APPENDIX 1A: TOXICITY LAB REPORT FOR *Hyalella azteca*

ENSR | AECOM

Report of Short-Term Toxicity of Whole Sediment to *Hyalella azteca*

Coeur Alaska Inc.
Kensington Mine
Juneau, AK

September 2006
Document Number 08503-125-058-(006, 008, 010)

ENSR | AECOM

Report of Short-Term Toxicity of Whole Sediment to Hyalella azteca

Project IDs: 08503-125-058-(006, 008, 010)
September 2006

Sponsor and Laboratory Information

Sponsor	Coeur Alaska Inc. Kensington Mine 3031 Clinton Drive Suite 202 Juneau, Alaska 99801
Project Officer	John Randolph (907) 789-1591
Testing Facility	ENSR Fort Collins Environmental Toxicology Laboratory 4303 West LaPorte Ave. Fort Collins, CO 80521 Fax: (970) 490-2963 State of Florida NELAP Laboratory ID: E87972
Study Director	David A. Pillard (970) 416-0916, ext. 310

Test Information

Test	Short-term chronic screening toxicity test of sediment	
Basis	USEPA (2000) and ASTM (2001)	
Test Protocol	HA3AK.TIE058.004	
Test Period	September 1, 2006 @ 1645 to September 11, 2006 @ 1600	
Test Length	10 days	
Species	*Hyalella azteca*	
Test Material	Whole sediment	
Sediment ID	Sample ID	ENSR Laboratory ID
	Lower Johnson	19793
	Lower Sherman	19796
	Lower Slate	19797
Control Sediments	Silica Sand and Laboratory Formulated Sediment	
Overlying water	Moderately hard reconstituted water prepared according to USEPA (2002), augmented with approximately 50 mg/L Cl^- (as NaCl)	
Test Concentrations	0 (control) and 100% of each test sediment	

Sediment Collection and Receipt

Sample ID	Collection Date and Time	ENSR No.	Date of Receipt	Temp. at Arrival (°C)
Lower Johnson	08/17/06 @ 1500	19793	8/23/06	14
Lower Sherman	08/16/06 @ unknown	19796	8/23/06	14
Lower Slate	08/17/06 @ 1300	19797	8/23/06	14

Note: See Appendix A for copies of chain of custody records

Control Sediment

The primary control sediment was silica sand, obtained from a local commercial supplier. A second control sediment, with a smaller grain size and higher organic matter content, was prepared in the laboratory. The composition of the formulated sediment is given in the following table (Kemble et al. 1999).

Composition of Laboratory Formulated Sediment (Control)

Material	Source	Pre-Treatment	Weight (g)
White Quartz Sand	U.S. Silica. Berkely Springs, West Virginia.	Rinsed with gentle mixing in Horsetooth water until water ran clear, then rinsed for 5 min with Milli-Q water. Air dried or dried in oven.	1242
Silt/Clay (ASP400)	Mozel, St. Louis, MO. Distributor = Englehardt	None	219
Dolomite	Grey Rock Clay Center, Ft. Collins	None	7.5
α-cellulose	Sigma	None	77.3
Humic Acid	Fluka	None	0.15
Total			1545.95

Test Sediment Preparation

Sample ID	Date Homogenized	Time Homogenized
19793	August 31, 2006	1750-1753
19796		1335-1338
19797		1425-1428

Test Conditions

Test Type	Static sediment with continuous replacement of overlying water
Test Duration	10 days
Overlying Water Delivery System	Continuous renewal (flow-through) [a]
Test Endpoints	Survival, Dry Weight per original and surviving organism
Test Chambers	500 ml glass beakers
Test Sediment Volume	100 ml
Overlying Water Volume	175 ml
Replicates per Treatment	8[c]
Organisms per Replicate	10
Test Temperature	23 ± 1°C; see Protocol Deviations
Lighting	Fluorescent, 16 hours light:8 hours dark
Chamber Placement	Randomized
Test Sediment Renewal	None
Test Overlying Water Renewal	Approximately two volume additions per test chamber per day

[a] Continuous replacement via a drip system
[b] Ash-Free Dry Weight
[c] There were only 5 replicates for the Lower Johnson sample; see Protocol Deviations
Note: See Appendix B for the Test Protocol

Test Organism

Species and Lot Number	*Hyalella azteca*, Lot 06-034
Age	7-14 days
Source	Aquatic BioSystems (ABS), Fort Collins, CO
Overlying Water	Moderately Hard Reconstituted Water with added chloride (52 mg/L) as NaCl, RW # 7856
Reference Toxicant Testing	Initiated September 1, 2006 using sodium chloride (NaCl)

TEST RESULTS

Biological Data – Survival and Dry Weights

Sample ID	Percent Survival[a]	Dry Weight (mg)[b]	
		Per original organism	Per surviving organism
Sand Control	83.75	0.041	0.049
Lab. Formulated Sediment	88.75	0.017	0.018
Lower Johnson	82.00	0.024[c]	0.029[c]
Lower Sherman	91.25	0.041	0.045
Lower Slate	95.00	0.062	0.064
Control Performance	Acceptable	N/A	N/A

[a] Samples were compared to the control (sand and formulated sediment were pooled prior to analysis)
[b] Samples were compared to the sand control
[c] Statistically significant reduction compared to the sand control
Note: See Appendix C for test data sheets

Data Analysis

Survival and growth data were compared to the Laboratory Control sediment(s) to determine statistical differences. The laboratory controls were first compared to each other using a t-test (α=0.05). If the two laboratory controls were not significantly different, they were pooled and the test sediment data were compared to the pooled control values. If the controls were significantly different, test sediments were only compared to the sand control. Dry weight (per original and per surviving) for the two laboratory controls was significantly different; therefore, dry weights for organisms from test sediments were only compared to the sand control dry weights.

Biological Endpoint	Comparison	Procedure
Survival	Normality[a]	Shapiro-Wilk's Test (α=0.01)
	Homogeneity of Variance[a]	Bartlett's Test (α=0.01)
	Significant Reduction Relative to the Pooled Control[a]	Bonferroni t-Test (α = 0.05)
Growth (Dry weight per Original Organism)	Normality[a]	Shapiro-Wilk's Test (α=0.01)
	Homogeneity of Variance[a]	Bartlett's Test (α=0.01)
	Significant Reduction Relative to the Sand Control [a]	Bonferroni t-Test (α = 0.05)
Growth (Dry weight per Surviving Organism)	Normality[a]	Shapiro-Wilk's Test (α=0.01)
	Homogeneity of Variance[a]	Bartlett's Test (α=0.01)
	Significant Reduction Relative to the Sand Control [a]	Bonferroni t-Test (α = 0.05)

[a] Using Toxstat Version 3.5 (WEST, Inc. and Gulley 1996)

Analytical Data

Total Metals (mg/Kg)[a]	Sample ID		
	Lower Johnson	Lower Sherman	Lower Slate
Aluminum	14900	17200	13200
Chromium	27.3	55.4	42.0
Copper	61.9	113	31.4
Nickel	41.7	37.3	36.4
Silver	ND (<1.00)	ND (<1.00)	ND (<1.00)
Zinc	177	121	83.2
Metals, Solid Samples (mg/Kg-dry)[b]			
Arsenic	18.5	27.7	5.75
Cadmium	0.646	0.366	0.204
Lead	11.6	12.0	5.47
Selenium	1.50	1.26	0.466
Mercury	0.0148[d]	0.157	0.112
Particle Size (%)[c]			
Clay	22.0	8.0	8.0
Sand	18.0	70.0	76.0
Silt	60.0	22.0	16.0
Texture	Silt Loam	Sandy Loam	Sandy Loam
TOC[e] (%)	0.3	1.4	2.0
Acid Volatile Sulfide (umoles/g)	ND (<0.50)	ND (<0.50)	ND (<0.50)

[a] Total metals were determined using SW-846 Method 6010B (USEPA 1986).
[b] Metals (solid sample analysis) were determined using SW-846 Method 6020 (USEPA 1986), except mercury which used Method 7471A
[c] Particle size was determined using ASTM Method D422
[d] Analyte detected below the Reporting Limit
[e] TOC was determined using the Organic Matter-Walkley Black Method
ND = Not Detected at the method detection limit
Note: See Appendix D for a copy of the report from the analytical laboratory (MSE-TA Analytical Laboratory, Butte, MT)

Percent Total Solids and Percent Total Volatile Solids

Sample ID	Percent Total Solids	Percent Total Volatile Solids
Lower Johnson	58.47	1.43
Lower Johnson (duplicate)	57.84	1.52
Lower Johnson (duplicate)	57.87	1.59
Lower Sherman	69.58	3.60
Lower Slate	69.65	4.63

Note: See Appendix D for data sheets (these parameters were determined at ENSR/FCETL)

Physical and Chemical Data

Sample ID	pH (units)	DO (mg/L)	Conductivity (µS/cm)	Temperature (°C)[a]	Ammonia as N (mg/L)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
Sand Control	7.9-8.2	6.0-6.9	504-552	22-23	<1.0	94-98	64-66
Lab. Form. Sed.	7.8-8.1	5.8-6.9	563-629	21-23	<1.0	108-116	82-88
Lower Johnson	8.0-8.1	6.0-6.5	520-555	21-23	<1.0	118-122	82-83
Lower Sherman	7.6-7.8	5.3-6.6	515-582	22-23	<1.0	118-122	79-80
Lower Slate	7.4-7.8	5.5-6.3	473-550	22-23	<1.0	100-114	57-68

[a] Temperature in test chambers; see Protocol Deviations

Reference Toxicant Test Results for *H. azteca*

Organism Lot Number	Test Dates	96-Hour LC_{50}	ENSR/FCETL Historical 95% Control Limits	
			Low	High
06-034	September 1 to 5, 2006	2328	891	3124

Note: Values are expressed as mg/L chloride

Protocol Deviations

Temperature as measured directly in overlying water was 21°C on day 2 for the Formulated sediment and Lower Johnson sediment, outside the range specified in the protocol (23±1°C). Temperature was within the range specified by the protocol on all other days of the test. The impact of this deviation on test outcome is unknown.

Bath temperature (continuously measured) ranged from 22.6 to 24.4°C during testing. Some of the higher temperatures slightly exceeded the upper limit of 24°C specified in the protocol. The water bath temperatures do not necessarily represent test chamber temperature, therefore the slightly warmer temperatures measured in the water bath should not be considered to be deviations from the protocol.

The sediment received from the Lower Johnson was received as a slurry (high water content) and was centrifuged to separate the sediment from the water prior to testing. After centrifuging the sample, there was enough sediment for 5 replicates, instead of 8 as specified in the protocol. The impact of this deviation on test outcome is unknown. To the best of the Study Director's knowledge, no further deviations from the test protocol occurred during these studies.

References

ASTM. 2001. Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates: Procedure 2: Conducting a 10-day Sediment Toxicity Test with *Chironomus tentans*. Method E 1706-00 In 2001 Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.05, Biological Effects and Environmental Fate; Biotechnology: Pesticides. American Society of Testing and Materials. Conshohocken, PA.

Kemble, N.E., F.J. Dwyer, C.G. Ingersoll, T.D. Dawson, and T.J. Norberg-King. 1999. Tolerance of Freshwater Test Organisms to Formulated Sediments for Use as Control Materials in Whole-Sediment Toxicity Test. *Environ. Toxicol. Chem.* 18:222-230.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012.

USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. EPA/600/R-99/064.

USEPA. 1986. Test Methods for Evaluating Solid Waste. Third Edition. SW-846.

WEST, Inc. and D.D. Gulley. 1996. Toxstat Version 3.5. Western EcoSystems Technology, Inc., Cheyenne, WY.

Statement of Procedural Compliance

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, accurate and complete.

for David Pillard — December 4, 2006

David A. Pillard, Ph.D. — Date
Study Director

Statement of Quality Assurance

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with standard operating procedures, and that the resulting data and report meet the requirements of the NELAC standards. This report is an accurate reflection of the raw data.

Anita Rehmer — December 4, 2006

Quality Assurance Unit — Date

APPENDIX A

Chain of Custody

ENSR INTERNATIONAL

CHAIN OF CUSTODY RECORD

Page ____ of ____

Client/Project Name: COEUR ALASKA

Project Location: ENSR/FCETL

Project Number: 0806 SEDTOX

Field Logbook No.:

Sampler (Print Name)/(Affiliation): JOHN RANDOLPH - COEUR

Signature:

Chain of Custody Tape No.: 30059 (Intact @ receipt)

Send Results/Report to: JOHN RANDOLPH - 907-523-3311

Analysis Requested: TOXICITY; METALS ETC; SULPHIDE

Field Sample No./ Identification	Date	Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	Field Filtered	TOXICITY	METALS ETC	SULPHIDE	Lab I.D.	Remarks
LOWER SHERMAN Sediment SX	8-16	–	X		(4L) nalgene	SEDIMENT	COOL		X	X		19796	
LOWER SLATE Sediment SX	8-17	13:00	X		(4L) nalgene	SEDIMENT	COOL		X	X		19797	
LOWER SHERMAN	8-16		X		100 ml glass	"	"				X	19798	
LOWER SLATE	8-17	13:00	X		100 ml glass	"	"				X	19799	

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date
E. FLORY - COEUR Signature: E Flory	8-22-06 Time: 11:00	John Randolph - Coeur Signature: John Randolph	8/22/06 Time: 1130
John Randolph Signature: John Randolph	8/22/06 Time: 12:30	David Pillard Signature: David Pillard	8/23/06 Time: 1650
Signature:	Time:	Signature:	Time:

Analytical Laboratory (Destination):

Temp = 14°C (cooler temp)

Right-Away Courier Fr Goldstreak

ENSR Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 493-8935 (FAX)

Serial No. 46941

FM01008b_902

ENSR INTERNATIONAL

CHAIN OF CUSTODY RECORD

Page ____ of ____

Client/Project Name: COEUR ALASKA

Project Location: ENSR/FCETL

Project Number: 0806SEDTOX

Field Logbook No.:

Sampler (Print Name)/(Affiliation): JOHN RANDOLPH

Signature:

Chain of Custody Tape No.: 30037 (Intact @ Receipt)

Send Results/Report to: JOHN RANDOLPH - 967-523-3311

Analysis Requested: Toxicity; Metals etc; Sulphide

Field Sample No./ Identification	Date	Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	Field Filtered	Toxicity	Metals etc	Sulphide						Lab I.D.	Remarks
LOWER JOHNSON Sediment SX	8-17	1500	X		(4L) nalgene	SEDIMENT	ICE		X	X							19793	
LOWER JOHNSON Sediment SX	"	"	X		(4L) nalgene	"	↓		X	X							↓	
LOWER JOHNSON Sediment SX	"	"	X		(4L) nalgene	"	↓		X	X							↓	
LOWER JOHNSON SEDIMENT SX	"	"	X		4L nalgene	"	↓		X	X							↓	
LOWER JOHNSON	"	"	X		100 ml glass	"	↓				X						19794	
LOWER JOHNSON	"	"	X		100 ml glass	"	↓				X						19795	

Relinquished by: (Print Name)/(Affiliation): E. FLORY - COEUR
Signature: E Flory
Date: 8-22-06
Time: 11:00

Received by: (Print Name)/(Affiliation): John Randolph - Coeur
Signature: John Randolph
Date: 8/22/06
Time: 1130

Relinquished by: (Print Name)/(Affiliation): John Randolph - Coeur
Signature: John Randolph
Date: 8/22/06
Time: 1230

Received by: (Print Name)/(Affiliation): David Pillard
Signature: D L Pillard
Date: 8/23/06
Time: 1650

Relinquished by: (Print Name)/(Affiliation)
Signature:
Date:
Time:

Received by: (Print Name)/(Affiliation)
Signature:
Date:
Time:

Analytical Laboratory (Destination): 14°C #22 (cooler temp)

Right Away Courier From Goldstreak

ENSR Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 493-8935 (FAX)

Serial No. 46940

FM01008b_902

APPENDIX B

Test Protocol

Title: Short-Term Chronic Toxicity of Bulk Sediment to the Amphipod, *Hyalella azteca*

Study Sponsor:

Coeur Alaska Inc.
Kensington Mine
3031 Clinton Drive
Suite 202
Juneau, Alaska 99801
Phone: (907) 789-1591

John Randolph

Testing Facility

Fort Collins Environmental Toxicology Laboratory
4303 West LaPorte Avenue
Fort Collins, Colorado 80521
Phone: (970) 416-0916, Ext. 310
Fax: (970) 490-2963
Project Manager/Study Director: David Pillard, Ph.D.

1.0 INTRODUCTION

1.1 Objective

To determine the short-term chronic toxicity of sediment samples to the amphipod, *Hyalella azteca.*

1.2 Sediment Sample

The sediment samples will be collected by the Study Sponsor or an agent of the Study Sponsor and shipped to ENSR's Fort Collins Laboratory. At the laboratory, sediment samples will be stored under refrigeration (4°C) until used in testing (preferably less than 4 weeks of storage). Each sample will be mechanically homogenized prior to use in testing (ENSR SOP #5208). Endemic organisms observed in the sediment will be removed manually.

2.0 BASIS AND TEST ORGANISM

2.1 Basis

This protocol is based on USEPA (2000) guidelines and ASTM Method E 1706-00 (ASTM 2001).

2.2 Test Organism

1. Species - *Hyalella azteca*
2. Age – 7-14 days old at the start of the test. Initial dry weight will be determined on a minimum of eighty organisms selected from the test population at test initiation.
3. Source - Test organisms will be obtained from a commercial supplier.
4. Feeding - *Hyalella azteca* will be fed 1.0 ml of a yeast-trout chow-Cerophyl suspension (YTC; USEPA 2002) per test chamber on a daily basis.

3.0 TEST SYSTEM

3.1 Overlying Water

The overlying water used in the toxicity test will be laboratory moderately hard reconstituted water prepared according to USEPA (2002). The water will be augmented with 50 mg/L Cl^-. Previous research has indicated that added Cl^- may be critical for maintaining organism health during the test.

3.2 Test Temperature

Test temperature will be 23 ± 1°C. Testing will be conducted in a temperature-controlled water bath or in an environmental chamber.

3.3 Test Containers

Test containers will be 500-ml beakers containing 100 ml of sediment and 175 ml of overlying water.

3.4 Photoperiod

The photoperiod will be 16-hours light and 8-hours dark.

3.5 Dissolved Oxygen Concentrations

Dissolved oxygen concentrations in the overlying water will be maintained >2.5 mg/L. If the dissolved oxygen concentration in the overlying water approaches this level, all test chambers will be gently aerated throughout the remainder of the test. If aeration is initiated, the aeration pipette will be appropriately positioned so as to avoid disturbance of the sediment.

3.6 Reference Toxicant Testing

In addition to the test material exposures, reference toxicant tests will be conducted using sodium chloride (NaCl) to determine the sensitivity range of the test organisms. Reference toxicant exposures will be conducted monthly or at the time of test initiation for in-house or commercially-supplied organisms. Reference toxicant testing will be performed according to USEPA (2000; 2002) methods.

4.0 TEST DESIGN

4.1 Test Concentrations

The test concentration will be 100 percent of each test sediment. A 100 percent laboratory control sediment (see section 4.3) exposure will be conducted concurrently.

4.2 Sediment/Water Mixture

Sediment (100 ml) will be placed in each test chamber. After addition of sediment, 175 ml of overlying water will be poured into each beaker. The beakers will be left unaerated overnight to allow sediment to settle and to reduce turbidity prior to addition of test organisms.

4.3 Reference/Control Sediment

In addition to any field-collected reference sediment, at least one laboratory control sediment will be tested concurrently. The laboratory control sediment may be clean, field-collected sediment and/or a formulated sediment.

4.4 Number of Test Organisms

Eighty *Hyalella azteca* will be exposed to each treatment. Ten organisms will be randomly assigned to each test chamber and eight replicates will be tested per treatment.

4.5 Test Initiation/Renewal Frequency

Testing will be initiated by addition of the test organisms after the overnight settling period. Each chamber will be renewed with approximately 2 volume additions per day, beginning on day 0 (after overlying water is characterized but before organisms are added). This will be accomplished with either a flow-through drip system or a renewal box that can be filled with overlying water and allowed to drain into the test chambers.

4.6 Chemical and Physical Monitoring

At a minimum, the following measurements will be made:

1. Dissolved oxygen, temperature, and pH will be measured in the overlying water of each treatment and the control each day of testing.

2. Hardness, alkalinity, conductivity, and ammonia will be measured in the laboratory reconstituted water (used as overlying water) on day 0.

3. Hardness, alkalinity, conductivity, and ammonia will be measured in overlying water from each treatment at test initiation (just prior to renewal on day 0 or 1) and at test termination.

4. Ammonia will also be measured in each treatment on days 3 and 7.

4.7 Biological Monitoring

After ten days of exposure, sediment from each test chamber will be removed and sieved or sorted to recover living test organisms. Organisms not recovered at test termination will be presumed dead. Dry weight will be determined at 60-90°C.

4.8 Test Duration

The test duration is 10 days. At test termination, the surviving organisms in each test chamber will be counted and transferred to a tared weighing boat and dried at 60-90°C for a minimum of 24 hours. Immediately after removal from the drying oven, the weigh boats will be placed in a dessicator to prevent absorption of moisture from the air, until they can be weighed. Weights will be measured to the nearest 0.01mg.

4.9 Calculations

Survival data will be transformed by arcsine squareroot. Normality and homogeneity assumptions for survival data will be evaluated by the Shapiro-Wilk's test and Bartlett's test, respectively (α = 0.01). Data will then be evaluated (α = 0.05) using either parametric or nonparametric methods, depending upon the outcome of the normality and homogeneity assessments.

Organism weights will be statistically compared in treatments not having significantly reduced survival. Analysis will occur in the same manner as for survival, although the weights will not be transformed using arcsine squareroot.

4.10 Quality Criterion

The test will not be considered acceptable if mortality in the control sediment exceeds 20 percent or if there is no measurable growth of test organisms in the control sediment. If mortality in one or more of the control treatments exceeds 20 percent or there is no measurable growth in the control, then the test will be reviewed to determine if certain chemical or physical characteristics of the test sediment (e.g., low dissolved oxygen or unusual pH) may have contributed to poor performance. Upon review by ENSR and the Sponsor, test data may be found acceptable.

5.0 TEST REPORT

The report will be a typed document describing the results of the test and will be signed by the Study Director and Quality Assurance Unit. The report will include, but not be limited to, the following:

- A copy of all raw data.
- Name of test, Study Director, and laboratory, and date test was begun.
- A detailed description of the sediment, including its source, time of collection, composition, known physical or chemical properties, and any information that appears on the sample container or has been provided by the Sponsor.
- The source of the overlying water, its chemical characteristics, and a description of any pretreatment.
- Detailed information about the test organisms, including scientific name, age, life stage, source, history, acclimation procedure, and food used.
- A description of the experimental design and the test chambers, the volume of solution in the chambers, the way the test was begun, the number of organisms per treatment, and the lighting.
- A description of any aeration performed on test solutions before or during the test.
- Definition of the criterion used to determine the effect and a summary of general observations on other effects or symptoms.
- Percentage of organisms that died or showed the effect.
- Anything unusual about the test, any deviations from the protocol, and any other relevant information.

6.0 LITERATURE CITED

ASTM. 2001. Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates: Procedure 1: Conducting a 10-day Sediment Toxicity Test with *Hyalella azteca*. Method E 1706-00 In *2001 Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.05, Biological Effects and Environmental Fate; Biotechnology: Pesticides.* American Society of Testing and Materials. Conshohocken, PA

USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates. Second Edition. EPA/600/R-99/064.

USEPA. 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013.

7.0 PROCEDURAL COMPLIANCE

All test procedures, documentation, records, and reports will comply with USEPA (2000, 2002) general guidance on quality assurance related to effluent and sediment toxicity testing. To this end, random audits of the test may be scheduled while the test is in progress. The raw data will be checked and compared to protocol requirements and Standard Operating Procedures, and the final report will be audited for accuracy and signed, if satisfactory, by both the Study Director and an individual from the Quality Assurance Unit.

8.0 PROTOCOL AMENDMENTS AND DEVIATIONS

All changes (i.e., amendments, deviations, and final report revisions) of the approved protocol plus the reasons for the changes must be documented in writing. The changes will be signed and dated by the Study Director and maintained with the protocol. All amendments must be authorized in advance by the Sponsor.

9.0 SPONSOR AND STUDY DIRECTOR APPROVAL

Sponsor Approval: _____ Date: _____

Study Director: D. L. Pulliam Date: 28 Aug 2006

APPENDIX C

Data Sheets

H. azteca 10-day Survival and Growth, Testing Cover Page

QA: AK11-02-06

Project Number: 8503-125-058-(006,000,010)
Test Substance: Sediment
Test Species: *H. azteca* Lot #: 06-034
Test Type: Chronic, Static Renewal
Dilution Water: Mod Hard with 50 mg/L Chloride
Sampling Date(s): August 16, 17, 2006
FCETL Sample #(s): 19793, 19796, 19797
Test Initiation Date/Time: 9/1/06 / 1645
Test Termination Date/Time: 9/12/06 @1600 ①

Protocol #: HA3AK.TIE058.004
Age: 7-14 days Supplier: ABS
Investigators: SK/DP/TD/TO
Sampling Time(s):

Renewal Frequency: Cont. drip, 2+ vol/da Feeding Freq: daily Food Type/Amount: 1 ml YTC daily Test Temp: 23 +/- 1 deg C
Test Chamber Capacity: 500-ML Test Soltn. Vol: 100 mL sed/175 mL # Repl's/Trtmnt: 8
Test Duration: 10 days # Org.'s/Repl: 10 Env. Chmbr/Bath: (5) 3

Water Characterization: Minimum of Hardness, Alkalinity, & Conductivity on days 0 and 10; Ammonia on days 0, 3, 7, and 10; No TRC; pH, temperature & DO daily on overlying water
aerate if dissolved oxygen <2.5 mg/L

Test Sediment (s):

1)	Sand (cont)	2)	Form sed (cont)	3)	19793 (Lower Johnson)
4)	19796 (Lower Sherma	5)	19797 (Lower Slate)	6)	
7)		8)		9)	
10)		11)			

Reference Tox. Dates: 9/1/06-9/5/06 LC50: 2320mg/L CL Hist. Limits: 991-3124 Method: SK
Study Director Initials: DP Date: 9/1/06

Overlying water added at a minimum of 2 volume additions/day; equivalent to >350 ml/day or >0.24 ml/min

① Ave for TD 11-02-06 E

BIOLOGICAL DATA *H. azteca* Chronic, Static Renewal Project 8503-125-058-006,-008,-010 QA: AK 11-02-04

Sediment	Test Termination	A	B	C	D	E	F	G	H	Remarks: % Survival
Sand (cont)	# Surviving	~~8~~ 9	9	9	9	8	9	7	7	93.75%
	# Observed Dead	~~1~~ 0	0	0	0	1	0	2	1	
	# Not Found	~~1~~ 1	1	1	1	1	1	1	2	
Form sed (cont)	# Surviving	9	9	10	8	9	8	8	10	88.75%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	1	1	0	2	1	2	2	0	
19793 (Lower Johnson)	# Surviving	7	7	8	16	9				82%
	# Observed Dead	0	1	2	0	0				
	# Not Found	3	2	0	0	1				
19796 (Lower Sherman)	# Surviving	9	10	10	7	8	10	10	9	91.25%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	1	0	0	3	2	0	0	1	
19797 (Lower Slate)	# Surviving	10	10	10	8	10	10	9	10	② 95% 96.25
	# Observed Dead	0	0	0	0	0	0	1	0	
	# Not Found	0	0	0	2	0	0	1	0	
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
	# Surviving									
	# Observed Dead									
	# Not Found									

① Wet Lab Wp ② Wet Lab G

QA: NZW-02-06

CHEMICAL DATA (Composite of Overlying Water) *H. azteca* Chronic, Static Renewal Project 8503-125-058-006, -008, -010

Parameter	Sediment	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day	Meter	Date	Time	Initials
Dissolved Oxygen (mg/l)	Sand (cont)	6.9	6.7	6.8	6.6	6.3	6.6	6.3	6.7	6.0	6.6	6.6	0	5	9/1/06	1400	
	Form sed (cont)	6.9	6.7	6.4	6.6	6.2	6.3	5.9	5.8	6.1	6.2	6.3	1	5	9/2/06	1530	
	19793 (Lower Johnson)	6.6	6.4	6.4	6.3	6.2	6.4	6.5	6.1	6.0	6.4	6.3	2	5	9/3/06	1410	
	19796 (Lower Sherman)	6.0	6.3	5.8	5.8	6.0	5.7	6.6	5.3	5.4	6.0	5.9	3	5	9/4/06	1435	
	19797 (Lower Slate)	6.0	6.3	5.9	5.9	5.4	5.8	5.5	5.9	6.0	5.9	5.7	4	5	9/5/06	1120	
	0												5	5	9/6/06	1020	
	0												6	5	9/7/06	0930	
	0												7	5	9/8/06	0950	
	0												8	5	9/9/06	1200	
	0												9	5	9/10/06	1405	
													10	5	9/11/06	1005	
Temp (deg C)	Sand (cont)	23	22	22	22	23	23	23	23	23	23	23	0	D-31	9/1/06	1400	
	Form sed (cont)	23	22	21	23	23	23	23	23	23	23	23	1	D32	9/2/06	1530	
	19793 (Lower Johnson)	23	22	21	23	23	23	23	23	23	23	23	2	D35	9/3/06	1410	
	19796 (Lower Sherman)	23	22	22	23	23	23	23	23	23	22	23	3	D35	9/4/06	1435	
	19797 (Lower Slate)	23	22	22	23	23	23	23	23	23	23	22	4	D-34	9/5/06	1120	
	0												5	D-34	9/6/06	1020	
	0												6	D-34	9/7/06	0930	
	0												7	D-31	9/8/06	0950	
	0												8	D-31	9/9/06	1200	
	0												9	D-35	9/10/06	1410	
													10	D-31	9/11/06	1005	
pH	Sand (cont)	8.2	8.0	8.1	8.1	8.1	8.1	7.9	8.0	8.0	8.1	8.0	0	16	9/1/06	1400	
	Form sed (cont)	8.1	8.0	8.0	8.1	8.0	8.0	8.0	8.0	8.0	7.8	7.9	1	16	9/2/06	1530	
	19793 (Lower Johnson)	8.1	8.1	8.0	8.1	8.1	8.1	8.1	8.0	8.0	8.0	8.0	2	16	9/3/06	1410	
	19796 (Lower Sherman)	7.6	7.8	7.6	7.7	7.8	7.8	7.7	7.7	7.7	7.6	7.7	3	16	9/4/06	1435	
	19797 (Lower Slate)	7.4	7.6	7.5	7.6	7.6	7.7	7.7	7.7	7.8	7.6	7.6	4	16	9/5/06	1120	
	0												5	16	9/6/06	1020	
	0												6	16	~~9/8/06~~	~~0950~~	~~[illegible]~~
	0												7	16	~~9/9/06~~	~~1000~~	~~[illegible]~~
	0												8	16	9/9/06	1000	
	0												9	16	9/10	1400	
	Replicate		A	B	C	D	E	F	6	H	A	B	10	16	9/11/06	1005	

9/7/06 1000 ?
9/8/06@0950

12/4/06 WP, LE

OVERLYING WATER CHARACTERIZATION | *H. azteca* | Chronic, Static Renewal | Project No. 8503-125-058-006, -008, -020

QA: AR 11-02-06

Sediment	Conductivity (µs/cm) Day 0	Conductivity (µs/cm) Day 10	Hardness (mg/L as CaCO3) Day 0	Hardness (mg/L as CaCO3) Day 10	Alkalinity (mg/l as CaCO3) Day 0	Alkalinity (mg/l as CaCO3) Day 10	Ammonia (mg/l) Day 0	Ammonia (mg/l) Day 3	Ammonia (mg/l) Day 7	Ammonia (mg/l) Day 10
Sand (cont)	552	504	98	94	66	64	<1.0	<1.0	<1.0	<1.0
Form sed (cont)	629	563	108	116	82	88	<1.0	<1.0	<1.0	<1.0
19793 (Lower Johnson)	520	555	122	118	82	83	<1.0	<1.0	<1.0	<1.0
19796 (Lower Sherman)	515	592	118	122	79	90	<1.0	<1.0	<1.0	<1.0
19797 (Lower Slate)	473	550	100	114	57	68	<1.0	<1.0	<1.0	<1.0
0										
0										
0										
MH+CR 7856 0	515		98		60		<1.0			
0										
Meter #	15	15	titr	titr	titr	titr	3	3	3	3
Date:	9/1/06	9/11/06	9/1/06	9/11/06	9/1/06	9/11/06	9/1/06 *	9/4/06 *	9/8/06 ▲	9/11/06 ▲
Time:	1745	1530	1745	1530	1745	1530	1530	1530	1500	1500
Initials:	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* Samples preserved on 9/1/06 and 9/4/06 and measured 9/5/06

▲ Samples preserved on 9/8/06 and 9/11/06 and measured 9/13/06

COC= ARTOX-02-06

DAILY TESTING LOG *H. azteca* Chronic, Static Renewal Project No. 8503-125-058 -006, -008, -020

Day -1	homogenized sediment added to test chambers, and added overlying water. Placed into bath to settle overnight			
Day 0	started drip after adding organisms		Feeding: 1.0 ml YTC	Initials/Date: 9/1/06
Day 1	Bath CT = 22.2°C	Range = 22.2-22.6°C	Feeding: 1ml YTC @1540	Initials/Date: 9/2/06
Day 2	Bath CT = 22.2°C	Range = 22.2-22.6°C	Feeding: 1ml YTC @1420	Initials/Date: JG 9/3/06
Day 3	Bath CT = 23.4°C	Range = 22.2-24.0°C	Feeding: 1 ml YTC @1510	Initials/Date: 9/4/06
Day 4	Bath CT = 23.8°C	Range = 23.6-24.4°C	Feeding: 1 mL YTC @1130 TD	Initials/Date: TD 9/5/06
Day 5	Bath CT = 23.4°C	Range = 23.2-24.4°C	Feeding: 1ml YTC @1030	Initials/Date: 9/6/06
Day 6	Bath CT = 23.0°C	Range = 22.6-23.6°C	Feeding: 1ml YTC @0945	Initials/Date: 9/7/06
Day 7	Bath CT = 23.2°C	Range = 23.0-24.0°C	Feeding: 1ml YTC @	Initials/Date: 9/8/06
Day 8	Bath CT = 23.2°C	Range = 23.0-23.6°C	Feeding: 1 mL YTC @1210	Initials/Date: TD 9/9/06
Day 9	Bath CT = 23.2°C	Range = 23.0-23.6°C	Feeding: 1mL YTC @1420	Initials/Date: NH 9/10/06
Day 10	Bath CT = 23.2°C	Range = 23.0-23.6°C	Feeding: none	Initials/Date: 9/11/06

① TD 9/9/06 E
② NH 9/10/06 E
③ ARTOX-02-06 E

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8503-125-050-(006, 008, 010)

EIGHT ~~TREATMENTS~~ Replicates FIVE ~~REPLICATES~~ Treatments

RANDOM CHAMBER LOCATION "X"

SK 11/16/06

QA: All 02 06

	A	B	C	D	E	F	G	H
1	3B	8A	7C	1D	5D	7D	6A	3D
2	3C	8C	1B	4D	7E	1E	1C	3A
3	4A	5A	7B	3E	8E	2D	4B	5C
4	2C	6C	8D	7A	5E	6B	4C	8B
5	5B	1A	6D	6E	4E	2A	2B	2E

1 = Sand Control
2 = Formulated Sed.
3 = Lower Johnson
4 = Lower Sherman
5 = Lower Slate

SK 11/16/06 CF

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

AR11-1606

Project Number: 8503125-058 (006, 008, 010) | Test Substance: Sediment | Comments:
Species: H. azteca | Analyst Tare: JN | Analyst Gross: [illegible] | Analytical Balance ID: SAUH1
Date/Time of Tare Wt.: 9/25/06 @ 1620 | Date/Time of Gross Wt.: 9/28/06 @ 1030 | Dried in Oven # ___ from Date: ___ Time: ___ to Date: ___ Time: ___

Weight Type (Circle): Wet Blot Dry Dry (~~>100°C~~ 60-90°C) AFDW (>500°C) | Lot or Batch Number: 06-034

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Formulated	A		1.02062	1.02081	0.00019		10	0.019	~~0.016~~ 0.017 ▲	9	0.021	~~0.017~~ 0.026 ▲
		B		1.01807	1.01811	0.00004		10	0.004		9	0.0044	
		C		1.00855	1.00881	0.00026		10	0.026		10	0.026	
		D		1.01024	1.01051	0.00027		10	0.027		8	0.034	
		E		0.98478	0.98482	0.00004		~~10~~ 9	0.0044		8	0.005	
		F		1.01794	1.01802	0.00008		10	0.008		8	0.010	
	▲	G		1.02248	1.02242	~~0.00006~~		~~10~~ 8*	~~0.00075~~		6	~~0.010~~	
		H		1.00042	1.00071	0.00029		10	0.029		10	0.029	
	Sand	A		1.00267	1.00302	0.00035		~~10~~ 9	0.039	0.041	8	0.0494	0.049
		B		1.01254	1.01283	0.00029		10	0.029		9	0.032	
		C		1.02342	1.02389	0.00047		~~10~~ 9	0.052		8	0.059	
		D		~~1.02389~~	1.03458	0.00054		10	0.054		9	0.060	
Blank				1.03409									
Range													
Mean													

Test Solution Volume: | Loading Rate:

* Two organisms were lost prior to ~~test~~ weighing the pan

[1] Add in weight loss of blank boat, if appropriate.

▲ replicate G is excluded

① MH 9/21/06 E ② 9/26/06 ③ 9/28/06 E, one organism was lost after takedown trying to weighing pan

FCETL QA Form No.010
Revision 5
Effective 08/99

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

AR1116Q6

Project Number:
Species:
Date/Time of Tare Wt.: 9/25/06 @ 1630

Test Substance: Sediment
Analyst Tare: JW Analyst Gross:
Date/Time of Gross Wt.: 9/28/06 @ 1030

Comments:
Analytical Balance ID: Smart #1
Dried in Oven # ___ from Date: _____ Time: _____
to Date: _____ Time: _____

Weight Type (Circle): Wet Blot Dry Dry (~~>100°C~~ 60-90) AFDW (>500°C)

Lot or Batch Number: 06-034

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Sand	E		1.02039	1.02088	0.00049		10	0.049		8	0.061	
		F		1.00885	1.00929	0.00044		10	0.0044		9	0.049	
		G		1.00699	1.00742	0.00043		10	0.043		7	0.061	
		H		1.04194	1.04212	0.00018		10	0.018		7	0.026	
	Lower	A		0.98589	0.98603	0.00014		10	0.014	0.024	7	0.020	0.029
	Johnson	B		1.00147	1.00181	0.00034		10	0.034		7	0.048	
		C		0.99756	0.99767	0.00011		10	0.011		8	0.014	
		D		1.01711	1.01736	0.00025		10	0.025		10	0.025	
		E		1.01430	1.01464	0.00034		10	0.034		9	0.038	
	Lower	A		1.02931	1.02976	0.00045		10	0.045	0.041	9	0.050	0.045
	Sherman	B		1.00875	1.00917	0.00042		9 *	0.047		9	0.047	
		C		1.01507	1.01545	0.00038		10	0.038		10	0.038	
Blank				1.01980	1.01981	+0.00001							
Range													
Mean													

Test Solution Volume:

Loading Rate:

[1] Add in weight loss of blank boat, if appropriate.

DEJ 11/15/06

* One organism was lost prior to weighing pan

AR 11-16-06

TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

Project Number: 8503-125-050(006,008,010) | Test Substance: Sediment | Comments:
Species: H. azteca | Analyst Tare: JW | Analyst Gross: JW | Analytical Balance ID: SAU #1
Date/Time of Tare Wt.: 9/25/06 @ 1630 | Date/Time of Gross Wt.: 9/25/06 @ 1030 | Dried in Oven # ___ from Date: _____ Time: _____ to Date: _____ Time: _____

Weight Type (Circle): Wet Blot Dry Dry (~~>100°C~~ 60-90) AFDW (>500°C) | Lot or Batch Number: 06-034

Boat No.	Treatment	Rep.	Length Units:	Tare Weight (g)	Gross Weight (g)	Net Weight (g)	Adjusted Net Weight (g)[1]	No. of Orig. Organisms	Mean Wt. per Original Organism (mg)	Mean Wt. per Treatment (mg) (Original)	No. of Surv. Organisms	Mean Wt. per Surviving Organism (mg)	Mean Wt. per Treatment (mg) (Surviving)
	Lower Sherman	D		1.01616	1.01646	0.00030		10	0.030		7	0.043	
		E		1.01513	1.01549	0.00036		10	0.036		8	0.0345	
		F		1.01737	1.01776	0.00039		9 *	0.043		9	0.043	
		G		0.98878	0.98920	0.00042		11 *	0.038		11	0.038	
		H		1.00801	1.00853	0.00052		10 ^	0.052		9	0.058	
	Lower State	A		1.02761	1.02819	0.00058		10	0.058	0.062	~~8~~ 10	0.058	0.064
		B		1.03033	1.03110	0.00077		9 ^	0.086		9	0.096	
		C		1.01058	1.01120	0.00062		10	0.062		10	0.062	
		D		0.99739	0.99786	0.00047		10	0.047		~~9~~ 8	0.059	
		E		1.02147	1.02213	0.00066		10	0.066		10	0.066	
		F		0.99957	1.00033	0.00076		10	0.076		10	0.076	
		G		1.01759	1.01813	0.00054		10	0.054		9	0.060	
~~Blank~~		H		0.99821	0.99868	0.00047		10	0.047		10	0.047	
Range													
Mean													

Test Solution Volume: | Loading Rate:

[1] Add in weight loss of blank boat, if appropriate. DF 11/15/06 E

* One organism from replicate F was placed into replicate G

^ One organism was lost prior to placement into pan

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Toxstat Version 3.5
Study #8503-125-058-(006, 008, 010)
Coeur
Hyalella azteca 10-day Sediment Test
Comparing Control Sediments to Determine Significant Difference for Survival

11/14/06
QA: AR11-1606

File: 12558hs.dat Transform: ARC SINE(SQUARE ROOT(Y))

t-Test of Solvent and Blank Controls Ho: GRP1 Mean = GRP2 Mean

GRP1 (Solvent cntl) Mean = 1.1668 Calculated t value = -1.1352
GRP2 (Blank cntl) Mean = 1.2366 Degrees of freedom = 14
Difference in means = -0.0697

2-sided t value (0.05,14) = 2.1448 No significant difference at alpha=0.05
2-sided t value (0.01,14) = 2.9768 No significant difference at alpha=0.01

WARNING: This procedure assumes normality and equal variances!

verified survival values by going into Toxstat and re-running the analysis (AR11-1606)
GRP1 = Sand Control = 83.75% survival
GRP2 = Form. Sed. = 88.75% survival

Page of

04/14/06

QA: AR11-1606

Toxstat Version 3.5
Study #8503-125-058-(006, 008, 010)
Coeur
Hyalella azteca 10-day Sediment Test
Summary of Survival

File: 12558hs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Sand Cont	8	0.7000	0.9000	0.8375
2	Form Sed	8	0.8000	1.0000	0.8875
3	Lower Johnson	5	0.7000	1.0000	0.8200
4	Lower Sherman	8	0.7000	1.0000	0.9125
5	Lower Slate	8	0.8000	1.0000	0.9625

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Sand Cont	0.0084	0.0916	0.0324	10.9388
2	Form Sed	0.0070	0.0835	0.0295	9.4031
3	Lower Johnson	0.0170	0.1304	0.0583	15.9005
4	Lower Sherman	0.0127	0.1126	0.0398	12.3396
5	Lower Slate	0.0055	0.0744	0.0263	7.7301

Pass

Toxstat Version 3.5
Study #8503-125-058-(006, 008, 010)
Coeur
Hyalella azteca 10-day Sediment Test
Determination of Significant Reduction for Survival (Compared to Pooled Controls)

11/14/06
QA: AR11-16-06

File: 12558hs.dat Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's Test for Normality

D = 0.6387
W = 0.9462

Critical W = 0.9140 (alpha = 0.01 , N = 37)
W = 0.9360 (alpha = 0.05 , N = 37)

Data PASS normality test (alpha = 0.01). Continue analysis.

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 1.7504 (p-value = 0.6258)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Using Average Degrees of Freedom
(Based on average replicate size of 9.25)
Calculated B2 statistic = 2.1027 (p-value = 0.5514)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

Toxstat Version 3.5
Study #8503-125-058-(006, 008, 010)
Coeur
Hyalella azteca 10-day Sediment Test
Determination of Significant Reduction for Survival (Compared to Pooled Controls)

File: 12558hs.dat Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	0.1794	0.0598	3.0893
Within (Error)	33	0.6387	0.0194	
Total	36	0.8180		

(p-value = 0.0404)

Critical F = 4.4368 (alpha = 0.01, df = 3,33)
= 2.8916 (alpha = 0.05, df = 3,33)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS t STAT	SIG 0.05
1	GRPS 1&2 POOLED	1.2017	0.8625		
2	Lower Johnson	1.1501	0.8200	0.7240	
3	Lower Sherman	1.2806	0.9125	-1.3090	
4	Lower Slate	1.3535	0.9625	-2.5205	

Bonferroni t critical value = 2.2209 (1 Tailed, alpha = 0.05, df = 3,33)

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	GRPS 1&2 POOLED	16			
2	Lower Johnson	5	0.1231	14.2	0.0425
3	Lower Sherman	8	0.1021	11.7	-0.0500
4	Lower Slate	8	0.1021	11.7	-0.1000

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
List Data for Growth, per original organism
File: 12558hg.dat Transform: NO TRANSFORMATION
Number of Groups: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Sand Cont	1	0.0390	0.0390
1	Sand Cont	2	0.0290	0.0290
1	Sand Cont	3	0.0520	0.0520
1	Sand Cont	4	0.0540	0.0540
1	Sand Cont	5	0.0490	0.0490
1	Sand Cont	6	0.0440	0.0440
1	Sand Cont	7	0.0430	0.0430
1	Sand Cont	8	0.0180	0.0180
2	Form Sed	1	0.0190	0.0190
2	Form Sed	2	0.0040	0.0040
2	Form Sed	3	0.0260	0.0260
2	Form Sed	4	0.0270	0.0270
2	Form Sed	5	0.0044	0.0044
2	Form Sed	6	0.0080	0.0080
2	Form Sed	7	0.0290	0.0290
3	Lower Johnson	1	0.0140	0.0140
3	Lower Johnson	2	0.0340	0.0340
3	Lower Johnson	3	0.0110	0.0110
3	Lower Johnson	4	0.0250	0.0250
3	Lower Johnson	5	0.0340	0.0340
4	Lower Sherman	1	0.0450	0.0450
4	Lower Sherman	2	0.0470	0.0470
4	Lower Sherman	3	0.0380	0.0380
4	Lower Sherman	4	0.0300	0.0300
4	Lower Sherman	5	0.0360	0.0360
4	Lower Sherman	6	0.0430	0.0430
4	Lower Sherman	7	0.0380	0.0380
4	Lower Sherman	8	0.0520	0.0520
5	Lower Slate	1	0.0580	0.0580
5	Lower Slate	2	0.0860	0.0860
5	Lower Slate	3	0.0620	0.0620
5	Lower Slate	4	0.0470	0.0470
5	Lower Slate	5	0.0660	0.0660
5	Lower Slate	6	0.0760	0.0760
5	Lower Slate	7	0.0540	0.0540
5	Lower Slate	8	0.0470	0.0470

Page 6F

4/11/16
QA: AR1121-06

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Summary of Growth, per original organism

File: 12558hg.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Sand Cont	8	0.0180	0.0540	0.0410
2	Form Sed	7	0.0040	0.0290	0.0168
3	Lower Johnson	5	0.0110	0.0340	0.0236
4	Lower Sherman	8	0.0300	0.0520	0.0411
5	Lower Slate	8	0.0470	0.0860	0.0620

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Sand Cont	0.0001	0.0122	0.0043	29.7864
2	Form Sed	0.0001	0.0111	0.0042	66.1004
3	Lower Johnson	0.0001	0.0108	0.0048	45.8920
4	Lower Sherman	0.0000	0.0070	0.0025	16.9685
5	Lower Slate	0.0002	0.0137	0.0049	22.1318

Pg 1 of 2

Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Comparing Control Sediments to Determine Significant Difference for Growth, per original organism

11/21/06
QA: Apr 11-21-06

File: 12558hg.dat Transform: NO TRANSFORMATION

t-Test of Solvent and Blank Controls Ho: GRP1 Mean = GRP2 Mean

GRP1 (Solvent cntl) Mean =	0.0410	Calculated t value =	3.9992
GRP2 (Blank cntl) Mean =	0.0168	Degrees of freedom =	13
Difference in means =	0.0242		

2-sided t value (0.05,13) = 2.1604** Significant difference at alpha=0.05
2-sided t value (0.01,13) = 3.0123** Significant difference at alpha=0.10

WARNING: This procedure assumes normality and equal variances!

GRP1 = Sand Control
GRP2 = Form. Sed.

Pass SD

8/11/2006
QA: 11-21-06

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Determination of Significant Reduction for Growth, per original organism
(compared to the sand control)

File: 12558hg.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0032
W = 0.9870

Critical W = 0.8980 (alpha = 0.01 , N = 29)
W = 0.9260 (alpha = 0.05 , N = 29)

Data PASS normality test (alpha = 0.01). Continue analysis.

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 2.9165 (p-value = 0.4047)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Using Average Degrees of Freedom
(Based on average replicate size of 7.25)
Calculated B2 statistic = 2.5098 (p-value = 0.4735)
Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

Page of

8/11/06
ACZ11-2106

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Determination of Significant Reduction for Growth, per original organism
(compared to the sand control)
File: 12558hg.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	0.0048	0.0016	12.6365
Within (Error)	25	0.0032	0.0001	
Total	28	0.0080		

(p-value = 0.0000)

Critical F = 4.6755 (alpha = 0.01, df = 3,25)
= 2.9912 (alpha = 0.05, df = 3,25)
Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Sand Cont	0.0410	0.0410		
2	Lower Johnson	0.0236	0.0236	2.7096	*
3	Lower Sherman	0.0411	0.0411	-0.0222	
4	Lower Slate	0.0620	0.0620	-3.7286	

Bonferroni t critical value = 2.2523 (1 Tailed, alpha = 0.05, df = 3,25)

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Sand Cont	8			
2	Lower Johnson	5	0.0145	35.3	0.0174
3	Lower Sherman	8	0.0127	30.9	-0.0001
4	Lower Slate	8	0.0127	30.9	-0.0210

4/11/2006
QA: AK11-21-06

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
List Data for Growth, per surviving organism
File: 12558hgs.dat Transform: NO TRANSFORMATION
Number of Groups: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Sand Cont	1	0.0440	0.0440
1	Sand Cont	2	0.0320	0.0320
1	Sand Cont	3	0.0590	0.0590
1	Sand Cont	4	0.0600	0.0600
1	Sand Cont	5	0.0610	0.0610
1	Sand Cont	6	0.0490	0.0490
1	Sand Cont	7	0.0610	0.0610
1	Sand Cont	8	0.0260	0.0260
2	Form Sed	1	0.0210	0.0210
2	Form Sed	2	0.0044	0.0044
2	Form Sed	3	0.0260	0.0260
2	Form Sed	4	0.0340	0.0340
2	Form Sed	5	0.0050	0.0050
2	Form Sed	6	0.0100	0.0100
2	Form Sed	7	0.0290	0.0290
3	Lower Johnson	1	0.0200	0.0200
3	Lower Johnson	2	0.0480	0.0480
3	Lower Johnson	3	0.0140	0.0140
3	Lower Johnson	4	0.0250	0.0250
3	Lower Johnson	5	0.0380	0.0380
4	Lower Sherman	1	0.0500	0.0500
4	Lower Sherman	2	0.0470	0.0470
4	Lower Sherman	3	0.0380	0.0380
4	Lower Sherman	4	0.0430	0.0430
4	Lower Sherman	5	0.0450	0.0450
4	Lower Sherman	6	0.0430	0.0430
4	Lower Sherman	7	0.0380	0.0380
4	Lower Sherman	8	0.0580	0.0580
5	Lower Slate	1	0.0580	0.0580
5	Lower Slate	2	0.0860	0.0860
5	Lower Slate	3	0.0620	0.0620
5	Lower Slate	4	0.0590	0.0590
5	Lower Slate	5	0.0660	0.0660
5	Lower Slate	6	0.0760	0.0760
5	Lower Slate	7	0.0600	0.0600
5	Lower Slate	8	0.0470	0.0470

Page of

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Summary of Growth, per suriving organism

QA: NC11-21-06

File: 12558hgs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Sand Cont	8	0.0260	0.0610	0.0490
2	Form Sed	7	0.0044	0.0340	0.0185
3	Lower Johnson	5	0.0140	0.0480	0.0290
4	Lower Sherman	8	0.0380	0.0580	0.0453
5	Lower Slate	8	0.0470	0.0860	0.0643

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Sand Cont	0.0002	0.0139	0.0049	28.3624
2	Form Sed	0.0001	0.0120	0.0045	65.0017
3	Lower Johnson	0.0002	0.0138	0.0062	47.6561
4	Lower Sherman	0.0000	0.0066	0.0023	14.5516
5	Lower Slate	0.0001	0.0120	0.0042	18.6167

Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Comparing Control Sediments to Determine Significant Difference for Growth, per surviving organism

4/11/06
QA: NR11-2106

File: 12558hgs.dat Transform: NO TRANSFORMATION

t-Test of Solvent and Blank Controls Ho: GRP1 Mean = GRP2 Mean

==========

GRP1 (Solvent cntl) Mean = 0.0490 Calculated t value = 4.5135
GRP2 (Blank cntl) Mean = 0.0185 Degrees of freedom = 13
Difference in means = 0.0305

==========

2-sided t value (0.05,13) = 2.1604** Significant difference at alpha=0.05
2-sided t value (0.01,13) = 3.0123** Significant difference at alpha=0.10

WARNING: This procedure assumes normality and equal variances!

GRP1 = SAND CONTROL
GRP2 = FORM. SED.

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Determination of Significant Reduction for Growth, per surviving organism
(compared to the sand control)

8/11/2006
QA: A2117-21-06

File: 12558hgs.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.0034
W = 0.9722

Critical W = 0.8980 (alpha = 0.01 , N = 29)
W = 0.9260 (alpha = 0.05 , N = 29)

Data PASS normality test (alpha = 0.01). Continue analysis.

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 3.7233 (p-value = 0.2929)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Using Average Degrees of Freedom
(Based on average replicate size of 7.25)

Calculated B2 statistic = 3.3262 (p-value = 0.3440)
Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

Page of

8/11/2006
QA: A0211-21-06

Toxstat Version 3.5
Study #8503-125-058-(006, 008 ,010)
Coeur
Hyalella azteca 10-day Sediment Test
Determination of Significant Reduction for Growth, per surviving organism
(compared to the sand control)
File: 12558hgs.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	0.0040	0.0013	9.6726
Within (Error)	25	0.0034	0.0001	
Total	28	0.0074		

(p-value = 0.0002)

Critical F = 4.6755 (alpha = 0.01, df = 3,25)
= 2.9912 (alpha = 0.05, df = 3,25)
Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Sand Cont	0.0490	0.0490		
2	Lower Johnson	0.0290	0.0290	2.9990	*
3	Lower Sherman	0.0453	0.0453	0.6411	
4	Lower Slate	0.0643	0.0643	-2.6073	

Bonferroni t critical value = 2.2523 (1 Tailed, alpha = 0.05, df = 3,25)

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Sand Cont	8			
2	Lower Johnson	5	0.0150	30.7	0.0200
3	Lower Sherman	8	0.0132	26.9	0.0037
4	Lower Slate	8	0.0132	26.9	-0.0153

APPENDIX D

Analytical Data

Thursday, October 05, 2006

Analytical Laboratory

Dave Pillard
ENSR
4303 W. LaPorte Ave
Fort Collins, CO 80521

RE: ENSR-FCETL

Work Order: 0608219

Dear Richard Thorp:

MSE-TA Analytical Laboratory received 6 sample(s) on 8/29/2006 for the analyses presented in the following report.

Please find enclosed revised analytical results for the sample(s) received at the MSE-TA Laboratory. The "%Sand/Silt/Clay" values were calculated incorrectly, leading to incorrect "Texture" determinations. The values have been correctly calculated and revised in the attached report. I'm sorry for any confusion this revision may cause.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Gary F. Wyss
Laboratory Manager
406-494-7222

Enclosure

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-001

Client Sample ID: 19793
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS		**SW6010B**		**SW3050B**		Analyst: **HC**
Aluminum	14900	9.00		mg/Kg	1	10/2/2006
Chromium	27.3	4.00		mg/Kg	1	10/2/2006
Copper	61.9	0.600		mg/Kg	1	10/2/2006
Nickel	41.7	5.00		mg/Kg	1	10/2/2006
Silver	ND	1.00		mg/Kg	1	10/2/2006
Zinc	177	2.00		mg/Kg	1	10/2/2006
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**E200.8**		Analyst: **SW**
Arsenic	18.5	0.096		mg/Kg-dry	1	9/19/2006
Cadmium	0.646	0.019		mg/Kg-dry	1	9/19/2006
Lead	11.6	0.019		mg/Kg-dry	1	9/19/2006
Selenium	1.50	0.193		mg/Kg-dry	1	9/19/2006
MERCURY IN SEDIMENT - SW846 7471B		**E245.5**		**SW7471A**		Analyst: **KJ**
Mercury	0.0148	0.0315	J	mg/Kg-dry	1	9/13/2006
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**				Analyst: **HC**
TOC	0.3	0.1		%	1	9/27/2006
PARTICLE SIZE DETERMINATION		**ASTMD422**				Analyst: **HC**
% Clay	22.0	0		%	1	9/28/2006
% Sand	18.0	0		%	1	9/28/2006
% Silt	60.0	0		%	1	9/28/2006
Texture	SILT LOAM	0		%	1	9/28/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-004

Client Sample ID: 19794
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE		**AVS-SEM**				Analyst: **CR**
Sulfide	ND	0.50		umoles/g	1	9/6/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-002

Client Sample ID: 19796
Collection Date: 8/16/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS		**SW6010B**		**SW3050B**		Analyst: **HC**
Aluminum	17200	9.00		mg/Kg	1	10/2/2006
Chromium	55.4	4.00		mg/Kg	1	10/2/2006
Copper	113	0.600		mg/Kg	1	10/2/2006
Nickel	37.3	5.00		mg/Kg	1	10/2/2006
Silver	ND	1.00		mg/Kg	1	10/2/2006
Zinc	121	2.00		mg/Kg	1	10/2/2006
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**E200.8**		Analyst: **SW**
Arsenic	27.7	0.096		mg/Kg	1	9/19/2006
Cadmium	0.366	0.019		mg/Kg	1	9/19/2006
Lead	12.0	0.019		mg/Kg	1	9/19/2006
Selenium	1.26	0.192		mg/Kg	1	9/19/2006
MERCURY IN SEDIMENT - SW846 7471B		**E245.5**		**SW7471A**		Analyst: **KJ**
Mercury	0.157	0.0311		mg/Kg-dry	1	9/13/2006
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**				Analyst: **HC**
TOC	1.4	0.1		%	1	9/27/2006
PARTICLE SIZE DETERMINATION		**ASTMD422**				Analyst: **HC**
% Clay	8.00	0		%	1	9/28/2006
% Sand	70.0	0		%	1	9/28/2006
% Silt	22.0	0		%	1	9/28/2006
Texture	SANDY LOAM	0		%	1	9/28/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-005

Client Sample ID: 19798
Collection Date: 8/16/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE		**AVS-SEM**				Analyst: **CR**
Sulfide	ND	0.50		umoles/g	1	9/6/2006

Review _____

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-003

Client Sample ID: 19797
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS		**SW6010B**		**SW3050B**		Analyst: **HC**
Aluminum	13200	9.00		mg/Kg	1	10/2/2006
Chromium	42.0	4.00		mg/Kg	1	10/2/2006
Copper	31.4	0.600		mg/Kg	1	10/2/2006
Nickel	36.4	5.00		mg/Kg	1	10/2/2006
Silver	ND	1.00		mg/Kg	1	10/2/2006
Zinc	83.2	2.00		mg/Kg	1	10/2/2006
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**E200.8**		Analyst: **SW**
Arsenic	5.75	0.096		mg/Kg	1	9/19/2006
Cadmium	0.204	0.019		mg/Kg	1	9/19/2006
Lead	5.47	0.019		mg/Kg	1	9/19/2006
Selenium	0.466	0.192		mg/Kg	1	9/19/2006
MERCURY IN SEDIMENT - SW846 7471B		**E245.5**		**SW7471A**		Analyst: **KJ**
Mercury	0.112	0.0348		mg/Kg-dry	1	9/13/2006
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**				Analyst: **HC**
TOC	2.0	0.1		%	1	9/27/2006
PARTICLE SIZE DETERMINATION		**ASTMD422**				Analyst: **HC**
% Clay	8.00	0		%	1	9/28/2006
% Sand	76.0	0		%	1	9/28/2006
% Silt	16.0	0		%	1	9/28/2006
Texture	SANDY LOAM	0		%	1	9/28/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-006

Client Sample ID: 19799
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE		**AVS-SEM**				Analyst: **CR**
Sulfide	ND	0.50		umoles/g	1	9/6/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

FCETL QA Form No.131
Revision 0
Effective 10/06

QA: MC 10-20-06

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 8503125058(006-011)

TARE: Date/time: 9/21/06 @ 1400 Analyst: [signature]

DRY GROSS: Date/time: 9/25/06 @ 1520 Analyst: [signature]

Analytical Balance ID: AND#1

ASHED GROSS: Date/time: 9/26/06 @ 1100 Analyst: [signature]

Dried in Oven # 3 from Date: 9/21/06 Time: 1420
Oven °C: 103 to Date: 9/25/06 Time: 1410

Ashed in Furnace from Date: 9/25/06 Time: 1525
Furnace °C: 550 to Date: 9/26/06 Time: 1240

Dish No.	Treatment	Rep	Tare Weight of Dish (g) A	Dish + Wet Sample (g) B	Dry Gross Weight (g) (dish + dry sample) C	% Total Solids (g) [(C-A)(100)]/(B-A)	Ashed Gross Weight (dish + sample)(g) D	% Total Volatile Solids (g) [(C-D)(100)]/(C-A)
Blank A	#19796		12.1409	25.3766	29.7024	69.5959	29.0701	3.595
2A	#19793		12.3630	37.5335	27.0903	59.4704	26.8699	1.430
3A	#19793	dup	10.4475	35.5145	24.9476	57.8454	24.7265	1.5248
4A	#19793	dup	10.7728	36.7870	25.8283	57.8742	25.5891	1.5898
5A	#19797		12.0064	37.4198	29.7071	69.6510	28.8868	4.6343
Blank	1A		12.4274		12.4274		12.4276	

[1] Add in weight loss of blank boat, if appropriate. [signature] 10/20/06

APPENDIX 1B: TOXICITY LAB REPORT FOR *Chironomus tentans*

ENSR | AECOM

Report of Short-Term Toxicity of Whole Sediment to *Chironomus tentans*

Coeur Alaska Inc.
Kensington Mine
Juneau, AK

September 2006
Document Number 08503-125-058-(007, 009, 011)

ENSR | AECOM

Report of Short-Term Toxicity of Whole Sediment to Chironomus tentans

Project IDs: 08503-125-058-(007, 009, 011)
September 2006

Sponsor and Laboratory Information

Sponsor	Coeur Alaska Inc. Kensington Mine 3031 Clinton Drive Suite 202 Juneau, Alaska 99801
Project Officer	John Randolph (907) 789-1591
Testing Facility	ENSR Fort Collins Environmental Toxicology Laboratory 4303 West LaPorte Ave. Fort Collins, CO 80521 Fax: (970) 490-2963 State of Florida NELAP Laboratory ID: E87972
Study Director	David A. Pillard (970) 416-0916, ext. 310

Test Information

Test	Short-term chronic screening toxicity test of sediment	
Basis	USEPA (2000) and ASTM (2001)	
Test Protocol	CT3AK.TIE058.003	
Test Period	September 1, 2006 @ 1400 to September 11, 2006 @ 1100	
Test Length	10 days	
Species	*Chironomus tentans*	
Test Material	Whole sediment	
Sediment ID	Sample ID	ENSR Laboratory ID
	Lower Johnson	19793
	Lower Sherman	19796
	Lower Slate	19797
Control Sediments	Silica Sand and Laboratory Formulated Sediment	
Overlying water	Moderately hard reconstituted water prepared according to USEPA (2002), augmented with approximately 50 mg/L Cl^- (as NaCl)	
Test Concentrations	0 (control) and 100% of each test sediment	

Sediment Collection and Receipt

Sample ID	Collection Date and Time	ENSR No.	Date of Receipt	Temp. at Arrival (°C)
Lower Johnson	08/17/06 @ 1500	19793	8/23/06	14
Lower Sherman	08/16/06 @ unknown	19796	8/23/06	14
Lower Slate	08/17/06 @ 1300	19797	8/23/06	14

Note: See Appendix A for copies of chain of custody records

Control Sediment

The primary control sediment was silica sand, obtained from a local commercial supplier. A second control sediment, with a smaller grain size and higher organic matter content, was prepared in the laboratory. The composition of the formulated sediment is given in the following table (Kemble et al. 1999).

Composition of Laboratory Formulated Sediment (Control)

Material	Source	Pre-Treatment	Weight (g)
White Quartz Sand	U.S. Silica. Berkely Springs, West Virginia.	Rinsed with gentle mixing in Horsetooth water until water ran clear, then rinsed for 5 min with Milli-Q water. Air dried or dried in oven.	1242
Silt/Clay (ASP400)	Mozel, St. Louis, MO. Distributor = Englehardt	None	219
Dolomite	Grey Rock Clay Center, Ft. Collins	None	7.5
α-cellulose	Sigma	None	77.3
Humic Acid	Fluka	None	0.15
Total			1545.95

Test Sediment Preparation

Sample ID	Date Homogenized	Time Homogenized
19793	August 31, 2006	1750-1753
19796		1335-1338
19797		1425-1428

Test Conditions

Test Type	Static sediment with continuous replacement of overlying water
Test Duration	10 days
Overlying Water Delivery System	Continuous renewal (flow-through) [a]
Test Endpoints	Survival, AFDW[b] per original and surviving organism
Test Chambers	500 ml glass beakers
Test Sediment Volume	100 ml
Overlying Water Volume	175 ml
Replicates per Treatment	8[c]
Organisms per Replicate	10
Test Temperature	23 ± 1°C; see Protocol Deviations
Lighting	Fluorescent, 16 hours light:8 hours dark
Chamber Placement	Randomized
Test Sediment Renewal	None
Test Overlying Water Renewal	Approximately two volume additions per test chamber per day

[a] Continuous replacement via a drip system
[b] Ash-Free Dry Weight
[c] There were only 5 replicates for the Lower Johnson sample; see Protocol Deviations
Note: See Appendix B for the Test Protocol

Test Organism

From the lot of *Chironomus tentans* received for use in the test, 20 were collected, preserved, and used to determine head capsule widths. The mean head capsule width of lot 06-035 was 0.371 mm. All organisms were, therefore, third instars according to the range given in USEPA (2000).

Species and Lot Number	*Chironomus tentans*, Lot 06-035
Age	3rd instar
Source	Aquatic BioSystems (ABS), Fort Collins, CO
Overlying Water	Moderately Hard Reconstituted Water with added chloride (52 mg/L) as NaCl, RW # 7856
Reference Toxicant Testing	Initiated September 1, 2006 using sodium chloride (NaCl)

TEST RESULTS

Biological Data – Survival and Ash Free Dry Weights

Sample ID	Percent Survival[a]	Ash Free Dry Weight (mg)[a]	
		Per original organism	Per surviving organism
Sand Control	88.75	0.9496	1.0778
Lab. Formulated Sediment	87.5	1.3233	1.5327
Lower Johnson	86.0	0.8678	1.0260
Lower Sherman	82.5	1.0602	1.2876
Lower Slate	85.0	1.1009	1.3081
Control Performance	Acceptable	N/A	N/A

[a] Samples were compared to the sand control
Note: See Appendix C for test data sheets

Data Analysis

Survival and growth data for field collected-samples were compared to the sand control data to determine statistical differences. AFDW (per original and per surviving) for the laboratory controls (sand and laboratory formulated sediment) was first compared using a t-test (α=0.05). AFDW (per original and per surviving) for the two laboratory controls was significantly different; therefore, test sediments were only compared to the sand control.

Biological Endpoint	Comparison	Procedure
Survival	Normality	N/A
	Homogeneity of Variance	N/A
	Significant Reduction Relative to the Pooled Control	Inspection
Growth (AFDW per Original Organism)	Normality[a]	Shapiro-Wilk's Test (α=0.01)
	Homogeneity of Variance[a]	Bartlett's Test (α=0.01)
	Significant Reduction Relative to the Sand Control [a]	Bonferroni t-Test (α = 0.05)
Growth (AFDW per Surviving Organism)	Normality[a]	Shapiro-Wilk's Test (α=0.01)
	Homogeneity of Variance[a]	Bartlett's Test (α=0.01)
	Significant Reduction Relative to the Sand Control [a]	Bonferroni t-Test (α = 0.05)

[a] Using Toxstat Version 3.5 (WEST, Inc. and Gulley 1996)

Analytical Data

Total Metals (mg/Kg)[a]	Sample ID		
	Lower Johnson	Lower Sherman	Lower Slate
Aluminum	14900	17200	13200
Chromium	27.3	55.4	42.0
Copper	61.9	113	31.4
Nickel	41.7	37.3	36.4
Silver	ND (<1.00)	ND (<1.00)	ND (<1.00)
Zinc	177	121	83.2
Metals, Solid Samples (mg/Kg-dry)[b]			
Arsenic	18.5	27.7	5.75
Cadmium	0.646	0.366	0.204
Lead	11.6	12.0	5.47
Selenium	1.50	1.26	0.466
Mercury	0.0148[d]	0.157	0.112
Particle Size (%)[c]			
Clay	22.0	8.0	8.0
Sand	18.0	70.0	76.0
Silt	60.0	22.0	16.0
Texture	Silt Loam	Sandy Loam	Sandy Loam
TOC[e] (%)	0.3	1.4	2.0
Acid Volatile Sulfide (umoles/g)	ND (<0.50)	ND (<0.50)	ND (<0.50)

[a] Total metals were determined using SW-846 Method 6010B (USEPA 1986).
[b] Metals (solid sample analysis) were determined using SW-846 Method 6020 (USEPA 1986), except mercury which used Method 7471A
[c] Particle size was determined using ASTM Method D422
[d] Analyte detected below the Reporting Limit
[e] TOC was determined using the Organic Matter-Walkley Black Method
ND = Not Detected at the method detection limit
Note: See Appendix D for a copy of the report from the analytical laboratory (MSE-TA Analytical Laboratory, Butte, MT)

Percent Total Solids and Percent Total Volatile Solids

Sample ID	Percent Total Solids	Percent Total Volatile Solids
Lower Johnson	58.47	1.43
Lower Johnson (duplicate)	57.84	1.52
Lower Johnson (duplicate)	57.87	1.59
Lower Sherman	69.58	3.60
Lower Slate	69.65	4.63

Note: See Appendix D for data sheets (these parameters were determined at ENSR/FCETL)

Physical and Chemical Data

Sample ID	pH (units)	DO (mg/L)	Conductivity (µS/cm)	Temperature (°C)[a]	Ammonia as N (mg/L)	Hardness (mg/L as $CaCO_3$)	Alkalinity (mg/L as $CaCO_3$)
Sand Control	7.6-8.2	5.3-6.9	529-552	21-25	<1.0-1.0	92-98	66-70
Lab. Form. Sed.	7.5-8.0	4.2-6.9	597-629	21-25	<1.0	108-130	82-101
Lower Johnson	7.8-8.1	5.2-6.8	520-535	21-25	<1.0	118-122	82-86
Lower Sherman	7.4-7.8	4.3-6.5	515-517	21-25	<1.0-1.4	104-118	71-79
Lower Slate	7.3-7.6	4.5-6.3	473-544	21-25	<1.0-2.2	100-110	57-71

[a] Temperature in test chambers; see Protocol Deviations

Reference Toxicant Test Results for *C. tentans*

Organism Lot Number	Test Dates	96-Hour LC_{50}	ENSR/FCETL Historical 95% Control Limits	
			Low	High
06-035	September 1 to 5, 2006	5749	4399	6519

Note: Values are expressed as mg/L chloride

Protocol Deviations

Temperature as measured directly in overlying water was 21°C on day 2 and 25°C on day 5 for all the treatments, outside the range specified in the protocol (23±1°C). Temperature was within the range specified by the protocol on all other days of the test. The impact of this deviation on test outcome is unknown.

Bath temperature (continuously measured) ranged from 22.6 to 24.4°C during testing. Some of the higher temperatures slightly exceeded the upper limit of 24°C specified in the protocol. The water bath temperatures do not necessarily represent test chamber temperature, therefore the slightly warmer temperatures measured in the water bath should not be considered to be deviations from the protocol.

The sediment received from the Lower Johnson was received as a slurry (high water content) and was centrifuged to separate the sediment from the water prior to testing. After centrifuging the sample, there was enough sediment for 5 replicates, instead of 8 as specified in the protocol. The impact of this deviation on test outcome is unknown. To the best of the Study Director's knowledge, no further deviations from the test protocol occurred during these studies.

References

ASTM. 2001. Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates: Procedure 2: Conducting a 10-day Sediment Toxicity Test with *Chironomus tentans*. Method E 1706-00 In 2001 Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.05, Biological Effects and Environmental Fate; Biotechnology: Pesticides. American Society of Testing and Materials. Conshohocken, PA.

Kemble, N.E., F.J. Dwyer, C.G. Ingersoll, T.D. Dawson, and T.J. Norberg-King. 1999. Tolerance of Freshwater Test Organisms to Formulated Sediments for Use as Control Materials in Whole-Sediment Toxicity Test. *Environ. Toxicol. Chem.* 18:222-230.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012.

USEPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. EPA/600/R-99/064.

USEPA. 1986. Test Methods for Evaluating Solid Waste. Third Edition. SW-846.

WEST, Inc. and D.D. Gulley. 1996. Toxstat Version 3.5. Western EcoSystems Technology, Inc., Cheyenne, WY.

Statement of Procedural Compliance

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge, accurate and complete.

D A. Pillard 1 Nov 2006

David A. Pillard, Ph.D. Date
Study Director

Statement of Quality Assurance

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with standard operating procedures, and that the resulting data and report meet the requirements of the NELAC standards. This report is an accurate reflection of the raw data.

Quita Relmer November 2, 2006

Quality Assurance Unit Date

APPENDIX A

Chain of Custody

ENSR INTERNATIONAL

CHAIN OF CUSTODY RECORD

Page ____ of ____

Client/Project Name: COEUR ALASKA

Project Location: ENSR/FCTL

Project Number: 0806 SEDTOX

Field Logbook No.:

Sampler (Print Name)/(Affiliation): JOHN RANDOLPH - COEUR

Chain of Custody Tape No.: 30059 (Intact @ receipt)

Signature:

Send Results/Report to: JOHN RANDOLPH - 907-523-3311

Field Sample No./ Identification	Date	Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	Field Filtered	Analysis Requested: TOXICITY	METALS ETC	SULPHIDE					Lab I.D.	Remarks
LOWER SHERMAN Sediment	8-16	—	X		(4L) nalgene	SEDIMENT	COOL		X	X						19796	
LOWER SLATE Sediment	8-17	13:00	X		(4L) nalgene	SEDIMENT	COOL		X	X						19797	
LOWER SHERMAN	8-16		X		100 ml glass	"	"				X					19798	
LOWER SLATE	8-17	13:00	X		100 ml glass	"	"				X					19799	

Relinquished by: (Print Name)/(Affiliation)	Date	Received by: (Print Name)/(Affiliation)	Date
E. FLORY - COEUR	8-22-06	John Randolph - Coeur	9/22/06
Signature: E Flory	Time: 11:00	Signature: John Randolph	Time: 1130
Relinquished by: (Print Name)/(Affiliation) John Randolph	Date: 8/22/06	Received by: (Print Name)/(Affiliation) David Pillard	Date: 8/23/06
Signature: John Randolph	Time: 12:30	Signature: D L Pillard	Time: 1650
Relinquished by: (Print Name)/(Affiliation)	Date:	Received by: (Print Name)/(Affiliation)	Date:
Signature:	Time:	Signature:	Time:

Analytical Laboratory (Destination):

Temp = 14°C (Cooler temp)

Right-Away Courier Fr Goldstreak

ENSR Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 493-8935 (FAX)

Serial No. 46941

FM01008b_902

CHAIN OF CUSTODY RECORD

ENSR INTERNATIONAL

Page ____ of ____

Client/Project Name: COEUR ALASKA

Project Location: ENSR/FCGTL

Project Number: 0806SEDTOX

Field Logbook No.:

Sampler (Print Name)/(Affiliation): JOHN RANDOLPH

Chain of Custody Tape No.: 30037 (Intact @ Receipt)

Signature:

Send Results/Report to: JOHN RANDOLPH - 967-523-3311

Analysis Requested

Field Sample No./ Identification	Date	Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid, Sludge, Etc.)	Preservative	Field Filtered	Toxicity	Metals	etc	Sulphide					Lab I.D.	Remarks
LOWER JOHNSON Sediment SX	8-17	1500	X		(4L) nalgene	SEDIMENT	ICE		X	X							19793	
LOWER JOHNSON Sediment SX	"	"	X		(4L) nalgene	"			X	X								
LOWER JOHNSON Sediment SX	"	"	X		(4L) nalgene	"			X	X								
LOWER JOHNSON SEDIMENT SX	"	"	X		4L nalgene	"			X	X								
LOWER JOHNSON	"	"	X		100 ml glass	"					X						19794	
LOWER JOHNSON	"	"	X		100 ml glass	"					X						19795	

Relinquished by: (Print Name)/(Affiliation) E. FLORY - COEUR
Date: 8-22-06
Time: 11:00
Signature:

Received by: (Print Name)/(Affiliation) John Randolph - Coeur
Date: 8/23/06
Time: 1130
Signature:

Relinquished by: (Print Name)/(Affiliation) John Randolph - Coeur
Date: 8/23/06
Time: 1230
Signature:

Received by: (Print Name)/(Affiliation) David Pillard
Date: 8/23/06
Time: 1650
Signature:

Relinquished by: (Print Name)/(Affiliation)
Date:
Time:
Signature:

Received by: (Print Name)/(Affiliation)
Date:
Time:
Signature:

Analytical Laboratory (Destination):
14°C #22 (cooler temp)

Right Away Courier From Goldstreak

ENSR Toxicology Lab
4303 W. Laporte Avenue
Fort Collins, CO 80521
(970) 416-0916
(970) 493-8935 (FAX)

Serial No. 46940

FM.01008b_902

APPENDIX B

Test Protocol

Title: Short-Term Chronic Toxicity of Bulk Sediment to the Midge, *Chironomus tentans*.

Study Sponsor:	Coeur Alaska Inc. Kensington Mine 3031 Clinton Drive Suite 202 Juneau, Alaska 99801 Phone: (907) 789-1591 John Randolph
Testing Facility	Fort Collins Environmental Toxicology Laboratory 4303 West LaPorte Avenue Fort Collins, Colorado 80521 Phone: (970) 416-0916, Ext. 310 Fax: (970) 490-2963 Project Manager/Study Director: David Pillard, Ph.D.

1.0 INTRODUCTION

1.1 Objective

To determine the short-term chronic toxicity of sediment samples to the midge, *Chironomus tentans*.

1.2 Test Substance

The sediment samples will be collected by the Study Sponsor or an agent of the Study Sponsor and shipped to ENSR's Fort Collins Laboratory. At the laboratory, sediment samples will be stored under refrigeration (4°C) until used in testing. Each sample will be mechanically homogenized prior to use in testing (ENSR SOP #5208). Endemic organisms observed in the sediment will be removed manually.

2.0 BASIS AND TEST ORGANISM

2.1 Basis

This protocol is based on USEPA (2000) guidelines and ASTM Method E 1706-00 (ASTM 2001).

2.2 Test Organism

1. Species - *Chironomus tentans*
2. Age - *Chironomus tentans* will be 2nd to 3rd instar (approximately 10 days). Age will be confirmed by measuring the head capsule width on a minimum of 20 organisms selected from the test population.
3. Source - Test organisms will be obtained from a commercial supplier.
4. Feeding - *Chironomus tentans* will be fed 1.5 ml of a 4 g dry solids/L (4,000 mg/1) Tetrafin® suspended in moderately hard water per exposure chamber daily.

3.0 TEST SYSTEM

3.1 Overlying Water

The overlying water used in the toxicity test will be laboratory moderately hard reconstituted water augmented prepared according to USEPA (2002), but augmented with 50 mg/L Cl^-.

3.2 Test Temperature

Test temperature will be 23 ± 1°C. Testing will be conducted in an environmental chamber or a temperature controlled water bath.

3.3 Test Containers

Test containers will be 500-ml beakers containing 100 ml of sediment and 175 ml of overlying water.

3.4 Photoperiod

The photoperiod will be 16-hours light and 8-hours dark.

3.5 Dissolved Oxygen Concentrations

Dissolved oxygen concentrations in the overlying water will be maintained >2.5 mg/L. If the dissolved oxygen concentration approaches this level, all test chambers will be gently aerated throughout the remainder of the test. If aeration is initiated, the aeration pipette will be appropriately positioned so as to avoid disturbance of the sediment.

3.6 Reference Toxicant Testing

In addition to the test material exposures, reference toxicant tests will be conducted using sodium chloride (NaCl) to determine the sensitivity range of the test organisms. Reference toxicant exposures will be conducted monthly or at the time of test initiation for in-house or commercially-supplied organisms. Reference toxicant testing will be performed according to USEPA (2000; 2002) methods.

4.0 TEST DESIGN

4.1 Test Treatments

The test concentration will be 100 percent of each test sediment. A 100 percent laboratory control sediment (see section 4.3) exposure will be conducted concurrently.

4.2 Sediment/Water Mixture

Sediment (100 ml) will be placed in each test chamber. After addition of sediment, 175 ml of overlying water will be poured into each beaker. The beakers will be left unaerated overnight to allow sediment to settle and to reduce turbidity prior to addition of test organisms.

4.3 Reference/Control Sediments

In addition to any field-collected reference sediment, at least one laboratory control sediment will be tested concurrently. The laboratory control sediment may be clean, field-collected sediment and/or a formulated sediment.

4.4 Number of Test Organisms

Eighty *Chironomus tentans* will be exposed to each treatment. Ten organisms will be assigned to each test chamber and eight replicates will be tested per treatment.

4.5 Test Initiation/Renewal Frequency

Testing will be initiated by addition of the test organisms after the overnight settling period. Each chamber will be renewed with approximately 2 volume additions per day, beginning on day 0 (after overlying water is characterized but before organisms are added).. This will be accomplished with either a flow-through drip system or a renewal box that can be filled with overlying water and allowed to drain into the test chambers.

4.6 Chemical and Physical Monitoring

At a minimum, the following measurements will be made:

1. Dissolved oxygen, temperature, and pH will be measured in the overlying water of each treatment and the control each day of testing.

2. Hardness, alkalinity, conductivity, and ammonia will be measured in the laboratory reconstituted water (used as overlying water) on day 0.

3. Hardness, alkalinity, conductivity, and ammonia will be measured in overlying water from each treatment at test initiation (just prior to renewal on day 0 or 1) and at test termination.

4. Ammonia will also be measured in each treatment on days 3 and 7.

4.7 Biological Monitoring

After ten days of exposure, sediment from each test chamber will be removed and sieved or sorted to recover living test organisms. Organisms not recovered at test termination will be presumed dead. Dry weight will be determined at 60-90°C for 24 hours, followed by ash-free dry weight determination (550°C for at least 2 hours).

4.8 Test Duration

Test duration will be 10 days. At test termination, the surviving organisms in each test chamber will be counted and preserved in preparation for ash-free dry weight (AFDW) determination according to ENSR SOP #5033.

4.9 Calculations

Survival data will be transformed by arcsine squareroot. Normality and homogeneity assumptions for survival data will be evaluated by the Shapiro-Wilk's test and Bartlett's test, respectively (α = 0.01). Data will then be evaluated (α = 0.05) using either parametric or nonparametric methods depending upon the outcome of the normality and homogeneity assessments.

Organism weights (AFDW) will be statistically compared in treatments not having significantly reduced survival. Analysis will occur in the same manner as for survival, although the weights will not be transformed using arcsine squareroot.

4.10 Quality Criterion

Survival in the controls should be 70 percent or greater and the mean weight per surviving control organism should be at least 0.48 mg AFDW. If mortality in one or more of the control treatments exceeds 30 percent or a mean control weight is less than 0.48 mg AFDW, then the test will be reviewed to determine if certain chemical or physical characteristics of the test sediment (e.g., low dissolved oxygen or unusual pH) may have contributed to poor survival. Upon review by ENSR and the Sponsor, test data may be found acceptable.

5.0 TEST REPORT

The report will be a typed document describing the results of the test and will be signed by the Study Director and Quality Assurance Unit. The report will include, but not be limited to, the following:

- A copy of all raw data.
- Name of test, Study Director, and laboratory, and date test was begun.
- A detailed description of the sediments, including their source, time of collection, composition, known physical or chemical properties, and any information that appears on the sample container or has been provided by the Sponsor.
- The source of the overlying water, its chemical characteristics.
- Detailed information about the test organisms, including scientific name, age, life stage, source, history, acclimation procedure, and food used.
- A description of the experimental design and the test chambers, the volume of solution in the chambers, the way the test was begun, the number of organisms per treatment, and the lighting.
- A description of any aeration performed on test solutions before or during the test.
- Definition of the criterion used to determine the effect and a summary of general observations on other effects or symptoms.
- Percentage of organisms that died or showed an effect.
- The minimum dissolved oxygen concentration, range in tests temperature and pH, all visual observations of test solutions.
- Any deviations from the protocol.

6.0 LITERATURE CITED

ASTM. 2001. Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates: Procedure 2: Conducting a 10-day Sediment Toxicity Test with *Chironomus tentans*. Method E 1706-00 In *2001 Annual Book of ASTM Standards, Section 11, Water and Environmental Technology, Volume 11.05, Biological Effects and Environmental Fate; Biotechnology: Pesticides*. American Society of Testing and Materials. Conshohocken, PA

USEPA. 2000. Methods for Measuring Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates. Second Edition. EPA/600/R-99/064.

USEPA. 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013.

7.0 PROCEDURAL COMPLIANCE

All test procedures, documentation, records, and reports will comply with USEPA (2000, 2002) general guidance on quality assurance related to effluent and sediment toxicity testing. To this end, random audits of the test may be scheduled while the test is in progress. The raw data will be checked and compared to protocol requirements and Standard Operating Procedures, and the final report will be audited for accuracy and signed, if satisfactory, by both the Study Director and an individual from the Quality Assurance Unit.

8.0 PROTOCOL AMENDMENTS AND DEVIATIONS

All changes (i.e., amendments, deviations, and final report revisions) of the approved protocol plus the reasons for the changes must be documented in writing. The changes will be signed and dated by the Study Director and maintained with the protocol. All amendments must be authorized in advance by the Sponsor.

9.0 SPONSOR AND STUDY DIRECTOR APPROVAL

Sponsor Approval: _____ Date: _____

Study Director: David A. Pillard Date: 28 Aug 2006

APPENDIX C

Data Sheets

C tentans 10-day Survival and Growth, Testing Cover Page

EA: AE10-20-06
SK 10/23/06

Project Number: 8503-125-058 - 007, 009, 011
Test Substance: Sediment
Test Species: *C. tentans* Lot #: D6-035 Age: 3rd instar Supplier: ABS
Test Type: Chronic, Static Renewal
Dilution Water: Mod Hard with 50 mg/L Chloride 7956 (52.5 mg/L) Investigators: [illegible]
Sampling Date(s): August 16, 17, 2006 Sampling Time(s):
FCETL Sample #(s): 19793, 19796, 19797
Test Initiation Date/Time: 9/1/06 @1400
Test Termination Date/Time: 9/12/06 @1100 (11)

Renewal Frequency: Cont. drip, 2+ vol/da Feeding Freq: daily Food Type/Amount: 1.5 ml 4g/L Tetrafin Test Temp: 23 +/- 1 deg C
Test Chamber Capacity: 500-ML Test Soltn. Vol: 100 mL sed/175 mL # Repl's/Trtmnt: 8
Test Duration: 10 days # Org.'s/Repl: 10 Env. Chmbr/Bath: 3

Water Characterization: Minimum of Hardness, Alkalinity, & Conductivity on days 0 and 10; Ammonia on days 0, 3, 7, and 10; No TRC; pH, temperature & DO daily on overlying water
aerate if dissolved oxygen <2.5 mg/L

Test Sediment (s):

1)	Sand (cont)	2)		Form sed (cont)	3)	19793 (Lower Johnson)	
4)	19796 (Lower Sherma	5)		19797 (Lower Slate)	6)		
7)		8)			9)		
10)		11)					

Reference Tox. Dates: 9/1/06-9/5/06 LC50: 5749 mg/L CL Hist. Limits: 4399-6519 Method: S-K
Study Director Initials: [illegible] Date: 9/7/06

Overlying water added at a minimum of 2 volume additions/day; equivalent to >350 ml/day or >0.24 ml/min

[illegible] 9/26/06 EE

QA: APP09-26-06

BIOLOGICAL DATA — *C. tentans* — Chronic, Static Renewal — Project 8503-125-058-007, -009, -011

Sediment	Test Termination	A	B	C	D	E	F	G	H	Remarks: % survival
Sand (cont)	# Surviving	8	7	9	7 (3)	10*	10	10	10	* 1 pupae 98.75%
	# Observed Dead	0	0	0	6	0	0	0	0	
	# Not Found	2	3	1	3	0	0	0	0	
Form sed (cont)	# Surviving	8	7	8	10	9	9	10	9	97.5%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	2	3	2	0	1	1	0	1	
19793 (Lower Johnson)	# Surviving	7	9 *	8 10	10	9	9			* 1 pupae 96%
	# Observed Dead	0	0	0	0	0	0			
	# Not Found	3	1	2 0	0	1	10			
19796 (Lower Sherman)	# Surviving	8	9	8	8	10	7	9	7	82.5%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	2	1	2	2	0	3	1	3	
19797 (Lower Slate)	# Surviving	8	7 *	10	6	10	9	8	10	* 1 eaten before preserving 95%
	# Observed Dead	0	0	0	0	0	0	0	0	
	# Not Found	2	3	0	4	0	1	2	0	
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									
0	# Surviving									
	# Observed Dead									
	# Not Found									

① 9/11/06 WP ② 9/11/06 E ③ 9/25/06 C

8/30/2006

UA: AR10-2006

CHEMICAL DATA (Composite of Overlying Water) *C. tentans* Chronic, Static Renewal Project: 8503-125-058-007, -009, -011

Parameter	Sediment	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day	Meter	Date	Time	Initials
Dissolved Oxygen (mg/l)	Sand (cont)	6.9	6.6	6.4	6.5	5.7	5.7	6.0	6.4	6.0	5.3	5.6	0	5	9/1/06	1400	
	Form sed (cont)	6.9	6.5	6.0	5.7	5.2	6.0	4.5	5.3	4.2	5.8	4.5	1	5	9/2/06	1540	
	19793 (Lower Johnson)	6.8	6.0	5.8	5.5	5.4	6.4	5.2	5.2	6.0	6.3	6.0	2	5	9/3/06	1410	
	19796 (Lower Sherman)	5.9	6.5	5.0	5.7	5.4	5.4	4.6	5.1	6.0	5.3	4.3	3	5	9/4/06	1440	
	19797 (Lower Slate)	6.0	6.3	5.5	5.4	5.7	5.4	4.5	4.5	4.7	4.7	4.5	4	5	9/5/06	1115	
	0												5	5	9/6/06	1020	
	0												6	5	9/7/06	0930	
	0												7	5	9/8/06	0940	
	0												8	5	9/9/06	1200	
	0												9	5	9/10/06	1405	
													10	5	9/11/06	1000	
Temp (deg C)	Sand (cont)	23	22	21	23	24	25	23	23	23	22	22	0	D-34	9/1/06	1400	
	Form sed (cont)	23	22	21	23	23	25	23	23	23	22	22	1	D32	9/2/06	1530	
	19793 (Lower Johnson)	23	22	21	23	24	25	22	23	23	22	22	2	D35	9/3/06	1410	
	19796 (Lower Sherman)	23	22	21	23	24	25	23	23	23	22	22	3	D35	9/4/06	1440	
	19797 (Lower Slate)	23	22	21	23	23	25	23	23	23	2282	22	4	D-34	9/5/06	1115	
	0												5	D-34	9/6/06	1020	
	0												6	D-31	9/7/06	0930	
	0												7	D-31	9/8/06	0940	
	0												8	D-31	9/9/06	1200	
	0												9	D-35	9/10/06	1410	
													10	D-35	9/11/06	1000	
pH	Sand (cont)	8.2	8.0	7.8	8.0	7.8	7.8	7.8	8.0	7.7	7.6	7.7	0	16	9/1/06	1400	
	Form sed (cont)	8.0	7.9	7.8	7.9	7.7	7.9	7.6	7.8	7.5	7.7	7.6	1	16	9/2/06	1540	
	19793 (Lower Johnson)	8.1	7.9	7.9	7.9	7.9	8.1	7.8	7.9	7.8	8.0	7.9	2	16	9/3/06	1410	
	19796 (Lower Sherman)	7.5	7.8	7.5	7.7	7.7	7.7	7.7	7.7	7.8	7.5	7.4	3	16	9/4/06	1440	
	19797 (Lower Slate)	7.4	7.6	7.5	7.5	7.6	7.6	7.5	7.5	7.3	7.3	7.4	4	16	9/5/06	1115	
	0												5	16	9/6/06	1020	
	0												6	16	9/7/06	0930	
	0												7	16	9/8/06	0940	
	0												8	16	9/9/06	1200	
	0												9	16	9/10/06	1400	
	Replicate		A	B	C	D	E	F	G	H	A	B	10	16	9/11/06	1000	

DMH 9/10/06

QA: A. 20 06

OVERLYING WATER CHARACTERIZATION | *C. tentans* | Chronic, Static Renewal | Project No. 8503-125-058 -007, -009, -011

	Conductivity (µs/cm)		Hardness (mg/L as CaCO3)		Alkalinity (mg/l as CaCO3)		Ammonia (mg/l)			
Sediment	Day 0	Day 10	Day 0	Day 10	Day 0	Day 10	Day 0	Day 3	Day 7	Day 10
Sand (cont)	552	529	98	92	66	70	<1.0	<1.0	<1.0	1.0
Form sed (cont)	629	597 ~~596~~	108	~~116~~ 130	82	~~88~~ 101	<1.0	<1.0	<1.0	<1.0
19793 (Lower Johnson)	520	②535	122	118	82	86	<1.0	<1.0	<1.0	<1.0
19796 (Lower Sherman)	515	517	118	104	79	71	<1.0	1.1	1.4	<1.0
19797 (Lower Slate)	473	544	100	110	57	71	<1.0	<1.0	2.2	1.1
0										
0										
0										
0										
MH+CI- 7856 0	515		98		60		<1.0 ⑧①			
Meter #	15	15	titr	titr	titr	titr	3	3	3	3
Date:	9/1/06	9/11/06	9/1/06	9/11/06	9/1/06	9/11/06	9/1/06 *	9/4/06 *	9/8/06 ▲	9/11/06 ▲
Time:	1745	1530	1745	1530	1745	1530	1530	1530	1500	1500
Initials:										

*Samples preserved on 9/4, measured on 9/5/06 and 9/1

▲ Samples preserved on 9/8, measured on 9/13/06 and 9/11

① ~~⑧ measured 9/5/06~~

①~~9/26/06~~ E

②Per KT 10-2006 CF, Conductivity day 10 Form sed = 597

QA: AR10-2004
#10623bb

DAILY TESTING LOG | *C. tentans* | Chronic, Static Renewal | Project No. 8503-125-058-007, -009, -011

Day -1	homogenized sediment and added to test chambers; added overlying water and placed into bath to settle overnight			
Day 0	started drip after adding organisms		Feeding: 1.5ml tetrafin @1700 ✱	Initials/Date: ✱ 9/1/06
Day 1	Bath CT = 22.2°C	Range = 22.2-22.6°C	Feeding: 1.5ml tetrafin @1545 ✱	Initials/Date: 9/2/06 ✱
Day 2	Bath CT = 22.2°C	Range = 22.2-22.6°C	Feeding: 1.5ml tetrafin @1420 JG.	Initials/Date: 9/3/06 JG
Day 3	Bath CT = 23.4°C	Range = 22.2-24.0°C	Feeding: 1.5ml tetrafin @1510 ✱	Initials/Date: 9/4/06 ✱
Day 4	Bath CT = 23.8°C	Range = 23.6-24.4 °C	Feeding: 1.5mL tetrafin @1130 TD	Initials/Date: TD 9/5/06
Day 5	Bath CT = 23.4°C	Range = 23.2 - 24.4 °C	Feeding: 1.5ml tetrafin @1030 ✱	Initials/Date: ✱ 9/6/06
Day 6	Bath CT = 23.0°C	Range = 22.6-23.6 °C	Feeding: 1.5 ml tetrafin @ 0945	Initials/Date: 9/7/06
Day 7	Bath CT = 23.2°C	Range = 23.0 - 24.0°C	Feeding: 1.5 ml tetrafin @ 1130	Initials/Date: 9/8/06
Day 8	Bath CT = 23.2°C	Range = 23.0 - 23.6°C	Feeding: 1.5 mL tetrafin @1215	Initials/Date: TD 9/9/06
Day 9	Bath CT = 23.2°C	Range = 23.0 - 23.6°C	Feeding: 1.5 mL tetrafin @ 1420	Initials/Date: MH 9/10/06
Day 10	Bath CT = 23.2°C	Range = 23.0-23.6°C	Feeding: none	Initials/Date: ✱ 9/11/06

8503-125-050-(007, 009, 011)

QA: Arc10-2406

EIGHT ~~TREATMENTS~~ REPLICATES FIVE ~~REPLICATES~~ TREATMENTS
RANDOM CHAMBER LOCATION "X"

	A	B	C	D	E	F	G	H
1	3B	8A	7C	1D	5D	7D	6A	3D
2	3C	8C	1B	4D	7E	1E	1C	3A
3	4A	5A	7B	3E	8E	2D	4B	5C
4	2C	6C	8D	7A	5E	6B	4C	8B
5	5B	1A	6D	6E	4E	2A	2B	2E

1 = Sand Control
2 = Formulated Sediment
3 = Lower Johnson (5 reps only)
4 = Lower Sherman
5 = Lower Slate

DB

DB 10b3b6E

8/10/23/06

QA: AR10-20-06

Length/Width of Objects Using a Micrometer

Project/Study Number: 8513-125-058	Project Name: Coeur
Study Initiation Date: 9/1/06	Species: Chironomus tentans
Source of Organisms: ABS	Organism Batch/Lot #: 06-035
Collected by: ?	Date Collected: 9/1/06
Analyzed by: ?	Date Analyzed: 9/25/06

Specimen Number	Magnif.	# of Squares	Length of One Square (mm)	Total (mm)	Remarks
1	100	5	0.07	0.35	
2	100	7	0.07	0.49	
3	100	4	0.07	0.28	
4	100	5	0.07	0.35	
5	100	5	0.07	0.35	
6	100	6	0.07	0.42	
7	100	5	0.07	0.35	
8	100	5	0.07	0.35	
9	100	5	0.07	0.35	
10	100	5	0.07	0.35	
11	100	5	0.07	0.35	
12	100	5	0.07	0.35	
13	100	5	0.07	0.35	
14	100	8	0.07	0.56	
15	100	5	0.07	0.35	
16	100	5	0.07	0.35	
17	100	6	0.07	0.42	
18	100	5	0.07	0.35	
19	100	5	0.07	0.35	
20	100	5	0.07	0.35	
Total		106	NA	7.42	
Mean		5.3	NA	0.371	

SSS 062306

QA: AM09-2606

spreadsheet for AFDW

test start date	9/1/2006	Test Substance	Sediment
Test number	8503-125-058-007, 009, 011		
Species	C. tentans	Data entered by	KT

boat #	treatment	rep	tare wt (dry) (g)	gross wt (dry) (g)	dry net wt (g)	dry adjusted net wt (g)	ashed gross wt (g)	AFDW (g)	Adjusted AFDW (g)	no orig org	AFDW mean wt per orig (mg)	AFDW mean wt per treatment (orig) (mg)	no surviving	AFDW mean wt per surviving	mean wt per (AFDW) treatment (surv) (mg)
1	Sand cont	A	2.17948	2.19028	0.01080	0.01084	2.18013	0.01015	0.01015	10	1.0150	0.9496	8	1.2687	1.0778
2	Sand cont	B	2.19982	2.20903	0.00921	0.00925	2.20093	0.00810	0.00810	10	0.8100		7	1.1571	
3	Sand cont	C	1.97075	1.98235	0.01160	0.01164	1.97295	0.00940	0.00940	10	0.9400		9	1.0444	
4	Sand cont	D	2.22818	2.23669	0.00851	0.00855	2.22921	0.00748	0.00748	10	0.7480		7	1.0686	
5	Sand cont	E	2.35708	2.36710	0.01002	0.01006	2.35797	0.00913	0.00913	9	1.0144		9	1.0144	
6	Sand cont	F	1.95055	1.96202	0.01147	0.01151	1.95174	0.01028	0.01028	10	1.0280		10	1.0280	
7	Sand cont	G	2.03169	2.04196	0.01027	0.01031	2.03251	0.00945	0.00945	10	0.9450		10	0.9450	
8	Sand cont	H	2.18222	2.19410	0.01188	0.01192	2.18314	0.01096	0.01096	10	1.0960		10	1.0960	
9	Form sed	A	1.94347	1.95906	0.01559	0.01563	1.94795	0.01111	0.01111	10	1.1110	1.3233	8	1.3887	1.5327
10	Form sed	B	2.21541	2.23382	0.01841	0.01845	2.21964	0.01418	0.01418	10	1.4180		7	2.0257	
11	Form sed	C	2.26867	2.28655	0.01788	0.01792	2.27246	0.01409	0.01409	10	1.4090		8	1.7612	
12	Form sed	D	2.37658	2.39531	0.01873	0.01877	2.38183	0.01348	0.01348	10	1.3480		10	1.3480	
13	Form sed	E	1.99159	2.00985	0.01826	0.01830	1.99651	0.01334	0.01334	10	1.3340		9	1.4822	
14	Form sed	F	2.21719	2.23463	0.01744	0.01748	2.22181	0.01282	0.01282	10	1.2820		9	1.4244	
15	Form sed	G	2.29083	2.30915	0.01832	0.01836	2.29553	0.01362	0.01362	10	1.3620		10	1.3620	
16	Form sed	H	1.96482	1.98283	0.01801	0.01805	1.96961	0.01322	0.01322	10	1.3220		9	1.4689	
Blank	A		2.35267	2.35263	-4E-05		2.35269	0.00006							

spreadsheet for AFDW

test start date	9/1/2006	Test Substance	Sediment
Test number	8503-125-058-007, 009, 011		
Species	C. tentans	Data entered by	KT

QA: AR10-20-06

boat #	treatment	rep	tare wt (dry) (g)	gross wt (dry) (g)	dry net wt (g)	dry adjusted net wt (g)	ashed gross wt (g)	AFDW (g)	Adjusted AFDW (g)	no orig org	AFDW mean wt per orig (mg)	AFDW mean wt per treatment (orig) (mg)	no surviving	AFDW mean wt per surviving	mean wt per (AFDW) treatment (surv) (mg)
25	Lower Slate	A	2.20061	2.21250	0.01189	0.01191	2.20371	0.00879	0.00879	10	0.8790	1.1009	8	1.0987	1.3081
26	Lower Slate	B	1.87903	1.88942	0.01039	0.01041	1.88161	0.00781	0.00781	9	0.8678		6	1.3017	
27	Lower Slate	C	2.11453	2.13228	0.01775	0.01777	2.11894	0.01334	0.01334	10	1.3340		10	1.3340	
28	Lower Slate	D	2.33444	2.34541	0.01097	0.01099	2.33745	0.00796	0.00796	10	0.7960		6	1.3267	
29	Lower Slate	E	2.35651	2.37398	0.01747	0.01749	2.36113	0.01285	0.01285	10	1.2850		10	1.2850	
30	Lower Slate	F	1.82773	1.84377	0.01604	0.01606	1.83242	0.01135	0.01135	9	1.2611		8	1.4188	
31	Lower Slate	G	1.84590	1.86277	0.01687	0.01689	1.85016	0.01261	0.01261	10	1.2610		8	1.5763	
32	Lower Slate	H	2.09774	2.11154	0.01380	0.01382	2.10143	0.01011	0.01011	9	1.1233		9	1.1233	
33	Lower Sherman	A	2.03558	2.05115	0.01557	0.01559	2.04038	0.01077	0.01077	10	1.0770	1.0602	8	1.34625	1.2876
34	Lower Sherman	B	1.98158	1.99745	0.01587	0.01589	1.98607	0.01138	0.01138	10	1.1380		9	1.2644	
35	Lower Sherman	C	1.98007	1.99631	0.01624	0.01626	1.98499	0.01132	0.01132	10	1.1320		8	1.4150	
36	Lower Sherman	D	2.06906	2.08310	0.01404	0.01406	2.07315	0.00995	0.00995	10	0.9950		8	1.2437	
37	Lower Sherman	E	2.24435	2.26050	0.01615	0.01617	2.24840	0.01210	0.01210	10	1.2100		10	1.2100	
38	Lower Sherman	F	2.05889	2.07087	0.01198	0.01200	2.06204	0.00883	0.00883	10	0.8830		7	1.2614	
39	Lower Sherman	G	2.23132	2.24815	0.01683	0.01685	2.23667	0.01148	0.01148	10	1.1480		9	1.2756	
40	Lower Sherman	H	1.85405	1.86594	0.01189	0.01191	1.85695	0.00899	0.00899	10	0.8990		7	1.2843	
41	Lower Johnson	A	2.24650	2.26268	0.01618	0.01620	2.25472	0.00796	0.00796	10	0.7960	0.8678	7	1.1371	1.0260
42	Lower Johnson	B	1.93106	1.94586	0.01480	0.01482	1.93793	0.00793	0.00793	9	0.8811		8	0.99125	
43	Lower Johnson	C	2.21169	2.22660	0.01491	0.01493	2.21885	0.00775	0.00775	9	0.8611		7	1.1071	
44	Lower Johnson	D	2.02152	2.04150	0.01998	0.02000	2.03189	0.00961	0.00961	10	0.9610		10	0.9610	
45	Lower Johnson	E	2.16461	2.18231	0.01770	0.01772	2.17391	0.00840	0.00840	10	0.8400		9	0.9333	
Blank	B		2.26189	2.26187	-2E-05		2.26190	0.00003							

SK 10/5/06
QA: AR 10-20-06

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Comparing Controls for AFDW, per original organism

File: 12558cgo.dat Transform: NO TRANSFORMATION

t-Test of Solvent and Blank Controls Ho: GRP1 Mean = GRP2 Mean

==========

GRP1 (Solvent cntl) Mean = 0.9495 Calculated t value = -6.9563
GRP2 (Blank cntl) Mean = 1.3232 Degrees of freedom = 14
Difference in means = -0.3737

==========

2-sided t value (0.05,14) = 2.1448** Significant difference at alpha=0.05
2-sided t value (0.01,14) = 2.9768** Significant difference at alpha=0.10

WARNING: This procedure assumes normality and equal variances!

GRP 1 = SAND CONTROL
GRP 2 = FORMULATED SEDIMENT

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Listing of Ash-Free Dry Weight, Per Original Organism

QA: MR10-20-06

Title: 8503-125-058
File: 12558CGO.DAT Transform: NO TRANSFORMATION
Number of Groups: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Sand	1	1.0150	1.0150
1	Sand	2	0.8100	0.8100
1	Sand	3	0.9400	0.9400
1	Sand	4	0.7480	0.7480
1	Sand	5	1.0144	1.0144
1	Sand	6	1.0280	1.0280
1	Sand	7	0.9450	0.9450
1	Sand	8	1.0960	1.0960
2	Form Sed	1	1.1110	1.1110
2	Form Sed	2	1.4180	1.4180
2	Form Sed	3	1.4090	1.4090
2	Form Sed	4	1.3480	1.3480
2	Form Sed	5	1.3340	1.3340
2	Form Sed	6	1.2820	1.2820
2	Form Sed	7	1.3620	1.3620
2	Form Sed	8	1.3220	1.3220
3	Lower Slate	1	0.8790	0.8790
3	Lower Slate	2	0.8678	0.8678
3	Lower Slate	3	1.3340	1.3340
3	Lower Slate	4	0.7960	0.7960
3	Lower Slate	5	1.2850	1.2850
3	Lower Slate	6	1.2611	1.2611
3	Lower Slate	7	1.2610	1.2610
3	Lower Slate	8	1.1233	1.1233
4	Lower Sherman	1	1.0770	1.0770
4	Lower Sherman	2	1.1380	1.1380
4	Lower Sherman	3	1.1320	1.1320
4	Lower Sherman	4	0.9950	0.9950
4	Lower Sherman	5	1.2100	1.2100
4	Lower Sherman	6	0.8830	0.8830
4	Lower Sherman	7	1.1480	1.1480
4	Lower Sherman	8	0.8990	0.8990
5	Lower Johnson	1	0.7960	0.7960
5	Lower Johnson	2	0.8811	0.8811
5	Lower Johnson	3	0.8611	0.8611
5	Lower Johnson	4	0.9610	0.9610
5	Lower Johnson	5	0.8400	0.8400

8/14/06
QA: ARCO-2006

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Summary of AFDW, per original organism

File: 12558cgo.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Sand	8	0.7480	1.0960	0.9495
2	Form Sed	8	1.1110	1.4180	1.3232
3	Lower Slate	8	0.7960	1.3340	1.1009
4	Lower Sherman	8	0.8830	1.2100	1.0603
5	Lower Johnson	5	0.7960	0.9610	0.8678

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Sand	0.0138	0.1173	0.0415	12.3522
2	Form Sed	0.0093	0.0966	0.0342	7.2998
3	Lower Slate	0.0481	0.2193	0.0775	19.9176
4	Lower Sherman	0.0148	0.1215	0.0429	11.4562
5	Lower Johnson	0.0037	0.0609	0.0272	7.0176

SB 10/5/06
QA: AR 10-2006

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Significant Difference from Sand Control for AFDW, per original organism

File: 12558cgo.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.5510
W = 0.9521

Critical W = 0.8980 (alpha = 0.01 , N = 29)
W = 0.9260 (alpha = 0.05 , N = 29)

Data PASS normality test (alpha = 0.01). Continue analysis.

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 7.2607 (p-value = 0.0640)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Using Average Degrees of Freedom
(Based on average replicate size of 7.25)

Calculated B2 statistic = 8.4225 (p-value = 0.0380)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

8/10/2006
QA: AR 10-20-06

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Significant Difference from Sand Control for AFDW, per original organism

File: 12558cgo.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	0.2164	0.0721	3.2735
Within (Error)	25	0.5510	0.0220	
Total	28	0.7674		

(p-value = 0.0377)

Critical F = 4.6755 (alpha = 0.01, df = 3,25)
= 2.9912 (alpha = 0.05, df = 3,25)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Sand	0.9495	0.9495		
2	Lower Slate	1.1009	1.1009	-2.0390	
3	Lower Sherman	1.0603	1.0603	-1.4914	
4	Lower Johnson	0.8678	0.8678	0.9655	

Bonferroni t critical value = 2.2523 (1 Tailed, alpha = 0.05, df = 3,25)

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Sand	8			
2	Lower Slate	8	0.1672	17.6	-0.1514
3	Lower Sherman	8	0.1672	17.6	-0.1107
4	Lower Johnson	5	0.1906	20.1	0.0817

10/5/06

AR: AR 10-20-06

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Comparing Controls for AFDW, per surviving organism

File: 12558cgs.dat Transform: NO TRANSFORMATION

t-Test of Solvent and Blank Controls Ho: GRP1 Mean = GRP2 Mean

==========

GRP1 (Solvent cntl) Mean = 1.0778 Calculated t value = -4.9863
GRP2 (Blank cntl) Mean = 1.5326 Degrees of freedom = 14
Difference in means = -0.4549

==========

2-sided t value (0.05,14) = 2.1448** Significant difference at alpha=0.05
2-sided t value (0.01,14) = 2.9768** Significant difference at alpha=0.10

WARNING: This procedure assumes normality and equal variances!

QA: ARC 10-20-06
SJ 10/23/06

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Listing of Ash-Free Dry Weight, Per Surviving Organism

File: 12558CGS.DAT Transform: NO TRANSFORMATION
Number of Groups: 5

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	Sand	1	1.2687	1.2687
1	Sand	2	1.1571	1.1571
1	Sand	3	1.0444	1.0444
1	Sand	4	1.0686	1.0686
1	Sand	5	1.0144	1.0144
1	Sand	6	1.0280	1.0280
1	Sand	7	0.9450	0.9450
1	Sand	8	1.0960	1.0960
2	Form Sed	1	1.3887	1.3887
2	Form Sed	2	2.0257	2.0257
2	Form Sed	3	1.7612	1.7612
2	Form Sed	4	1.3480	1.3480
2	Form Sed	5	1.4822	1.4822
2	Form Sed	6	1.4244	1.4244
2	Form Sed	7	1.3620	1.3620
2	Form Sed	8	1.4689	1.4689
3	Lower Slate	1	1.0987	1.0987
3	Lower Slate	2	1.3017	1.3017
3	Lower Slate	3	1.3340	1.3340
3	Lower Slate	4	1.3267	1.3267
3	Lower Slate	5	1.2850	1.2850
3	Lower Slate	6	1.4188	1.4188
3	Lower Slate	7	1.5763	1.5763
3	Lower Slate	8	1.1233	1.1233
4	LOwer Sherman	1	1.3462	1.3462
4	LOwer Sherman	2	1.2644	1.2644
4	LOwer Sherman	3	1.4150	1.4150
4	LOwer Sherman	4	1.2437	1.2437
4	LOwer Sherman	5	1.2100	1.2100
4	LOwer Sherman	6	1.2614	1.2614
4	LOwer Sherman	7	1.2756	1.2756
4	LOwer Sherman	8	1.2843	1.2843
5	Lower Johnson	1	1.1371	1.1371
5	Lower Johnson	2	0.9912	0.9912
5	Lower Johnson	3	1.1071	1.1071
5	Lower Johnson	4	0.9610	0.9610
5	Lower Johnson	5	0.9333	0.9333

SK10456

dA: AR10-2006

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Summary of AFDW, per surviving organism

File: 12558cgs.dat Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Sand	8	0.9450	1.2687	1.0778
2	Form Sed	8	1.3480	2.0257	1.5326
3	Lower Slate	8	1.0987	1.5763	1.3081
4	LOwer Sherman	8	1.2100	1.4150	1.2876
5	Lower Johnson	5	0.9333	1.1371	1.0259

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	Sand	0.0098	0.0988	0.0349	9.1716
2	Form Sed	0.0568	0.2383	0.0843	15.5501
3	Lower Slate	0.0234	0.1530	0.0541	11.6936
4	LOwer Sherman	0.0041	0.0644	0.0228	4.9984
5	Lower Johnson	0.0082	0.0908	0.0406	8.8466

8/10/06
QA: AR10-2004

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Significant Difference from Sand Control for AFDW, per surviving organism

File: 12558cgs.dat Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

D = 0.2941
W = 0.9674

Critical W = 0.8980 (alpha = 0.01 , N = 29)
W = 0.9260 (alpha = 0.05 , N = 29)

Data PASS normality test (alpha = 0.01). Continue analysis.

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 4.8747 (p-value = 0.1812)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 11.3449 (alpha = 0.01, df = 3)
= 7.8147 (alpha = 0.05, df = 3)

Using Average Degrees of Freedom
(Based on average replicate size of 7.25)

Calculated B2 statistic = 4.3085 (p-value = 0.2300)

Data PASS B2 homogeneity test at 0.01 level. Continue analysis.

4/10/06
QA: AR10-2006

Toxstat Version 3.5
Study #8503-125-058-(007, 009, 011)
Coeur
Chironomus tentans 10-day Sediment Test
Significant Difference from Sand Control for AFDW, per surviving organism

File: 12558cgs.dat Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	3	0.4230	0.1410	11.9853
Within (Error)	25	0.2941	0.0118	
Total	28	0.7171		

(p-value = 0.0000)

Critical F = 4.6755 (alpha = 0.01, df = 3,25)
= 2.9912 (alpha = 0.05, df = 3,25)
Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Bonferroni t-Test - TABLE 1 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	t STAT	SIG 0.05
1	Sand	1.0778	1.0778		
2	Lower Slate	1.3081	1.3081	-4.2463	
3	LOwer Sherman	1.2876	1.2876	-3.8685	
4	Lower Johnson	1.0259	1.0259	0.8383	

Bonferroni t critical value = 2.2523 (1 Tailed, alpha = 0.05, df = 3,25)

Bonferroni t-Test - TABLE 2 OF 2 Ho: Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	Sand	8			
2	Lower Slate	8	0.1221	11.3	-0.2303
3	LOwer Sherman	8	0.1221	11.3	-0.2098
4	Lower Johnson	5	0.1393	12.9	0.0518

APPENDIX D

Analytical Data

Thursday, October 05, 2006

Analytical Laboratory

Dave Pillard
ENSR
4303 W. LaPorte Ave
Fort Collins, CO 80521

RE: ENSR-FCETL Work Order: 0608219

Dear Richard Thorp:

MSE-TA Analytical Laboratory received 6 sample(s) on 8/29/2006 for the analyses presented in the following report.

Please find enclosed revised analytical results for the sample(s) received at the MSE-TA Laboratory. The "%Sand/Silt/Clay" values were calculated incorrectly, leading to incorrect "Texture" determinations. The values have been correctly calculated and revised in the attached report. I'm sorry for any confusion this revision may cause.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Gary F. Wyss
Laboratory Manager
406-494-7222

Enclosure

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-001

Client Sample ID: 19793
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS		**SW6010B**		**SW3050B**		Analyst: **HC**
Aluminum	14900	9.00		mg/Kg	1	10/2/2006
Chromium	27.3	4.00		mg/Kg	1	10/2/2006
Copper	61.9	0.600		mg/Kg	1	10/2/2006
Nickel	41.7	5.00		mg/Kg	1	10/2/2006
Silver	ND	1.00		mg/Kg	1	10/2/2006
Zinc	177	2.00		mg/Kg	1	10/2/2006
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**E200.8**		Analyst: **SW**
Arsenic	18.5	0.096		mg/Kg-dry	1	9/19/2006
Cadmium	0.646	0.019		mg/Kg-dry	1	9/19/2006
Lead	11.6	0.019		mg/Kg-dry	1	9/19/2006
Selenium	1.50	0.193		mg/Kg-dry	1	9/19/2006
MERCURY IN SEDIMENT - SW846 7471B		**E245.5**		**SW7471A**		Analyst: **KJ**
Mercury	0.0148	0.0315	J	mg/Kg-dry	1	9/13/2006
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**				Analyst: **HC**
TOC	0.3	0.1		%	1	9/27/2006
PARTICLE SIZE DETERMINATION		**ASTMD422**				Analyst: **HC**
% Clay	22.0	0		%	1	9/28/2006
% Sand	18.0	0		%	1	9/28/2006
% Silt	60.0	0		%	1	9/28/2006
Texture	SILT LOAM	0		%	1	9/28/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-004

Client Sample ID: 19794
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE		**AVS-SEM**				Analyst: **CR**
Sulfide	ND	0.50		umoles/g	1	9/6/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-002

Client Sample ID: 19796
Collection Date: 8/16/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS		**SW6010B**		**SW3050B**		Analyst: **HC**
Aluminum	17200	9.00		mg/Kg	1	10/2/2006
Chromium	55.4	4.00		mg/Kg	1	10/2/2006
Copper	113	0.600		mg/Kg	1	10/2/2006
Nickel	37.3	5.00		mg/Kg	1	10/2/2006
Silver	ND	1.00		mg/Kg	1	10/2/2006
Zinc	121	2.00		mg/Kg	1	10/2/2006
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**E200.8**		Analyst: **SW**
Arsenic	27.7	0.096		mg/Kg	1	9/19/2006
Cadmium	0.366	0.019		mg/Kg	1	9/19/2006
Lead	12.0	0.019		mg/Kg	1	9/19/2006
Selenium	1.26	0.192		mg/Kg	1	9/19/2006
MERCURY IN SEDIMENT - SW846 7471B		**E245.5**		**SW7471A**		Analyst: **KJ**
Mercury	0.157	0.0311		mg/Kg-dry	1	9/13/2006
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**				Analyst: **HC**
TOC	1.4	0.1		%	1	9/27/2006
PARTICLE SIZE DETERMINATION		**ASTMD422**				Analyst: **HC**
% Clay	8.00	0		%	1	9/28/2006
% Sand	70.0	0		%	1	9/28/2006
% Silt	22.0	0		%	1	9/28/2006
Texture	SANDY LOAM	0		%	1	9/28/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded
Limit	Instrument Reporting Limit
ND	Not Detected at the Method Detection Limit (MDL)
J	Analyte detected below the Reporting Limit
MDL	Method Detection Limit

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-005

Client Sample ID: 19798
Collection Date: 8/16/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE		**AVS-SEM**				Analyst: **CR**
Sulfide	ND	0.50		umoles/g	1	9/6/2006

Review

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-003

Client Sample ID: 19797
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846-ICP-AES TOTAL METALS		**SW6010B**		**SW3050B**		Analyst: **HC**
Aluminum	13200	9.00		mg/Kg	1	10/2/2006
Chromium	42.0	4.00		mg/Kg	1	10/2/2006
Copper	31.4	0.600		mg/Kg	1	10/2/2006
Nickel	36.4	5.00		mg/Kg	1	10/2/2006
Silver	ND	1.00		mg/Kg	1	10/2/2006
Zinc	83.2	2.00		mg/Kg	1	10/2/2006
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**E200.8**		Analyst: **SW**
Arsenic	5.75	0.096		mg/Kg	1	9/19/2006
Cadmium	0.204	0.019		mg/Kg	1	9/19/2006
Lead	5.47	0.019		mg/Kg	1	9/19/2006
Selenium	0.466	0.192		mg/Kg	1	9/19/2006
MERCURY IN SEDIMENT - SW846 7471B		**E245.5**		**SW7471A**		Analyst: **KJ**
Mercury	0.112	0.0348		mg/Kg-dry	1	9/13/2006
ORGANIC MATTER-WALKLEY BLACK		**OM_WALKLEYBLACK**				Analyst: **HC**
TOC	2.0	0.1		%	1	9/27/2006
PARTICLE SIZE DETERMINATION		**ASTMD422**				Analyst: **HC**
% Clay	8.00	0		%	1	9/28/2006
% Sand	76.0	0		%	1	9/28/2006
% Silt	16.0	0		%	1	9/28/2006
Texture	SANDY LOAM	0		%	1	9/28/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded	J	Analyte detected below the Reporting Limit
Limit	Instrument Reporting Limit	MDL	Method Detection Limit
ND	Not Detected at the Method Detection Limit (MDL)		

MSE-TA Analytical Laboratory

Date: *05-Oct-06*

CLIENT: ENSR
Lab Order: 0608219
Project: COEUR ALASKA
Lab ID: 0608219-006

Client Sample ID: 19799
Collection Date: 8/17/2006
Matrix: SEDIMENT

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ACID VOLATILE SULFIDE		**AVS-SEM**				Analyst: **CR**
Sulfide	ND	0.50		umoles/g	1	9/6/2006

_____ **Review**

Qualifiers:

H	Holding times for preparation or analysis exceeded
Limit	Instrument Reporting Limit
ND	Not Detected at the Method Detection Limit (MDL)
J	Analyte detected below the Reporting Limit
MDL	Method Detection Limit

FCETL QA Form No.131
Revision 0
Effective 10/06

QA: TKID-2006

PERCENT TOTAL SOLIDS AND PERCENT TOTAL VOLATILE SOLIDS (TVS)

Project No: 8503125058(006-011)

Analytical Balance ID: AND#1

TARE: Date/time: 9/21/06 @ 1400 Analyst: [illegible]

DRY GROSS: Date/time: 9/25/06 @ 1520 Analyst: [illegible]

ASHED GROSS: Date/time: 9/26/06 @ 1100 Analyst: [illegible]

Dried in Oven # 3 from Date: 9/21/06 Time: 1420
Oven °C: 103 to Date: 9/25/06 Time: 1410

Ashed in Furnace from Date: 9/25/06 Time: 1625
Furnace °C: 550 to Date: 9/26/06 Time: 1740

Dish No.	Treatment	Rep	Tare Weight of Dish (g) A	Dish + Wet Sample (g) B	Dry Gross Weight (g) (dish + dry sample) C	% Total Solids (g) [(C-A)(100)]/(B-A)	Ashed Gross Weight (dish + sample)(g) D	% Total Volatile Solids (g) [(C-D)(100)]/(C-A)
Blank A	#19796		12.1409	025.37.3766	29.7014	69.5859	29.0701	3.595
2A	#19793		12.3630	37.5335	27.0903	58.4704	26.8699	1.430
3A	#19793	dup	10.4475	35.5145	24.9476	57.8454	24.7265	1.5248
4A	#19793	dup	10.7728	36.7970	25.8293	57.8742	25.5891	1.5888
5A	#19797		12.0064	37.4198	29.7071	69.6510	28.8868	4.6343
Blank	1A		12.4274		12.4274		12.4276	

[1] Add in weight loss of blank boat, if appropriate. [illegible] 10/20/06

APPENDIX 2: BENTHIC INVERTEBRATE DATA

				Sherman Creek Reach 1					
Class	**Order**	**Family**	**Genus**	**1**	**2**	**3**	**4**	**5**	**6**
Insecta	Ephemeroptera	Baetidae	Baetis	12	50	31	6	25	46
			Diphetor	0	0	0	0	0	1
		Heptageniidae	Epeorus	2	2	5	0	0	7
			Cinygmula	0	8	6	2	6	19
			Rithrogena	0	2	3	1	1	3
		Ephemerellidae	Attenella	0	0	0	1	0	1
			Drunella	2	11	5	2	4	3
		Leptophlebiidae	Paraleptophlebia						
	Plecoptera	Chloroperlidae	Triznaka						
			Haploperla						
			Suwallia	0	4	0	0	2	2
			Kathroperla						
			Plumiperla	6	7	6	1	6	4
			Paraperla						
			Utaperla						
			Alloperla						
		Leuctridae	Despaxia						
			Zealeuctra	2	1	5	0	0	1
		Perlidae	Hesperoperla						
			Hansonperla						
			Agnetina						
			Doroneuria						
			Neoperla						
			Claassenia						
		Nemouridae	Zapada	0	1	2	0	0	11
			Nemoura	0	0	1	0	0	0
			Shipsa	0	8	1	0	1	1
		Perlodidae	Megarcys						
	Trichoptera	Brachycentridae	Micrasema						
		Hydropsychidae	Parapsyche						
			Arctopsyche	0	1	0	0	1	0
		Glossosomatidae	Glossoma						
			Agapetus	1	5	1	5	0	1
		Polycentropidae	Neureclipses	0	0	1	0	0	0
			Paranyctiophylax						
		Rhyacophilidae	Rhyacophila	3	4	2	1	2	1
			Himalopsyche	0	1	1	0	2	1
		Psychomiidae	Lype						
		Phryganeidae	Haganella						
			Yphria	0	0	0	0	0	1
		Lepidostomatidae	Theliopsyche						
	Diptera								
	Chironomidae	Orthocladiinae	Eukiefferiella	0	2	0	1	2	7
			Tvetania						
			Corynoneura						
		Diamesinae	Pagasta	0	0	0	0	1	0
		Tanytarsini	Tanytarsus						
			Constempellina						
	Nematocera	Tipulidae	Dicranota						
			Tipula	0	1	0	0	0	0
			Antocha						
		Psychodidae	Pericoma						
	Brachycera	Ceratopogonidae	Probezzia						
			Limnochares						
	Simuliidae	Simuliidae	Prosimulium						
Bivalva	Sphaeriidae	Psidiinae	Psidium (pea clam)						
			Total	**28**	**108**	**70**	**20**	**53**	**110**

				Sherman Creek Reach 2					
Class	**Order**	**Family**	**Genus**	**1**	**2**	**3**	**4**	**5**	**6**
Insecta	Ephemeroptera	Baetidae	Baetis	2	4	2	0	6	2
			Diphetor						
		Heptageniidae	Epeorus	2	1	4	1	2	0
			Cinygmula	4	2	3	4	4	3
			Rithrogena	4	2	1	5	0	0
		Ephemerellidae	Attenella	0	0	1	2	0	0
			Drunella	6	5	3	4	2	1
		Leptophlebiidae	Paraleptophlebia						
	Plecoptera	Chloroperlidae	Triznaka						
			Haploperla						
			Suwallia	2	0	0	0	0	0
			Kathroperla						
			Plumiperla	7	17	4	7	5	4
			Paraperla	0	0	0	0	0	1
			Utaperla	0	0	1	0	0	0
			Alloperla						
		Leuctridae	Despaxia						
			Zealeuctra	1	2	3	1	0	0
		Perlidae	Hesperoperla						
			Hansonperla						
			Agnetina						
			Doroneuria						
			Neoperla	1	0	0	0	0	0
			Claassenia						
		Nemouridae	Zapada						
			Nemoura	1	2	0	0	0	1
			Shipsa	0	0	0	0	1	0
		Perlodidae	Megarcys						
	Trichoptera	Brachycentridae	Micrasema						
		Hydropsychidae	Parapsyche						
			Arctopsyche	0	1	0	0	0	0
		Glossosomatidae	Glossoma						
			Agapetus	4	1	3	3	0	0
		Polycentropidae	Neureclipses	2	1	0	0	1	0
			Paranyctiophylax	0	0	3	0	3	0
		Rhyacophilidae	Rhyacophila	2	0	0	5	0	1
			Himalopsyche	2	1	0	1	0	0
		Psychomiidae	Lype						
		Phryganeidae	Haganella						
			Yphria						
		Lepidostomatidae	Theliopsyche	0	0	0	0	1	0
	Diptera								
	Chironomidae	Orthocladiinae	Eukiefferiella						
			Tvetania	1	0	1	0	0	0
			Corynoneura						
		Diamesinae	Pagasta	0	0	0	0	0	1
		Tanytarsini	Tanytarsus						
			Constempellina						
	Nematocera	Tipulidae	Dicranota						
			Tipula						
			Antocha						
		Psychodidae	Pericoma						
	Brachycera	Ceratopogonidae	Probezzia						
		Simuliidae	Prosimulium						
Bivalva	Sphaeriidae	Psidiinae	Psidium (pea clam)						
			Total	**41**	**39**	**29**	**33**	**25**	**14**

				Sweeny Reach 1 Samples					
Class	**Order**	**Family**	**Genus**	**1**	**2**	**3**	**4**	**5**	**6**
Insecta	Ephemeroptera	Baetidae	Baetis	11	12	10	11	7	5
			Diphetor						
		Heptageniidae	Epeorus	1	8	0	0	0	0
			Cinygmula	5	3	3	3	3	5
			Rithrogena	1	4	2	1	1	0
		Ephemerellidae	Attenella						
			Drunella	0	1	0	0	0	0
		Leptophlebiidae	Paraleptophlebia						
	Plecoptera	Chloroperlidae	Triznaka						
			Haploperla	12	0	0	0	0	0
			Suwallia						
			Kathroperla						
			Plumiperla	1	6	0	17	13	4
			Paraperla						
			Utaperla						
			Alloperla	3	1	0	0	0	1
		Leuctridae	Despaxia						
			Zealeuctra						
		Perlidae	Hesperoperla						
			Hansonperla						
			Agnetina						
			Doroneuria						
			Neoperla						
			Claassenia						
		Nemouridae	Zapada	0	0	0	1	0	0
			Nemoura						
			Shipsa						
		Perlodidae	Megarcys						
	Trichoptera	Brachycentridae	Micrasema						
		Hydropsychidae	Parapsyche						
			Arctopsyche						
		Glossosomatidae	Glossoma						
			Agapetus						
		Polycentropidae	Neureclipses						
			Paranyctiophylax						
		Rhyacophilidae	Rhyacophila	1	1	0	0	1	0
			Himalopsyche						
		Psychomiidae	Lype						
		Phryganiidae	Hagenalla						
			Yphria						
		Lepidostomatidae	Theliopsyche						
	Diptera								
	Chironomidae	Orthocladiinae	Eukiefferiella	0	1	0	0	0	0
			Tvetania						
			Corynoneura						
		Diamesinae	Pagastia						
		Tanytarsini	Tanytarsus						
			Constempellina						
		Tipulidae	Dicranota						
			Tipula						
			Antocha	0	0	0	0	1	0
		Psychodidae	Pericoma						
		Ceratopogonidae	Probezzia						
			Limnochares	0	0	0	0	0	1
		Simuliidae	Prosimulium						
Bivalva	Sphaeriidae	Psidiinae	Psidium (pea clam)						
			Total	**35**	**37**	**15**	**33**	**26**	**16**

				Sweeny Reach 2 Samples					
Class	**Order**	**Family**	**Genus**	**1**	**2**	**3**	**4**	**5**	**6**
Insecta	Ephemeroptera	Baetidae	Baetis	10	6	8	9	2	14
			Diphetor						
		Heptageniidae	Epeorus	0	3	6	1	0	0
			Cinygmula	4	5	1	5	1	9
			Rithrogena	2		3	4	0	0
		Ephemerellidae	Attenella						
			Drunella	0	0	1	0	0	3
		Leptophlebiidae	Paraleptophlebia						
	Plecoptera	Chloroperlidae	Triznaka						
			Haploperla						
			Suwallia						
			Kathroperla						
			Plumiperla	10	4	7	11	0	7
			Paraperla						
			Utaperla						
			Alloperla						
		Leuctridae	Despaxia	0	0	2	0	0	5
			Zealeuctra						
		Perlidae	Hesperoperla						
			Hansonperla						
			Agnetina						
			Doroneuria						
			Neoperla						
			Claassenia						
		Nemouridae	Zapada	0	0	0	1	0	0
			Nemoura						
			Shipsa						
		Perlodidae	Megarcys						
	Trichoptera	Brachycentridae	Micrasema						
		Hydropsychidae	Parapsyche	0	0	1	0	0	0
			Arctopsyche						
		Glossosomatidae	Glossoma						
			Agapetus						
		Polycentropidae	Neureclipses						
			Paranyctiophylax						
		Rhyacophilidae	Rhyacophila	0	0	1	0	0	0
			Himalopsyche	0	0	1	0	0	0
		Psychomiidae	Lype						
		Phryganiidae	Hagenalla						
			Yphria						
		Lepidostomatidae	Theliopysche						
	Diptera								
	Chironomidae	Orthocladiinae	Eukiefferiella						
			Tvetania						
			Corynoneura	0	0	0	1	0	0
		Diamesinae	Pagastia						
		Tanytarsini	Tanytarsus						
	Nematocera	Tipulidae	Constempellina						
			Dicranota						
			Tipula						
			Antocha						
		Psychodidae	Pericoma						
	Brachycera	Ceratopogonidae	Probezzia						
			Limnochares	1	1	1	0	0	0
		Simuliidae	Prosimulium						
Bivalva	Sphaeriidae	Psidiinae	Psidium (pea clam)						
			Total	**27**	**19**	**32**	**32**	**3**	**38**

				Johnson Creek Samples					
Class	**Order**	**Family**	**Genus**	**1**	**2**	**3**	**4**	**5**	**6**
Insecta	Ephemeroptera	Baetidae	Baetis	34	67	38	13	20	73
			Diphetor	0	0	1	0	0	0
		Heptageniidae	Epeorus	0	16	23	17	20	7
			Cinygmula	30	6	11	4	2	43
			Rithrogena	5	5	1	3	0	8
		Ephemerellidae	Attenella	2	5	13	13	34	14
			Drunella	3	8	7	3	3	13
		Leptophlebiidae	Paraleptophlebia	1	2	0	0	0	0
	Plecoptera	Chloroperlidae	Triznaka						
			Haploperla						
			Suwallia						
			Kathroperla	1	1	2	0	0	1
			Plumiperla	3	0	0	0	0	4
			Paraperla						
			Utaperla						
			Alloperla						
		Leuctridae	Despaxia						
			Zealeuctra	4	1	2	0	0	2
		Perlidae	Hesperoperla	1	0	0	0	0	0
			Hansonperla						
			Agnetina						
			Doroneuria	1	0	0	0	0	0
			Neoperla						
			Claassenia						
		Nemouridae	Zapada	4	8	7	2	16	0
			Nemoura	0	0	1	0	0	1
			Shipsa	4	1	4	3	1	6
		Perlodidae	Megarcys	0	0	0	0	1	1
	Trichoptera	Brachycentridae	Micrasema	1	0	0	0	0	0
		Hydropsychidae	Parapsyche	0	1	1	1	0	3
			Arctopsyche	5	4	9	4	0	2
		Glossosomatidae	Glossoma	2	1	4	0	0	7
			Agapetus						
		Polycentropidae	Neureclipses	0	0	0	0	1	1
			Paranyctiophylax						
		Rhyacophilidae	Rhyacophila	3	3	8	5	5	11
			Himalopsyche	0	0	3	1	1	4
		Psychomiidae	Lype	0	0	0	1	0	0
		Phryganeidae	Haganella	0	0	1	0	0	0
			Yphria						
		Lepidostomatidae	Theliopsyche						
	Diptera	Chironomidae							
	sub-family	Orthocladiinae	Eukiefferiella	2	1	1	2	1	0
			Tvetania						
			Corynoneura						
		Diamesinae	Pagasta	0	0	1	0	0	0
		Tanytarsini	Tanytarsus						
			Constempellina						
	Nematocera	Tipulidae	Dicranota						
			Tipula	0	0	0	1	2	1
			Antocha						
		Psychodidae	Pericoma						
	Brachycera	Ceratopogonidae	Probezzia						
			Limnochares						
		Simuliidae	Prosimulium	1	5	0	0	12	0
Bivalva	Sphaeriidae	Psidiinae	Psidium (pea clam)						
			Total	**107**	**135**	**138**	**73**	**119**	**202**

				Slate Creek Samples					
Class	**Order**	**Family**	**Genus**	**1**	**2**	**3**	**4**	**5**	**6**
Insecta	Ephemeroptera	Baetidae	Baetis	48	98	23	15	30	9
			Diphetor	7	7	6	1	2	1
		Heptageniidae	Epeorus	19	28	21	8	41	17
			Cinygmula	7	3	1	2	4	0
			Rithrogena	0	1	1	0	0	0
		Ephemerellidae	Attenella	0	0	0	0	0	0
			Drunella	1	1	0	1	2	1
		Leptophlebiidae	Paraleptophlebia	39	3	39	10	49	13
	Plecoptera	Chloroperlidae	Triznaka	1	0	0	0	0	0
			Haploperla						
			Suwallia	0	0	1	0	1	0
			Kathroperla						
			Plumiperla	2	0	2	0	4	1
			Paraperla						
			Utaperla						
			Alloperla						
		Leuctridae	Despaxia						
			Zealeuctra						
		Nemouridae	Nemoura	0	0	3	0	0	3
			Zapada						
		Perlidae	Hesperoperla	0	0	1	6	11	7
			Hansonperla	2	0	0	0	0	0
			Agnetina	0	0	1	0	0	0
			Doroneuria						
			Neoperla						
			Claassenia	0	0	1	0	0	0
	Trichoptera	Brachycentridae	Micrasema	0	1	1	0	0	0
		Hydropsychidae	Parapsyche						
			Arctopsyche						
		Glossosomatidae	Glossoma						
			Agapetus						
		Polycentropidae	Neureclipses						
			Paranyctiophylax						
		Rhyacophilidae	Rhyacophila	0	0	0	0	4	1
			Himalopsyche						
		Phryganiidae	Hagenalla	1	0	0	0	0	0
			Yphria						
		Lepidostomatidae	Theliopsyche						
	Diptera								
	Chironomidae	Orthocladiinae	Eukiefferiella	126	16	78	28	148	52
			Tvetania						
			Corynoneura	6	0	0	3	5	0
		Diamesinae	Pagastia	6	0	2	3	5	6
		Tanytarsini	Tanytarsus	15	0	1	1	23	12
			Constempellina	3	0	0	0	5	4
	Nematocera	Tipulidae	Dicranota	0	0	0	1	0	0
			Tipula	0	0	0	0	0	1
			Antocha						
		Psychodidae	Pericoma	0	0	0	0	1	0
	Brachycera	Ceratopogonidae	Probezzia	0	0	1	0	11	5
			Limnochares						
	Simuliidae	Simuliidae	Prosimulium	9	11	8	2	13	6
Bivalva	Sphaeriidae	Psidiinae	Psidium (pea clam)	2	0	2	3	14	3
			Total	**294**	**169**	**193**	**84**	**373**	**142**

APPENDIX 3A: ADFG FISH RESOURCE PERMIT

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME

P.O. BOX 115525
JUNEAU, AK 99811-5525

Permit No. SF2006-174

Expires: 08/31/2006

FISH RESOURCE PERMIT
(For Scientific/Educational Purposes)

This permit authorizes Elizabeth Flory *(whose signature is required on page 2 for permit validation)*
person

of Aquatic Science, Inc. at 4546 River Road, Juneau, AK 99801
agency or organization address

to conduct the following activities **from** July 17, 2006 **to** August 31, 2006 in accordance with AS 16.05.930:

Purpose: To monitor resident fish as part of NPDES permit (EPA) for the Kensington Mine. To gather population estimates by species, habitat type and strata and to measure fish to determine condition factor.

Location Sherman Creek, Lynn Canal; Slate and Johnson creeks, N. Berners Bay, Juneau area

Species Collected: Cutthroat trout and Dolly Varden

Method of Capture: Minnow trap or single pass only with a backpack electrofisher

Final Disposition: Up to 30 juvenile cutthroat trout and 135 Dolly Varden may be captured, identified, measured and then released alive at the site of capture.

-Continued on Back-

REPORT DUE September 30, 2006. The report shall include species, numbers, dates, and locations of collection and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish. The report shall also include other information as may be required under the permit stipulations section.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized State law enforcement officer.
4. Permits will not be renewed until the department has received detailed reports, as specified above.
5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

for Fish Resource Permit Coordinator Division of Sport Fish	for Director Division of Sport Fish	7-24-06 Date

Authorized Personnel: The following persons may perform collecting activities under terms of this permit:
Carissa Canning, Brian Flory, Elizabeth Flory, Brad Hildebrand, John Randolph, Kate Savage
Employees and volunteers under the direct supervision of, and in the presence of, one of the authorized personnel listed above may participate in collecting activities under terms of this permit.

Permit Stipulations:

1) **Brian Glynn** (465-4320; brian_glynn@fishgame.state.ak.us) Juneau Sport Fish Division Area Management Biologist must be notified within a few days **prior** to engaging in collecting activities within their management areas. These biologists have the right to specify methods for collecting, as well as limiting the collections of any species, and the number of specimens collected by time and area.
2) Electroshocking is currently discouraged, but not prohibited by the department. Electroshockers **may not** be used in anadromous waters (as defined by the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes, ADF&G) or in the presence of spawning salmonids, adult trout or char. Operators of electroshocking equipment should have formal training. Electroshockers may only be used in areas where other means of capture are not feasible.
3) Salmon eggs used as bait in traps must be disinfected prior to use. A 10 minute soak in 1/100 Betadyne solution or some other iodophor disinfectant is adequate.
4) All unattended collecting gear must be labeled with the permittee's name, telephone number, and permit number and all fish collecting traps must be accounted for and removed from the water at the conclusion of sampling.
5) No fish may be transported from the water body where they were captured without a valid Fish Transport Permit (FTP) obtained from the Alaska Department of Fish and Game, Division of Commercial Fisheries.
6) *A Title 41 Permit is required from Alaska Department of Natural Resources, Office of Habitat Management and Permitting, to place structures (weir, etc.) in streams.*
7) *A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.*
8) Issuance of this permit does not absolve the permittee from compliance in full with any and all other applicable federal, state, or local laws, regulations, or ordinances.
9) A **report of collecting activities**, referenced to this fish resource permit number, must be submitted to the Alaska Department of Fish and Game, Division of Sport Fish HQ, P.O. Box 115525, Juneau, AK 99811-5525, Attention: Tammy Davis (465-6183; tammy_davis@fishgame.state.ak.us), within 30 days after the expiration of this permit. This report must summarize the number of fish captured by date, by location (provide GPS coordinates and datum or a map), and by species, and the fate of those fish. Fish length, weight, sex, and age data should be included if collected. A report is required whether or not collecting activities were undertaken. A report should also be sent to the Biologist(s) listed under stipulation 1 in the Permit Stipulations section.

PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:

Signature of Permittee

cc: Brian Glynn, Division of Sport Fish, Douglas
Kevin Monagle, Division of Commercial Fisheries, Juneau
Jackie Timothy, ADNR, Office of Habitat Management and Permitting, Juneau
Fish and Wildlife Protection, Juneau

APPENDIX 3B: FISH HABITAT DIMENSIONS

Stream Reach	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Lower Sherman	Number of Units	**16**	**22**	**4**	**0**	**42**
	Total Length (m)	291.1	74.2	37.0		402.3
	Mean Length (m)	18.2	3.4	9.3		9.6
	Mean Width (m)	6.1	2.8	5.6		4.3
	Mean Area (m^2)	123.2	16.0	88.1		63.7
	Total Area (m^2)	**1971.5**	**352.3**	**352.3**	**0**	**2676.1**
	% of Total Area	73.7	13.2	13.2	0	100
	Habitat Variable	**Riffle**	**Pool**	**Glide**	**Cascade**	**All Units**
Middle Sherman	Number of Units	**19**	**48**	**2**	**3**	**72**
	Total Length (m)	287.0	88.5	17.0	30.5	423.0
	Mean Length (m)	15.1	1.8	8.5	10.2	5.9
	Mean Width (m)	6.0	2.5	6.3	4.2	3.6
	Mean Area (m^2)	61.3	16.2	23.0	41.0	29.3
	Total Area (m^2)	**1164.5**	**775.6**	**46.0**	**123.0**	**2109.1**
	% of Total Area	55.2	36.8	2.2	5.8	100
	Habitat Variable	**Riffle**	**Pool**	**Glide**	**Cascade**	**All Units**
Upper Sherman	Number of Units	**15**	**36**	**2**	**19**	**72**
	Total Length (m)	137.5	107.5	13.5	140.5	399.0
	Mean Length (m)	9.2	3.0	6.8	7.4	5.5
	Mean Width (m)	4.1	3.5	3.3	4.4	3.8
	Mean Area (m^2)	32.6	24.3	18.3	25.7	26.2
	Total Area (m^2)	**488.4**	**875.5**	**36.5**	**488.8**	**1889.1**
	% of Total Area	25.9	46.3	1.9	25.9	100
Stream Reach	**Habitat Variable**	**Riffle**	**Pool**	**Glide**	**Cascade**	**All Units**
Lower Slate	Number of Units	**16**	**24**	**10**	**0**	**50**
	Total Length (m)	302.5	59.0	73.0		434.5
	Mean Length (m)	18.9	2.5	7.3		8.7
	Mean Width (m)	4.4	2.6	4.7		3.6
	Mean Area (m^2)	62.7	8.7	82.3		40.7
	Total Area (m^2)	**1003.3**	**208.6**	**823.0**	**0**	**2034.9**
	% of Total Area	49.3	10.3	40.4	0	100
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Middle Slate	Number of Units	**17**	**43**	**11**	**3**	**74**
	Total Length (m)	223.0	83.9	72.1	20.5	399.5
	Mean Length (m)	13.1	2.0	6.6	6.8	5.4
	Mean Width (m)	3.4	2.0	3.5	2.8	2.5
	Mean Area (m^2)	20.5	6.4	40.1	42.7	16.1
	Total Area (m^2)	**348.3**	**273.6**	**440.6**	**128.1**	**1190.7**
	% of Total Area	29.3	23.0	37.0	10.8	100
	Habitat Variable	**Riffle**	**Pool**	**Glide**	**Cascade**	**All Units**
Upper Slate	Number of Units	**33**	**43**	**14**	**0**	**90**
	Total Length (m)	244.5	75.5	60.5		380.5
	Mean Length (m)	7.4	1.8	4.3		4.2
	Mean Width (m)	1.9	1.4	1.7		1.6
	Mean Area (m^2)	7.9	6.6	8.5		7.4
	Total Area (m^2)	**261.0**	**285.1**	**118.9**	**0**	**665.0**
	% of Total Area	39.2	42.9	17.9	0	100

2006 Resident Fish Habitat Summary						
Stream Reach	**Habitat Variable**	**Riffle**	**Pool**	**Glide**	**Cascade**	**All Units**
Lower Johnson	Number of Units	**10.0**	**16.0**	**4.0**	**0**	**30.0**
	Total Length (m)	233.5	77.5	53.5		364.5
	Mean Length (m)	23.4	4.8	13.4		12.2
	Mean Width (m)	7.6	6.6	4.8		6.7
	Mean Area (m^2)	48.1	131.1	24.9		89.3
	Total Area (m^2)	**481.1**	**2097.6**	**99.8**	**0**	**2678.5**
	% of Total Area	18.0	78.3	3.7	0	100
	Habitat Variable	Riffle	Pool	Glide	Cascade	All Units
Middle Johnson	Number of Units	**15**	**65**	**3**	**3**	**86**
	Total Length (m)	253.5	146.0	24.0	22.5	446.0
	Mean Length (m)	16.9	2.2	8.0	7.5	5.2
	Mean Width (m)	7.1	2.4	5.8	6.0	3.4
	Mean Area (m^2)	70.7	15.4	48.8	111.1	29.6
	Total Area (m^2)	**1060.8**	**1001.6**	**146.5**	**333.3**	**2542.1**
	% of Total Area	41.7	39.4	5.8	13.1	100
	Habitat Variable	**Riffle**	**Pool**	**Glide**	**Cascade**	**All Units**
Upper Johnson	Number of Units	**19**	**37**	**10**	**4**	**70**
	Total Length (m)	235.5	88.5	75.5	27.5	427.0
	Mean Length (m)	12.4	2.4	7.6	6.9	6.1
	Mean Width (m)	3.8	2.2	3.5	2.6	2.8
	Mean Area (m^2)	49.6	35.0	35.0	25.5	22.8
	Total Area (m^2)	**941.6**	**201.3**	**349.6**	**102.1**	**1594.6**
	% of Total Area	59.0	12.6	21.9	6.4	100

APPENDIX 3C: Resident Fish Survey Data

Strata	Lower Sherman								
Date	7/27/2006								
				Trapezoid	Rectangle	**Snorkel**		**Electro Shock**	
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Ct	Dv	Ct	Dv
Riffle	20.5	20.5	10.5	76.5	215.3	2	1	3	2
Riffle	29	8.5	7.5	77.5	63.8	NS	NS		
Riffle	39	10	8	112.4	80.0	0	0		
Pool	54.5	15.5	6.5	21.9	100.8	5	7	1	8
SDP	56	3	1.0	3.0	3.0	1	0	1	0
Riffle	58	3.5	6	49.9	21.0	NS	NS		
Riffle	67.5	9.5	4.5	35.8	42.8	1	0	1	0
Riffle	74	6.5	6.5	31.3	42.3	1	0	1	0
Riffle	79	5	6	192.5	30.0	1	0	1	0
SDP	91	1.5	1.5	2.3	2.3	2	0	2	0
SDP	99	3	3	9.0	9.0	2	1	1	1
SDP	106	1	1	1.0	1.0	1	0		
Riffle	114	35	5	23.6	175.0	1	0		
Riffle	118.5	4.5	5.5	30.0	24.8	1	0		
Riffle	123.5	5	6.5	68.8	32.5	1	0		
Glide	134.5	11	6	54.6	66.0	3	2	2	2
Glide	144	9.5	5.5	235.8	52.3	2	1	2	2
SDP	153	1	1.0	1.0	1.0	1	0		
SDP	158	1	2.0	2.0	2.0	1	0		
SDP	173	1.5	1.5	2.3	2.3	0	1		
SDP	179	1	1.0	1.0	1.0	0	1		
Riffle	185	41	6	62.5	246.0	0	1		
Glide	195	10	6.5	35.8	65.0	1	1		
Glide	201.5	6.5	4.5	26.1	29.3	1	0		
Riffle	207	5.5	5	10.0	27.5	NS	NS		
Pool	209	2	5	26.3	10.0	1	0		
Pool	214	5	5.5	27.5	27.5	NS	NS		
Riffle	219	5	5.5	40.3	27.5	2	1		
Pool	226	7	6	109.3	42.0	1	7		
Riffle	245	19	5.5	23.5	104.5	1	0		
SDP	245	0.5	1.0	0.5	0.5	NS	NS		
SDP	245	0.5	1.0	0.5	0.5	NS	NS		
Pool	249.7	4.7	4.5	541.5	21.1	1	2		
Riffle	254	4.3	4.5	74.8	19.4	NS	NS		
SDP	275	3	2.0	6.0	6.0	NS	NS		
SDP	287.5	2	1.5	3.0	3.0	NS	NS		
SDP	302	3	0.5	1.5	1.5	1	0		
SDP	308	1	1.0	1.0	1.0	NS	NS		
SDP	323	4	2.0	8.0	8.0	2	7		
SDP	340	2	3.0	6.0	6.0	0	0		
Riffle	358	108.3	5.5	518.0	595.7	0	1		
Pool	358	11	9.1	100.1	100.1	2	9		

Strata Middle Sherman
Date 7/31/2006

				Trapezoid	Rectangle	Snorkel	Electro
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Dv	Dv
Riffle	5.5	5.5	10	14.6	55.0	0	
Pool	7	1.5	9.5	24.0	14.3	0	
Riffle	10	3	6.5	10.1	19.5	NS	
Pool	11.5	1.5	7	120.0	10.5	1	
SDP	12	2	2.5	5.0	5.0	2	
SDP	15.5	2.5	1.5	3.8	3.8	NS	
SDP	18	2.5	4.5	11.3	11.3	1	
SDP	22	1	1.5	1.5	1.5	0	
SDP	23	1.5	1.5	2.3	2.3	NS	
SDP	28.5	1	1.5	1.5	1.5	1	
Riffle	31.5	20	5	102.5	100.0	NS	
SDP	39	1.5	2	3.0	3.0	0	
SDP	47.5	3	1	3.0	3.0	1	
SDP	52	1.5	2	3.0	3.0	0	
SDP	52	0.5	1	0.5	0.5	1	
Riffle	52	20.5	5	7.0	102.5	0	
Riffle	53	1	9	195.5	9.0	NS	
SDP	60	1	1	1.0	1.0	NS	
SDP	63.5	2	2	4.0	4.0	0	
SDP	72.5	2	2	4.0	4.0	NS	
Riffle	76	23	8	100.7	184.0	0	
Riffle	88.2	12.2	8.5	212.9	103.7	NS	
SDP	90.1	0.5	1	0.5	0.5	1	
SDP	96.5	2	3	6.0	6.0	3	
Riffle	114	25.8	8	39.9	206.4	0	
Glide	119.5	5.5	6.5	25.0	35.8	1	
Pool	123.5	4	6	184.3	24.0	2	
SDP	124	2	1.5	3.0	3.0	1	
SDP	129.5	3	2.5	7.5	7.5	1	
SDP	130.5	1.5	1	1.5	1.5	1	
SDP	145	3	2	6.0	6.0	NS	
SDP	146	1	0.5	0.5	0.5	1	
SDP	153	1	1	1.0	1.0	NS	
SDP	155	2	1	2.0	2.0	1	
Riffle	157	33.5	5	102.0	167.5	0	
Cascade	181	24	3.5	7.5	84.0	NS	
Pool	183	2	4	44.0	8.0	1	
Riffle	194	11	4	8.8	44.0	NS	
Pool	196.5	2.5	3	10.5	7.5	2	
SDP	196.5	1	1	1.0	1.0	0	
Riffle	199.5	3	4	8.8	12.0	0	
Pool	202	2.5	3	166.9	7.5	0	
SDP	209	1	1	1.0	1.0	NS	
SDP	219	1	1	1.0	1.0	1	
SDP	222.5	3.5	2	7.0	7.0	1	
SDP	226.5	1.5	0.5	0.8	0.8	0	
SDP	234	0.5	0.5	0.3	0.3	1	
SDP	242	1	2	2.0	2.0	1	
Riffle	246.5	44.5	4.5	23.6	200.3	0	0
Cascade	251	4.5	6	69.0	27.0	NS	
Glide	262.5	11.5	6	21.0	69.0	1	1
Pool	266	3.5	6	32.5	21.0	0	
Riffle	271	5	7	14.0	35.0	NS	
Pool	273	2	7	28.0	14.0	NS	
Riffle	277	4	7	45.0	28.0	0	0
Pool	283	6	8	37.5	48.0	6	3
SDP	283	2.5	1.5	3.8	3.8	1	2
SDP	285	1	2	2.0	2.0	0	1
SDP	286	0.5	1	0.5	0.5	1	1
Riffle	288	5	7	126.0	35.0	NS	
SDP	304.5	3	3	9.0	9.0	1	1
Riffle	309	21	5	142.5	105.0	0	0
SDP	309.5	1	1	1.0	1.0	NS	
SDP	317.5	0.5	1.5	0.8	0.8	0	
SDP	325	2	2	4.0	4.0	1	1
SDP	334	2	2	4.0	4.0	0	
Riffle	339	30	4.5	3.8	135.0	1	1
Pool	340	1	3	6.0	3.0	0	1
Cascade	342	2	3	46.5	6.0	NS	
Riffle	357.5	15.5	3	7.0	46.5	NS	
Pool	359.5	2	4	12.3	8.0	0	2
Riffle	363	3.5	3		10.5	0	1

SBrata Upper Sherman
Date 7/26/2006

Habitat Type	Distance (m)	Length (m)	Width (m)	Trapezoid Ai (m2)	Rectangle Ai (m2)	Snorkel Dv	Electro Dv
SDP	6	1	1	1	1	0	1
SDP	6	1	1	1	1	1	1
Riffle	6	6	4	19.1	24.0	0	0
Pool	10.5	4.5	4.5	26.1	20.3	0	
Riffle	16	5.5	5	30.0	27.5	NS	
SDP	16	1.5	1.0	1.5	1.5	NS	
Riffle	16	7.5	3	22.5	22.5	0	0
SDP	23.5	3	1.0	3.0	3.0	2	3
Riffle	23.5	7.5	3	31.5	22.5	NS	
Riffle	34	10.5	3	26.3	31.5	1	2
Cascade	41	7	4.5	18.0	31.5	NS	
Riffle	45	4	4.5	47.3	18.0	0	0
Cascade	54	9	6	11.0	54.0	NS	
SDP	54	2	1.0	2.0	2.0	0	
SDP	54	2	1	2.0	2.0	NS	
Pool	56	2	5	10.0	10.0	0	1
Cascade	58	2	5	7.1	10.0	NS	
Pool	59.5	1.5	4.5	11.9	6.8	1	1
Riffle	62	2.5	5	36.0	12.5	0	0
Cascade	68	6	7	49.9	42.0	NS	
Glide	77.5	9.5	3.5	35.0	33.3	2	3
Cascade	84.5	7	6.5	6.3	45.5	NS	
Pool	85.5	1	6	18.4	6.0	NS	
Cascade	89	3.5	4.5	28.0	15.8	NS	
Riffle	96	7	3.5	3.5	24.5	0	0
Pool	97	1	3.5	6.5	3.5	0	1
Cascade	99	2	3	33.0	6.0	NS	
Pool	111	12	2.5	20.0	30.0	NS	
SDP	115	2	2.0	4.0	4.0	1	2
Pool	119	8	2.5	4.9	20.0	1	2
Pool	120.5	1.5	4	40.4	6.0	1	1
Riffle	130	9.5	4.5	6.8	42.8	NS	
SDP	130	2	1.0	2.0	2.0	0	1
Pool	131.5	1.5	4.5	55.1	6.8	1	
Cascade	142	10.5	6	27.5	63.0	NS	
Pool	147	5	5	138.4	25.0	8	
Cascade	167.5	20.5	8.5	71.5	174.3	NS	
SDP	167.5	2	1.0	2.0	2.0	0	
SDP	167.5	2	5	10.0	10.0	1	
Riffle	178.5	11	4.5	20.3	49.5	0	
Cascade	183	4.5	4.5	10.5	20.3	NS	
Pool	185	2	6	65.6	12.0	NS	
Riffle	197.5	12.5	4.5	39.9	56.3	1	
SDP	204	1	1.5	1.5	1.5	0	
SDP	205	2	2.5	5.0	5.0	1	
Cascade	212	14.5	1	11.0	14.5	NS	
Pool	217.5	5.5	3	13.5	16.5	NS	
Cascade	222	4.5	3	3.0	13.5	NS	
Pool	223	1	3	6.5	3.0	NS	
Cascade	225	2	3.5	7.5	7.0	NS	
Pool	227	2	4	14.9	8.0	1	
Riffle	230.5	3.5	4.5	27.0	15.8	NS	
Cascade	236.5	6	4.5	4.8	27.0	NS	
Pool	237.5	1	5	5.0	5.0	0	
Riffle	238.5	1	5	23.8	5.0	0	
Pool	243.5	5	4.5	30.0	22.5	1	
Cascade	251.5	8	3	12.0	24.0	NS	
Glide	255.5	4	3	1.5	12.0	2	
Cascade	256	0.5	3	20.6	1.5	NS	
Pool	261.5	5.5	4.5	7.5	24.8	1	
SDP	270	2	2.0	4.0	4.0	1	
Cascade	272	2	3	21.0	6.0	NS	
Pool	278	6	4	72.0	24.0	NS	
Cascade	296	18	4	32.0	72.0	NS	
SDP	296	2.5	1.0	2.5	2.5	NS	
Riffle	304	8	4	14.6	32.0	NS	
Cascade	308.5	4.5	2.5	114.1	11.3	NS	
Riffle	350	41.5	3	140.0	124.5	0	
SDP	350	1.5	1.0	1.5	1.5	0	
SDP		2	1.0	2.0	2.0	1	
SDP		2	1.0	2.0	2.0	1	
Pool	360	10	25	26.0	250.0	NS	

Strata Lower Johnson
Date 7/25/2006

				Trapezoid	Rectangle		Trap		Snorkel		Electro Shock	
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap	Ct	Dv	Ct	Dv	Ct	Dv
Riffle	0		10	76.5	0.0				NS			
Riffle	8.5	8.5	8	94.3	68.0				0			
Pool	21.5	13	6.5	164.0	84.5	T1		4	0	2		2
Riffle	42	20.5	9.5	43.8	194.8				NS			
SDP	42	2	1.0	2.0	2.0				NS			
Pool	47	5	8	143.5	40.0	T2		11	0	1		1
Riffle	67.5	20.5	6	54.4	123.0				0	0		
SDP	67.5	2.5	1.0	2.5	2.5				0	1		
Pool	75	7.5	8.5	25.4	63.8	T3		25	6	15		1
Pool	78.5	3.5	6	74.3	21.0				NS			
Riffle	92	13.5	5	33.8	67.5				NS			
Pool	97	5	8.5	17.0	42.5				0	1		
Pool	99	2	8.5	119.0	17.0				NS			
Riffle	113	14	8.5	20.6	119.0				0	0		
Pool	115.5	2.5	8	20.6	20.0	T4		1	0	0		
Pool	118	2.5	8.5	101.3	21.3				0	0		
Glide	133	15	5	21.4	75.0				1	0		
Pool	137.5	4.5	4.5	22.5	20.3				NS			
Riffle	143.5	6	3	36.0	18.0				NS			
Glide	152.5	9	5	2.8	45.0				NS			
Pool	153	0.5	6	71.5	3.0				NS			
Glide	166	13	5	10.6	65.0				NS			
Pool	168.5	2.5	3.5	61.9	8.8	T5		3	0	0		
Glide	185	16.5	4	65.0	66.0				0	0		
Pool	195	10	9	866.3	90.0				NS			
Riffle	300	105	7.5	52.5	787.5				0	1		
Pool	307	7	7.5	196.0	52.5				0	0		
Riffle	331.5	24.5	8.5	69.4	208.3				0	1		
Pool	339	7.5	10	210.0	75.0				0	0		
Riffle	360	21	10		210.0				0	0		

Strata Middle Johnson
Date 8/4/2006

				Trapezoid	Rectangle		Trap	Snorkel	Electro
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap	Dv	Dv	Dv
SDP	7	4	3	12	12.0			0	
Riffle	8	8	8.5	141.8	68.0			0	
SDP	24.5	1	1.5	1.5	1.5			0	
Riffle	29	21	5	16.3	105.0			1	1
Pool	31.5	2.5	8	58.1	20.0			NS	
SDP	33.6	1	1	1.0	1.0			0	
SDP	38	1.5	1	1.5	1.5			NS	
SDP	39	2	2	4.0	4.0			0	
Riffle	39	7.5	7.5	87.0	56.3			NS	
SDP	44	1	2	2.0	2.0			NS	
SDP	50.5	1.5	2	3.0	3.0			0	
Riffle	51	12	7	141.4	84.0			0	
Riffle	69.25	18.25	8.5	141.4	155.1			NS	
SDP	54	1	0.5	0.5	0.5			0	
SDP	59.5	1	1	1.0	1.0			1	
SDP	62.5	1	1	1.0	1.0			0	
SDP	71.5	2.5	2	5.0	5.0			NS	
SDP	80.5	1	1	1.0	1.0			NS	
SDP	83	1	1	1.0	1.0			0	
Riffle	87.5	18.25	7	13.0	127.8			0	0
Pool	89.5	2	6	187.5	12.0			0	
SDP	91.5	2	2	4.0	4.0			NS	
SDP	95.5	0.5	1.5	0.8	0.8			0	
SDP	97	1.5	1.5	2.3	2.3			NS	
SDP	103	2	1	2.0	2.0			0	
SDP	104.5	1.5	1.5	2.3	2.3			NS	
SDP	111.5	1.5	2	3.0	3.0			NS	
SDP	113	0.5	2	1.0	1.0			0	
SDP	116.5	2	2	4.0	4.0			0	
Riffle	119.5	30	6.5	54.6	195.0			0	0
Glide	129	9.5	5	78.0	47.5	**T1**	2	0	
Pool	142	13	7	14.0	91.0	**T2**	2	14	5
Cascade	144	2	7	81.3	14.0			NS	
SDP	144	1.5	1	1.5	1.5			1	1
SDP	146	2	1	2.0	2.0			1	1
SDP	149	3	3	9.0	9.0			1	1
SDP	153	1.5	1	1.5	1.5			NS	
SDP	153	2	3	6.0	6.0			NS	
SDP	157	0.5	1	0.5	0.5			0	
Riffle	157	13	5.5	121.5	71.5			NS	
SDP	161.5	1	1	1.0	1.0			0	
SDP	168	1.5	2	3.0	3.0			0	

Continued. Middle Johnson

				Trapezoid	Rectangle		Trap	Snorkel	Electro
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap	Dv	Dv	Dv
SDP	171	1	2	2.0	2.0			NS	
SDP	171	2	2	4.0	4.0			0	
Riffle	175	18	8	91.0	144.0			NS	
Pool	188	13	6	52.5	78.0	**T3**	0	3	
SDP	189	2.5	1	2.5	2.5			0	
SDP	194.5	1	1	1.0	1.0			0	
Cascade	198	10	4.5	60.0	45.0			NS	
SDP	201	1	2	2.0	2.0			NS	
SDP	202	1	2	2.0	2.0			0	
SDP	203	1	1	1.0	1.0			0	
SDP	204	2	2	4.0	4.0			NS	
Riffle	208	10	7.5	56.3	75.0			0	
Pool	217	9	5	218.8	45.0	**T4**	1	2	
SDP	220.5	2	2	4.0	4.0			0	
SDP	224	1	2	2.0	2.0			NS	
SDP	229	3	3	9.0	9.0			0	
SDP	231	3	3	9.0	9.0			1	
SDP	237.5	1	1.5	1.5	1.5			1	
SDP	248	1	0.5	0.5	0.5			1	
SDP	249	2	3	6.0	6.0			0	
Riffle	252	35	7.5	25.0	262.5			0	0
Pool	256	4	5	14.3	20.0			1	
Riffle	259	3	4.5	23.8	13.5			NS	
Pool	264	5	5	69.0	25.0			NS	
SDP	266	2	3	6.0	6.0			0	
SDP	270.5	1	2	2.0	2.0			0	
SDP	272.5	1	3	3.0	3.0			NS	
Riffle	276	12	6.5	39.9	78.0			NS	
Pool	281.5	5.5	8	176.3	44.0	**T5**	0	0	
SDP	283	2	3	6.0	6.0			2	1
SDP	289	1	1	1.0	1.0			0	
SDP	290	1	1	1.0	1.0			NS	
SDP	294.5	1.5	1	1.5	1.5			0	
SDP	299.5	2	1	2.0	2.0			1	
Riffle	305	23.5	7	30.4	164.5			0	0
Glide	309.5	4.5	6.5	36.0	29.3			0	
Pool	315.5	6	5.5	63.0	33.0	**T6**	1	2	
Cascade	326	10.5	6.5	192.0	68.3			NS	
Pool	338	2	2	4.0	4.0	**T7**	1	1	
Pool	338	2	2	4.0	4.0			1	
SDP	348.5	1	1	1.0	1.0			NS	
Riffle	350	24	9.5	77.5	228.0			NS	
Glide	360	10	6	32.5	60.0			1	
Pool	365	5	7		35.0	**T8**	7	4	

Strata Upper Johnson
Date 8/5/2006

				Trapezoid	Rectangle		Trap	Snorkel
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap	Dv	Dv
Glide	6	6	3	22.5	18.0			0
SDP	7.5	2	3	6.0	6.0	0		0
Riffle	15	9	2	7.9	18.0			NS
SDP	17	1.5	1.5	2.3	2.3			NS
Glide	18.5	3.5	2.5	40.5	8.8			NS
SDP	18.5	1.5	1	1.5	1.5	0		0
SDP	24.6	1.5	2	3.0	3.0	T1	2	1
Riffle	32	13.5	3.5	13.0	47.3			1
Glide	36	4	3	32.5	12.0		0	0
SDP	36	2	2	4.0	4.0			NS
Riffle	42	14	3	42.0	42.0			1
SDP	43	1	1.5	1.5	1.5	T2,T3	2	1
Riffle	46	10	3.5	35.0	35.0			NS
SDP	51	5	4	20.0	20.0	T4,T5,T6	12	13
Glide	56	10	3.5	20.6	35.0		1	0
Riffle	61.5	5.5	4	95.0	22.0	T7(59)	0	1
SDP	61.5	1	1	1.0	1.0			NS
SDP	69	3	4	12.0	12.0	0		0
Pool	74	3	4	12.0	12.0	0		0
Glide	80.5	19	6	12.0	114.0		0	0
Glide	82.5	2	6	106.3	12.0		1	1
SDP	84.5	1.5	1	1.5	1.5	0	2	1
SDP	93.5	1.5	2	3.0	3.0	T8 (100)	2	2
Riffle	99.5	17	6.5	112.9	110.5		2	1
Glide	121	21.5	4	88.0	86.0			NS
SDP	134.5	0.5	3	1.5	1.5	0		0
SDP	136	2	2	4.0	4.0			NS
Riffle	143	22	4	42.8	88.0	T9(140)	1	NS
SDP	151	1.5	4	6.0	6.0	0		0
Riffle	152	9	5.5	140.0	49.5			NS
SDP	163.5	1	1	1.0	1.0	0		0
SDP	163.5	1	1	1.0	1.0			NS
SDP	178.5	1.5	3	4.5	4.5			1
Riffle	180	28	4.5	56.0	126.0			NS
SDP	188.5	1.5	1	1.5	1.5			0
Cascade	194	14	3.5	32.5	49.0			NS
SDP	200	3	6	18.0	18.0			0
Riffle	204	10	3	15.0	30.0			NS
SDP	205	3	1.5	4.5	4.5			0
Riffle	209	5	3	38.3	15.0			0
SDP	211	1	1	1.0	1.0			NS
SDP	213	1	3.5	3.5	3.5			1
Riffle	217.5	8.5	6	32.5	51.0			0
SDP	218	1.5	2	3.0	3.0			0
Riffle	224	6.5	4	21.3	26.0			NS
Pool	229	5	4.5	25.5	22.5			1
Cascade	235	6	4	56.3	24.0			NS
Riffle	250	15	3.5	23.8	52.5			0
SDP	251	2	1	2.0	2.0			0
SDP	251	1	1	1.0	1.0			NS
Riffle	255	5	6	210.0	30.0			0
SDP	273.5	1	0.5	0.5	0.5			0
SDP	274	2	0.5	1.0	1.0			NS
SDP	280	1	1	1.0	1.0			NS
SDP	291	1	2	2.0	2.0			0
Riffle	295	40	4.5	22.8	180.0			0
Riffle	302	7	2	29.3	14.0			NS
Pool	315	13	2.5	15.8	32.5			1
Pool	322	7	2	9.0	14.0			0
Glide	326	4	2.5	7.5	10.0			0
Pool	329	3	2.5	10.0	7.5			0
Cascade	334	5	1.5	9.0	7.5			NS
Pool	340	6	1.5	5.3	9.0			NS
Glide	343	3	2	16.0	6.0			NS
SDP	346	2	3	6.0	6.0			0
Riffle	351	8	2	4.4	16.0			0
Cascade	353.5	2.5	1.5	4.4	3.8			NS
Glide	356	2.5	2	3.8	5.0			0
Pool	357.5	1.5	3	5.0	4.5			0
Riffle	360	2.5	1		2.5			0

Strata Lower Slate
Date 7/29/2006

				Trapezoid	Rectangle		Trap		Snorkel		Electro Shock	
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap	Ct	Dv	Ct	Dv	Ct	Dv
Glide	20.5	20.5	5	74.4	102.5				1	3		
SDP	22.5	1.5	2.0	3.0	3.0	**T1**	0	1	0	0		
Riffle	38	17.5	3.5	29.8	61.3				NS	NS		
Glide	45	7	5	150.0	35.0				1	0		
SDG	64	3	3.0	9.0	9.0				2	0		
Riffle	69	24	7.5	115.5	180.0				0	0		
Glide	83	14	9	465.0	126.0	**T2**	2	3	2	3		
SDP	89	4	1.5	6.0	6.0				0	0		
SDP	116	1.5	2.0	3.0	3.0		0	2	0	1		
SDP	120	1	2.0	2.0	2.0				NS	NS		
SDP	131	1	4.0	4.0	4.0		2	0	2	0		
Riffle	145	62	6	37.4	372.0	**T3**			1	0	1	0
Pool	151.5	6.5	5.5	70.1	35.8	**T4**	5	6	4	6		
SDP	167	1.5	1.5	2.3	2.3				NS	NS		
Riffle	168	16.5	3	33.8	49.5				1	0	1	0
Glide	177	9	4.5	59.4	40.5		3	1	2	0		
SDG	188	1	3.0	3.0	3.0		2	1	1	0		
Riffle	189.5	12.5	5	31.5	62.5				0	0	0	0
Riffle	195.5	6	5.5	112.5	33.0				2	1	2	1
SDP	208	1	1.0	1.0	1.0		0	1	2	0		
SDP	209	3	3.0	9.0	9.0		3	0	3	0		
SDP	209	3	3.0	9.0	9.0				4	0		
SDP	209	3	3.0	9.0	9.0		3	0	4	0		
Riffle	218	22.5	4.5	58.5	101.3				2	0		
SDP	230	2	1.0	2.0	2.0		1	0	1	0		
Riffle	231	13	4.5	58.5	58.5				1	0	1	0
Riffle	231	13	4.5	110.3	58.5				NS	NS		
SDP	241	1.5	1.5	2.3	2.3				2	0		
SDP	245	3	4.0	12.0	12.0				1	0		
SDP	247	3	1.5	4.5	4.5				NS	NS		
SDP	250	2	3.0	6.0	6.0				2	2		
Riffle	252	21	6	9.8	126.0				NS	NS		
Riffle	255	3	2	28.0	6.0				0	0		
Glide	263	8	5.5	19.3	44.0				7	4		
Riffle	268.5	5.5	3	12.4	16.5				NS	NS		
Glide	274	5.5	3	25.0	16.5				1	1		
Riffle	284	10	2	21.3	20.0				2	0	2	0
Riffle	289	5	2.5	71.3	12.5				NS	NS		
SDP	289	1	1.5	1.5	1.5				NS	NS		
SDP	290	3	2.5	7.5	7.5				2	3		
SDP	304	1.5	5.0	7.5	7.5				0	4		
Riffle	308	19	5	273.0	95.0				0	0		
SDP	323	4	3.0	12.0	12.0				3	0		
SDP	328	4	4.0	16.0	16.0				0	6		
SDG	347	1	6.0	6.0	6.0				NS	NS		
SDP	352	2	2.0	4.0	4.0				NS	NS		
SDG		4	3.0	12.0	12.0				2	1		
SDP		2	3.0	6.0	6.0				NS	0		
SDP		3	3.0	9.0	9.0				0	0		
Riffle	360	52	5.5		286.0				NS	0		

Strata Middle Slate
Date 8/9/2006

				Trapezoid	Rectangle		Trap	Snorkel	Electro
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap	Dv	Dv	Dv
SDP	2	1	1	1	1				
SDP	2	1	1.5	1.5	1.5				
SDP	4	1	1.5	1.5	1.5				
Cascade	10	6	4	33.8	24.0				
SDP	13	3	2.5	7.5	7.5				
Riffle	19	9	3.5	21.0	31.5				
Glide	25	6	3.5	14.6	21.0				
Pool	29.5	4.5	3	6.9	13.5	T1,T2	0	0	
SDP	34	2	2	4.0	4.0				
Cascade	41	2.5	2.5	67.4	6.3				
SDP	43	0.5	2	1.0	1.0				
SDP	43	0.5	2	1.0	1.0				
SDP	49.5	0.5	1	0.5	0.5				
Riffle	65.5	24.5	3	8.8	73.5			0	
Pool	68	2.5	4	4.9	10.0		0	0	
Pool	69.5	1.5	2.5	10.5	3.8				
Riffle	73	3.5	3.5	16.9	12.3			0	
Pool	77.5	4.5	4	9.8	18.0	T3	0	0	
Glide	80.5	3	2.5	26.3	7.5				
Riffle	88	7.5	4.5	18.0	33.8			0	
SDP	91	2	2	4.0	4.0				
Glide	92.5	4.5	3.5	99.8	15.8				
SDP	100	1	1	1.0	1.0				
SDP	105	2	3	6.0	6.0				
SDP	116.5	2.5	2	5.0	5.0				
SDP	116.5	3	2	6.0	6.0				
Riffle	121	28.5	3.5	35.6	99.8			0	0
SDP	124	3	2	6.0	6.0				
SDP	126	3	2	6.0	6.0				
Riffle	128.5	7.5	6	22.5	45.0			0	0
Riffle	133.5	5	3	14.7	15.0				
Pool	138.4	4.9	3	12.8	14.7		0	0	
Glide	143.5	5.1	2	8.0	10.2				
Riffle	147.5	4	2	11.3	8.0			0	0
Glide	152.5	5	2.5	4.5	12.5				
Pool	154.5	2	2	24.0	4.0			0	
SDP	160	1.5	1.5	2.3	2.3				
SDP	160	1	1	1.0	1.0				
Cascade	166.5	12	2	27.0	24.0				
SDP	171	3	2.5	7.5	7.5			0	
Riffle	178.5	12	2.5	12.4	30.0				
Glide	183	4.5	3	9.0	13.5				
SDP	184	1	3	3.0	3.0			0	
Riffle	186	3	3	17.5	9.0				
SDP	192.5	0.5	1	0.5	0.5				
Riffle	193	7	2	37.5	14.0			0	0
SDP	197	2	2	4.0	4.0				
SDP	202.5	2	1	2.0	2.0				
Riffle	205.5	12.5	4	17.0	50.0				
Pool	209.5	4	4.5	56.3	18.0	T4	2	1	
Glide	222	12.5	4.5	92.0	56.3			0	
SDP	222.5	0.5	1	0.5	0.5				
SDP	225	0.5	0.5	0.3	0.3		0	0	
SDP	234	0.5	0.5	0.3	0.3				
SDP	237.5	1	1.5	1.5	1.5				
SDP	242.5	1	1	1.0	1.0				
Riffle	245	23	3.5	30.0	80.5			0	0
Pool	252.5	7.5	4.5	50.6	33.8	T5	1	1	
SDP	259	1	1	1.0	1.0				
SDP	259	1	0.5	0.5	0.5			1	
Riffle	266	13.5	3	12.0	40.5				
Glide	270	4	3	42.0	12.0			0	0
SDP	276	2	2	4.0	4.0				
Riffle	284	14	3	56.0	42.0			1	1
Glide	294	10	5	42.5	50.0			0	0
Glide	302.5	8.5	3.5	19.1	29.8			0	
SDP	313	3	1	3.0	3.0				
SDP	320	3	1	3.0	3.0				
SDP	329	2	2	4.0	4.0				
SDP	333	0.5	1	0.5	0.5				
SDP	338.5	3	1	3.0	3.0				
Riffle	346	43.5	3	38.0	130.5				
Glide	355.5	9.5	5	21.4	47.5				
Riffle	360	4.5	4.5		20.3				

Strata Upper Slate
Date 8/1/2006

				Trapezoid	Rectangle		Trap 1	Electro1	Trap2	Electro2
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap			Dv	Dv
Pool	5.5	5.5	3	52.5	16.5					
Riffle	23	17.5	3	5.3	52.5			1		
SDP	23.5	1	1	1.0	1.0			1		
Riffle	24.5	1.5	4	25.5	6.0			2		2
Glide	33	8.5	2	17.5	17.0					
Riffle	43	10	1.5	3.8	15.0			1		2
Riffle	46	3	1	7.0	3.0			1		
Riffle	49.5	3.5	3	1.3	10.5			1		1
Glide	50	0.5	2	8.0	1.0			3		3
SDP	52	1	2	2.0	2.0					
Glide	54	4	2	10.5	8.0	T1		3	4	
SDP	54.5	1	1	1.0	1.0	T2		2	1	
Riffle	60	6	1.5	3.0	9.0			1		1
Pool	62	2	1.5	10.5	3.0			3	1	
SDP	62	0.5	1	0.5	0.5	T3		2		1
Riffle	69	7	1.5	9.0	10.5			2		
Glide	75	6	1.5	5.0	9.0			2		1
Riffle	79	4	1	9.0	4.0			1		1
Glide	85	6	2	9.0	12.0			2		1
Riffle	91	6	1	5.0	6.0			1		1
Glide	95	4	1.5	15.8	6.0			2		
Riffle	104	9	2	7.0	18.0			1		
Glide	108	4	1.5	2.3	6.0	T4		1	0	0
Riffle	109.5	1.5	1.5	3.1	2.3			1		
Pool	112	2.5	1	10.6	2.5			2		
SDP	117.5	0.5	0.5	0.3	0.3			1		
Riffle	120.5	8.5	1.5	5.0	12.8			1		
Pool	124.5	4	1	10.6	4.0	T5	1		0	0
Riffle	133	8.5	1.5	6.0	12.8			2		
Glide	137	4	1.5	2.3	6.0			3		
Pool	138.5	1.5	1.5	5.0	2.3	T6	1		0	0
Glide	142.5	4	1	4.5	4.0			3		
Pool	145.5	3	2	6.1	6.0	T7	3		5	
Riffle	149	3.5	1.5	1.3	5.3			1		
Pool	150	1	1	5.0	1.0		1			
Glide	154	4	1.5	0.5	6.0					
Pool	154.5	0.5	0.5	20.3	0.3		2			
SDP	160.5	0.5	1	0.5	0.5		1			
Riffle	168	13.5	2.5	5.0	33.8			2		
Glide	170.5	2.5	1.5	3.5	3.8					
Pool	172.5	2	2	5.6	4.0	T8	1		2	
Riffle	175	2.5	2.5	10.0	6.3			1		

Continued	Upper Slate									
				Trapezoid	Rectangle		Trap 1	Electro1	Trap2	Electro2
Habitat Type	Distance (m)	Length (m)	Width (m)	Ai (m2)	Ai (m2)	Trap			Dv	Dv
SDP	178.5	1	1	1.0	1.0	T9	3		0	
Glide	179	4	2.5	27.5	10.0					
Riffle	189	10	2.5	13.0	25.0			2		
Pool	193	4	3	19.3	12.0	T10	4		7	
SDP	193.5	1.5	2	3.0	3.0		1			
Riffle	200	7	3.5	6.0	24.5			1		
Pool	202	2	3	6.0	6.0		1			
Pool	204	4	2	5.0	8.0		2			
Pool	206.5	2.5	1	8.3	2.5		1			
Riffle	209.5	3	3	5.3	9.0					
Pool	212.5	3	2.5	10.6	7.5		1			
Riffle	221	8.5	1	6.8	8.5					
Glide	225.5	4.5	1.5	10.1	6.8					
Riffle	230	4.5	1.5	22.5	6.8					
SDP	235	1.5	1.5	2.3	2.3					
Riffle	240	10	3	27.0	30.0					
Riffle	258	18	1.5	3.8	27.0					
Pool	260.5	2.5	1.5	6.8	3.8					
Riffle	265	4.5	1.5	3.0	6.8					
Pool	267	2	1.5	5.0	3.0					
Riffle	271	4	1.5	3.8	6.0					
Pool	273.5	2.5	1	51.6	2.5					
SDP	274.5	0.5	1	0.5	0.5					
SDP	278	0.5	1.5	0.8	0.8					
SDP	282.5	1	1	1.0	1.0					
SDP	284	0.5	1	0.5	0.5					
SDP	289	1.5	1	1.5	1.5					
SDP	297.5	0.5	0.5	0.3	0.3					
SDP	302	1	0.5	0.5	0.5					
Riffle	303	29.5	2	15.0	59.0					
SDP	304	0.5	0.5	0.3	0.3					
Riffle	315	12	1.5	7.0	18.0					
Pool	319	4	1	8.8	4.0					
Riffle	324	5	2.5	10.5	12.5					
SDP	324	1	1	1.0	1.0					
SDP	327	1	1	1.0	1.0					
Riffle	330	6	1	15.0	6.0					
SDP	335	1	1	1.0	1.0					
Riffle	336	6	2.5	4.5	15.0					
Pool	338	2	2.5	3.0	5.0					
Pool	339.5	1.5	2	6.1	3.0					
Riffle	343	3.5	2	6.8	7.0					
Glide	347.5	4.5	1.5	2.5	6.8					
Riffle	349.5	2	1.5	0.6	3.0					
Pool	350	0.5	1	8.3	0.5					
Riffle	355.5	5.5	1.5	3.4	8.3					
Pool	360	4.5	1.5		6.8					
SDP	360.5	1	0.5	0.5	0.5					

APPENDIX 3D: FISH LENGTH & WEIGHT DATA

Dolly Varden	Length (mm)	Weight (g)	k	Statistics	
Lower Sherman	70	2.9	0.845	Mean	0.814
	92	6.1	0.783	Standard deviation	0.044
				n	2
				95% Confidence	0.061
Middle Sherman	127	17.7	0.864	Mean	0.863
	161	35.8	0.858	Standard deviation	0.080
	122	18.7	1.030	n	8
	135	22.1	0.898	95% Confidence	0.056
	105	8.8	0.760		
	103	9.1	0.833		
	120	15	0.868		
	115	12.1	0.796		
Upper Sherman	110	13.8	1.037	Mean	0.885
	122	15.5	0.854	Standard deviation	0.0813455
	177	46.7	0.842	n	9
	120	14.3	0.828	95% Confidence	0.0531457
	141	27.6	0.985		
	134	19.5	0.810		
	125	17.9	0.916		
	123	16.6	0.892		
	126	16	0.800		
Lower Johnson	69	2.6	0.791	Mean	0.785
	77	3.8	0.832	Standard deviation	0.0455999
	79	3.5	0.710	n	18
	73	3	0.771	95% Confidence	0.0210661
	73	3.2	0.823		
	79	3.9	0.791		
	77	3.7	0.810		
	83	4.5	0.787		
	70	2.5	0.729		
	75	3.6	0.853		
	73	3.2	0.823		
	77	3.6	0.789		
	84	4.9	0.827		
	96	6.6	0.746		
	89	5.4	0.766		
	94	5.7	0.686		
	96	6.8	0.769		
	77	3.8	0.832		

Dolly Varden	Length (mm)	Weight (g)	k	Statistics	
Middle Johnson	111	11.6	0.848	Mean	0.843
	131	21.7	0.965	Standard deviation	0.0566095
	129	16.7	0.778	n	18
	150	27.5	0.815	95% Confidence	0.0261523
	120	14.9	0.862		
	196	62.3	0.827		
	145	26.7	0.876		
	190	56	0.816		
	110	12.8	0.962		
	104	9.3	0.827		
	102	8.4	0.792		
	164	40.2	0.911		
	120	13.5	0.781		
	129	18.7	0.871		
	160	33.4	0.815		
	132	19.2	0.835		
	127	16.8	0.820		
	127	15.9	0.776		
Upper Johnson	124	15.5	0.813	Mean	0.871
	95	8.2	0.956	Standard deviation	0.0788991
	97	7.6	0.833	n	33
	95	7.6	0.886	95% Confidence	0.0269197
	95	8.4	0.980		
	102	9.5	0.895		
	98	8.2	0.871		
	116	9.7	0.621		
	127	17.1	0.835		
	91	6.9	0.916		
	100	9.2	0.920		
	87	6.1	0.926		
	99	8.8	0.907		
	96	7.8	0.882		
	99	8.2	0.845		
	102	9.2	0.867		
	107	10.7	0.873		
	119	16.4	0.973		
	113	9.9	0.686		
	100	9.7	0.970		
	92	7.1	0.912		
	105	10	0.864		
	110	11.3	0.849		
	96	8	0.904		
	108	10.3	0.818		
	110	10.8	0.811		
	100	8.4	0.840		
	97	6.7	0.734		
	101	8.9	0.864		
	110	12	0.902		
	95	8.5	0.991		
	102	9.6	0.905		
	100	9	0.900		

APPENDIX 4A: ADFG FISH RESOURCE PERMIT
(fry counts)

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME

P.O. BOX 115525
JUNEAU, ALASKA 99811-5525

Permit No. SF2006-070

Expires: 06/30/2006

FISH RESOURCE PERMIT
(For Scientific/Educational Purposes)

This permit authorizes Elizabeth Flory *(whose signature is required on page 2 for permit validation)*
person

of Couer Alaska, Inc. at 3031 Clinton Drive, Suite 202, Juneau AK 99801
agency or organization address

to conduct the following activities **from** April 1, 2006 **to** June 30, 2006 in accordance with AS 16.05.930:

Purpose: To monitor outmigrating pink and chum salmon and obtain baseline data for Kensington Mine EPA NPDES permit

Location Sherman, Johnson, Slate Creeks north of Berners Bay within Lynn Canal

Species Collected: Chum and pink salmon

Method of Capture: Fyke nets and or incline-plane traps with live boxes (see Permit Stipulations #2)

Final Disposition: Any species and number of fish may be collected, identified, measured and then released alive at the site of capture, until 30,000 pink salmon and 10,000 chum salmon have been collected at which point sampling will end.

-Continued on Back-

REPORT DUE July 30, 2006. The report shall include species, numbers, dates, and locations of collection and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish. The report shall also include other information as may be required under the permit stipulations section.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.
4. Permits will not be renewed until the department has received detailed reports, as specified above.
5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

Fish Resource Permit Coordinator
Division of Sport Fish

Director
Division of Sport Fish

4/5/06
Date

Authorized Personnel: The following persons may perform collecting activities under terms of this permit:
John Dewitt, Liz Flory, Johnse Ostman, John Randolph, Kate Savage
Employees and volunteers under the direct supervision of, and in the presence of, one of the authorized personnel listed above may participate in collecting activities under terms of this permit.

Permit Stipulations:

1) **Brian Glynn** (465-4318, brian_glynn@fishgame.state.ak.us), Juneau, and Randy Ericksen (766-3638, randy_ericksen@fishgame.state.ak.us) Haines, Sport Fish Division Area Management Biologists, must be notified at least several days **prior** to engaging in collecting activities within their management areas. These biologists have the right to specify methods for collecting, as well as limiting the collections of any species, and the number of specimens collected by time and area.
2) **The stream channel shall not be blocked by capture gear. Fyke nets and inclined-plane traps must be operated in such a manner as to allow cutthroat trout and Dolly Varden to migrate freely up and downstream.**
3) A valid Alaska sport fishing license must be in the possession of any individual using hook-and-line gear.
4) **Atlantic salmon**, and any other listed **exotic or non-native species** that you encounter in any way in your sampling should be killed and not released. In such an event please contact the nearest Alaska Department of Fish and Game office (ADF&G) (see # 1 above), as soon as possible, with species identification or description, capture location or location of sighting (if capture is not possible), number captured (seen), size, and sex. ADF&G requests that you take measures to preserve and then turn in, the whole specimen to the nearest ADF&G office for sampling and documentation.
5) Electroshocking is currently discouraged, but not prohibited by the department. Electroshockers **may not** be used in anadromous waters (as defined by the Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes, ADF&G) or in the presence of spawning salmonids, adult trout or char. Operators of electroshocking equipment should have formal training.
6) All unattended collecting gear must be labeled with the permittee's name, telephone number, and permit number and all fish collecting traps must be accounted for and removed from the water at the conclusion of sampling.
7) No fish may be transported from the water body where they were captured without a valid Fish Transport Permit (FTP) obtained from the Alaska Department of Fish and Game, Division of Commercial Fisheries.
8) *A Title 41 Permit is required from Alaska Department of Natural Resources, Office of Habitat Management and Permitting, to place structures (weir, etc.) in streams.*
9) *A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.*
10) Issuance of this permit does not absolve the permittee from compliance in full with any and all other applicable federal, state, or local laws, regulations, or ordinances.
11) A **report of collecting activities**, referenced to this fish resource permit number, must be submitted to the Alaska Department of Fish and Game, Division of Sport Fish HQ, P.O. Box 115525, Juneau, AK 99811-5525, Attention: Tammy Davis (465-6183; tammy_davis@fishgame.state.ak.us), within 30 days after the expiration of this permit. This report must summarize the number of fish captured by date, by location (provide GPS coordinates and datum or a map), and by species, and the fate of those fish. Fish length, weight, sex, and age data should be included if collected. A report is required whether or not collecting activities were undertaken. A report should also be sent to the Biologist(s) listed under stipulation 1 in the Permit Stipulations section.

PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:

_____
Signature of Permittee

cc: Brian Glynn, Division of Sport Fish, Juneau
Randy Ericksen, Division of Sport Fish, Haines
Kevin Monagle, Division of Sport Fish, Juneau
Randy Bachman, Division of Commercial Fisheries, Haines
Jackie Timothy, ADNR, Office of Habitat Management and Permitting, Juneau
Fish and Wildlife Protection, Juneau

APPENDIX 4B: ADNR FISH HABITAT PERMIT
(for fry counts)

STATE OF ALASKA

FRANK H. MURKOWSKI, GOVERNOR

400 WILLOUGHBY AVENUE, 4th FLOOR
PO BOX 111050
JUNEAU, ALASKA 99801-1050
PHONE: (907) 465-4105
FAX: (907) 465-4759

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF HABITAT MANAGEMENT AND PERMITTING
JUNEAU AREA OFFICE

FISH HABITAT PERMITS
FH06-I-0024, FH06-I-0025, and FH06-I-0026

ISSUED: March 23, 2006
EXPIRES: December 31, 2011

Ms. Liz Flory
Coeur Alaska, Inc.
3031 Clinton Drive
Juneau, AK 99801

RE: Installation of Temporary Fish Weirs
Sherman Creek (Stream #115-31-10330)
Slate Creek (Stream #115-20-10030)
Johnson Creek (Stream #115-20-10070)
T. 35 S., R. 62 E., C.R.M. (Juneau D-4)

Dear Ms. Flory:

Pursuant to AS 41.14.870(b), the Alaska Department of Natural Resources (DNR) Office of Habitat Management and Permitting (OHMP) has reviewed your proposal to install temporary fish weirs in Sherman Creek, Slate Creek and Johnson Creek to monitor out-migrating salmon fry. Weirs will be in place from early April until fish numbers diminish in late May or early June.

Anadromous Fish Act and Coastal Consistency Requirements

Sherman Creek (Stream #115-31-10330), Slate Creek (Stream #115-20-10030), and Johnson Creek (Stream #115-20-10070) have been specified as being important for the spawning, rearing, or migration of anadromous fish pursuant to AS 41.14.870(a). Pink salmon are present in Sherman Creek; coho, pink and chum salmon are present in Slate Creek and Johnson Creek. Installation of temporary fish weirs is consistent with the Standards of the Alaska Coastal Management Program under Generally Consistent Determination GCD-6, *Temporary Fish Research and Management Facilities*, provided you conduct the project as described above and adopt the standard alternative measures. I have attached GCD 6 for your information.

In accordance with AS 41.14.870(d) and 11 AAC 110, your project is approved according to the project description, standard alternative measures, and the terms of this permit.

FH06-I-0024 authorizes placement of a weir in Sherman Creek
FH06-I-0025 authorizes placement of a weir in Slate Creek
FH06-I-0026 authorizes placement of a weir in Johnson Creek

You are responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved project. For any activity that significantly deviates from the approved plan, you shall notify OHMP and obtain written approval in the form of a permit amendment before beginning the activity. Any action that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the OHMP. Therefore, it is recommended you consult OHMP immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 41.14.870. This permit must be retained on site during construction. Please be advised that this determination applies only to activities regulated by OHMP; other divisions with ADNR also may have jurisdiction under their respective authorities. This determination does not relieve you of your responsibility to secure other permits; state, federal, or local. You are still required to comply with all other applicable laws.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish created by the project which was a direct result of failure to comply with this permit or any applicable law.

You shall indemnify, save harmless, and defend the department, its agents, and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or your performance under this permit. However, this provision has no effect if, and only if, the sole proximate cause of the injury is the department's negligence.

This permit decision may be appealed in accordance with the provisions of AS 44.62.330-630.

If you have any questions, please contact Carl Schrader at (907) 465-4287 or email carl_schrader@dnr.state.ak.us.

Sincerely,

Edmund J. Fogels
Acting Deputy Commissioner

By Jackie Timothy
Office of Habitat Management and Permitting
Department of Natural Resources

Email cc:

Al Ott, OHMP, Fairbanks
Carl Schrader, OHMP, Juneau
Joe Donohue, OPMP, Juneau
Tom Crafford, OPMP, Anchorage
Brian Glynn, ADF&G-SF, Juneau
Randy Bachman, ADF&G-CF, Haines
Mark Fink, ADF&G-SF, Anchorage

GENERALLY CONSISTENT DETERMINATION GCD-6

TEMPORARY FISH RESEARCH AND MANAGEMENT FACILITIES

The following activity is consistent with the Alaska Coastal Management Program per 11 AAC 110.730 when conducted according to the standard alternative measures listed below. This approval does not relieve the applicant from obtaining required permits and approvals from local, State, and federal individual agencies.

For activities subject to this generally consistent determination, the applicant is not automatically required to complete a CPQ. DFG may require a CPQ for project proposals where it is uncertain whether other State and federal authorizations may be required.

DESCRIPTION OF THE ACTIVITY

Seasonal construction, maintenance, operation, and removal of temporary fish weirs, counting towers, sonar arrays, holding pens, and other sampling or research facilities for the purpose of fisheries research, management, or enhancement. Camp facilities are excluded from this generally consistent determination, but may qualify for approval under generally consistent determination GCD-23.

Authority: AS 41.14.840
AS 41.14.870
AS 16.20
AS 38.05.850
5 AAC 95

Permits: Fish Habitat Permit (OHMP)
Special Area Permit (DFG)
Land Use Permit (DNR)

Region: Statewide

STANDARD ALTERNATIVE MEASURES

1. Streambanks shall not be disturbed. If streambanks are inadvertently disturbed by activities attributable to this project, they shall be immediately stabilized to prevent erosion and the resultant sedimentation of streams which could occur both during and after operations.

2. Facilities shall be operated and maintained as required by DFG and OHMP to prevent unnecessary sampling mortality and ensure that fish mortality caused by delays in migration do not occur.

APPENDIX 4C: MARK-RECAPTURE DATA FOR FRY POPULATION ESTIMATES

	Sherman Creek			Johnson Creek			Slate Creek		
Date of release	# mark fish released	# mark fish recaptured	% fish recapture	# mark fish released	# mark fish recaptured	% fish recaptured	# mark fish released	# mark fish recaptured	% fish recapture
13-Apr									
14-Apr				49	0	0			
15-Apr									
16-Apr	49	22	44.9				50	14	28
17-Apr				107	8	16.3			
18-Apr									
19-Apr	79	17	21.5						
20-Apr				250	28	11.2			
21-Apr							100	35	35
22-Apr	low catch								
23-Apr							trap pulled		
24-Apr				flow over	top of trap		trap reset		
25-Apr							45	0	0
26-Apr	43	4	9.3	498	51	10.2	no visit		
27-Apr							eulachon	in trap	
28-Apr									
29-Apr	145	49	33.8	495	29	5.9			
30-Apr							185	20	10.8
1-May									
2-May	91	15	16.5	496	35	7			
3-May							140	0	0
4-May							net blown		
5-May				494	11	2.2	net out		
6-May							net reset		
7-May							40	1	2.5
8-May				496	7	1.4	no wings		
9-May				no wings					
10-May							80	20	25
11-May				495	85	17.2			
12-May									
13-May							31	1	3.2
14-May				500	86	17.2	sculpins		
15-May									

APPENDIX 5: WEEKLY SALMON COUNTS

Sherman Pink Salmon Counts

Reach	7/27/06	8/3/06	8/10/06	8/17/06	8/23/06	8/31/06	9/7/06	9/13/06	9/21/06	9/28/06
Intertidal	0	12	55	13	25	33	0	2	0	0
0-50	0	34	42	40	68	30	18	9	2	0
50-100	2	10	32	30	30	22	4	3	1	0
100-150	0	32	65	73	69	63	15	6	5	0
150-200	1	36	75	96	98	63	20	12	6	1
200-250	1	15	57	70	48	38	15	1	1	0
250-300	0	14	69	60	72	32	3	6	1	0
300-350	1	6	66	30	40	32	7	1	0	0
Falls Pool	1	4	20	20	10	6	0	0	0	0
Total	**6**	**163**	**481**	**432**	**460**	**319**	**82**	**40**	**16**	**1**

Johnson Pink Salmon Counts

Reach	7/25/06	8/3/06	8/10/06	8/17/06	8/23/06	8/31/06	9/7/06	9/13/06	9/21/06	9/28/06
Lace Trib	300	450	650	100	25	0	0	0	0	0
Trap Corner	350	1000	900	100	20	40	40	50	10	0
Marker 4	350	1000	900	300	40	40	30	30	0	0
Marker 7	200	500	700	400	40	20	25	20	0	0
Marker 8	150	500	850	200	50	40	20	15	0	0
Marker 10	150	800	300	150	50	50	20	12	0	0
Powerhouse	50	400	350	50	20	20	10	10	0	0
Log Falls	0	0	100	0	10	6	0	6	0	0
Marker 15	0	0	50	0	0	0	0	0	0	0
Falls Barrier	0	0	0	0	0	0	0	0	0	0
Total	**1550**	**4650**	**4800**	**1300**	**255**	**216**	**145**	**143**	**10**	**0**

Slate Pink Salmon Counts

Reach	7/29/06	8/3/06	8/10/06	8/17/06	8/23/06	8/31/06	9/7/06	9/13/06	9/21/06	9/28/06
Intertidal	0	0	19	54	40	11	0	0	0	0
0-100	3	9	172	315	165	38	6	3	0	0
100-200	6	22	277	445	244	34	0	6	0	0
200-300	13	0	175	155	117	8	1	0	0	0
300-400	7	23	190	250	94	10	0	0	0	0
400-500	2	31	260	262	79	7	0	0	0	0
500-600		64	150	160	85	17	0	0	0	0
600-700		32	150	173	49	2	0	0	0	0
700-800		0	115	95	29	0	0	0	0	0
800-900		0	115	40	6	0	0	0	0	0
900-1000		0	20	0	1	0	0	0	0	0
Total	**31**	**181**	**1643**	**1949**	**909**	**127**	**7**	**9**	**0**	**0**