	0.00	0.00	0.00	8.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.33	0.00	0.67	0.00	0.67	0.00	0.00	0.00	0.67	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.29	0.00	0.41	0.00	0.41	0.00	0.00	0.00	0.41	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	28.87	na	10.21	na	10.21	na	na	na	10.21	28.87	28.87	na	na	na	na	na	na	na

FIGURE 1
CH2M05-00134 (001-006)
FETAX Screen with *X. laevis*
FETAX Solution Control

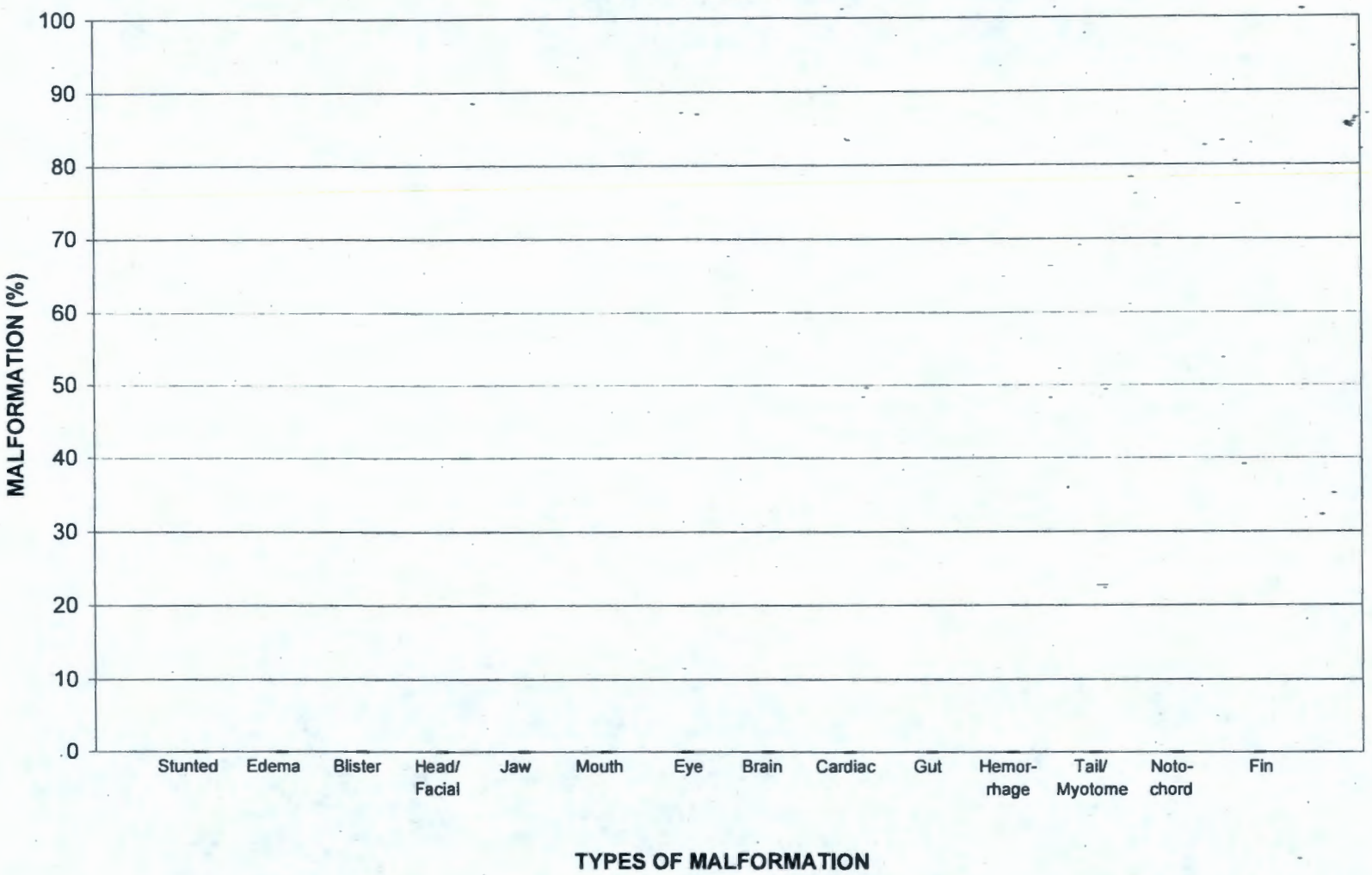


FIGURE 2
CH2M05-00134
FETAX Screen with *X. laevis*
J13W64 Water (001)

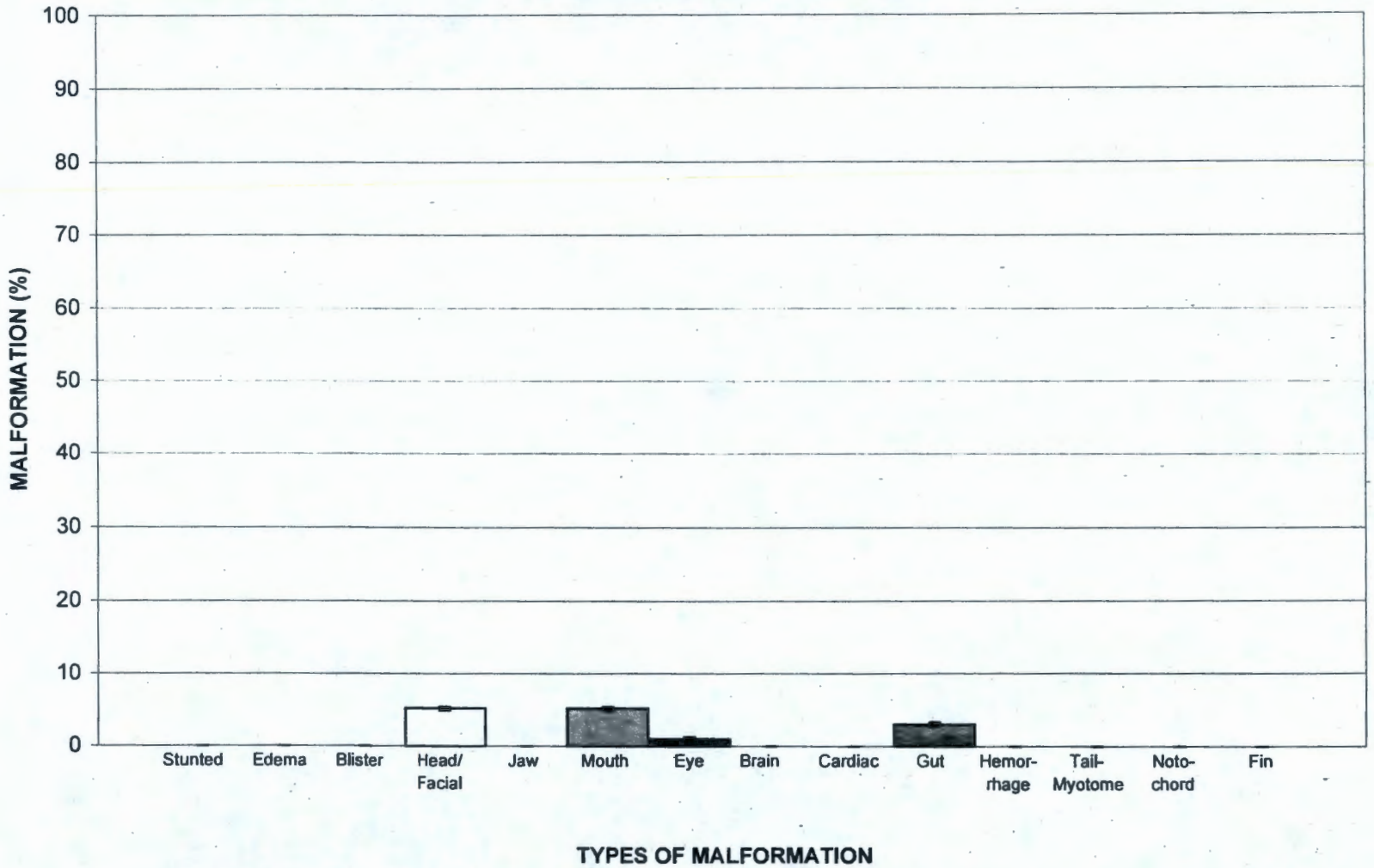


FIGURE 3
CH2M05-00134
FETAX Screen with *X. laevis*
J13W65 Water (002)

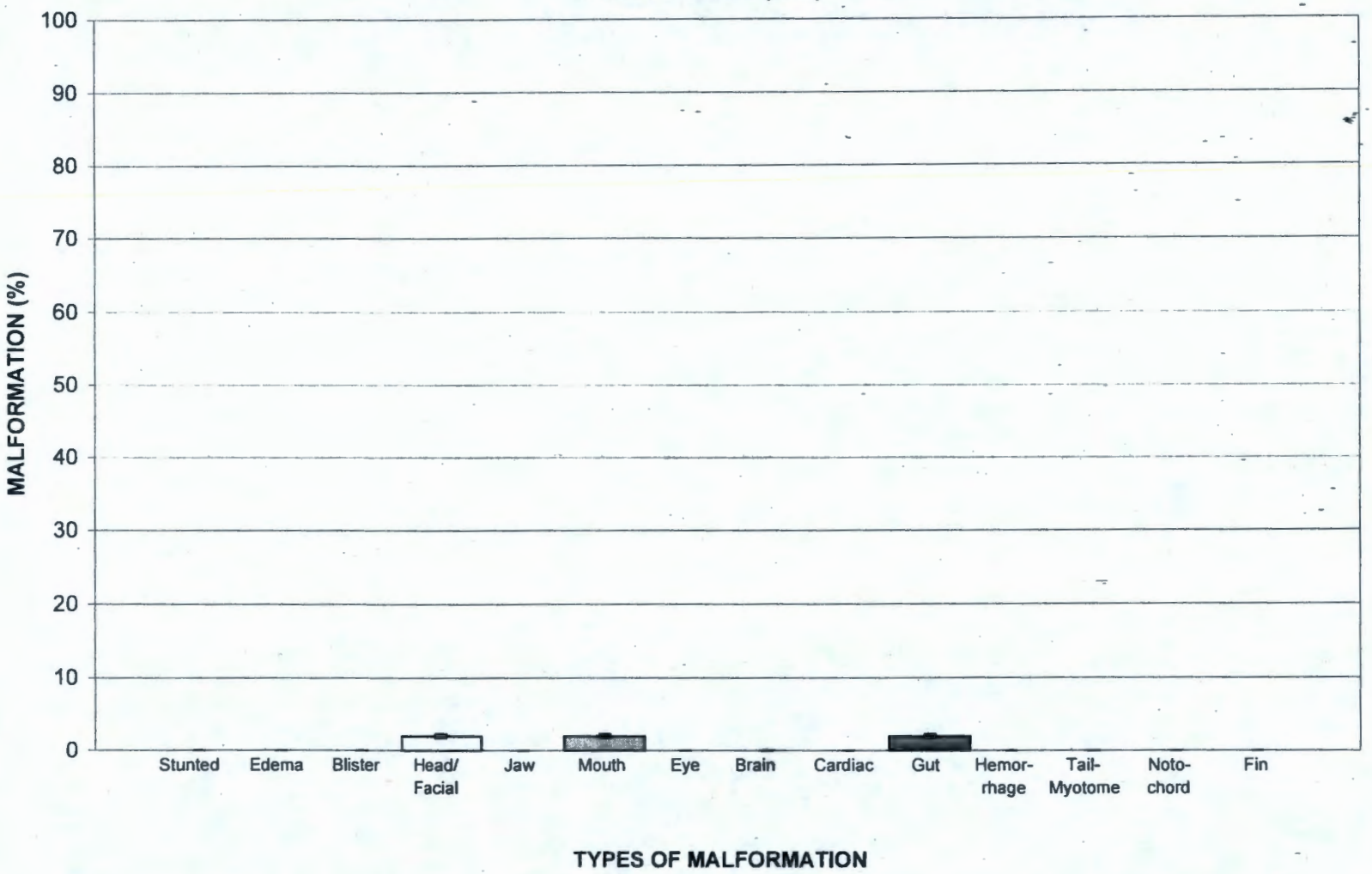


FIGURE 4
CH2M05-00134
FETAX Screen with *X. laevis*
J13V94 Water (003)

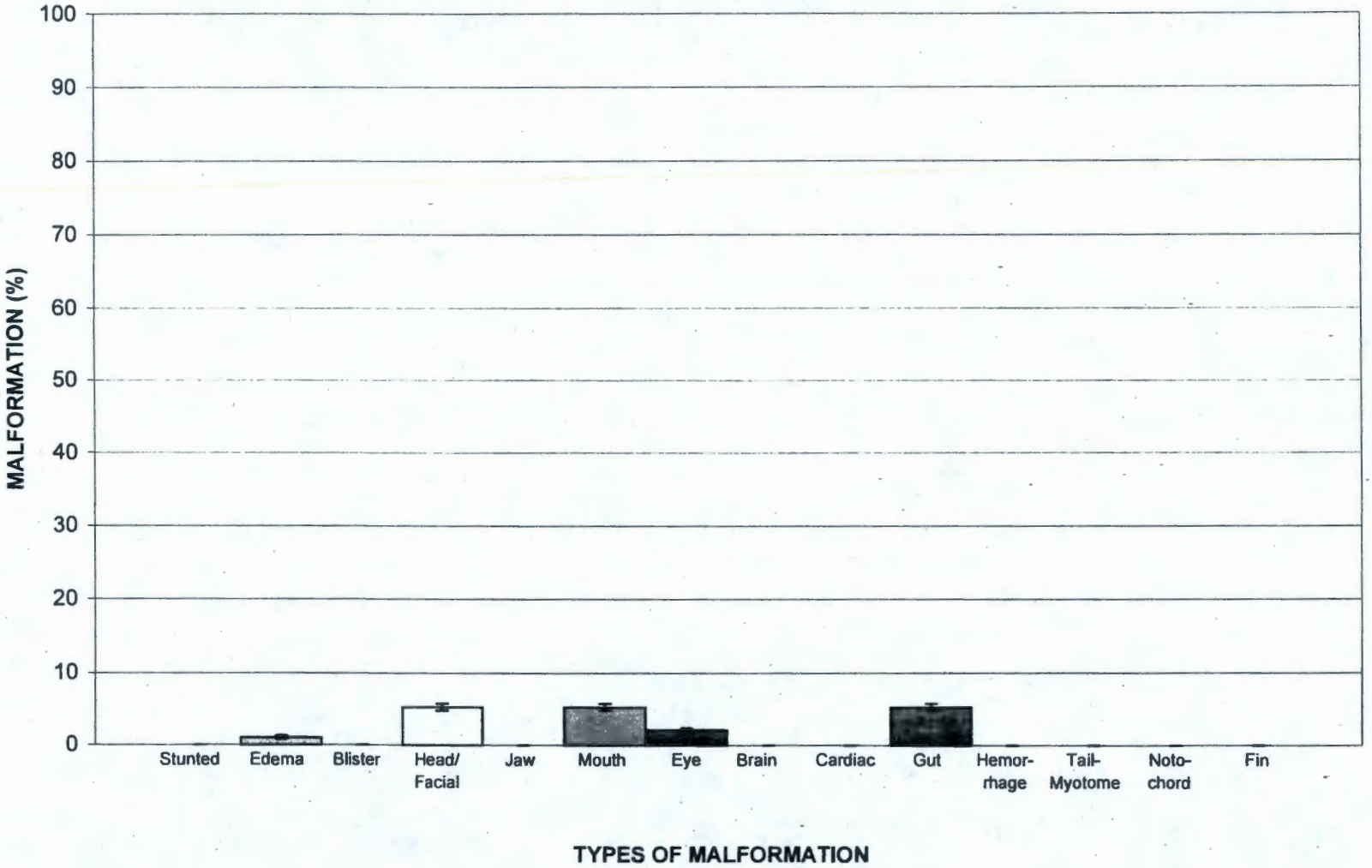


FIGURE 5
CH2M05-00134
FETAX Screen with *X. laevis*
J13V93 Water (004)

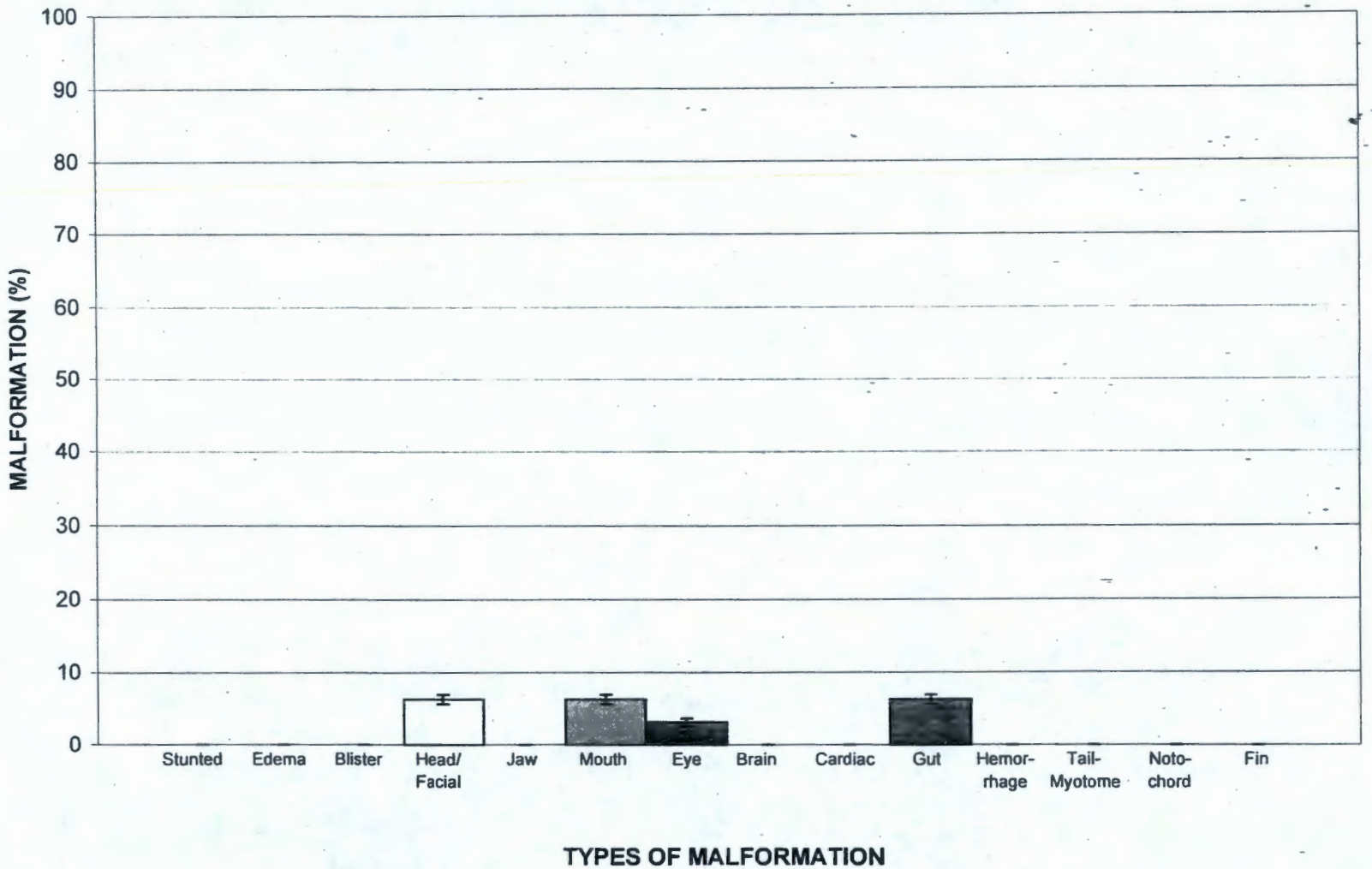


FIGURE 6
CH2M05-00134
FETAX Screen with *X. laevis*
J13V92 Water (005)

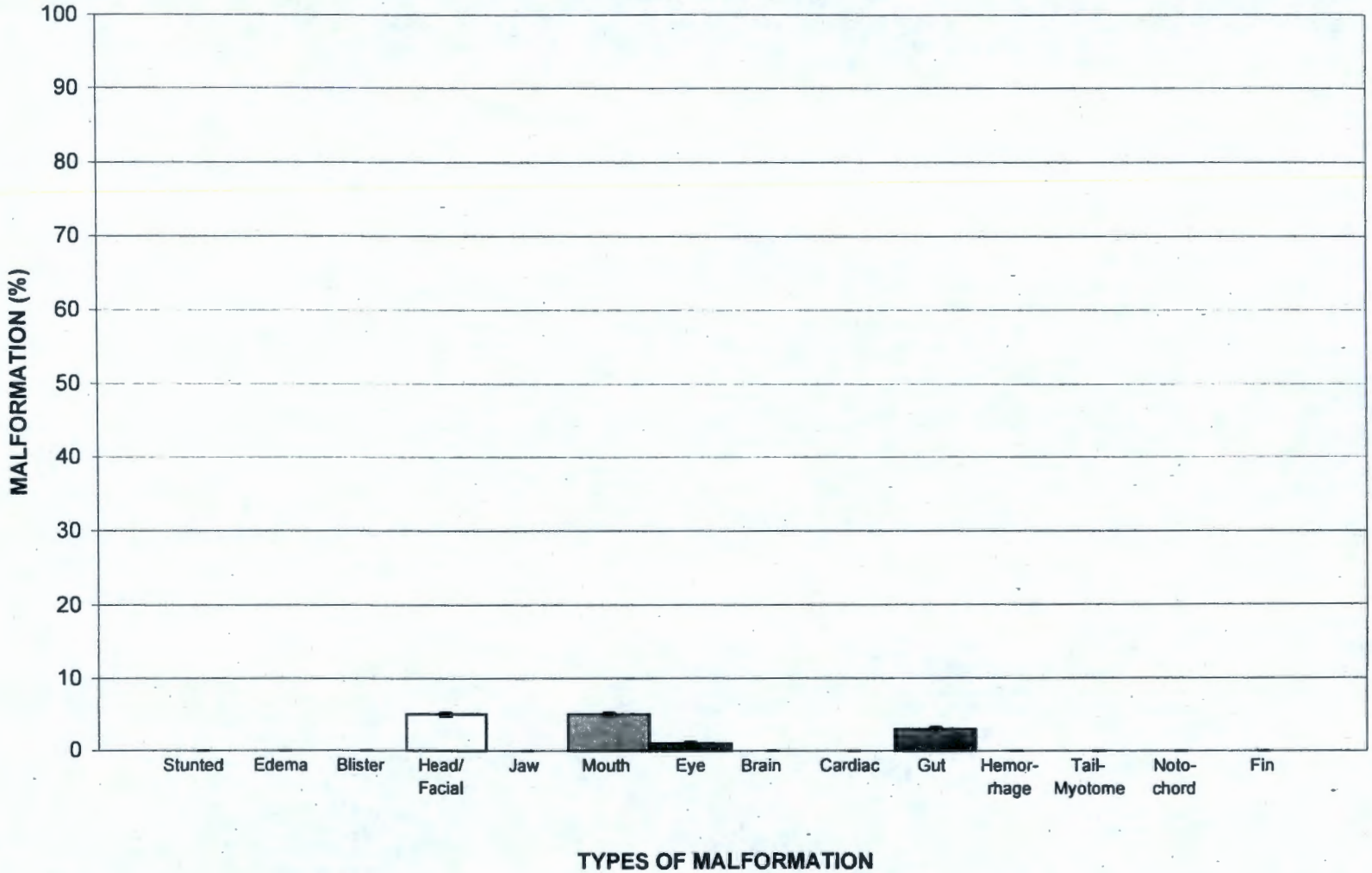


FIGURE 7
CH2M05-00134
FETAX Screen with *X. laevis*
J13V91 Water (006)

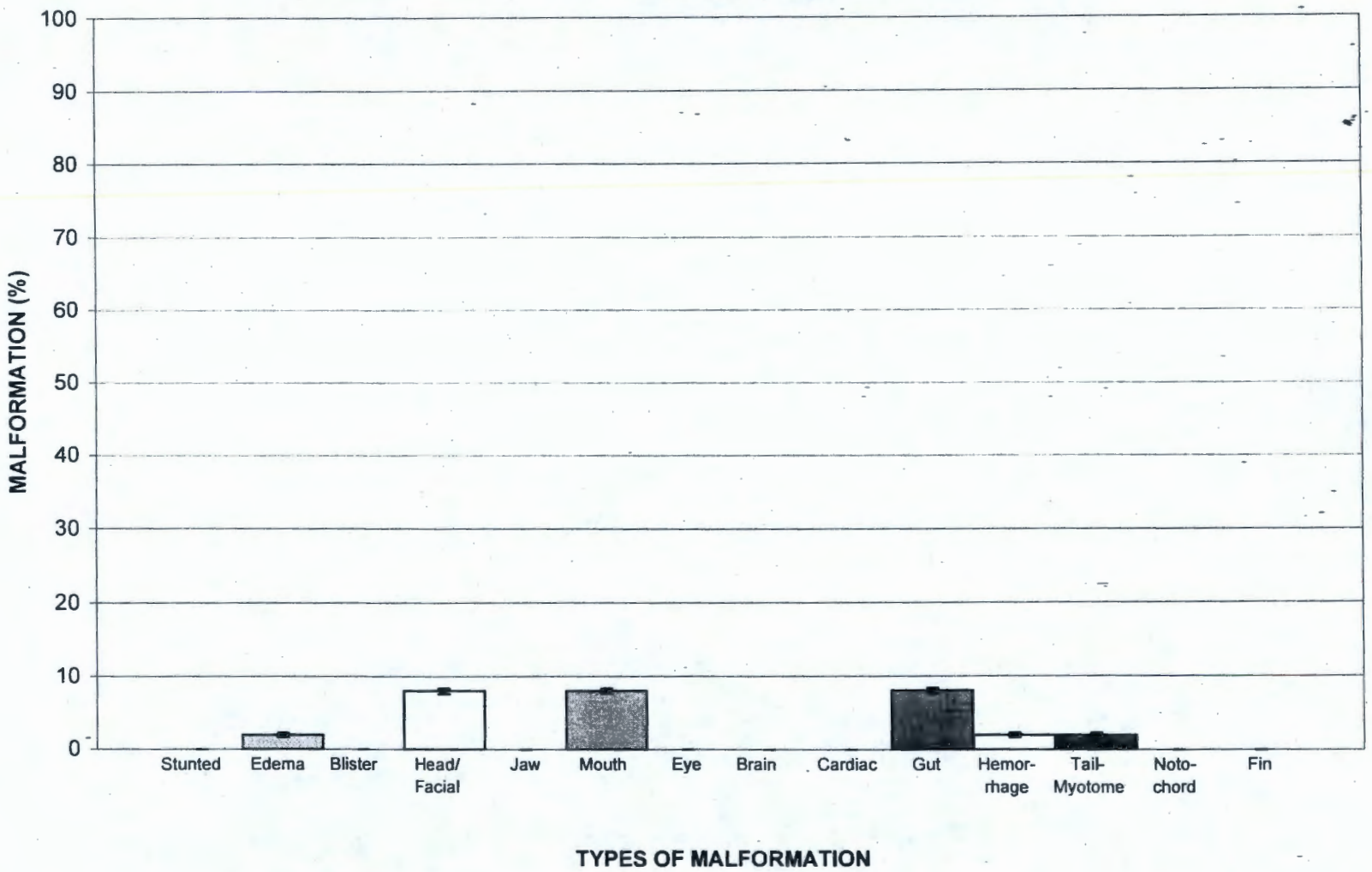


FIGURE 8
CH2M05-00134 (001-006)
FETAX Screen with *X. laevis*

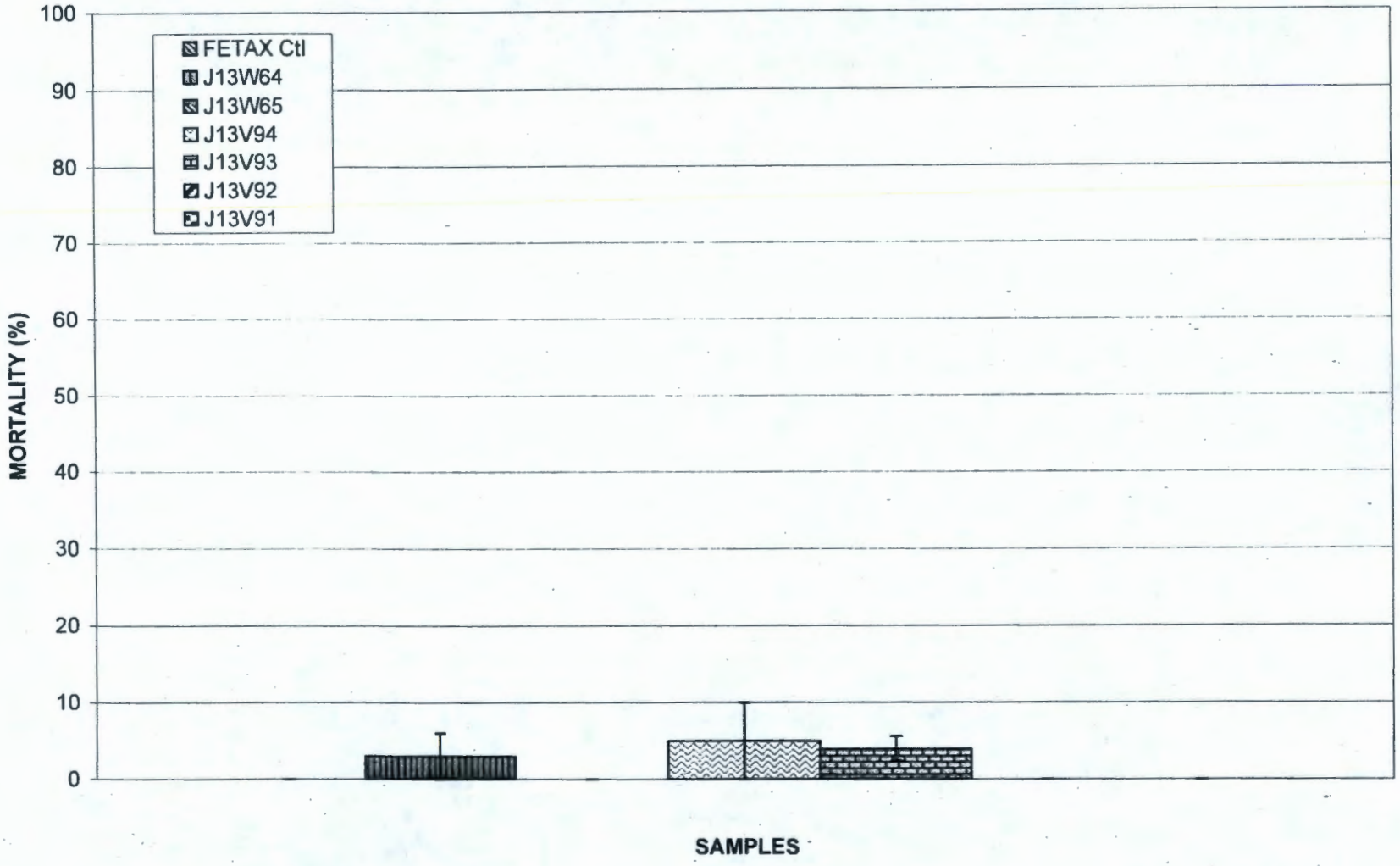
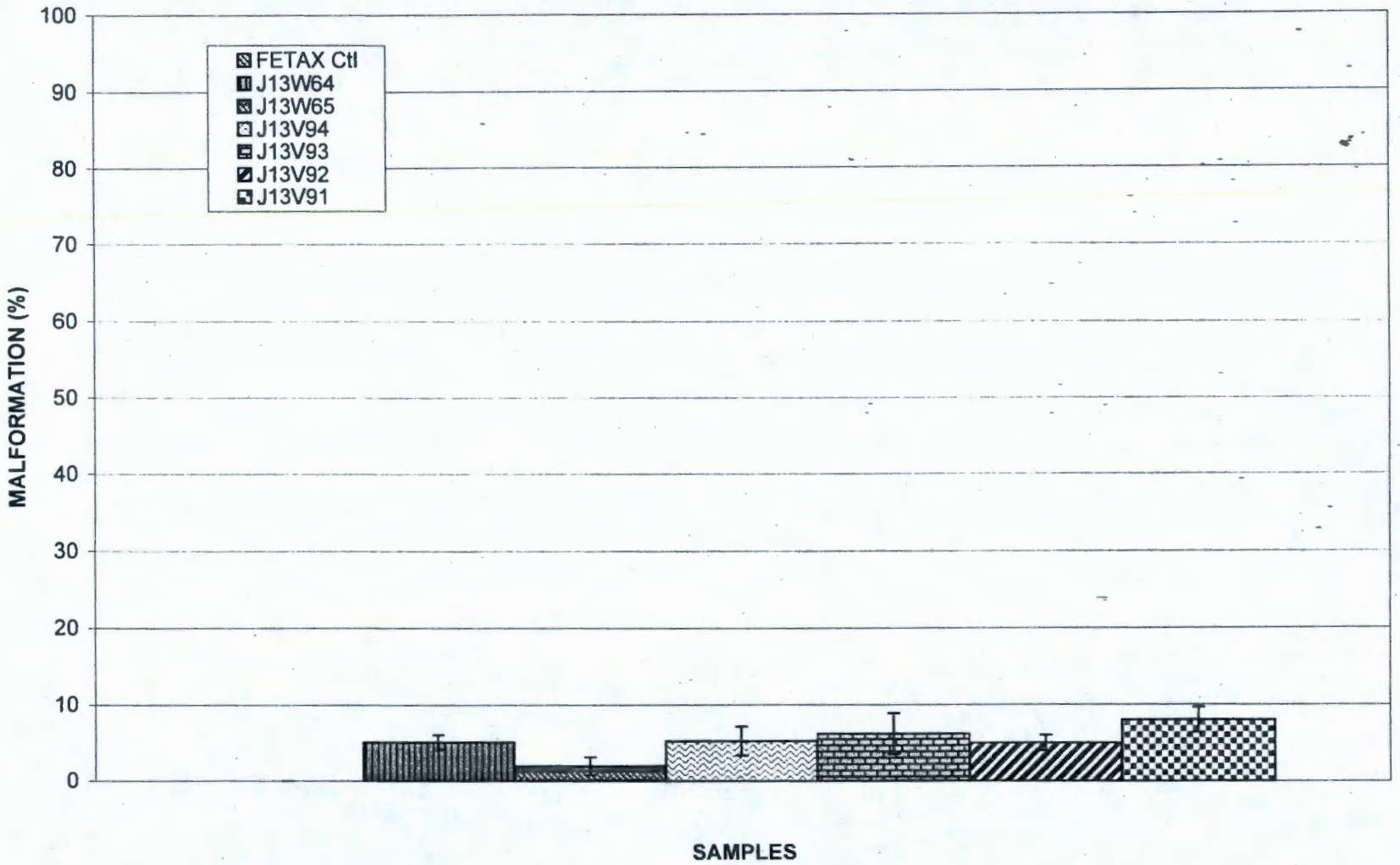


FIGURE 9
CH2M05-00134 (001-006)
FETAX Screen with *X. laevis*



FETAX SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	01/15/07
Test Material:	Controls	FEL Sample No.:	007-011	Test End Date:	01/19/07
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/25/07

Malformation:	Sample ID/Concentration *(unit)*															
	FETAX Ctl												5.5mg/L 6AN		2500mg/L 6AN	
Stunted																
Edema		1		1										2		
Blister																
Head/Facial	1	2	1	2									10	7		
Jaw																
Mouth	1	2	1	2									10	7		
Eye	1	1	1	1									3	2		
Brain													1			
Cardiac			1	1												
Gut	1	2	1	2									10	7		
Hemorrhage		1		1										2		
Tail/Myotome																
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	1	2	1	2									10	7	-	-
Total Survived	25	25	25	25									19	16	0	0
Total Tested	25	25	25	25									25	25	25	25
% Mortality	0.0	0.0	0.0	0.0									24.0	36.0	100.0	100.0
% Malformed	4.0	8.0	4.0	8.0									52.6	43.8	-	-
Avg % Mortality	0.0												30.0		100.0	
SEM (Mortality)	0.0												6.00		0.00	
Avg % Malformed	6.0												48.6		-	
SEM (Malformed)	1.2												4.44		-	

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																		
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
FETAX Ctl	1	1	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
	2	2	0	1	0	2	0	2	1	0	0	2	1	0	0	0	0	0	0	0	0
	3	1	0	0	0	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0
	4	2	0	1	0	2	0	2	1	0	1	2	1	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		6	0	2	0	6	0	6	4	0	2	6	2	0	0	0	0	0	0	0	0
% Malformed			0.00	2.00	0.00	6.00	0.00	6.00	4.00	0.00	2.00	6.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.33	0.00	0.33	0.00	0.33	0.00	0.00	0.33	0.33	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.29	0.00	0.29	0.00	0.29	0.00	0.00	0.29	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	28.87	na	9.62	na	9.62	0.00	na	28.87	9.62	28.87	na	na	na	na	na	na	na	na
5.5mg/L 6AN	1	10	0	0	0	10	0	10	3	1	0	10	0	0	0	0	0	0	0	0	0
	2	7	0	2	0	7	0	7	2	0	0	7	2	0	0	0	0	0	0	0	0
Total Survived	35																				
Total Malformed		17	0	2	0	17	0	17	5	1	0	17	2	0	0	0	0	0	0	0	0
% Malformed			0.00	5.71	0.00	48.57	0.00	48.57	14.29	2.86	0.00	48.57	5.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	2.00	0.00	4.50	0.00	4.50	0.50	0.50	0.00	4.50	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	1.00	0.00	1.50	0.00	1.50	0.50	0.50	0.00	1.50	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	24.75	na	4.37	na	4.37	4.95	24.75	na	4.37	24.75	na	na	na	na	na	na	na	na
2500mg/L 6AN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Survived	0																				
Total Malformed		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Malformed			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Var (S2)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CV (%)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	01/15/07
Test Material:	Water	FEL Sample No.:	007-011	Test End Date:	01/19/07
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/25/07

	Sample No./Sample ID/Concentration *(unit)*															
Malformation:	J13VP3				J13VP4				J13V89				J13V90			
Stunted																
Edema		2					1	1	2		1		2	2	3	2
Blister																
Head/Facial	2	4	1	1	1	2	2	3	4	2	4	1	6	4	7	4
Jaw																
Mouth	2	4	1	1	1	2	2	3	4	2	4	1	3	2	5	3
Eye		2	1			1	1	1	2		2		1	1	2	2
Brain	1	1		1					1	1		1	2	2	1	2
Cardiac							1	1								
Gut	1	4	1	1	1	2	2	3	4	2	4	1	6	4	7	4
Hemorrhage									1		2		1	2	3	1
Tail/Myotome													1	1		
Notochord															1	
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	2	4	1	1	1	2	2	3	4	2	4	1	6	4	7	4
Total Survived	23	25	22	24	25	22	25	25	24	22	22	19	24	18	23	15
Total Tested	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
% Mortality	8.0	0.0	12.0	4.0	0.0	12.0	0.0	0.0	4.0	12.0	12.0	24.0	4.0	28.0	8.0	40.0
% Malformed	8.7	16.0	4.5	4.2	4.0	9.1	8.0	12.0	16.7	9.1	18.2	5.3	25.0	22.2	30.4	26.7
Avg % Mortality	6.0				3.0				13.0				20.0			
SEM (Mortality)	2.6				3.0				4.1				8.5			
Avg % Malformed	8.5				8.2				12.6				26.3			
SEM (Malformed)	2.7				1.7				3.1				1.7			

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																		
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
J13VP3	1	2	0	0	0	2	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0
	2	4	0	2	0	4	0	4	2	1	0	4	0	0	0	0	0	0	0	0	0
	3	1	0	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
	4	1	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Total Survived	94																				
Total Malformed		8	0	2	0	8	0	8	3	3	0	7	0	0	0	0	0	0	0	0	0
% Malformed			0.00	2.13	0.00	8.51	0.00	8.51	3.19	3.19	0.00	7.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	1.00	0.00	2.00	0.00	2.00	0.92	0.25	0.00	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.50	0.00	0.71	0.00	0.71	0.48	0.25	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	47.00	na	16.62	na	16.62	30.00	15.67	na	20.14	na	na	na	na	na	na	na	na	na
J13VP4	1	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	2	2	0	0	0	2	0	2	1	0	0	2	0	0	0	0	0	0	0	0	0
	3	2	0	1	0	2	0	2	1	0	1	2	0	0	0	0	0	0	0	0	0
	4	3	0	1	0	3	0	3	1	0	1	3	0	0	0	0	0	0	0	0	0
Total Survived	97																				
Total Malformed		8	0	2	0	8	0	8	3	0	2	8	0	0	0	0	0	0	0	0	0
% Malformed			0.00	2.06	0.00	8.25	0.00	8.25	3.09	0.00	2.06	8.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.33	0.00	0.67	0.00	0.67	0.25	0.00	0.33	0.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.29	0.00	0.41	0.00	0.41	0.25	0.00	0.29	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	28.00	na	9.90	na	9.90	16.17	na	28.00	9.90	na	na	na	na	na	na	na	na	na
J13V89	1	4	0	2	0	4	0	4	2	1	0	4	1	0	0	0	0	0	0	0	0
	2	2	0	0	0	2	0	2	0	1	0	2	0	0	0	0	0	0	0	0	0
	3	4	0	1	0	4	0	4	2	0	0	4	2	0	0	0	0	0	0	0	0
	4	1	0	0	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Total Survived	87																				
Total Malformed		11	0	3	0	11	0	11	4	3	0	11	3	0	0	0	0	0	0	0	0
% Malformed			0.00	3.45	0.00	12.64	0.00	12.64	4.60	3.45	0.00	12.64	3.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.92	0.00	2.25	0.00	2.25	1.33	0.25	0.00	2.25	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.48	0.00	0.75	0.00	0.75	0.58	0.25	0.00	0.75	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	27.77	na	11.86	na	11.86	25.11	14.50	na	11.86	27.77	na	na	na	na	na	na	na	na
J13V90	1	6	0	2	0	6	0	3	1	2	0	6	1	1	0	0	0	0	0	0	0
	2	4	0	2	0	4	0	2	1	2	0	4	2	1	0	0	0	0	0	0	0
	3	7	0	3	0	7	0	5	2	1	0	7	3	0	1	0	0	0	0	0	0
	4	4	0	2	0	4	0	3	2	2	0	4	1	0	0	0	0	0	0	0	0
Total Survived	80																				
Total Malformed		21	0	9	0	21	0	13	6	7	0	21	7	2	1	0	0	0	0	0	0
% Malformed			0.00	11.25	0.00	26.25	0.00	16.25	7.50	8.75	0.00	26.25	8.75	2.50	1.25	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.25	0.00	2.25	0.00	1.58	0.33	0.25	0.00	2.25	0.92	0.33	0.25	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.25	0.00	0.75	0.00	0.63	0.29	0.25	0.00	0.75	0.48	0.29	0.25	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	4.44	na	5.71	na	7.74	7.70	5.71	na	5.71	10.94	23.09	40.00	na	na	na	na	na	na

SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	01/15/07
Test Material:	Water	FEL Sample No.:	007-011	Test End Date:	01/19/07
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/25/07

Malformation:	Sample No./Sample ID/Concentration *(unit)*															
	J13VP2															
Stunted																
Edema	2	1	1	1												
Blister																
Head/Facial	3	2	2	2												
Jaw																
Mouth	3	2	2	2												
Eye	1		1													
Brain	1	1		1												
Cardiac																
Gut	3	2	2	2												
Hemorrhage	1															
Tail/Myotome		1		1												
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	3	2	2	2												
Total Survived	21	23	25	20												
Total Tested	25	25	25	25												
% Mortality	16.0	8.0	0.0	20.0												
% Malformed	14.3	8.7	8.0	10.0												
Avg % Mortality	11.0															
SEM (Mortality)	4.4															
Avg % Malformed	10.1															
SEM (Malformed)	1.4															

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																		
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
J13VP2	1	3	0	2	0	3	0	3	1	1	0	3	1	0	0	0	0	0	0	0	0
	2	2	0	1	0	2	0	2	0	1	0	2	0	1	0	0	0	0	0	0	0
	3	2	0	1	0	2	0	2	1	0	0	2	0	0	0	0	0	0	0	0	0
	4	2	0	1	0	2	0	2	0	1	0	2	0	1	0	0	0	0	0	0	0
Total Survived	89																				
Total Malformed		9	0	5	0	9	0	9	2	3	0	9	1	2	0	0	0	0	0	0	0
% Malformed			0.00	5.62	0.00	10.11	0.00	10.11	2.25	3.37	0.00	10.11	1.12	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.25	0.00	0.25	0.00	0.25	0.33	0.25	0.00	0.25	0.25	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.25	0.00	0.25	0.00	0.25	0.29	0.25	0.00	0.25	0.25	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	8.90	na	4.94	na	4.94	25.69	14.83	na	4.94	44.50	25.69	na	na	na	na	na	na	na

FIGURE 1
CH2M05-00134 (007-011)
FETAX Screen with *X. laevis*
FETAX Solution Control

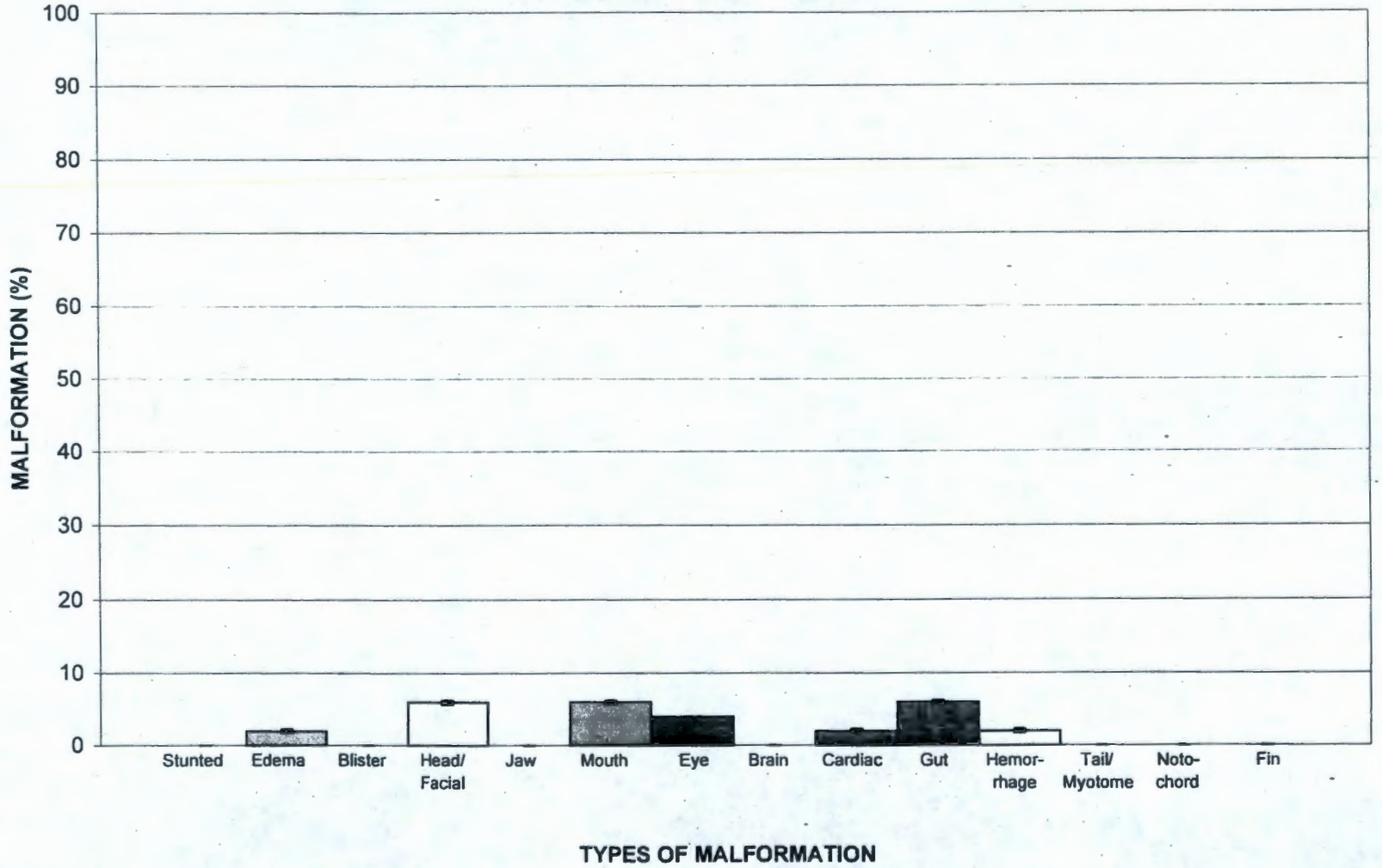


FIGURE 2
CH2M05-00134
FETAX Screen with *X. laevis*
J13VP3 Water (007)

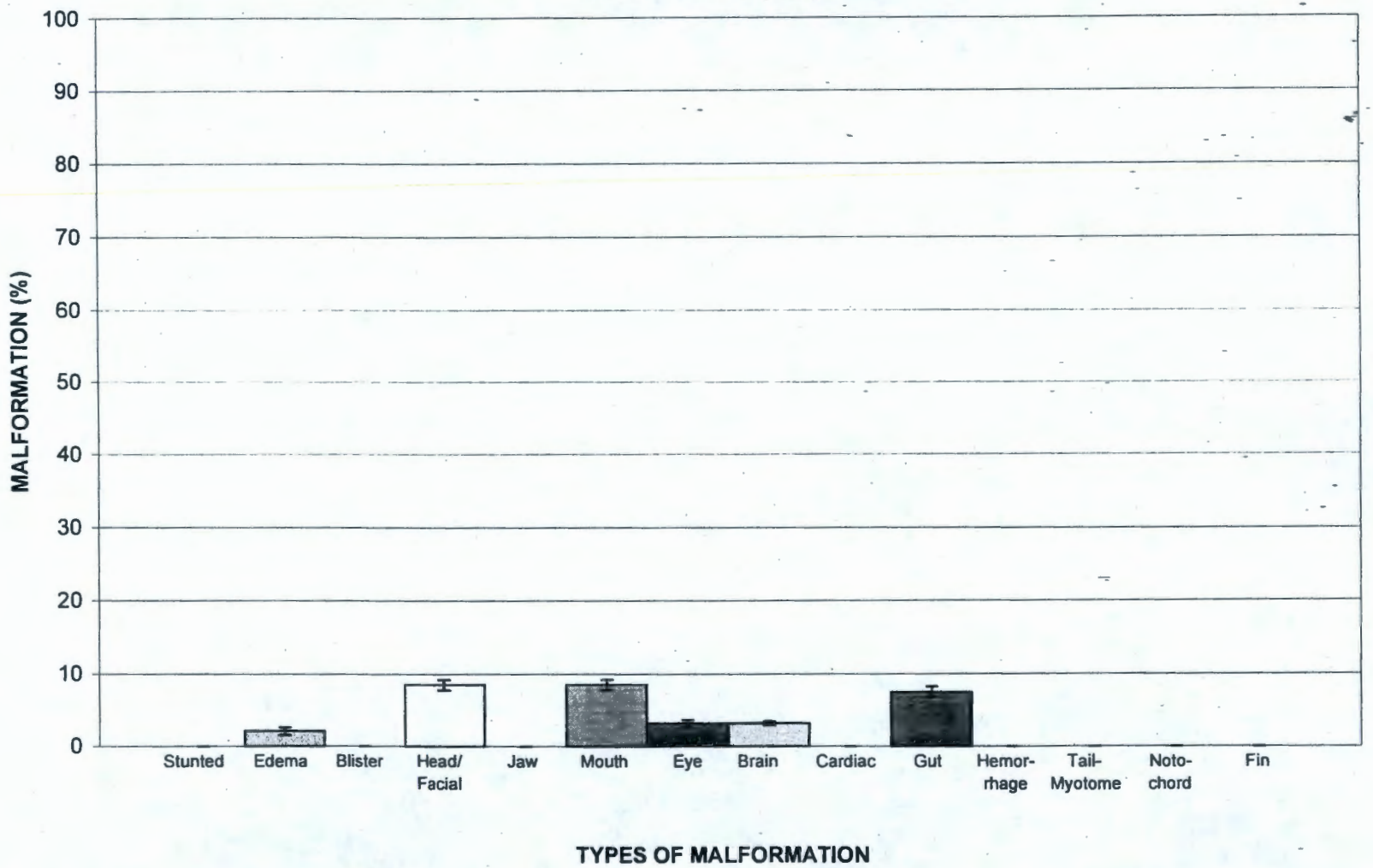


FIGURE 3
CH2M05-00134
FETAX Screen with *X. laevis*
J13VP4 Water (008)

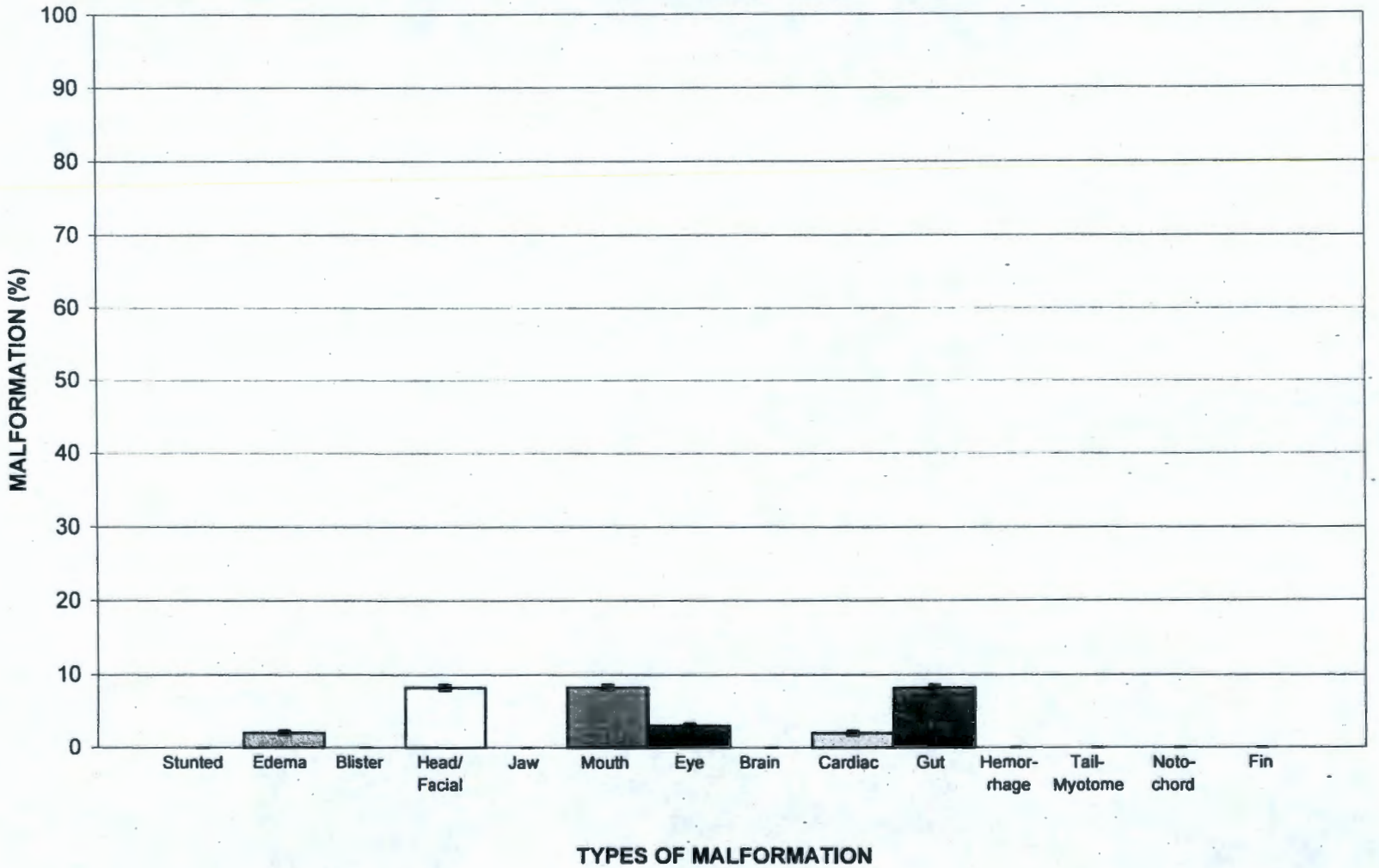


FIGURE 4
CH2M05-00134
FETAX Screen with *X. laevis*
J13V89 Water (009)

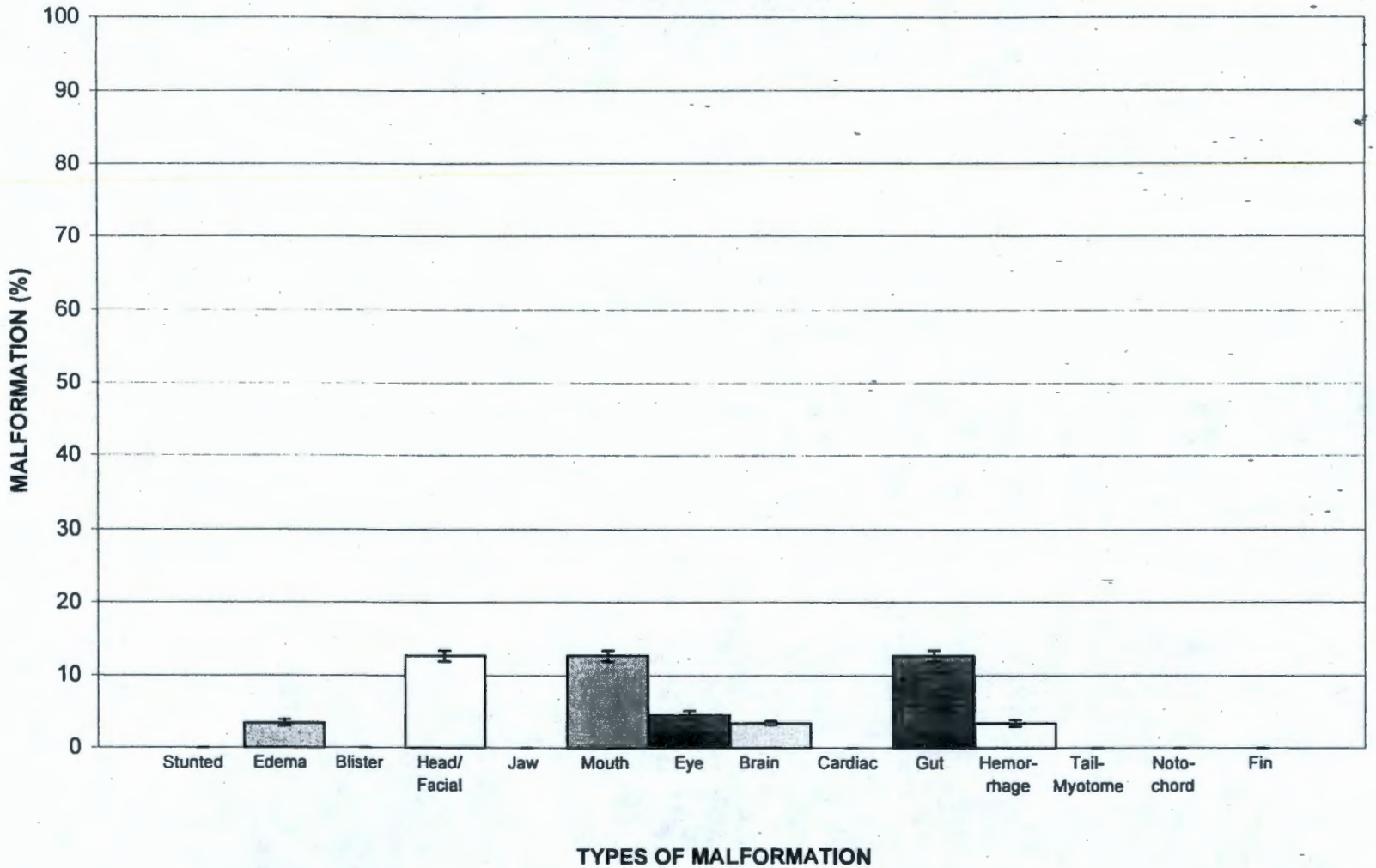


FIGURE 5
CH2M05-00134
FETAX Screen with *X. laevis*
J13V90 Water (010)

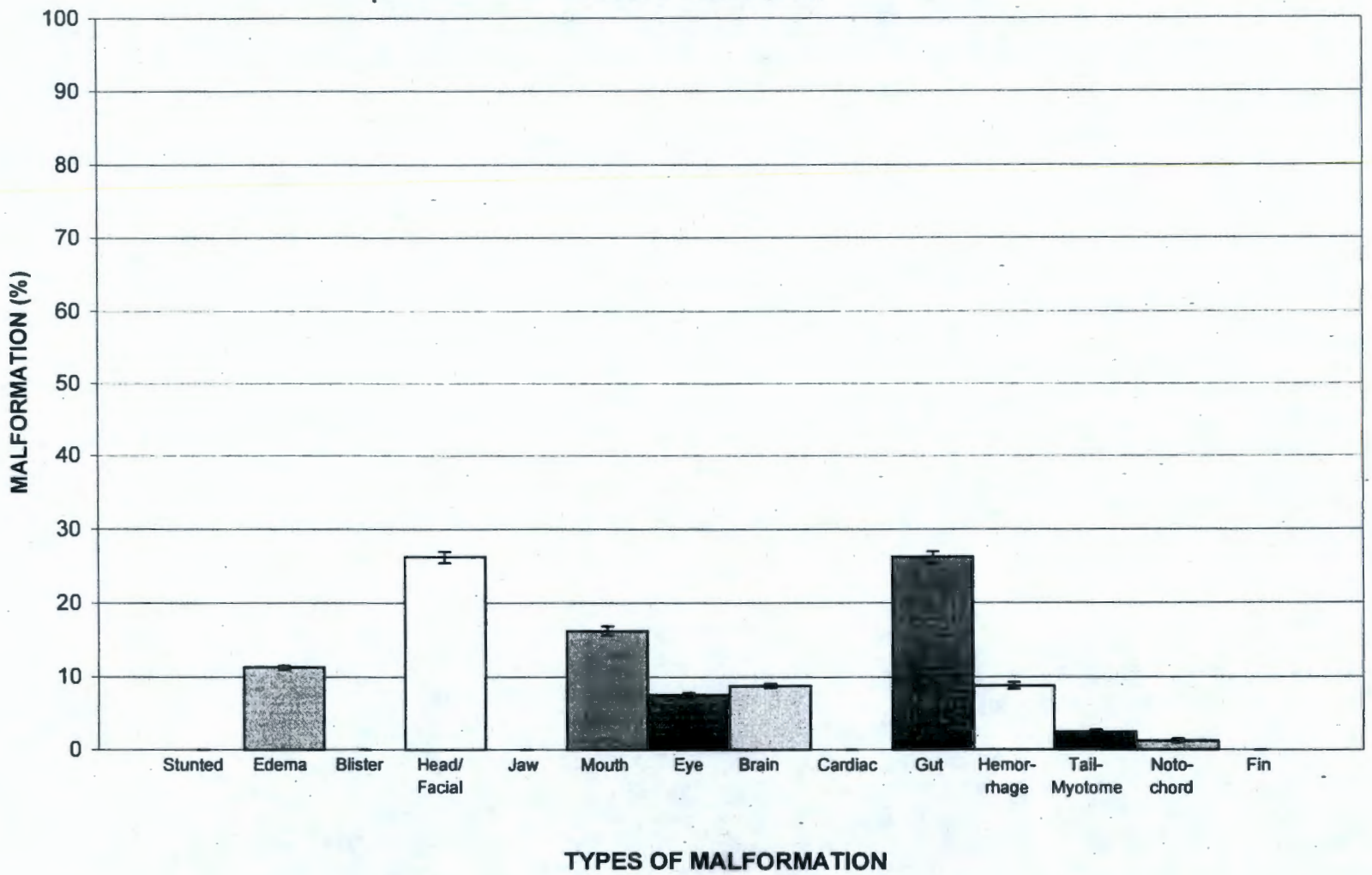


FIGURE 6
CH2M05-00134
FETAX Screen with *X. laevis*
J13VP2 Water (011)

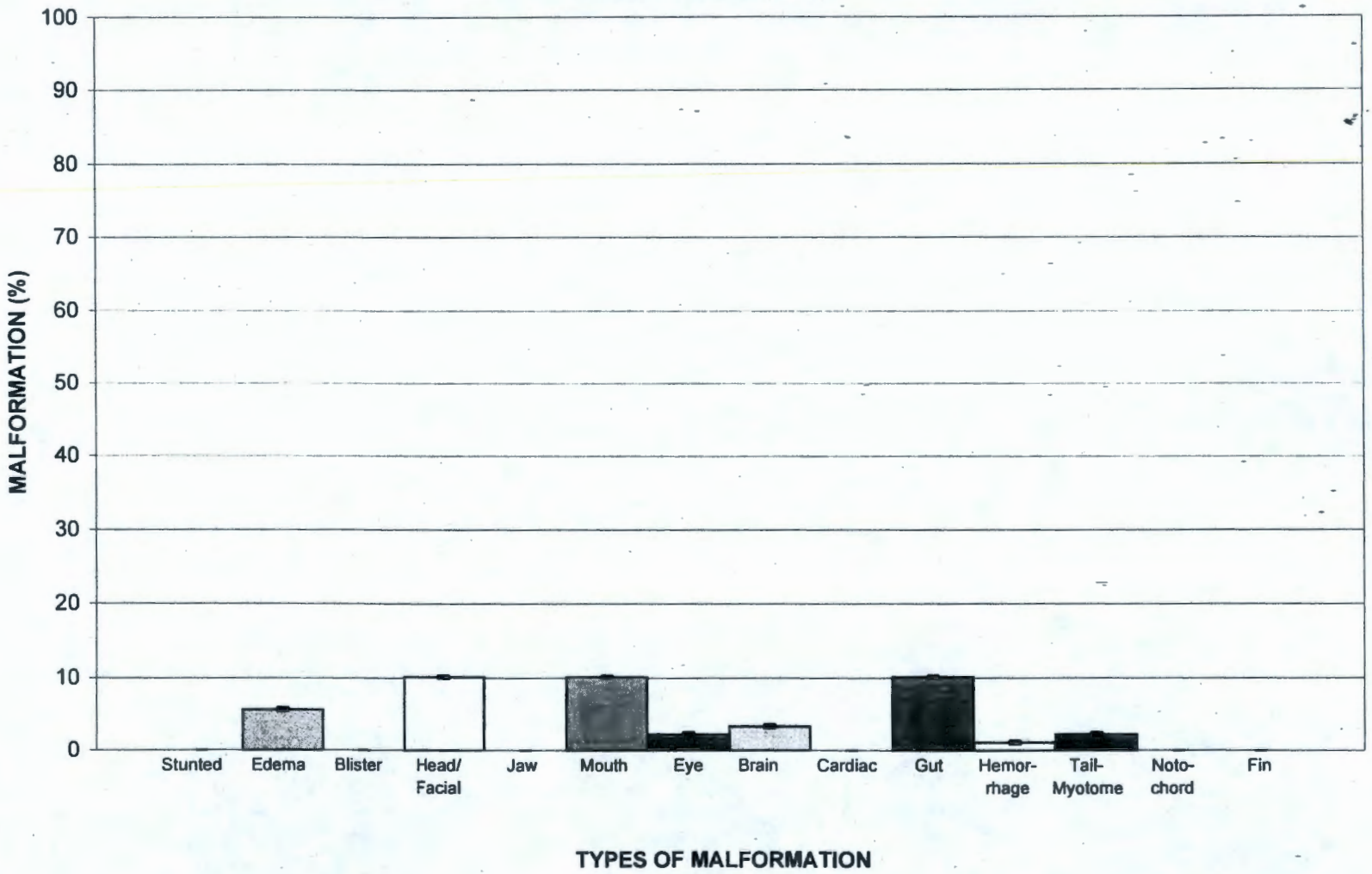


FIGURE 7
CH2M05-00134 (007-011)
FETAX Screen with *X. laevis*

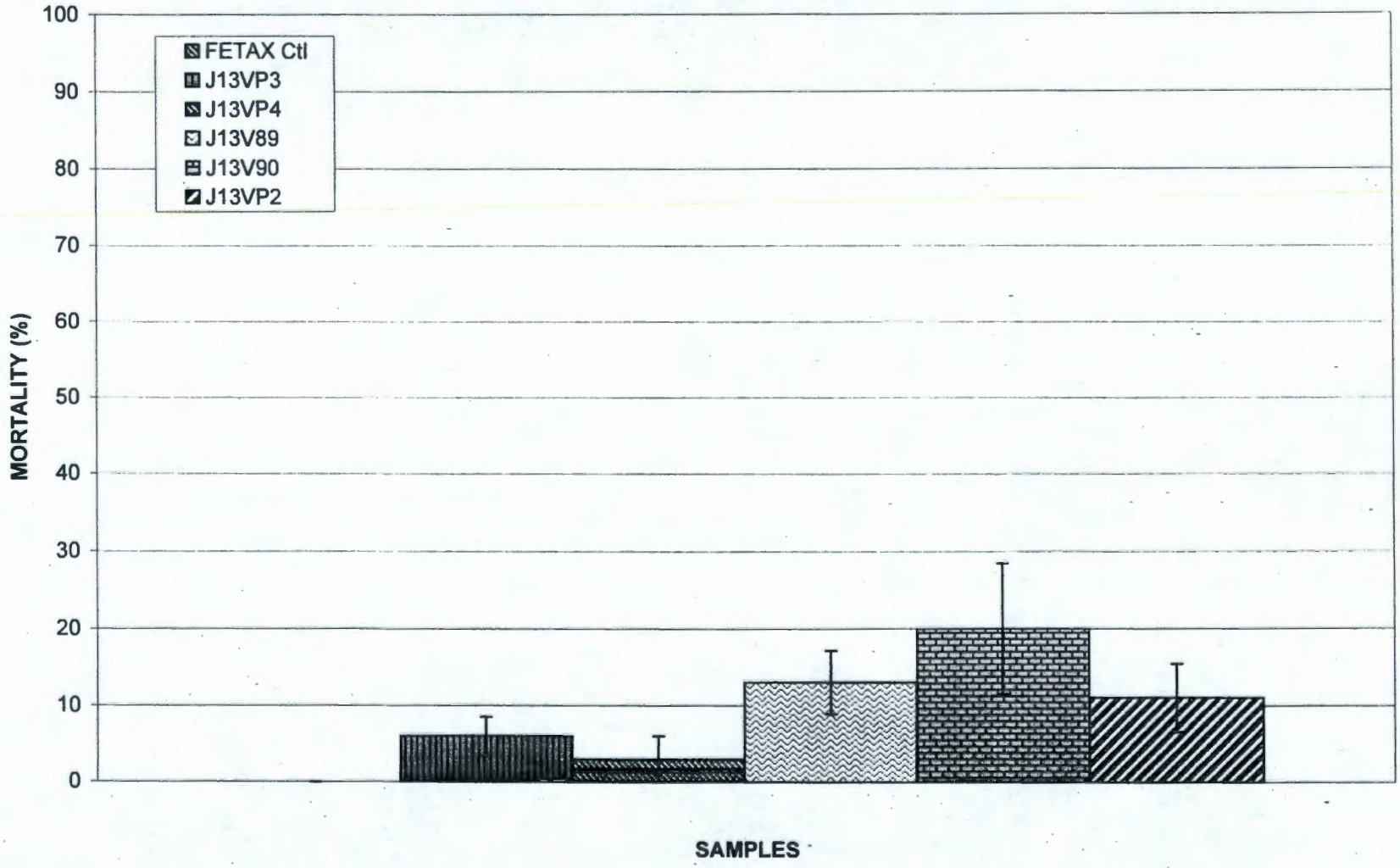
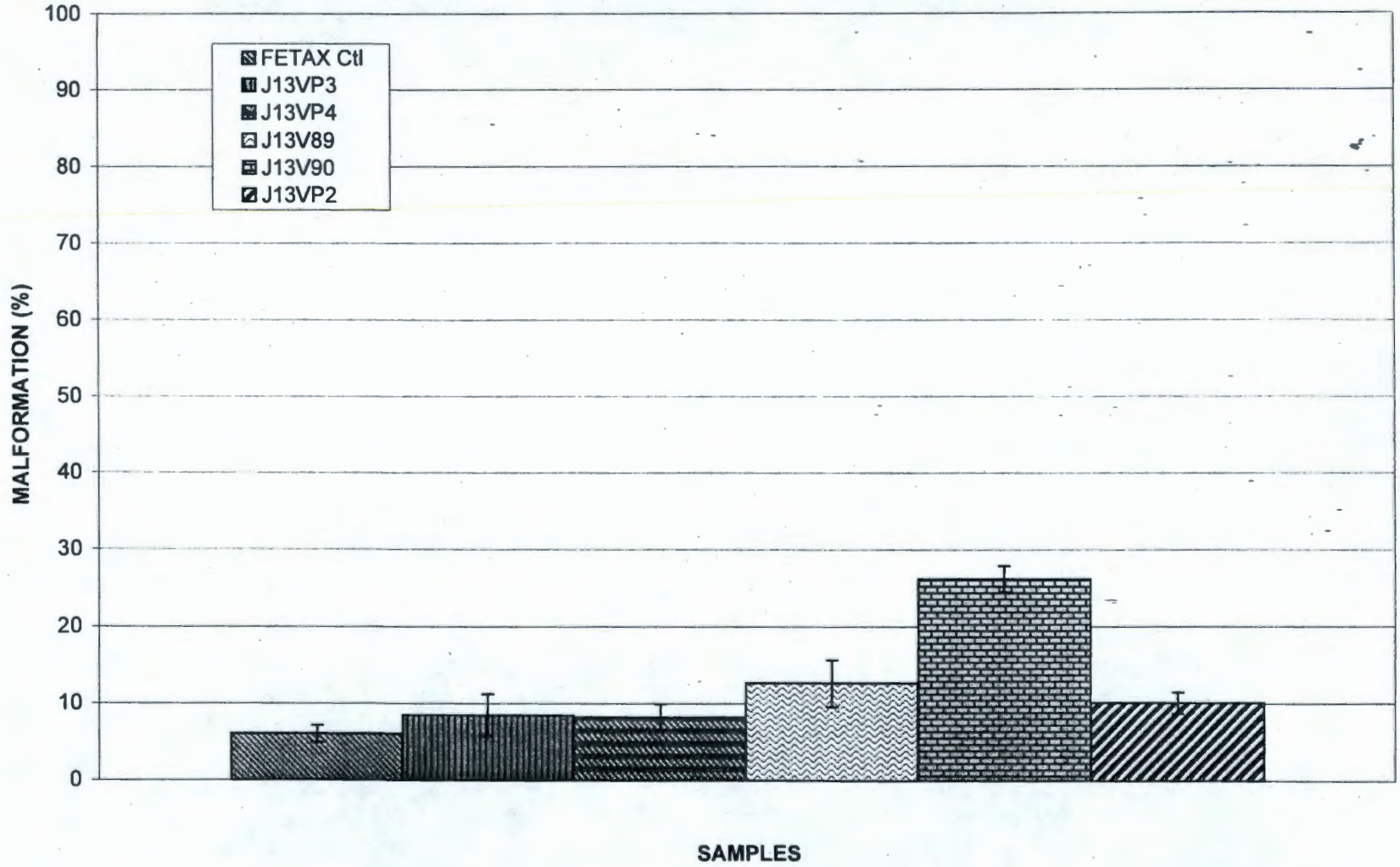


FIGURE 8
CH2M05-00134 (007-011)
FETAX Screen with *X. laevis*



FETAX SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	01/23/07
Test Material:	Controls	FEL Sample No.:	012	Test End Date:	01/27/07
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/29/07

Malformation:	Sample ID/Concentration *(unit)*															
	FETAX Ctl												5.5mg/L 6AN		2500mg/L 6AN	
Stunted																
Edema	1															
Blister																
Head/Facial	1												12	14		
Jaw																
Mouth	1												12	14		
Eye	1												8	10		
Brain																
Cardiac																
Gut													12	14		
Hemorrhage																
Tail/Myotome																
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	1	0	0	0									12	14	-	-
Total Survived	25	25	25	25									23	21	0	0
Total Tested	25	25	25	25									25	25	25	25
% Mortality	0.0	0.0	0.0	0.0									8.0	16.0	100.0	100.0
% Malformed	4.0	0.0	0.0	0.0									52.2	66.7	-	-
Avg % Mortality	0.0												12.0		100.0	
SEM (Mortality)	0.0												4.00		0.00	
Avg % Malformed	1.0												59.1		-	
SEM (Malformed)	1.0												7.25		-	

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																	
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
FETAX Ctl	1	1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		1	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
% Malformed			0.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.25	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.25	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	50.00	na	50.00	na	50.00	50.00	na	na	na	na	na	na	na	na	na	na	na	na
5.5mg/L 6AN	1	12	0	0	0	12	0	12	8	0	0	12	0	0	0	0	0	0	0	0	0
	2	14	0	0	0	14	0	14	10	0	0	14	0	0	0	0	0	0	0	0	0
Total Survived	44																				
Total Malformed		26	0	0	0	26	0	26	18	0	0	26	0	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	59.09	0.00	59.09	40.91	0.00	0.00	59.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	2.00	0.00	2.00	2.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	2.39	na	2.39	3.46	na	na	2.39	na	na	na	na	na	na	na	na	na
2500mg/L 6AN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Survived	0																				
Total Malformed		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% Malformed			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Var (S2)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SEM			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CV (%)			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SCORE SHEET / MALFORMATION DATA
FORT ENVIRONMENTAL LABORATORIES

Investigator:	DF	Client/Project-WO No.:	CH2M05-00134	Test Start Date:	01/23/07
Test Material:	Water	FEL Sample No.:	012	Test End Date:	01/27/07
Test Type:	FETAX Screen with X. laevis			Test Score Date:	01/29/07

Malformation:	Sample No./Sample ID/Concentration *(unit)*															
	J13W35															
Stunted																
Edema																
Blister																
Head/Facial	1	1	1	2												
Jaw																
Mouth		1		1												
Eye			1													
Brain																
Cardiac	1			1												
Gut	1	1	1	2												
Hemorrhage			1	1												
Tail/Myotome																
Notochord																
Fin																
Other:																
Other:																
Other:																
Other:																
Other:																

Total Malformed	1	1	1	2												
Total Survived	25	25	25	25												
Total Tested	25	25	25	25												
% Mortality	0.0	0.0	0.0	0.0												
% Malformed	4.0	4.0	4.0	8.0												
Avg % Mortality	0.0															
SEM (Mortality)	0.0															
Avg % Malformed	5.0															
SEM (Malformed)	1.0															

MALFORMATION DATA

CH2M05-00134
FETAX Screen with X. laevis

SAMPLE ID	REPLICATE NUMBER	NUMBER MALFORMED	TYPE OF MALFORMATION/DELTS OBSERVED																		
			Stunted	Edema	Blister	Head/ Facial	Jaw	Mouth	Eye	Brain	Cardiac	Gut	Hemor-rhage	Tail/ Myotome	Noto-chord	Fin	Other (specify)	Other (specify)	Other (specify)	Other (specify)	Other (specify)
J13W35	1	1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
	2	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	3	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0
	4	2	0	0	0	2	0	1	0	0	1	2	1	0	0	0	0	0	0	0	0
Total Survived	100																				
Total Malformed		5	0	0	0	5	0	2	1	0	2	5	2	0	0	0	0	0	0	0	0
% Malformed			0.00	0.00	0.00	5.00	0.00	2.00	1.00	0.00	2.00	5.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Var (S2)			0.00	0.00	0.00	0.25	0.00	0.33	0.25	0.00	0.33	0.25	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SEM			0.00	0.00	0.00	0.25	0.00	0.29	0.25	0.00	0.29	0.25	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CV (%)			na	na	na	10.00	na	28.87	50.00	na	28.87	10.00	28.87	na	na	na	na	na	na	na	na

FIGURE 1
CH2M05-00134 (012)
FETAX Screen with *X. laevis*
FETAX Solution Control

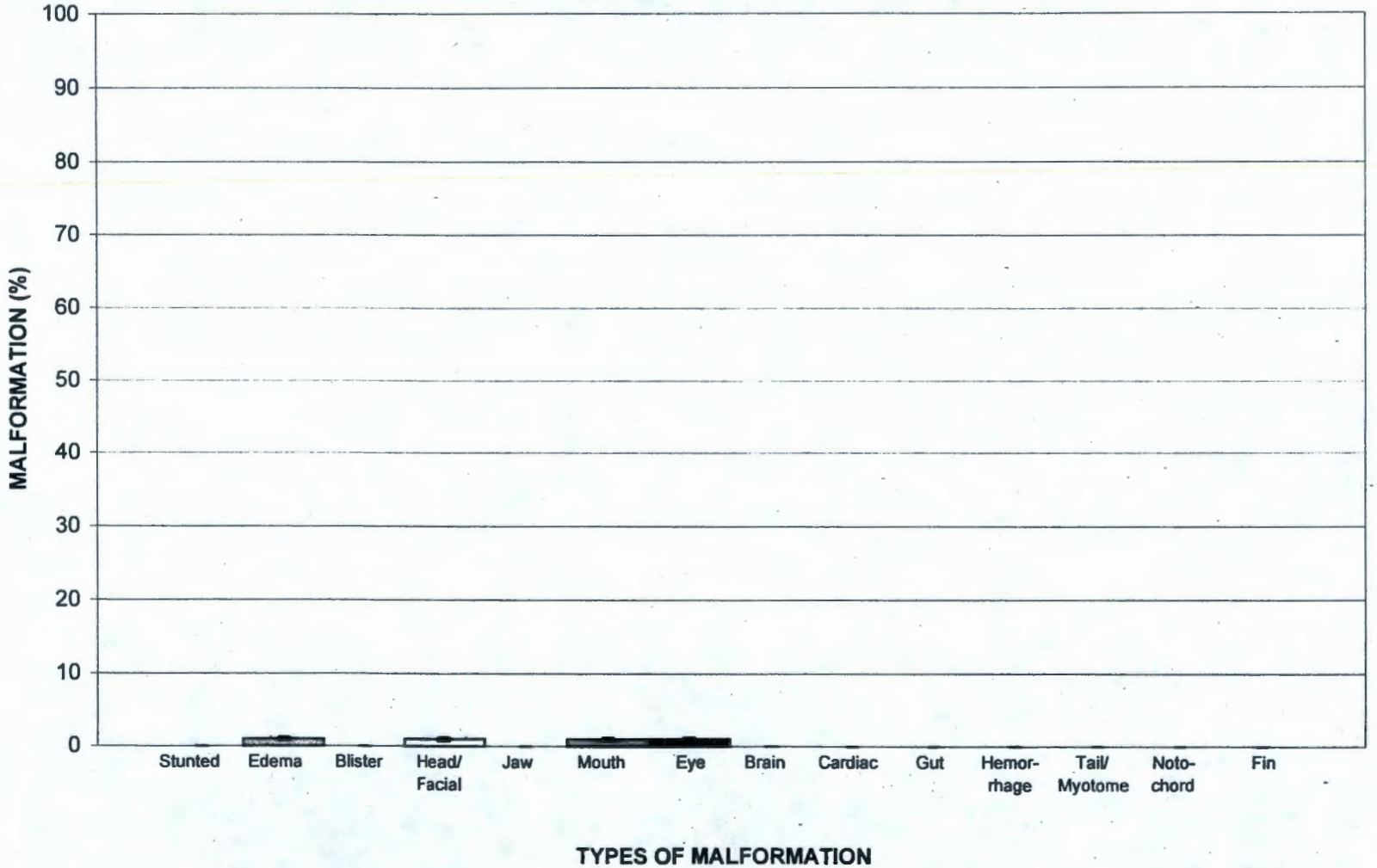


FIGURE 2
CH2M05-00134
FETAX Screen with *X. laevis*
J13W35 Water (012)

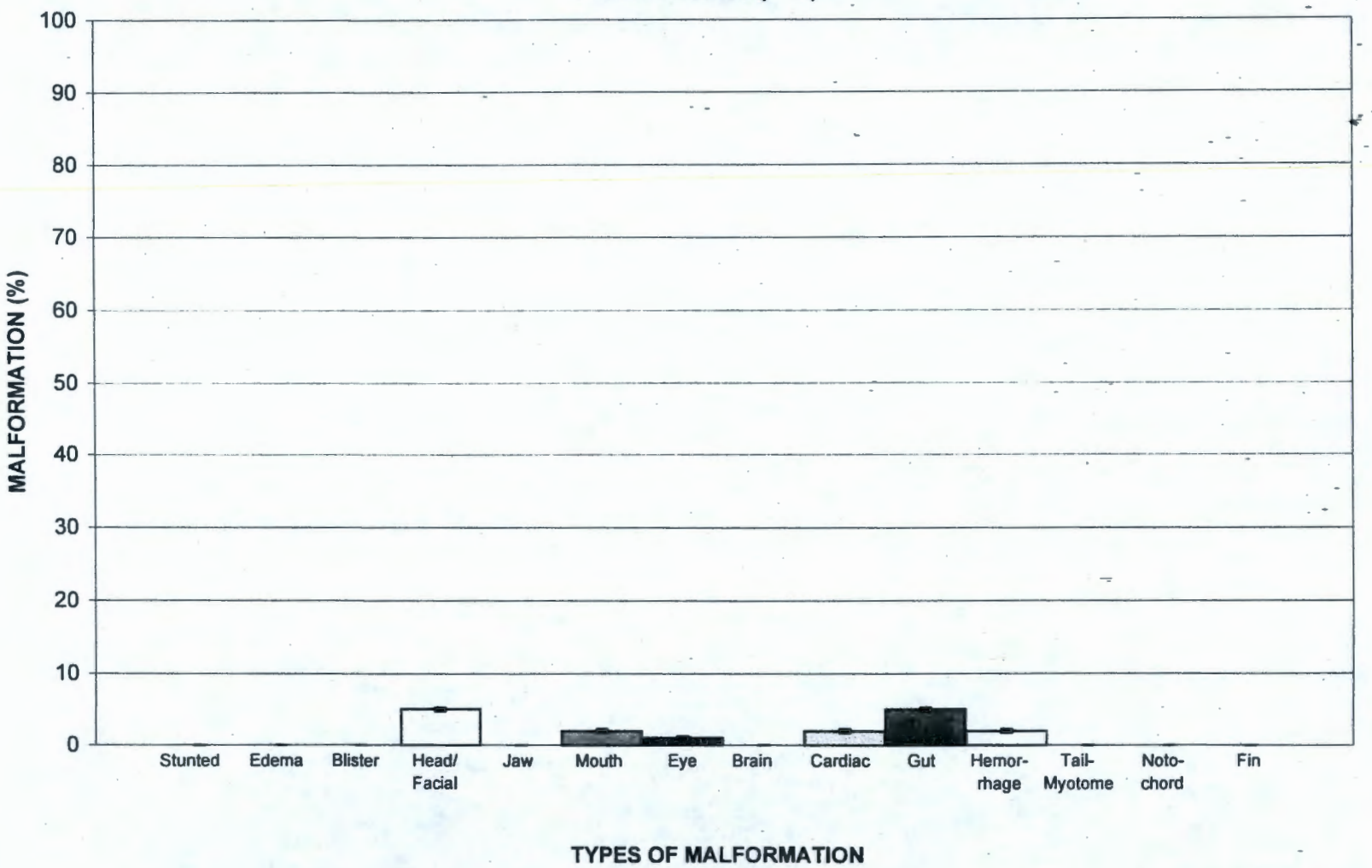


FIGURE 3
CH2M05-00134 (012)
FETAX Screen with *X. laevis*

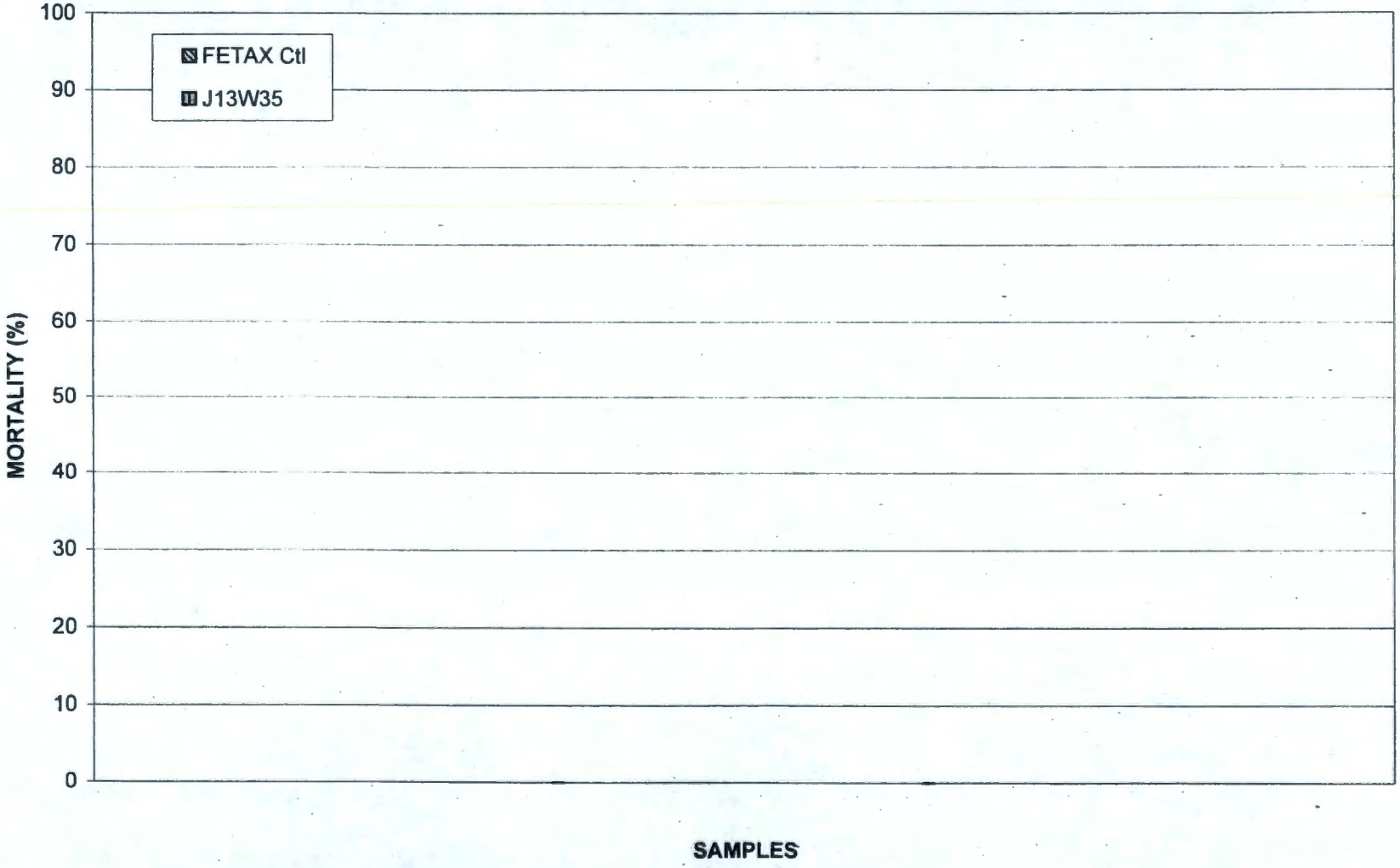
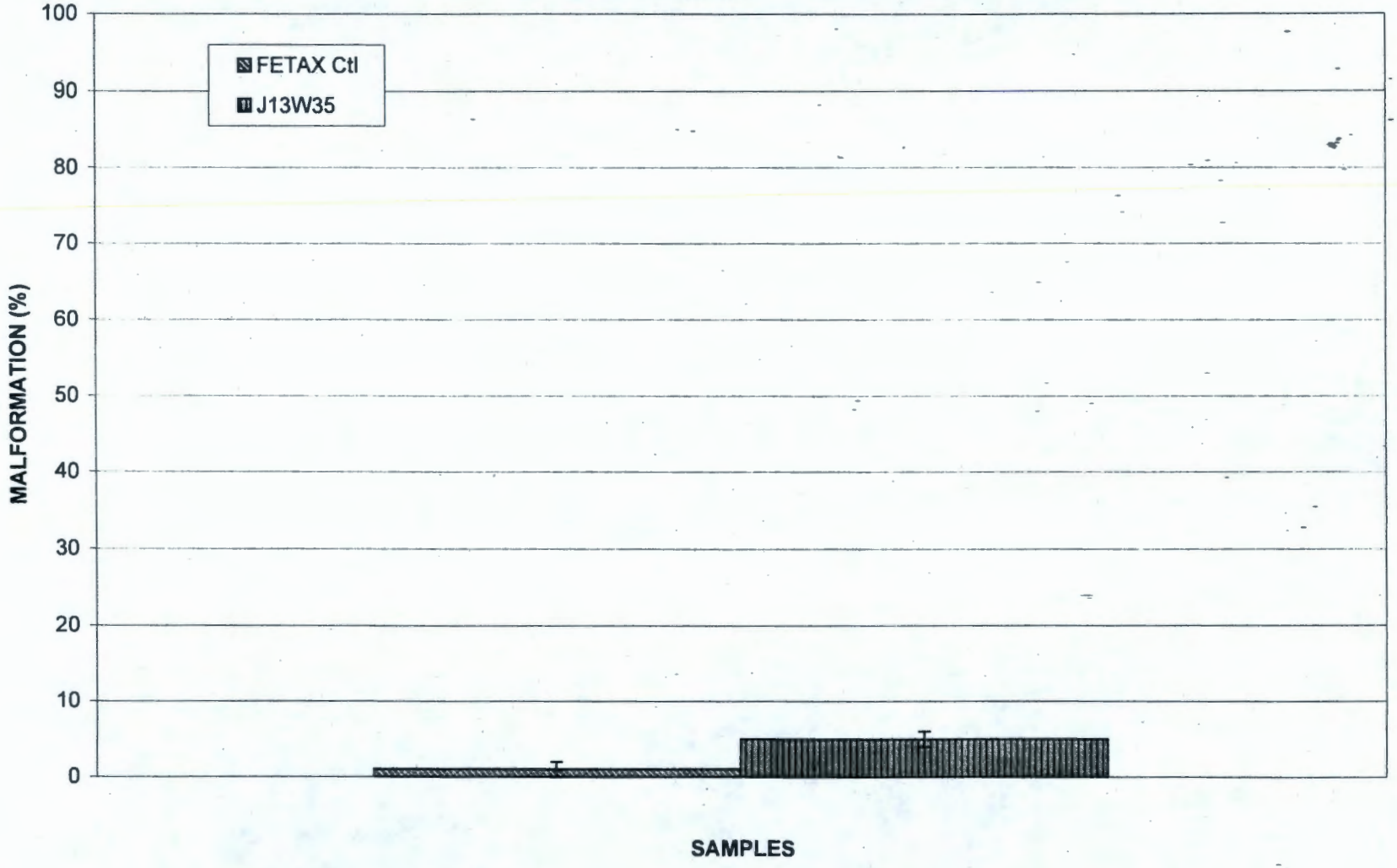


FIGURE 4
CH2M05-00134 (012)
FETAX Screen with *X. laevis*



FEL

CH2M05-00134_Pore Water Growth Data (001-006)						
FX Ctl	J13W64	J13W65	J13V94	J13V93	J13V92	J13V91
0.907	0.891	0.914	0.856	0.844	0.897	0.962
0.681	0.791	0.897	0.891	0.804	0.747	0.878
0.948	0.953	0.805	0.908	0.791	0.722	0.898
0.762	0.943	0.929	0.984	0.963	0.900	0.863
0.967	0.802	1.241	0.908	0.884	0.877	0.807
0.938	0.933	0.945	0.873	0.823	0.876	0.965
0.990	0.866	0.883	0.858	0.850	0.679	0.774
0.813	0.748	0.770	0.905	0.838	0.900	0.954
0.658	0.758	0.689	1.036	0.868	0.791	0.922
0.940	0.894	0.779	0.868	0.788	0.802	0.962
0.912	0.810	0.687	0.852	0.779	0.743	0.887
0.857	0.906	0.796	0.844	0.875	0.896	0.874
0.779	0.967	0.707	0.921	0.851	0.850	0.822
0.771	0.698	0.948	0.919	0.860	0.786	0.887
0.734	0.847	0.716	0.859	0.896	0.932	0.842
0.975	0.890	0.702	0.852	0.816	0.772	0.886
0.906	0.747	0.756	0.816	0.908	0.894	0.931
0.883	0.688	0.644	0.655	0.899	0.877	0.783
0.918	0.870	0.903	0.827	0.922	0.721	0.827
0.934	0.671	0.881	0.881	0.932	0.971	0.841
0.850	0.871	0.936	0.976	0.870	0.827	0.963
0.936	0.893	0.920	0.749	0.895	0.877	0.930
0.882	0.983	0.961	0.972	0.883	0.656	0.949
0.780	0.828	1.019	0.788	0.890	0.819	0.930
0.895	0.934	0.870	0.970	0.839	0.987	0.830
0.699	0.909	0.829	0.949	0.924	0.794	0.907
0.861	0.898	0.860	1.070	0.854	0.882	0.798
0.850	0.933	0.844	0.905	0.783	0.861	0.917
0.930	0.890	0.961	0.883	0.804	0.847	0.982
0.822	0.924	0.899	0.829	0.829	0.896	0.926
0.763	0.898	0.882	0.895	0.914	0.689	0.774
0.962	0.839	0.890	0.963	0.830	0.927	0.853
0.965	1.024	0.853	0.924	0.816	0.768	0.908
0.886	0.870	0.769	0.815	0.953	0.865	0.977
0.912	1.003	0.831	0.871	0.931	0.847	0.744
0.787	0.801	0.828	0.804	0.949	0.912	0.971
0.757	0.848	0.842	0.760	0.919	0.883	0.832
0.763	0.832	0.912	0.823	0.828	0.732	0.856
0.924	0.838	0.825	0.883	0.865	0.780	0.927
0.776	0.813	1.063	0.892	0.832	0.933	0.984
0.971	0.877	0.770	0.829	0.933	0.845	0.933
0.794	0.911	0.835	0.743	0.912	0.854	0.747
0.948	0.808	0.908	0.799	0.844	0.934	0.813
0.807	0.749	0.857	0.747	0.781	0.732	0.915
0.813	0.614	0.843	0.878	0.906	0.678	0.829
0.904	0.856	0.846	0.769	0.886	0.912	0.790
0.964	0.894	0.733	0.888	0.857	1.021	0.892
0.976	0.877	0.893	0.837	0.801	0.848	0.746
0.710	0.927	0.647	0.849	0.821	0.778	0.823
0.926	0.875	0.876	0.968	0.851	0.815	0.768

FEL

CH2M05-00134_Pore Water Growth Data (001-006)						
FX Ctl	J13W64	J13W65	J13V94	J13V93	J13V92	J13V91
0.772	0.913	0.840	0.772	0.892	0.791	0.850
0.810	0.921	0.969	0.789	0.792	0.889	0.900
0.811	0.871	0.859	0.769	0.761	0.909	0.720
1.030	0.785	0.971	0.771	0.870	0.920	0.752
1.000	0.955	0.780	0.882	0.869	0.900	0.938
0.720	0.806	0.851	0.921	0.725	0.975	0.895
0.710	0.987	0.708	0.948	0.958	0.891	0.709
0.870	0.893	0.917	0.890	0.729	0.832	0.855
0.682	0.875	0.760	0.816	0.914	0.978	0.981
0.819	0.751	0.754	0.828	0.812	0.847	0.853
0.990	0.817	0.744	0.891	0.778	1.101	0.919
0.847	0.935	0.960	0.866	0.874	0.806	0.915
0.921	0.901	0.912	0.800	0.708	0.863	0.783
0.703	0.862	0.811	0.797	0.926	0.895	0.813
0.660	0.948	0.522	0.863	0.703	0.760	1.011
0.967	0.953	0.696	0.793	0.613	0.867	0.929
0.743	0.812	0.770	0.881	0.804	0.924	0.785
0.886	0.842	0.772	0.821	0.881	0.919	0.810
0.824	0.901	0.869	0.700	0.873	0.814	0.783
0.861	0.901	0.827	0.746	0.955	0.893	0.893
0.832	0.918	0.781	0.753	0.990	0.921	0.743
0.830	0.796	1.008	0.738	0.914	0.840	0.885
0.604	0.780	0.832	0.990	0.955	0.910	0.913
0.730	0.921	0.849	0.841	0.765	0.800	0.859
0.693	0.920	0.698	0.767	0.861	0.955	1.068
0.861	0.764	0.778	0.722	0.924	0.940	0.910
0.914	0.804	0.911	0.856	0.730	0.921	0.948
0.926	0.740	0.956	0.826	0.715	0.903	1.029
0.954	0.905	0.935	0.738	0.964	0.847	0.808
0.926	0.724	0.740	0.906	0.953	0.803	0.815
0.934	0.877	0.782	0.877	0.976	0.851	1.016
0.946	0.922	0.835	0.914	0.779	0.920	0.850
0.981	0.842	0.797	0.817	0.830	0.951	0.713
0.891	0.877	0.775	0.782	0.911	0.928	0.738
0.890	0.744	0.608	0.821	0.816	0.925	0.777
0.903	0.861	0.799	0.911	0.702	0.903	0.858
0.857	0.912	0.754	0.973	0.757	0.943	0.827
0.780	0.696	0.842	0.867	0.673	0.956	0.807
0.867	0.872	0.816	0.973	0.902	0.863	0.801
0.831	0.862	0.755	0.875	0.959	0.841	0.953
0.825	0.891	0.779	0.822	0.832	0.863	0.732
0.972	0.974	0.706	0.928	0.788	0.931	0.958
0.958	0.875	0.709	0.864	0.861	0.880	0.918
0.873	0.918	0.729	0.673	0.909	0.797	0.898
0.900	0.905	0.720	0.881	0.722	0.910	0.902
0.738	0.783	0.915		0.804	0.870	0.843
0.907	0.949	0.747			0.886	0.951
0.866		0.810			0.921	0.716
0.825		0.793			0.863	0.903
0.927		0.653			0.863	0.814

FEL

Descriptive Statistics:
Data source: Growth in CH2M05-00134 (001-006) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean	%Growth
FX Ctl	100	0	0.857	0.0932	0.00932	0.0185	-
J13W64	97	0	0.861	0.0783	0.00795	0.0158	100.47
J13W65	100	0	0.827	0.105	0.0105	0.0208	96.50
J13V94	95	0	0.855	0.0781	0.00801	0.0159	99.77
J13V93	96	0	0.85	0.076	1%	2%	99.18
J13V92	100	0	0.863	0.0774	0.00774	0.0154	100.70
J13V91	100	0	0.868	0.0801	1%	2%	101.28

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0.426	1.03	0.604	0.868	0.688	0.978
J13W64	0.411	1.024	0.614	0.875	0.707	0.972
J13W65	0.72	1.241	0.522	0.83	0.67	0.97
J13V94	0.415	1.07	0.655	0.859	0.738	0.975
J13V93	0.377	0.99	0.613	0.858	0.71	0.958
J13V92	0.445	1.101	0.656	0.876	0.722	0.973
J13V91	0.358	1.068	0.709	0.876	0.735	0.983

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	-0.5	-0.518	0.0897	0.046	85.656	74.23
J13W64	-0.69	0.384	0.121	0.001	83.552	72.556
J13W65	0.387	1.898	0.0468	0.78	82.699	69.475
J13V94	0.0132	0.114	0.0443	0.84	8120%	6997%
J13V93	-0.539	0.0585	0.0526	0.68	81.62	69.943
J13V92	-0.359	0.65	0.0976	0.02	86.314	75.094
J13V91	-0.0454	-0.643	0.0732	0.204	86.827	76.025

One Way Analysis of Variance
Data source: Growth in CH2M05-00134 (001-006) Data

Normality Test: **Failed (P = <0.001)**

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Growth in CH2M05-00134 (001-006) Data

Group	N	Missing	Median	25%	75%
FX Ctl	100	0	0.868	0.784	0.929
J13W64	97	0	0.875	0.809	0.914
J13W65	100	0	0.83	0.758	0.898
J13V94	95	0	0.859	0.801	0.905
J13V93	96	0	0.858	0.804	0.91
J13V92	100	0	0.876	0.815	0.916
J13V91	100	0	0.876	0.809	0.928

H = 15.681 with 6 degrees of freedom. (P = 0.016)

The differences in the median values among the treatment groups are greater than would be expected by chance; **there is a statistically significant difference (P = 0.016)**

To isolate the group or groups that differ from the others use a multiple comparison procedure.
Multiple Comparisons versus Control Group (**Dunn's Method**) :

Comparison	Diff of Ranks	Q	P<0.05
J13W65 vs FX Ctl	79.13	2.815	Yes
J13V93 vs FX Ctl	24.373	0.858	No
J13V94 vs FX Ctl	22.096	0.776	Do Not Test
J13V91 vs FX Ctl	14.785	0.526	Do Not Test
J13V92 vs FX Ctl	5.805	0.207	Do Not Test
J13W64 vs FX Ctl	5.536	0.195	Do Not Test

FEL

Descriptive Statistics:
Data source: Mortality in CH2M05-00134 (001-006) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
FX Ctl	4	0	0	0	0	0
J13W64	4	0	0.03	0.06	0.03	0.0955
J13W65	4	0	0	0	0	0
J13V94	4	0	0.05	0.1	0.05	0.159
J13V93	4	0	0.04	0.0327	2%	5%
J13V92	4	0	0	0	0	0
J13V91	4	0	0	0	0%	0%

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0	0	0	0	0	0
J13W64	0.12	0.12	0	0	0	0.12
J13W65	0	0	0	0	0	0
J13V94	0.2	0.2	0	0	0	0.2
J13V93	0.08	0.08	0	0.04	0	0.08
J13V92	0	0	0	0	0	0
J13V91	0	0	0	0	0	0

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	0	-6	0	<0.001	0	0
J13W64	2	4	0.441	0.006	0.12	0.0144
J13W65	0	-6	0	<0.001	0	0
J13V94	2	4	0.441	0.006	0.2	0.04
J13V93	0	1.5	0.25	0.432	16%	1%
J13V92	0	-6	0	<0.001	0	0
J13V91	0	-6	0	<0.001	0	0

One Way Analysis of Variance

Data source: Mortality in CH2M05-00134 (001-006) Data

Normality Test: Failed (P = <0.001)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Mortality in CH2M05-00134 (001-006) Data

Group	N	Missing	Median	25%	75%
asinsqrt(-FX Ctl)	4	0	0	0%	0%
asinsqrt(-J13W64)	4	0	0	0	0.177
asinsqrt(-J13W65)	4	0	0	0%	0%
asinsqrt(-J13V94)	4	0	0	0%	23%
asinsqrt(-J13V93)	4	0	0.201	10%	24%
asinsqrt(-J13V92)	4	0	0	0	0
asinsqrt(-J13V91)	4	0	0	0	0

H = 10.790 with 6 degrees of freedom. (P = 0.095)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; **there is not a statistically significant difference (P = 0.095)**

Descriptive Statistics:
Data source: Malformation in CH2M05-00134 (001-006) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
FX Ctl	4	0	0	0	0	0
J13W64	4	0	0.0513	0.0193	0.00966	0.0307
J13W65	4	0	0.02	0.0231	0.0115	0.0367
J13V94	4	0	0.05	0.0383	0.0191	0.0609
J13V93	4	0	0.0617	0.0533	3%	8%
J13V92	4	0	0.05	0.02	0.01	0.0318
J13V91	4	0	0.08	0.0327	2%	5%

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0	0	0	0	0	0
J13W64	0.04	0.08	0.04	0.0425	0.04	0.08
J13W65	0.04	0.04	0	0.02	0	0.04
J13V94	0.08	0.08	0	0.06	0	0.08
J13V93	0.125	0.125	0	0.061	0	0.125
J13V92	0.04	0.08	0.04	0.04	0.04	0.08
J13V91	0.08	0.12	0.04	0.08	0.04	0.12

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	0	-6	0	<0.001	0	0
J13W64	1.914	3.68	0.377	0.048	0.205	0.0116
J13W65	0	-6	0.307	0.203	0.08	0.0032
J13V94	-0.855	-1.289	0.283	0.289	0.2	0.0144
J13V93	0.0701	-0.818	0.144	0.707	0.247	0.0238
J13V92	2	4	0.441	0.006	0.2	0.0112
J13V91	-7.40E-16	1.5	0.25	0.432	0.32	0.0288

One Way Analysis of Variance
Data source: Malformation in CH2M05-00134 (001-006) Data

Normality Test: **Failed (P = 0.001)**

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Malformation in CH2M05-00134 (001-006) Data

Group	N	Missing	Median	25%	75%
asinsqrt(-FX Ctl)	4	0	0	0	0
asinsqrt(-J13W64)	4	0	0.208	0.201	0.25
asinsqrt(-J13W65)	4	0	0.101	0	0.201
asinsqrt(-J13V94)	4	0	0.244	0.101	0.287
asinsqrt(-J13V93)	4	0	0.247	0.103	0.324
asinsqrt(-J13V92)	4	0	0.201	0.201	0.244
asinsqrt(-J13V91)	4	0	0.287	0.244	0.32

H = 13.124 with 6 degrees of freedom. (P = 0.041)

The differences in the median values among the treatment groups are greater than would be expected by chance; **there is a statistically significant difference (P = 0.041)**

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (**Dunn's Method**) :

Comparison	Diff of Ranks	Q	P<0.05
asinsqrt(-J13V91) vs asinsqrt(-FX Ctl)	17	2.923	Yes
asinsqrt(-J13V93) vs asinsqrt(-FX Ctl)	13.875	2.385	No
asinsqrt(-J13W64) vs asinsqrt(-FX Ctl)	12.5	2.149	Do Not Test
asinsqrt(-J13V94) vs asinsqrt(-FX Ctl)	11.375	1.956	Do Not Test
asinsqrt(-J13V92) vs asinsqrt(-FX Ctl)	11	1.891	Do Not Test
asinsqrt(-J13W65) vs asinsqrt(-FX Ctl)	4.25	0.731	Do Not Test

FEL

CH2M05-00134 Water Growth Data (007-011)					
FX Ctl	J13VP3	J13VP4	J13V89	J13V90	J13VP2
0.891	0.765	0.741	0.873	0.772	0.959
0.694	0.877	0.979	0.877	0.340	0.968
0.752	0.726	0.959	0.782	0.913	0.981
0.856	0.851	0.886	0.816	0.893	0.937
0.895	0.900	0.864	0.608	0.771	0.900
0.743	0.975	0.859	0.644	0.966	0.901
0.930	0.822	0.711	0.905	0.914	0.378
0.813	0.775	0.902	0.805	0.732	0.716
0.812	0.890	0.781	0.868	0.381	0.895
0.767	0.621	0.830	0.802	0.292	0.890
0.770	0.865	0.667	0.720	0.344	0.952
0.845	0.872	0.712	0.389	0.808	0.835
0.975	0.798	0.870	0.743	0.892	0.977
0.851	0.577	0.840	0.835	0.822	0.901
0.793	1.000	0.963	0.868	0.850	0.714
0.639	0.796	0.977	0.921	0.928	0.895
0.814	0.922	0.885	0.897	0.931	0.810
0.787	0.897	0.859	0.864	0.624	0.946
0.832	0.832	0.861	0.453	0.729	0.940
0.565	0.865	0.881	0.443	0.402	0.915
0.787	0.955	0.856	0.357	0.927	0.990
0.446	0.861	0.885	0.676	0.705	0.878
0.750	0.921	0.901	0.912	0.801	0.932
0.787	0.730	0.674	0.871	0.516	0.376
0.925	0.908	0.883	0.866	0.821	0.832
0.552	0.745	0.914	0.757	0.797	0.838
0.909	0.965	0.954	0.775	0.498	0.760
0.530	0.793	0.942	0.848	0.561	0.972
0.776	0.720	0.875	0.885	0.760	0.970
0.810	0.834	0.757	0.928	0.868	0.832
0.694	0.769	0.836	0.951	0.357	0.886
0.698	0.700	0.880	0.968	0.519	0.927
0.912	0.865	0.780	0.890	0.849	0.930
0.681	0.870	0.948	1.055	0.893	0.900
0.725	0.802	0.351	0.885	0.984	0.383
0.886	0.851	0.870	0.833	0.689	0.940
0.707	0.786	0.895	0.952	0.814	0.894
0.563	0.878	0.835	0.871	0.769	0.900
1.002	0.345	0.932	0.854	0.614	0.881
0.922	0.703	0.716	0.626	0.448	0.980
0.779	0.792	0.931	0.633	0.547	0.748
0.993	0.874	0.760	0.552	0.817	0.922
0.967	0.542	0.737	0.778	0.821	0.852
0.698	0.914	0.820	0.870	0.752	0.779
1.065	0.722	0.765	0.837	0.533	0.760
0.990	0.933	0.869	0.650	0.920	0.971
0.889	0.723	0.896	0.932	0.461	0.903
0.750	0.812	0.884	0.780	0.412	0.990
0.627	0.832	0.896	0.801	0.410	0.928
0.671	0.944	0.774	0.872	0.930	0.895
0.988	0.849	0.866	0.827	0.944	0.868

FEL

CH2M05-00134 Water Growth Data (007-011)					
FX Ctl	J13VP3	J13VP4	J13V89	J13V90	J13VP2
0.891	0.765	0.741	0.873	0.772	0.959
0.820	0.830	0.782	0.941	0.513	0.899
0.927	1.032	0.853	0.820	0.500	0.934
0.824	0.902	0.746	0.782	0.347	0.880
0.752	0.856	0.929	0.746	0.380	0.863
0.595	0.952	1.037	0.948	0.679	0.936
0.912	0.913	0.852	0.581	0.921	0.861
0.411	0.863	0.550	0.801	0.974	0.756
0.801	0.903	0.489	0.535	0.910	0.607
0.557	0.872	0.872	0.746	0.877	0.891
1.036	0.899	0.905	0.754	0.937	0.466
0.671	0.810	0.923	0.592	0.855	0.859
0.946	0.820	0.829	0.864	0.924	0.760
0.709	0.953	0.724	0.689	0.668	0.813
0.943	0.648	0.929	0.920	0.881	0.848
0.975	0.753	0.913	0.880	0.778	0.912
0.846	0.861	0.422	0.762	0.901	0.803
0.772	1.010	0.717	0.877	0.478	0.837
0.773	0.943	0.861	1.039	0.981	0.916
0.823	0.836	0.870	0.864	0.900	0.757
0.774	0.696	0.830	0.866	0.694	0.845
0.940	0.825	0.969	0.940	0.860	0.782
0.847	0.814	0.955	0.801	0.862	0.688
0.841	0.920	0.939	0.911	0.801	0.783
0.893	0.851	0.800	0.705	0.912	0.386
0.876	0.806	0.927	0.845	0.753	0.828
0.918	0.936	0.434	0.780	0.910	0.820
0.667	0.915	0.696	0.750	0.827	0.696
0.816	0.792	0.873	0.780	0.679	0.832
0.743	0.541	0.616	0.795	0.873	0.381
0.933	0.708	0.832	0.834		0.955
0.754	0.867	0.931	0.875		0.931
0.835	0.855	0.844	0.664		0.813
0.966	0.818	0.883	0.446		0.794
0.707	0.981	0.860	0.768		0.908
0.944	1.020	0.744	0.914		0.948
0.773	1.004	0.794	0.822		0.630
0.658	0.763	0.812			0.758
0.902	0.832	0.829			1.034
1.072	1.013	0.911			
0.822	0.981	0.747			
0.922	0.705	0.740			
0.830	0.839	0.886			
0.652	0.859	0.892			
0.897		0.874			
0.900		0.900			
0.937		0.932			
0.811					
0.919					
0.684					

FEL

Descriptive Statistics:
Data source: Growth in CH2M05-00134 (007-011) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean	%Growth
FX Ctl	100	0	0.808	0.132	0.0132	0.0261	-
J13VP3	94	0	0.836	0.114	0.0117	0.0233	103.47
J13VP4	97	0	0.831	0.121	0.0122	0.0243	102.85
J13V89	87	0	0.794	0.14	2%	3%	98.27
J13V90	80	0	0.733	0.197	0.0221	0.0439	90.72
J13VP2	89	0	0.836	0.146	2%	3%	103.47

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0.66	1.072	0.411	0.815	0.56	0.992
J13VP3	0.686	1.032	0.345	0.851	0.627	1.003
J13VP4	0.686	1.037	0.351	0.864	0.573	0.961
J13V89	0.698	1.055	0.357	0.827	0.452	0.951
J13V90	0.691	0.984	0.292	0.801	0.352	0.955
J13VP2	0.657	1.034	0.376	0.881	0.386	0.98

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	-0.547	0.279	0.0715	0.231	80.83	67.053
J13VP3	-1.235	3.259	0.104	0.014	78.561	66.858
J13VP4	-1.771	4.047	0.174	<0.001	80.566	68.312
J13V89	-1.174	1.39	0.14	<0.001	69.046	56.474
J13V90	-0.745	-0.748	0.153	<0.001	5862%	4603%
J13VP2	-1.883	3.564	0.163	<0.001	74.439	64.132

One Way Analysis of Variance

Data source: Growth in CH2M05-00134 (007-011) Data

Normality Test: **Failed (P = <0.001)**

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Data source: Growth in CH2M05-00134 (007-011) Data

Group	N	Missing	Median	25%	75%
FX Ctl	100	0	0.815	0.734	0.912
J13VP3	94	0	0.851	0.792	0.908
J13VP4	97	0	0.864	0.779	0.902
J13V89	87	0	0.827	0.747	0.877
J13V90	80	0	0.801	0.554	0.897
J13VP2	89	0	0.881	0.791	0.93

H = 21.762 with 5 degrees of freedom. (P = <0.001)

The differences in the median values among the treatment groups are greater than would be expected by chance; there is a statistically significant difference (P = <0.001)

To isolate the group or groups that differ from the others use a multiple comparison procedure.

Multiple Comparisons versus Control Group (**Dunn's Method**) :

Comparison	Diff of Ranks	Q	P<0.05
J13VP2 vs FX Ctl	57.235	2.485	No
J13V90 vs FX Ctl	40.253	1.698	Do Not Test
J13VP4 vs FX Ctl	33.656	1.494	Do Not Test
J13VP3 vs FX Ctl	31.428	1.384	Do Not Test
J13V89 vs FX Ctl	11.534	0.498	Do Not Test

Descriptive Statistics:
Data source: Mortality in CH2M05-00134 (007-011) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
FX Ctl	4	0	0	0	0	0
J13VP3	4	0	0.06	0.0516	0.0258	0.0822
J13VP4	4	0	0.03	0.06	0.03	0.0955
J13V89	4	0	0.13	0.0825	0.0412	0.131
J13V90	4	0	0.2	0.17	0.0849	0.27
J13VP2	4	0	0.11	0.0887	0.0443	0.141

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0	0	0	0	0	0
J13VP3	0.12	0.12	0	0.06	0	0.12
J13VP4	0.12	0.12	0	0	0	0.12
J13V89	0.2	0.24	0.04	0.12	0.04	0.24
J13V90	0.36	0.4	0.04	0.18	0.04	0.4
J13VP2	0.2	0.2	0	0.12	0	0.2

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	0	-6	0	<0.001	0	0
J13VP3	-4.67E-16	-1.2	0.151	0.71	0.24	0.0224
J13VP4	2	4	0.441	0.006	0.12	0.0144
J13V89	0.713	1.785	0.298	0.232	0.52	0.088
J13V90	0.367	-3.438	0.26	0.387	0.8	0.246
J13VP2	-0.482	-1.7	0.214	0.586	0.44	0.072

One Way Analysis of Variance

Data source: Mortality in CH2M05-00134 (007-011) Data

Normality Test: **Passed** **(P = 0.083)**

Equal Variance Test: **Passed** **(P = 0.271)**

Group Name	N	Missing	Mean	Std Dev	SEM
asinsqrtFX Ctl	4	0	0	0	0
asinsqrtJ13VP3	4	0	0.21	0.154	0.0768
asinsqrtJ13VP4	4	0	0.0884	0.177	0.0884
asinsqrtJ13V89	4	0	0.355	0.127	0.0634
asinsqrtJ13V90	4	0	0.433	0.227	0.113
asinsqrtJ13VP2	4	0	0.29	0.207	0.104

Source of Variation	DF	SS	MS	F	P
Between Groups	5	0.535	0.107	3.883	0.015
Residual	18	0.496	0.0275		
Total	23	1.031			

The differences in the mean values among the treatment groups are greater than would be expected by chance;
there is a statistically significant difference (P = 0.015).

Power of performed test with alpha = 0.050: 0.713

The power of the performed test (0.713) is below the desired power of 0.800.
You should interpret the negative findings cautiously.

Multiple Comparisons versus Control Group (**Bonferroni t-test**):

Comparisons for factor:

Comparison	Diff of Means	t	P	P<0.050
asinsqrtFX Ctl vs. asinsqrtJ13V90	0.433	3.686	0.008	Yes
asinsqrtFX Ctl vs. asinsqrtJ13V89	0.355	3.027	0.036	Yes
asinsqrtFX Ctl vs. asinsqrtJ13VP2	0.29	2.475	0.117	No
asinsqrtFX Ctl vs. asinsqrtJ13VP3	0.21	1.793	0.449	Do Not Test
asinsqrtFX Ctl vs. asinsqrtJ13VP4	0.0884	0.754	1	Do Not Test

FEL

Descriptive Statistics:
Data source: Malformation in CH2M05-00134 (007-011) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
FX Ctl	4	0	0.06	0.0231	0.0115	0.0367
J13VP3	4	0	0.0835	0.055	0.0275	0.0875
J13VP4	4	0	0.0828	0.0331	0.0166	0.0527
J13V89	4	0	0.123	0.0615	0.0307	0.0978
J13V90	4	0	0.261	0.0343	0.0171	0.0546
J13VP2	4	0	0.103	0.0282	0.0141	0.0449

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0.04	0.08	0.04	0.06	0.04	0.08
J13VP3	0.118	0.16	0.042	0.066	0.042	0.16
J13VP4	0.08	0.12	0.04	0.0855	0.04	0.12
J13V89	0.129	0.182	0.053	0.129	0.053	0.182
J13V90	0.082	0.304	0.222	0.259	0.222	0.304
J13VP2	0.063	0.143	0.08	0.0935	0.08	0.143

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	5.92E-16	-6	0.307	0.203	0.24	0.016
J13VP3	1.28	0.876	0.258	0.396	0.334	0.037
J13VP4	-0.475	1.1	0.217	0.573	0.331	0.0307
J13V89	-0.269	-3.933	0.262	0.38	0.493	0.0721
J13V90	0.359	0.414	0.178	0.689	1.043	0.275
J13VP2	1.518	2.24	0.285	0.281	0.41	0.0444

One Way Analysis of Variance

Data source: Malformation in CH2M05-00134 (007-011) Data

Normality Test: **Passed** **(P > 0.200)**

Equal Variance Test: **Passed** **(P = 0.222)**

Group Name	N	Missing	Mean	Std Dev	SEM
asinsqrtFX Ctl	4	0	0.244	0.0493	0.0247
asinsqrtJ13VP3	4	0	0.283	0.0957	0.0478
asinsqrtJ13VP4	4	0	0.287	0.0637	0.0318
asinsqrtJ13V89	4	0	0.35	0.0984	0.0492
asinsqrtJ13V90	4	0	0.535	0.039	0.0195
asinsqrtJ13VP2	4	0	0.324	0.045	0.0225

Source of Variation	DF	SS	MS	F	P
Between Groups	5	0.215	0.043	8.94	<0.001
Residual	18	0.0866	0.00481		
Total	23	0.302			

The differences in the mean values among the treatment groups are greater than would be expected by chance; **there is a statistically significant difference (P = <0.001).**

Power of performed test with alpha = 0.050: 0.996

Multiple Comparisons versus Control Group (Bonferroni t-test):

Comparisons for factor:

Comparison	Diff of Means	t	P	P<0.050
asinsqrtFX Ctl vs. asinsqrtJ13V90	0.291	5.939	<0.001	Yes
asinsqrtFX Ctl vs. asinsqrtJ13V89	0.106	2.163	0.221	No
asinsqrtFX Ctl vs. asinsqrtJ13VP2	0.0799	1.629	0.604	Do Not Test
asinsqrtFX Ctl vs. asinsqrtJ13VP4	0.043	0.877	1	Do Not Test
asinsqrtFX Ctl vs. asinsqrtJ13VP3	0.0387	0.79	1	Do Not Test

FEL

CH2M05-00134 Water Growth Data (012)				
FX Ctl	FX Ctl		J13W35	J13W35
0.874	0.961		0.793	0.780
0.962	0.993		0.843	0.922
0.935	0.986		0.911	0.896
0.877	0.770		0.912	0.902
0.882	0.833		0.995	0.752
0.811	0.742		0.959	0.925
0.951	1.011		0.928	0.855
0.721	0.901		0.886	0.824
0.848	0.892		0.764	1.018
0.992	0.960		0.924	0.899
0.859	1.001		0.940	0.917
0.862	0.975		0.961	0.927
0.793	0.932		0.687	0.909
0.748	0.882		0.846	0.790
0.709	0.932		0.634	0.763
0.804	0.946		0.977	0.913
0.759	0.998		0.742	0.842
0.817	0.897		0.940	0.858
0.834	0.866		0.805	0.979
0.791	0.934		0.949	0.892
0.833	0.869		0.942	0.754
0.860	1.044		0.797	0.999
0.881	0.991		0.925	0.802
0.921	0.909		0.771	0.877
0.826	0.980		0.893	0.835
0.951	0.860		0.951	0.882
0.756	0.842		0.900	0.944
0.844	0.984		0.901	0.868
1.010	0.948		0.887	0.782
0.777	0.853		1.019	0.869
0.952	0.816		0.965	0.543
0.953	0.841		0.890	0.973
0.951	0.754		0.781	0.778
0.846	0.923		0.969	0.945
0.766	0.951		0.961	0.842
1.001	0.833		0.852	0.943
0.951	0.890		0.953	0.827
0.962	0.891		0.901	0.862
0.980	0.843		0.987	0.965
1.000	0.934		1.028	0.942
0.970	0.928		0.913	0.956
1.026	0.953		0.782	0.704
0.874	0.904		0.872	0.940
0.968	0.880		0.872	0.864
0.951	0.823		0.501	0.944
0.800	0.843		0.803	0.996
0.865	0.832		0.977	0.860
0.850	0.830		0.951	0.814
1.005	0.869		0.923	1.037
0.862	1.008		0.951	1.001

FEL

Descriptive Statistics:
Data source: Growth in CH2M05-00134 (012) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean	%Growth
FX Ctl	100	0	0.893	0.0786	0.00786	0.0156	-
J13W35	100	0	0.881	0.0957	0.00957	0.019	98.66

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0.336	1.044	0.709	0.886	76%	101%
J13W35	0.537	1.037	0.501	0.9	0.723	1

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	-0.224	-0.759	0.101	0.014	89.256	80.277
J13W35	-1.31	2.794	0.098	0.019	88.125	78.566

One Way Analysis of Variance
Data source: Growth in CH2M05-00134 (012) Data

Normality Test: Failed (P = 0.002)

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Group	N	Missing	Median	25%	75%
FX Ctl	100	0	0.886	0.837	0.953
J13W35	100	0	0.9	0.831	0.947

H = 0.180 with 1 degrees of freedom. (P = 0.672)

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability;
there is not a statistically significant difference (P = 0.672)

Descriptive Statistics:
Data source: Mortality in CH2M05-00134 (012) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
FX Ctl	4	0	0	0	0	0
J13W35	4	0	0	0	0	0

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0	0	0	0	0	0
J13W35	0	0	0	0	0	0

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	0	-6	0	<0.001	0	0
J13W35	0	-6	0	<0.001	0	0

One Way Analysis of Variance
Data source: Mortality in CH2M05-00134 (012) Data

Normality Test: **Failed** **(P = <0.001)**

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Group	N	Missing	Median	25%	75%
asinsqrtFX Ctl	4	0	0	0	0
asinsqrtJ13W35	4	0	0	0	0

H = 0.000 with 1 degrees of freedom. P(est.)= 1.000 P(exact)= 1.000

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability;
there is not a statistically significant difference (P = 1.000)

FEL

Descriptive Statistics:
Data source: Malformation in CH2M05-00134 (012) Data

Column	Size	Missing	Mean	Std Dev	Std. Error	C.I. of Mean
FX Ctl	4	0	0.01	0.02	0.01	0.0318
J13W35	4	0	0.05	0.02	0.01	0.0318

Column	Range	Max	Min	Median	5%	95%
FX Ctl	0.04	0.04	0	0	0	0.04
J13W35	0.04	0.08	0.04	0.04	0.04	0.08

Column	Skewness	Kurtosis	K-S Dist.	K-S Prob.	Sum	Sum of Squares
FX Ctl	2	4	0.441	0.006	0.04	0.0016
J13W35	2	4	0.441	0.006	0.2	0.0112

One Way Analysis of Variance
Data source: Malformation in CH2M05-00134 (012) Data

Normality Test: **Failed** **(P = 0.003)**

Test execution ended by user request, ANOVA on Ranks begun

Kruskal-Wallis One Way Analysis of Variance on Ranks

Group	N	Missing	Median	25%	75%
asinsqrtFX Ctl	4	0	0	0	0.101
asinsqrtJ13W35	4	0	0.201	0.201	0.244

H = 4.225 with 1 degrees of freedom. P(est.)= 0.040 P(exact)= 0.057

The differences in the median values among the treatment groups are not great enough to exclude the possibility that the difference is due to random sampling variability; **there is not a statistically significant difference (P = 0.057)**