

**Final  
Upper Animas River  
2012 Surface Water Toxicity Testing Report**

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### Acronym List

BERA	Baseline Ecological Risk Assessment
BLM	Bureau of Land Management
°C	Degrees Celsius
CETIS	Comprehensive Environmental Toxicity Information System
DO	Dissolved Oxygen
DRMS	Division of Reclamation, Mining and Safety
EC <sub>50</sub>	50% Effect Concentration
EPA	United States Environmental Protection Agency
ESAT	Environmental Services Assistance Team
FS	Feasibility Study
gpm	Gallons Per Minute
LC <sub>50</sub>	50% Lethal Concentration
LCL	Lower Confidence Limit
MHRW	Moderately Hard Reconstituted Water
mL	Milliliter
mg/L	Milligrams per liter
µg/L	Micrograms per liter
µs/cm	Microsiemens/centimeter
QA	Quality Assurance
RI	Remedial Investigation
SGC	Sunnyside Gold Corporation
UCL	Upper Confidence Limit

## 1.0 INTRODUCTION

Two 96-hour static renewal toxicity tests were performed at the United States Environmental Protection Agency (EPA) Region 8 Laboratory in October and November 2012 using juvenile rainbow trout (*Oncorhynchus mykiss*) to determine the acute toxicity of surface water samples collected from the Animas River and its two major tributaries Cement Creek and Mineral Creek, located in Silverton in the San Juan Country, Colorado. During the first test, conducted in October of 2012, three sets of Site samples were run consisting of an undiluted set, a set diluted with reference water from sample location A56 and another set diluted with reference water from sample location A68. As a Quality Assurance (QA) measure, a simultaneous reference toxicity test with a separate batch of juvenile rainbow trout was performed using Moderately Hard Reconstituted Water (MHRW) spiked with different concentrations of zinc sulfate heptahydrate ( $ZnSO_4$ ).

A second Site toxicity test and concurrent reference toxicity test were conducted following the October, 2012 round of testing. This Site test consisted of three sets of diluted samples, all diluted with reference water from sample location A68. Section 2.5 below provides a detailed description of the sample preparation for all the diluted samples from the October and November 2012 Site tests.

Survival was the endpoint evaluated in all tests. This toxicity test report includes a brief background of the Upper Animas River area, materials and methods, test results, a discussion of results, and supporting references.

### 1.1 Background

Information in this section was obtained from the *Final 2012 Sampling and Analysis Plan/Quality Assurance Project Plan, Revision 1, Upper Animas Mining District Gladstone, San Juan County, Colorado*, dated September 2012 (Environmental Services Assistance Team [ESAT], 2012).

The discovery of gold and silver brought miners to the Silverton area and Animas Mining District in the early 1870's. The discovery of silver in the base-metal ores was the major factor in establishing Silverton as a permanent settlement. Between 1870 and 1890, the richer ore deposits were discovered and mined to the extent possible. Not until 1890 was any serious attempt made to mine and concentrate the larger low-grade ore bodies in the area. By 1900, there were 12 concentration mills in the valley sending products to the Kendrick and Gelder Smelter near the mouth of Cement Creek. Mining and milling operations slowed down circa 1905, and mines were consolidated into fewer and larger operations with the facilities for milling large volumes of ore. After 1907, mining and milling continued throughout the basin whenever prices were favorable.

Gladstone, located about eight miles upstream of Silverton on Cement Creek, is the site of an historic mining town developed in the 1880s commensurate with the onset of mining in the surrounding area. The town was the central location and railroad terminus for the milling and shipping of mine ores from the surrounding three-square-mile valley. The town declined in the 1920s and no remnants of the town remain. By the 1970's only one year-round producing mine (Sunnyside Mine) remained in the county. This mine ceased production in 1991, and has since undergone extensive reclamation efforts. The Gold King Mine's permit with Division of Reclamation, Mining and Safety (DRMS) is currently in inactive status; however, landowners hope to rehabilitate the mine. Both the Sunnyside and Gold King properties were partially accessed through the American Tunnel that has its portal in Gladstone.

Previously the American Tunnel drained as much as 1,600 gallons per minute (gpm) of water from the mines. A lime feed and settling pond type treatment facility was constructed in Gladstone in 1979 by Standard Metals Corporation. Water discharging from the American Tunnel was treated as required by the water discharge permit. The facility operations and mine ownership was later transferred to the Sunnyside Gold Corporation (SGC). Under jurisdiction of a court consent decree to terminate their discharge permit, SGC installed several bulkheads within the Sunnyside Mine that greatly reduced the amount of discharge from the American Tunnel. Seventy to one hundred gpm continue to discharge presumably from near surface groundwater. All terms of the consent decree were met by SGC in 2002.

In January 2003 the treatment facility, operations, and permit were transferred to the Gold King Mines Corporation. The settling ponds were deeded to the San Juan Corporation by SGC prior to the lease between the Gold King Mines and San Juan Corporations. The treatment facility continued to treat the remaining American Tunnel discharge and the Gold King discharge until September 2004. The San Juan Corporation required SGC to reclaim the four settling ponds (completed in 2005) following termination of the San Juan Corporation and SGC lease. The Gold King Mines Corporation was subsequently evicted and the balance of the Gold King Mines Corporation land was acquired by the San Juan Corporation as the lien holder. The American Tunnel portal reclamation and removal of some out buildings were completed in 2006. The Bureau of Land Management (BLM) manages land associated with the American Tunnel portal and vicinity; however, the San Juan Corporation owns the majority of the land surrounding the portal.

Numerous historic and now abandoned mines exist within a two-mile radius of Gladstone. They include: the Upper Gold King 7 Level, American Tunnel, Grand Mogul, Mogul, and Red and Bonita, Evelyne, Henrietta, Joe and John, and Lark mines. Some of these mines have acid mine drainage that flows between 30 and 300 gpm directly or indirectly into Cement Creek and eventually into the Animas River, the confluence located about eight miles downstream of Gladstone. The Animas River Stakeholder Group, Bureau of Land Management, Division of Reclamation, Mining and Safety and private stakeholders have completed remediation projects at

the Evelyne, Henrietta, Joe and John, and Lark mines. The remaining sites located in the Cement Creek drainage that will be the focus of these sampling efforts include the American Tunnel, Grand Mogul, Mogul, Red and Bonita, and the Upper Gold King 7 Level.

## 1.2 Objective

The objective of these toxicity tests was to characterize the effects of mine waste-impacted surface water on juvenile rainbow trout under acute exposure conditions. The results will be used to support the development of a site-wide Remedial Investigation/Feasibility Study (RI/FS) that will include a Baseline Ecological Risk Assessment (BERA) for the Animas River Site.

## 2.0 MATERIALS AND METHODS

This section outlines the materials and methods used for testing purposes, including surface water collection procedures, water preparation and delivery, test organisms, food preparation, and test conditions. The general test methods and testing criteria followed EPA protocol (EPA, 2002) and are summarized in **Table 2.5-1**.

### 2.1 Surface Water Collection

Surface water was collected in October 2012 from six locations along the Animas River. Samples from two reference locations (A56 and A68) were collected above where Cement Creek flows into the Animas River. Four Site samples (A72, A73B, A75B, and Baker Bridge) were collected downstream of the confluence with Cement Creek. Surface water was collected from two tributaries (Cement Creek and Mineral Creek) for diluting the Site samples (**Figure 2.1-1**). The water from these two tributaries was not included in the toxicity test other than as a diluent. However, analytical results for water collected from Cement Creek and Mineral Creek are included in the analytical results (**Tables 2.5-2, 2.5-3, and 2.5-4**). The weather before and during the sampling event was sunny with no rain.

Surface water was collected in November 2012 for a follow-up Site test. Samples were collected from four locations; one reference location on the Animas River (A68) upstream of the confluence with Cement Creek, one location on the Animas River downstream of the confluence with Mineral Creek (A72), one location on Cement Creek (CC48), and one location on Mineral Creek (M34).

Adequate volume of water was collected for each sample location with a minimum of 5 gallons collected at each location. This was accomplished by using one gallon and two and a half gallon cubitainers that were dedicated for each sample location. Equipment decontamination was not necessary because cubitainers were used once. All surface water samples were stored on ice in coolers immediately after collection and were then transported to the Region 8 laboratory in

Golden, CO. All samples were placed in a 4°C refrigerator at the laboratory for preservation until test initiation, which took place within 36 hours of the last sample collection.

## 2.2 Water Preparation and Renewal

The MHRW used in the reference toxicity tests was prepared in accordance with Smith *et al.* (1997) by adding 47.4 grams of calcium sulfate, 122.8 grams of magnesium sulfate heptahydrate, 96 grams of sodium bicarbonate, and 4 grams of potassium chloride to the laboratory stainless steel batch tank containing 1,000 liters of deionized water. The batch tank of MHRW was continuously aerated during the toxicity test. The water quality of the MHRW was checked to verify that the following parameters had been met: hardness between 90 and 100 milligrams per liter (mg/L), alkalinity between 50 and 70 mg/L, conductivity between 330 and 360 microsiemens/centimeter ( $\mu\text{s}/\text{cm}$ ), and pH between 7.8 and 8.2 standard units (EPA, 2002). The average results from the four replicates for the MHRW batch water for the October test were as follows: hardness = 96 mg/L; alkalinity = 59.4 mg/L; conductivity = 312  $\mu\text{s}/\text{cm}$ ; and pH = 7.38. The average results from the four replicates for the MHRW for the November test were as follows: hardness = 91 mg/L; alkalinity = 55.2 mg/L; conductivity = 297.6  $\mu\text{s}/\text{cm}$ ; and pH = 7.63. Note that both the average conductivity and average pH of the October and November 2012 MHRW fell below the expected range.

The MHRW and site water in the test chambers were renewed entirely each day by pouring 900 mL of site water into a clean 1000 milliliters (mL) glass beaker and carefully removing live organisms and placing them into the newly mixed water. Site water used for renewal was first warmed to 12 degrees Celsius ( $^{\circ}\text{C}$ ). The water temperature was held constant during the 96-hour exposure period by placing all the test chambers in a temperature-controlled water bath.



## **2.3 Test Organisms**

Juvenile rainbow trout (*O. mykiss*) obtained from Trout Lodge, Inc. (located in Sumner, Washington) were used for site water and reference toxicity testing. An importation license was obtained from the Colorado Division of Wildlife before the *O. mykiss* were shipped by the supplier. The fish in the shipping bag were placed in the holding tank after they arrived at the Region 8 laboratory to equilibrate the temperature. Once temperature was equilibrated, the shipping bag was carefully opened to allow a small amount of laboratory reconstituted water to enter the bag. This procedure was repeated several times throughout the day until laboratory MHRW and shipping water were well mixed. The fish were then released from the shipping bag into the holding tank where they were held for 5 days until used for testing. The fish were also cultured and shipped in MHRW such that water quality acclimation was not an issue. At the time of testing, organisms were 15-30 days post yolk sac absorption and were uniform in size. The average weight of the organisms was 0.28 grams at the start of the October test and an average weight of 0.84 grams at the start of the November test.

## **2.4 Feeding Procedure**

The fish were fed starter trout chow obtained from Nelson's Silver Cup, Inc. in accordance with EPA methodology (EPA, 2002). They were fed twice daily before the test started and once daily thereafter. The fish were not fed for 24 hours before the test started in order to reduce the accumulation of metabolic wastes.

## **2.5 Test Procedures**

The following sections discuss the procedures used for the site water toxicity test and reference toxicity tests.

### **2.5.1 October 2012 Site Water Toxicity Testing**

Site water used for testing purposes during the October 2012 Site test was obtained from the following four locations along the Animas River: A72, A73B, A75B, and Baker Bridge (the furthest down-river sample location). Reference surface water samples were collected from sample locations A56 and A68 on the Animas River, upstream of the confluence with Cement Creek. All six samples were run un-diluted in the Site test. Surface water was also collected from Mineral Creek (M34) and Cement Creek (CC48). The water from these two tributaries was combined in a 61% (M34), 39% (CC48) ratio and then diluted using water from the reference location A56 at concentrations of 6.25%, 12.5%, 25%, 50% and 100% (see table below). The ratio of M34 and CC48 were based on the flow rate of each tributary into the Animas River.

<b>Concentration</b>	<b>Volume M34* (ml)</b>	<b>Volume CC48** (ml)</b>	<b>Volume A56 (ml) (Reference Water)</b>
M34/CC48/A56-Control	0	0	900 (MHRW)
M34/CC48/56A-6.25%	34.3	21.9	844
M34/CC48/A56-12.5%	68.6	43.9	788
M34/CC48/A56-25%	137	87.8	675
M34/CC48/A56-50%	275	176	450
M34/CC48/A56-100%	549	351	0

\*Based off a flow rate of 23 cubic feet per second (61%).

\*\* Based off a flow rate of 14 cubic feet per second (39%).

A second set of diluted samples was run using water from Reference location A68 as the diluent to a mixture of M34 and CC48. The identical ratio of M34 and CC48 were used as indicated above, except a 100% solution of M34/CC48 was not included in the Site test (see table below)

<b>Concentration</b>	<b>Volume M34* (ml)</b>	<b>Volume CC48* (ml)</b>	<b>Volume A68 (ml) (Reference Water)</b>
M34/CC48/A68-Control	0	0	900 (MHRW)
M34/CC48/A68-6.25%	34.3	21.9	844
M34/CC48/A68-12.5%	68.6	43.9	788
M34/CC48/A68-25%	137	87.8	675
M34/CC48/A68-50%	275	176	450

\*Based off a flow rate of 23 cubic feet per second (61%).

\*\* Based off a flow rate of 14 cubic feet per second (39%).

## 2.5.2 November 2012 Site Water Toxicity Test

Surface water for use in the November 2012 Site test was obtained from the following four locations; A68 and A72 on the Animas River, M34 from Mineral Creek, and CC48 from Cement Creek. Reference location A68 was collected on the Animas River upstream of the confluence with Cement Creek. Samples M34 and A68 were run undiluted in the Site toxicity test. Surface water from reference location A68 was used to dilute samples A72 and CC48 at various dilutions. Water from A68 was also used to dilute a mixture of CC48 and M34. The tables below explain the three sets of dilutions.

<b>Concentration Percentage of A72 water</b>	<b>Volume A72 (ml)</b>	<b>Volume A68 (ml) (Reference water)</b>
Control	0	900 (MHRW)
A72/A68-5%	45	855
A72/A68-10%	90	810
A72/A68-25%	225	675
A72/A68-50%	450	450

A72/A68-75%	675	225
A72/A68-100%	900	0

<b>Concentration Percentage of CC48 water</b>	<b>Volume CC48 (ml)</b>	<b>Volume A68 (ml) (Reference water)</b>
Control	0	900 (MHRW)
CC48/A68- 1%	9	891
CC48/A68- 3%	27	873
CC48/A68- 6%	54	846
CC48/A68- 12%	108	792
CC48/A68- 25%	225	675
CC48/A68- 50%	450	450

<b>Concentration Percentage of CC48/M34 water</b>	<b>Volume CC48 (ml)</b>	<b>Volume M34 (ml)</b>	<b>Volume A68 (ml) (Reference water)</b>
Control	0	0	900 (MHRW)
CC48/M34/A68-4%	12	24	864
CC48/M34/A68-9%	26	55	819
CC48/M34/A68-20%	58	122	720
CC48/M34/A68-40%	115	245	540
CC48/M34/A68-65%	187	398	315
CC48/M34/A68-85%	245	520	135

A laboratory control sample of MHRW was simultaneously tested during both the October 2012 and November 2012 Site tests to verify the health of the fish used in the test. The same test procedure was followed for each test. The test chambers consisted of 1-L glass beakers, which were placed in a water bath to maintain a constant temperature of 12° C during the 96-hour exposure period. Four replicates were tested for each location and each sample dilution, as well as the laboratory control. Testing criteria specified in EPA (2002) were followed (**Table 2.5-1**).

Ten organisms were added to each test chamber at the start of the test using a small dip net and an 8-ounce cup, in which the count was quickly verified. Four replicate chambers were used for each of the Site and reference water samples. Each chamber contained 10 fish, for a total of 40 fish per sample location, dilution series or reference test dilution.

As previously stated, each test took place over a 96-hour period, with one daily water renewal. Water quality was measured daily for Dissolved Oxygen (DO), pH, conductivity, and temperature. Water samples were analyzed for alkalinity and hardness at the start and end of each test. Fish mortality was observed daily in each test chamber and recorded. All dead organisms were removed and discarded.

**Appendix A** provides the water chemistry and mortality data sheets for the October 2012 Site surface water toxicity test and **Appendix B** provides the water chemistry and mortality data sheets for the November 2012 Site surface water toxicity test. Water samples were collected on Day 0 and Day 4 for the following analyses: total and dissolved metals (EPA Method 200.7/200.8), anions (EPA Method 300.0), ammonia (EPA Method 350.1), and alkalinity (EPA Method 310.1). Results from the October 2012 test for dissolved metals are included in **Table 2.5-2**. **Table 2.5-3** shows initial and final results for total recoverable metals and **Table 2.5-4** includes wet chemistry data. **Table 2.5-5a** (Site test) and **Table 2.5-5b** (reference test) show initial and final results for ammonia, as well as calculated ammonia criteria. Results from the November 2012 test for dissolved metals are included in **Table 2.5-6**. **Table 2.5-7** shows initial and final results for total recoverable metals and **Table 2.5-8** includes wet chemistry data. **Table 2.5-9a** (Site test) and **Table 2.5-9b** (reference test) shows initial and final results for ammonia, as well as calculated ammonia criteria for acute toxicity.

### 2.5.3 Control Water Toxicity Testing

For QA purposes, a control toxicity test using *O. mykiss* was run concurrently with the October 2012 and November 2012 Site water toxicity tests. Test solutions were made by spiking MHRW with ZnSO<sub>4</sub> solution via serial dilution. Zinc concentrations were reduced by 50% starting with the highest target concentration (1000 µg/L) until the lowest dilution concentration of 6.25% (62.5 µg/L target concentration) was reached.

The following are the dilutions and average zinc concentrations (calculated from initial and final dissolved metals results) used for the October 2012 reference test: 100% concentration (1029.5 µg/L), 50% concentration (518.5 µg/L), 25% concentration (263.5 µg/L), 12.5% concentration (131.5 µg/L), and 6.25% concentration (68.85µg/L). The following are the dilutions and average zinc concentrations (calculated from initial and final dissolved metals results) used for the November 2012 reference test: 100% concentration (874 µg/L), 50% concentration (435 µg/L), 25% concentration (220 µg/L), 12.5% concentration (107 µg/L), and 6.25% concentration (55.3µg/L).

Zinc concentrations were verified in the analytical laboratory using EPA Method 200.7/200.8. The control surface water toxicity tests were performed using the same approach as outlined at the end of **Section 2.5.2** (November 2012 Site Water Toxicity Test). Mortality and daily water chemistry data for the control tests run in October 2012 and November 2012 are included in **Appendices A and B, respectively**. The measured zinc concentrations for the October 2012 and November 2012 tests are provided in **Tables 2.5-2 and 2.5-6**, respectively.

### 3.0 RESULTS

This section presents the results for the Site-specific surface water and reference toxicity testing, and also addresses any issues or potentially confounding conditions encountered during the tests.

**Appendix A** shows that the water quality parameters were consistently within the established criteria throughout both Site water toxicity tests, with one exception. DO was consistently above 6.0 mg/L, and average test chamber temperatures were maintained within +/- 2°C of the target test temperature (12°C), which met performance criteria. Sample A68/CC48- Control-Rep 1 was above the target test temperature on day one, ranging from 14.48 to 15.42°C. The average initial and final ammonia levels measured in the four replicates of each of the surface water samples used in the toxicity test were compared to their pH-dependent acute ammonia criterion. **Tables 2.5-5a and 2.5-9a** show the ammonia levels for the October 2012 and November 2012 tests, respectively. All ammonia levels for both tests fell consistently below the relevant criteria. This comparison indicates that any observed toxicity was not caused by excess ammonia in the test chambers.

#### 3.1 Site-Specific Surface Water Toxicity Test - October 2012

Daily mortality numbers were evaluated at the end of the test to determine the Site water toxicity to the test organisms (**Appendix A** and **Figure 3.1-1**). The results of the undiluted Site samples showed 100% survival at both reference locations A56 and A68. Survival was also 100% at locations A73B, A75B, and Baker Bridge. Survival at location A72 was 0%. The laboratory control showed 100% survival, which met the performance criterion of 90% survival.

A combination of water from M34 and CC48 was diluted with water from reference location A56 and run at five different dilutions (6.25%, 12.5%, 25%, 50% and 100%). The results of the acute test showed 100% survival in the 6.25%, 12.5%, and 25% dilutions. The 50% dilution had 97.5% survival while the 100% dilution (with no reference water) had 0% survival. The control, which consisted of 100% reference water from A56, had 100% survival.

A combination of M34 and CC48 surface water was diluted with water from reference location A68 and run at four different dilutions (6.25%, 12.5%, 25%, and 50%). The results of the dilutions showed 100% survival in the 6.25%, 12.5%, and 25% dilutions. The 50% dilution had 37.5% survival. A 100% dilution (with no reference water) was not run. The control sample (0% dilution), consisting of 100% reference water from A68, had 100% survival.

#### 3.2 Control Water Toxicity Test - October 2012

Water quality parameters were similar in all testing chambers, and water chemistries were held within acceptable ranges for temperature, DO, pH, and conductivity (**Appendix B**). Zinc levels are presented as average zinc concentrations taken from the initial and final dissolved metals

analysis. The control and the 6.25% concentration (68.85 µg/L zinc) had 100% survival. The 12.5% concentration (131.5 µg/L zinc) had 75% survival. The 25% (263.5 µg/L zinc) showed 5% survival. The 50% (518.5 µg/L zinc) concentration and the 100% concentration (1029.5 µg/L zinc) had 0% survival (see **Figure 3.2-1**).

The Spearman-Kärber Estimates method [Comprehensive Environmental Toxicity Information System (CETIS), 2011] was used to calculate the 50% Lethal Concentration (LC<sub>50</sub>) value for zinc, as well as Upper Confidence Limits (UCLs) and Lower Confidence Limits (LCLs) confidence limits. The LC<sub>50</sub> value for the control toxicity test was 162.9 µg/L, with a UCL and LCL of 180.6 µg/L and 146.9 µg/L, respectively. This LC<sub>50</sub> value is comparable to previous reference toxicity tests performed from 2005 through 2011. **Figure 3.5-1** provides the zinc LC<sub>50</sub> control chart which shows historical LC<sub>50</sub> data obtained at the Region 8 laboratory. Note that CETIS uses the term “EC50” (50% maximal Effect Concentration) instead of LC<sub>50</sub>. Both terms represent the same calculated value.

### 3.3 Site-Specific Surface Water Toxicity Test - November 2012

Daily mortality numbers were evaluated at the end of the test to determine the Site water toxicity to the test organisms (**Appendix A** and **Figure 3.3**). The results of the undiluted Site samples showed 92.5% survival at reference location A68 and 0% survival at M34. The laboratory control showed 100% survival, which met the performance criterion of 90% survival.

Site sample A72 was diluted with water from reference location A68 and run at six different dilutions (5%, 10%, 25%, 50%, 75%, and 100%). The results of the dilutions showed A68/A72-5% with 92.5% survival while A68/A72-10% and A68/A72-25% showed 94.7% and 92.2% survival, respectively. Sample A68/A72-50% and A68/A72-75% each had 100% survival. Sample A68/A72-100% showed 2.5% survival. The A68/A72 control, which consisted of 100% A68, water had 100% survival.

Site sample CC48 was diluted with water from reference location A68 and run at six different dilutions (1%, 3%, 6%, 12%, 25%, and 50%). The results of the dilutions showed A68/CC48 1% with 85% survival while A68/CC48-3% and A68/CC48-6% had 97.5% survival. A68/CC48-12% and A68/CC48-25% showed 90% survival in each dilution. A68/CC48-50% had 0% survival. The A68/CC48 control which consisted of 100% A68 water had 100% survival.

A combination of CC48 and M34 surface water was diluted with water from reference location A68 at six different dilutions (4%, 9%, 20%, 40%, 65%, and 85%). The results of the dilutions showed A68/CC48/M34-4% with 97.5% survival, A68/CC48/M34-9% showed 95% survival, and A68/CC48/M34-20% showed 100% survival. Sample A68/CC48/M34-40% had 92.5% survival while A68/CC48/M34-65% and A68/CC48/M34-85% had 0% survival. The A68/CC48/M34 control, which consisted of 100% A68 water, had 100% survival.

Nine juvenile rainbow trout escaped from eight separate testing chambers during the November 2012 toxicity test and were found swimming in the water bath. These fish were excluded from the results and the statistical analyses. The number of fish exposed was reduced by the number of fish that escaped to prevent biasing the results (i.e. if one of the ten fish in a test chamber escaped and one of the remaining nine fish died, survival was calculated as 8/9, or 88.9%).

### 3.4 Control Water Toxicity Test - November 2012

Water quality parameters were similar in all testing chambers, and water chemistries were held within acceptable ranges for temperature, DO, pH, and conductivity (**Appendix B**). Zinc levels are presented as average zinc concentrations taken from the initial and final dissolved metals analysis. Survival was 100% in the control and the 6.25% concentration (55.3 µg/L zinc), and 75% in the 12.5% concentration (107 µg/L zinc). The 25% (220 µg/L zinc), 50% (435 µg/L zinc), and 100% (874 µg/L zinc) concentrations all had 0% survival, (**Figure 3.4-1**).

The Trimmed Spearman-Kärber Estimates method (CETIS, 2011) was used to calculate the LC<sub>50</sub> value for zinc, as well as UCLs and LCLs. The LC<sub>50</sub> for the reference toxicity test was 129.1 µg/L, with a UCL and LCL equal to 141.9 µg/L and 117.5 µg/L, respectively. The LC<sub>50</sub> is comparable to previous control toxicity tests performed from 2005 through 2011. **Figure 3.5-1** provides the zinc LC<sub>50</sub> control chart which shows historical LC<sub>50</sub> data obtained at the Region 8 laboratory.

## 4.0 DISCUSSION

### 4.1 October 2012 Toxicity Test

#### Un-diluted Site Samples

Results of the site-specific surface water toxicity test conducted in October 2012 using un-diluted surface water indicated that location A72 was acutely toxic, with 0% survival, to *O. mykiss* over a 96-hour exposure period. 100% survival was observed at A56 (reference location), A68 (reference location), A73B, A75B, and Baker Bridge.

A Steel Many-One Rank Test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The Steel Many-One Rank test is a non-parametric test which was used in the analyses because the data distribution was non-normal. The data were determined to be non-normal by the Shapiro-Wilk W test because they did not follow a predictable pattern with 50% of the values greater than the mean and 50% values less than the mean. The results of the statistical analysis show the presence of significant mortality at location A72 ( $p = 0.0480$ ) when compared to the laboratory control sample. No significant difference was observed in mortality between the remaining locations when compared to the laboratory control sample.

A Steel Many-One Rank Test was also used to compare the Site locations to reference locations A56 and A68. The results of this comparison were identical because both reference samples had 100% survival. There was significant mortality at sample location A72 ( $p = 0.0350$ ) when compared to each reference location. No significant difference in mortality was observed between the remaining locations when compared to either A56 or A68.

#### M34/CC48 diluted with A56

Results of the Site-specific surface water toxicity test conducted in October 2012 using a combination of M34 and CC48 surface water diluted with water from reference location A56 at five different concentrations indicated that M34/CC48/A56 at 100% was acutely toxic to *O. mykiss* over a 96-hour exposure period. 100% survival was observed in M34/CC48/A56 concentrations of 6.25%, 12.5%, and 25%. M34/CC48/A56-50% had 97.5% survival. Site control sample M34/CC48/A56 (which consisted of 100% A56 surface water) had 100% survival.

A Steel Many-One Rank Test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The results of the statistical analysis show the presence of significant mortality at M34/CC48/A56-100% ( $p = 0.0417$ ) when compared to M34/CC48/A56-Control. No significant difference was observed in mortality between the remaining dilutions when compared to the Site control sample.

#### M34/CC48 diluted with A68

Results of the Site-specific surface water toxicity test conducted in October 2012 using a combination of M34 and CC48 surface water diluted with water from reference location A68 at four different concentrations indicated that M34/CC48/A68 at 50% was acutely toxic to *O. mykiss* over a 96-hour exposure period, with only 37.5% survival. 100% survival was observed in M34/CC48/A68 at concentrations 6.25%, 12.5%, and 25%. The Site control sample, M34/CC48/A68, (100% A68 surface water) had 100% survival.

A Steel Many-One Rank Test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The results of the statistical analysis show the presence of significant mortality at M34/CC48/A56-100% ( $p = 0.0350$ ) when compared to M34/CC48/A68-Control. No significant difference was observed in mortality between the remaining dilutions when compared to the Site control sample.

#### *Summary*

In conclusion, the results of the October 2012 toxicity test showed that the surface water samples collected from A72 and tested un-diluted, as well as M34/CC48/A56-100% and M34/CC48/A68-50%, were acutely toxic to juvenile rainbow trout after 96 hours of exposure. The mortality at



all the other locations and dilutions were not statistically different from either the laboratory control sample or the two Animas River reference samples.

## 4.2 November Toxicity Test

### Undiluted Samples

Results of the Site-specific surface water toxicity test conducted in November 2012 using undiluted surface water indicated that location M34 was acutely toxic (0 % survival) to *O. mykiss* over a 96-hour exposure period when tested as an undiluted sample. 92.5% survival was observed at reference location A68. Only a M34 and A68 were run un-diluted during the November 2012 test.

An Equal Variance Two- Sample *t*-test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The data met the conditions for conducting a *t*-test because the sample variances were statistically equal, determined by Mod Levene Equality of Variance test and the data had normal distribution determined by Shapiro-Wilk W Normality test. The results of the statistical analysis show the presence of significant mortality at location M34 ( $p = <0.0001$ ) when compared to A68.

### Site sample A72 diluted with A68

Results of the site-specific surface water toxicity test conducted in November 2012 using A72 surface water diluted with water from reference location A68 at six different concentrations indicated that A68/A72 at 100% was acutely toxic to *O. mykiss* over a 96-hour exposure period with 2.5% survival. 100% survival was observed in the 75% and 50% dilutions. Survival in the 5%, 10% and 25% dilutions resulted in 92.5%, 94.7%, and 92.2% survival, respectively. The Site control sample, A68/A72, (100% A68 surface water) had 100% survival.

A Steel Many-One Rank Test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The results of the statistical analysis show the presence of significant mortality at A68/A72-100% ( $p = 0.0480$ ) when compared to A68/A72-Control. No significant difference was observed in mortality between the remaining dilutions when compared to the Site control sample.

### Site sample CC48 diluted with A68

Results of the Site-specific surface water toxicity test conducted in November 2012 using CC48 surface water diluted with water from reference location A68 at six different concentrations indicated that A68/CC48 at 50% was acutely toxic (0% survival) to *O. mykiss* over a 96-hour exposure period. 90% survival was observed in the 25% and 12% dilutions. The 6%, 3% and 1% dilutions resulted in 97.5%, 97.5%, and 85% survival respectively. The Site control sample, A68/CC48, (100% A68 surface water) had 100% survival.

A Steel Many-One Rank Test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The results of the statistical analysis show the presence of significant mortality at A68/CC48-50% ( $p = 0.0480$ ) when compared to A68/CC48-Control. No significant difference was observed in mortality between the remaining dilutions when compared to the Site control sample.

#### CC48/M34 diluted with A68

Results of the Site-specific surface water toxicity test conducted in November 2012 using a mixture of CC48 and M34 surface water diluted with water from reference location A68 at six different concentrations indicated that A68/CC48/M34 at 65% and 85% were acutely toxic (0% survival) to *O. mykiss* over a 96-hour exposure period. 92.5% survival was observed in A68/CC48/M34-40% while 20%, 9% and 4% dilutions resulted in 100%, 95%, and 97.5% survival, respectively. The Site control sample, A68/CC48/M34, (100% A68 surface water) had 100% survival.

A Steel Many-One Rank Test was performed in order to determine the significance of the observed toxic effects (**Attachment A**). The results of the statistical analysis show the presence of significant mortality at A68/CC48-65% and A68/CC48/M34 ( $p = 0.0480$ , for both dilutions) when compared to A68/CC48/M34-Control. No significant difference was observed in mortality between the remaining dilutions when compared to the Site control sample.

#### Summary

In conclusion, the results of the November 2012 toxicity test showed that the surface water samples collected from M34 (un-diluted) as well as A68/A72-100%, A68/CC48-50%, A68/CC48/M34-65% and A68/CC48/M34-85% were acutely toxic to juvenile rainbow trout after 96 hours of exposure. The survival for all other locations and dilutions was not statistically different from either the laboratory control sample or the two reference samples.

## **5.0 REFERENCES**

Colorado Department of Public Health and Environment, Water Quality Control Commission. 1979-2012. Regulation No. 31: The Basic Standards and Methodologies for Surface Water (5 CCR 1002-31). Amended June 11, 2012.

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ESAT. 2012. *Final 2012 Sampling and Analysis Plan/Quality Assurance Project Plan, Revision 1, Upper Animas Mining District Gladstone, San Juan County, Colorado*. September 2012.

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## **Tables**

**Table 2.5-1 Summary of Test Conditions**October 2012 and November 2012 Upper Animas River Surface Water Toxicity Test Using Juvenile *O. mykiss*

Test Parameter	Criteria
Test Type	Static Renewal
Test Duration	96-Hour
Temperature	12°C ± 2°C
Light Quality	Ambient Laboratory Illumination
Light Intensity	50-100 ft-c
Photo Period	16 Hours Light, 8 Hours Dark
Test Chamber Size	1 liter
Test Solution Volume	900mL
Renewal of Test Solutions	Daily
Age of Test Organisms	15-30 Days Post Yolk-Sac Absorption
No. Replicate Chambers per Concentration	Four
No. Organisms per Chamber	Ten
No. Organisms per Concentration	40
Feeding Regime	Feeding Not Required
Test Chamber Cleaning	Cleaning Not Required
Test Solution Aeration	Not Exceeding 100 Bubbles per Minute
Dissolved Oxygen	≥6.0 mg/L
Dilution Water	Moderately Hard Reconstituted Water
End Point	Mortality
Sample Holding Time	36 hours after collection of last sample
Test Acceptability	≥90% survival in controls





**Table 2.5-4 Initial and Final Wet Chemistry Results**  
**October 2012 Upper Animas River Surface Water Toxicity Test Using Juvenile *O.mykiss***

**Initial Wet Chemistry Results (mg/L)**

STATION_ID	Chloride	Fluoride	Nitrate/Nitrite as N	Sulfate as SO4	Dissolved Organic Carbon	Total Alkalinity (mg CaCO3/L)
<b>Profile test of the Animas River, Mineral Creek, and Cement Creek surface water samples</b>						
Control	2.3	<0.1U	<0.2U	84.3	<1.0U	59.4
Baker Bridge	16.8JD	4.3D	<2.0U	1730D	<1.0U	26.5
A75B	1.6J	0.4	<0.2U	184	<1.0U	17.1
A73B	1.5J	0.5	<0.2U	234	<1.0U	<5.00U
A56	1.3J	0.5	<0.2U	127	<1.0U	37.8
A72	<10.0U	<1.0U	<2.0U	263D	<1.0U	<5.00U
A68	1.2J	0.5	<0.2U	141	<1.0U	35.8
M34	<10.0U	<1.0U	<2.0U	232D	<1.0U	<5.00U
CC48	<1.0U	0.2	<0.2U	60.9	<1.0U	<5.00U
<b>Combined sample M34/CC48 serially diluted by Animas River surface water sample A56</b>						
M34/CC48/A56 Control*	--	--	--	--	--	--
M34/CC48/A56 6.25%	1.3J	0.5	<0.2U	145	<1.0U	32.3
M34/CC48/A56 100%	<10.0U	<1.0U	<2.0U	357D	<1.0U	<5.00U
M34/CC48/A56 12.5%	1.3J	0.5	<0.2U	162	<1.0U	27.5
M34/CC48/A56 25%	1.3J	0.5	<0.2U	196	<1.0U	17.5
M34/CC48/A56 50%	<10.0U	<1.0U	<2.0U	239D	<1.0U	<5.00U
M34/CC48/A56 100%	<10.0U	<1.0U	<2.0U	357D	<1.0U	<5.00U
<b>Combined sample M34/CC48 serially diluted by Animas River surface water sample A68</b>						
M34/CC48/A68 Control*	--	--	--	--	--	--
M34/CC48/A68 6.25%	1.2J	0.5	<0.2U	158	<1.0U	31.6
M34/CC48/A68 12.5%	1.3J	0.5	<0.2U	164	<1.0U	31.2
M34/CC48/A68 25%	1.2J	0.6	<0.2U	210	<1.0U	17.6
M34/CC48/A68 50%	<10.0U	<1.0U	<2.0U	254D	<1.0U	<5.00U
<b>Reference toxicity test</b>						
Control-Ref	2.3	<0.1U	<0.2U	84.1	<1.0U	56.6
6.25%	2.3	<0.1U	<0.2U	84.3	<1.0U	60.0
12.50%	2.3	<0.1U	<0.2U	84.3	<1.0U	56.7
25%	2.3	<0.1U	<0.2U	85.0	<1.0U	59.5
50%	2.3	<0.1U	<0.2U	85.2	<1.0U	58.4
100%	2.3	<0.1U	<0.2U	84.3	<1.0U	60.5

**Final Wet Chemistry Results (mg/L)**

STATION_ID	Chloride	Fluoride	Nitrate/Nitrite as N	Sulfate as SO4	Dissolved Organic Carbon	Total Alkalinity (mg CaCO3/L)
<b>Profile test of the Animas River, Mineral Creek, and Cement Creek surface water samples</b>						
Control	2.3	<0.1U	<0.2U	85.0	<1.0U	61.0
Baker Bridge	<10.0U	<1.0U	<2.0U	160D	<1.0U	31.8
A75B	1.6J	0.4	<0.2U	183	<1.0U	20.5
A73B	1.6J	0.4	<0.2U	232	<1.0U	<5.00U
A56	1.3J	0.4	<0.2U	125	<1.0U	40.9
A72	<10.0U	1.6JD	<2.0U	282D	3.1	<5.00U
A68	1.2J	0.5	<0.2U	139	<1.0U	42.7
<b>Combined sample M34/CC48 serially diluted by Animas River surface water sample A56</b>						
M34/CC48/A56 Control*	--	--	--	--	--	--
M34/CC48/A56 6.25%	1.3J	0.5	<0.2U	144	<1.0U	37.1
M34/CC48/A56 12.5%	1.2J	0.5	<0.2U	161	<1.0U	32.0
M34/CC48/A56 25%	1.3J	0.5	<0.2U	195	1.0	19.5
M34/CC48/A56 50%	<10.0U	<1.0U	<2.0U	242D	<1.0U	5.82
M34/CC48/A56 100%	<10.0U	<1.0U	<2.0U	371D	6.3	<5.00U
<b>Combined sample M34/CC48 serially diluted by Animas River surface water sample A68</b>						
M34/CC48/A68 Control	2.4	<0.1U	<0.2U	85.3	<1.0U	72.2
M34/CC48/A68 6.25%	1.7J	0.5	<0.2U	157	1.2	35.7
M34/CC48/A68 12.5%	1.7J	0.5	<0.2U	173	1.1	28.1
M34/CC48/A68 25%	1.8J	0.5	<0.2U	206	1.0	19.5
M34/CC48/A68 50%	<10.0U	<1.0U	<2.0U	248D	1.3	5.00
<b>Reference toxicity test</b>						
Control-Ref	2.3	<0.1U	<0.2U	84.6	<1.0U	70.5
Ref 6.25%	2.3	<0.1U	<0.2U	85.3	<1.0U	63.8
Ref 12.50%	2.3	<0.1U	<0.2U	85.4	<1.0U	66.3
Ref 25%	3.4	<0.1U	<0.2U	85.4	1.6	64.0
Ref 50%	3.1	<0.1U	<0.2U	84.8	1.3	62.4
Ref 100%	2.8	<0.1U	<0.2U	85.7	<1.0U	59.7

\* No analytical data is available

Qualifiers:

D= Diluted sample

J= Estimated value

U= Non-detect

Prepared by: EC 3.7.13

Reviewed by: BGK 3.11.13



Table 2.5-5a: Initial and Final Average Ammonia Results for October 2012 Upper Animas River Surface Water Toxicity Test Using Juvenile *O. mykiss*

Replicate ID	Day 0 Measured Ammonia Conc. (mg N/L)	Day 0 Measured pH	Day 0 Average Measured Ammonia Conc. (mg N/L)	Day 0 Average Measured pH	Day 0 Ammonia Criterion (mg N/L) <sup>a</sup>	Day 4 Measured Ammonia Conc. (mg N/L) <sup>b</sup>	Day 4 Measured pH <sup>b</sup>	Day 4 Average Measured Ammonia Conc. (mg N/L)	Day 4 Average Measured pH	Day 4 Ammonia Criterion (mg N/L) <sup>a</sup>
<b>PROFILE TEST</b>										
Control-01	0.09422	7.3	0.0932	7.38	15.87	0.9190	7.5	0.9231	7.58	11.84
Control-02	0.09144	7.4				0.8345	7.6			
Control-03	0.08965	7.4				0.9018	7.6			
Control-04	0.09735	7.4				1.0370	7.6			
A56-01	0.10340	6.9	0.1012	7.00	24.10	1.0190	7.0	0.9032	7.10	21.94
A56-02	0.09974	7.0				0.8928	7.2			
A56-03	0.09829	7.0				0.8984	7.1			
A56-04	0.10330	7.1				0.8024	7.1			
A68-01	0.06243	7.2	0.0627	7.23	19.17	0.9075	7.3	0.9958	7.38	15.87
A68-02	0.06379	7.2				1.0410	7.4			
A68-03	0.06102	7.2				1.0590	7.4			
A68-04	0.06375	7.3				0.9758	7.4			
A72-01	0.10640	5.5	0.1072	5.50	38.25	1.1350	6.2	0.8267	6.03	36.59
A72-02	0.10750	5.5				0.7567	6.1			
A72-03	0.10750	5.5				0.4720	5.9			
A72-04	0.10740	5.5				0.9430	5.9			
A73B-01	0.11070	6.3	0.1149	6.15	35.86	1.1990	7.1	1.0718	6.85	27.12
A73B-02	0.11420	6.1				1.1250	6.9			
A73B-03	0.11800	6.1				1.0270	6.7			
A73B-04	0.11680	6.1				0.9361	6.7			
A75B-01	0.10380	7.1	0.1016	7.10	21.94	0.9501	7.4	0.9497	7.35	16.41
A75B-02	0.10130	7.1				0.9315	7.4			
A75B-03	0.10340	7.1				0.8740	7.3			
A75B-04	0.09803	7.1				1.0430	7.3			
Baker Bridge-01	0.11120	7.1	0.1088	7.10	21.94	0.9039	7.4	0.9099	7.40	15.34
Baker Bridge-02	0.10180	7.1				0.8546	7.4			
Baker Bridge-03	0.10270	7.1				0.8947	7.4			
Baker Bridge-04	0.11930	7.1				0.9865	7.4			
<b>SERIAL DILUTION OF SAMPLE 34/48 WITH 56 AS THE DILUENT</b>										
34/48/56-Control-01	0.05895	7.6	0.0608	7.45	14.30	0.8217	7.6	0.8483	7.68	10.06
34/48/56-Control-02	0.06058	7.4				0.8818	7.7			
34/48/56-Control-03	0.06092	7.4				0.8147	7.7			
34/48/56-Control-04	0.06276	7.4				0.8750	7.7			
34/48/56-6.25%-01	0.06189	7.3	0.0619	7.28	18.06	0.9375	7.6	0.8716	7.53	12.79
34/48/56-6.25%-02	0.06267	7.2				0.8028	7.5			
34/48/56-6.25%-03	0.06153	7.3				0.8767	7.5			
34/48/56-6.25%-04	0.06162	7.3				0.8695	7.5			
34/48/56-12.5%-01	0.05990	7.2	0.0570	7.20	19.73	0.8763	7.5	0.8755	7.43	14.81
34/48/56-12.5%-02	0.05917	7.2				0.9640	7.4			
34/48/56-12.5%-03	0.05431	7.2				0.8171	7.4			
34/48/56-12.5%-04	0.05476	7.2				0.8446	7.4			
34/48/56-25%-01	0.05823	7.1	0.0581	7.08	22.49	0.9556	7.4	0.9013	7.38	15.87
34/48/56-25%-02	0.05733	7.1				0.8771	7.4			
34/48/56-25%-03	0.05855	7.1				0.9341	7.3			
34/48/56-25%-04	0.05816	7.0				0.8384	7.4			
34/48/56-50%-01	0.05896	6.2	0.0581	6.18	35.69	0.9973	7.1	0.9348	6.98	24.63
34/48/56-50%-02	0.05784	6.2				1.0670	7.0			
34/48/56-50%-03	0.05704	6.2				0.7439	6.9			
34/48/56-50%-04	0.05855	6.1				0.9308	6.9			
34/48/56-100%-01	0.05955	3.9	0.0594	3.85	38.98	1.6430	4.2	0.7493	4.15	38.97
34/48/56-100%-02	0.05658	3.9				0.4627	4.1			
34/48/56-100%-03	0.06055	3.8				0.3219	4.1			
34/48/56-100%-04	0.06089	3.8				0.5694	4.2			
<b>SERIAL DILUTION OF SAMPLE 34/48 WITH 68AS THE DILUENT</b>										
34/48/68 Control-01	0.05814	7.2	0.0580	7.23	19.17	0.8449	7.3	0.8699	7.48	13.79
34/48/68 Control-02	0.05853	7.2				0.8881	7.4			
34/48/68 Control-03	0.05827	7.2				0.8595	7.6			
34/48/68 Control-04	0.05719	7.3				0.8872	7.6			
34/48/68-6.25%-01	0.17650	7.3	0.1822	7.33	16.96	0.5949	7.7	0.6156	7.60	11.37
34/48/68-6.25%-02	0.19660	7.3				0.6748	7.6			
34/48/68-6.25%-03	0.16030	7.3				0.5602	7.6			
34/48/68-6.25%-04	0.19520	7.4				0.6323	7.5			
34/48/68-12.5%-01	0.17150	7.3	0.1607	7.25	18.61	0.6344	7.6	0.6206	7.55	12.31
34/48/68-12.5%-02	0.15250	7.3				0.5795	7.6			
34/48/68-12.5%-03	0.15520	7.2				0.6419	7.5			
34/48/68-12.5%-04	0.16350	7.2				0.6265	7.5			
34/48/68-25%-01	0.16250	7.1	0.1656	6.98	24.63	0.6199	7.4	0.7245	7.45	14.30
34/48/68-25%-02	0.17310	6.9				0.8713	7.5			
34/48/68-25%-03	0.15450	7.0				0.6583	7.4			
34/48/68-25%-04	0.17230	6.9				0.7485	7.5			
34/48/68-50%-01	0.14220	6.1	0.1414	6.03	36.59	0.8853	7.1	0.9240	7.00	24.10
34/48/68-50%-02	0.14290	5.9				1.0520	7.1			
34/48/68-50%-03	0.14380	6.0				0.9768	6.9			
34/48/68-50%-04	0.13680	6.1				0.7819	6.9			

<sup>a</sup> The sample-specific acute ammonia criterion was calculated using the "salmon present" formula on p. 54 of the Colorado Department of Public Health and Environment, Water Quality Control Commission, Regulation No. 31: The Basic Standards and Methodologies for Surface Water (5CCR 1002-31).

<sup>b</sup> Values shown are either the measurements made at the end of the test (day 4) or earlier if all test organisms died before the 4-day exposure period was completed.

Table 2.5-5b Initial and Final Average Ammonia Results for October 2012 Upper Animas River Concurrent Reference Toxicity Test Using Juvenile *O. mykiss*

Replicate ID	Day 0 Measured Ammonia Conc. (mg N/L)	Day 0 Measured pH	Day 0 Average Measured Ammonia Conc. (mg N/L)	Day 0 Average Measured pH	Day 0 Ammonia Criterion (mg N/L) <sup>a</sup>	Day 4 Measured Ammonia Conc. (mg N/L) <sup>b</sup>	Day 4 Measured pH <sup>b</sup>	Day 4 Average Measured Ammonia Conc. (mg N/L)	Day 4 Average Measured pH	Day 4 Ammonia Criterion (mg N/L) <sup>a</sup>
Ref Control-01	0.08144	7.40	0.0831	7.50	13.28	0.7470	7.60	0.7812	7.63	10.92
Ref Control-02	0.08438	7.50				0.8759	7.60			
Ref Control-03	0.08350	7.50				0.7547	7.70			
Ref Control-04	0.08304	7.60				0.7471	7.60			
6.25%-01	0.07884	7.50	0.0844	7.55	12.31	0.8604	7.60	0.8056	7.60	11.37
6.25%-02	0.08514	7.50				0.7369	7.60			
6.25%-03	0.08633	7.60				0.7664	7.60			
6.25%-04	0.08711	7.60				0.8588	7.60			
12.5%-01	0.06867	7.60	0.0693	7.60	11.37	0.5868	7.60	0.7010	7.65	10.49
12.5%-02	0.06773	7.60				0.6369	7.70			
12.5%-03	0.07157	7.60				0.8041	7.70			
12.5%-04	0.06908	7.60				0.7761	7.60			
25%-01	0.06999	7.60	0.0710	7.60	11.37	0.3805	7.60	0.4599	7.70	9.64
25%-02	0.07186	7.60				0.6962	7.70			
25%-03	0.07181	7.60				0.2761	7.70			
25%-04	0.07049	7.60				0.4869	7.80			
50%-01	0.06989	7.60	0.0699	7.60	11.37	0.2685	7.70	0.3577	7.75	8.85
50%-02	0.07212	7.60				0.2968	7.80			
50%-03	0.06837	7.60				0.5770	7.70			
50%-04	0.06923	7.60				0.2884	7.80			
100%-01	0.08044	7.60	0.0726	7.60	11.37	0.2373	7.70	0.2477	7.70	9.64
100%-02	0.06943	7.60				0.2355	7.70			
100%-03	0.06942	7.60				0.3495	7.80			
100%-04	0.07124	7.60				0.1686	7.60			

<sup>a</sup> The sample-specific acute ammonia criterion was calculated using the "salmon present" formula on p. 54 of the Colorado Department of Public Health and Environment, Water Quality Control Commission, Regulation No. 31: The Basic Standards and Methodologies for Surface Water (5 CCR 1002-31).

<sup>b</sup> Values shown are either the measurements made at the end of the test (day 4) or earlier if all test organisms died before the 4-day exposure period was completed.

Prepared by: EC 3/7/13

Reviewed by: BGK 3/11/13





**Table 2.5-8 Initial and Final Wet Chemistry Results  
November 2012 Upper Animas River Surface Water Toxicity Test Using Juvenile *O.mykiss***

**Initial Wet Chemistry (mg/L)**

STATION ID	Chloride	Fluoride	Nitrate/Nitrite as N	Sulfate as SO4	Dissolved Organic Carbon	Total Alkalinity (mg CaCO3/L)
<b>Profile test of the Animas River, Mineral Creek, and Cement Creek surface water samples</b>						
Profile Control	2.3	<0.1U	<0.2U	86.6	<1.0U	55.2
A68	1.2J	0.5	<0.2U	150	<1.0U	37.6
A72	<10.0U	1.7JD	<2.0U	286D	<1.0U	<5.00U
CC48	<10.0U	1.7JD	<2.0U	594D	<1.0U	<5.00U
M34	22.9D	<1.0U	<2.0U	856D	<1.0U	<5.00U
<b>Animas River surface water sample A72 serially diluted by Animas River surface water sample A68</b>						
A68/A72 control	2.3	<0.1U	<0.2U	85.6	<1.0U	63.1
A68/A72 5%	1.2J	0.4	<0.2U	147	<1.0U	38.5
A68/A72 10%	1.3J	0.5	<0.2U	166	<1.0U	29.9
A68/A72 25%	1.2J	0.4	<0.2U	160	<1.0U	25.9
A68/A72 50%	1.5J	0.6	<0.2U	227	<1.0U	16.6
A68/A72 75%	<10.0U	<1.0U	<2.0U	264D	<1.0U	<5.00U
A68/A72 100%	<10.0U	2.4D	<2.0U	281D	<1.0U	<5.00U
<b>Cement Creek surface water sample CC48 serially diluted by Animas River surface water sample A68</b>						
A68/CC48 Control	2.3	<0.1U	<0.2U	85.9	<1.0U	62.4
A68/CC48 1%	1.2J	0.5	<0.2U	154	<1.0U	33.1
A68/CC48 3%	1.2J	0.5	<0.2U	165	<1.0U	35.9
A68/CC48 6%	1.2J	0.6	<0.2U	179	<1.0U	29.1
A68/CC48 12%	1.2J	0.6	<0.2U	223	<1.0U	22.4
A68/CC48 25%	<10.0U	1.4JD	<2.0U	254D	<1.0U	10.2
A68/CC48 50%	<10.0U	2.1D	<2.0U	364D	<1.0U	<5.00U
<b>Combined sample M34/CC48 serially diluted by Animas River surface water samples A68</b>						
A68/M34/CC48 Control	2.3	<0.1U	<0.2U	85.5	<1.0U	54.8
A68/M34/CC48 4%	1.2J	0.5	<0.2U	160	<1.0U	34.9
A68/M34/CC48 9%	1.2J	0.5	<0.2U	172	<1.0U	28.2
A68/M34/CC48 20%	1.3J	0.5	<0.2U	201	<1.0U	25.2
A68/M34/CC48 40%	<10.0U	<1.0U	<2.0U	268D	<1.0U	10.8
A68/M34/CC48 65%	<10.0U	3.4D	<2.0U	293D	<1.0U	<5.00U
A68/M34/CC48 85%	<10.0U	<1.0U	<2.0U	334D	<1.0U	<5.00U
<b>Reference toxicity test</b>						
Control-Ref	<1.0U	0.2	<0.2U	27.0	<1.0U	61.9
Ref 6.25%	2.3	<0.1U	<0.2U	85.5	<1.0U	58.9
Ref 12.5%	2.3	<0.1U	<0.2U	85.6	<1.0U	61.4
Ref 25%	2.4	<0.1U	<0.2U	97.0	<1.0U	58.2
Ref 50%	2.3	<0.1U	<0.2U	85.7	<1.0U	57.7
Ref 100%	2.2	<0.1U	<0.2U	85.5	<1.0U	60.5

**Final Wet Chemistry (mg/L)**

STATION ID	Chloride	Fluoride	Nitrate/Nitrite as N	Sulfate as SO4	Dissolved Organic Carbon	Total Alkalinity (mg CaCO3/L)
<b>Profile test of the Animas River and Mineral Creek</b>						
Profile Control	2.6	<0.1U	<0.2U	87.2	1.5	65.8
A68	1.4J	0.5	<0.2U	147	1.9	47.0J
M34	25.5D	<1.0U	<0.2U	871D	6.6	8.16
<b>Animas River surface water sample A72 serially diluted by Animas River surface water sample A68</b>						
A68/A72 control	2.7	<0.1U	<0.2U	87.8	1.7	72.9
A68/A72 5%	1.3J	0.5	<0.2U	159	1.5	39.2
A68/A72 10%	1.4J	0.5	<0.2U	166	1.5	33.8
A68/A72 25%	1.4J	0.5	<0.2U	189	1.8	33.4
A68/A72 50%	1.5J	0.5	<0.2U	229	1.7	17.5
A68/A72 75%	<10.0U	<1.0U	<2.0U	251D	1.4	7.50
A68/A72 100%	<10.0U	<1.0U	<2.0U	287D	2.3	<5.00U
<b>Cement Creek surface water sample CC48 serially diluted by Animas River surface water sample A68</b>						
A68/CC48 Control	2.6	<0.1U	<0.2U	87.6	1.6	68.7
A68/CC48 1%	1.4J	0.5	<0.2U	155	1.7	39.4
A68/CC48 3%	1.3J	0.5	<0.2U	164	1.1	36.2
A68/CC48 6%	1.3J	0.5	<0.2U	178	1.4	36.8
A68/CC48 12%	1.4J	0.6	<0.2U	209	1.7	32.0
A68/CC48 25%	<10.0U	<1.0U	<2.0U	248D	1.6	13.4
A68/CC48 50%	13.0JD	<1.0U	<2.0U	358D	2.5	<5.00U
<b>Combined sample M34/CC48 serially diluted by Animas River surface water samples A68</b>						
A68/M34/CC48 Control	2.5	<0.1U	<0.2U	87.7	1.6	63.4
A68/M34/CC48 4%	1.4J	0.5	<0.2U	158	1.7	40.8
A68/M34/CC48 9%	1.4J	0.5	<0.2U	171	1.4	38.9
A68/M34/CC48 20%	1.5J	0.5	<0.2U	199	1.8	26.0
A68/M34/CC48 40%	1.7J	0.5	<0.2U	247	1.6	12.5
A68/M34/CC48 65%	<10.0U	<1.0U	<2.0U	294D	2.4	<5.00U
A68/M34/CC48 85%	13.3JD	<1.0U	<2.0U	338D	3.1	<5.00U
<b>Reference toxicity test</b>						
Control-Ref	2.5	<0.1U	<0.2U	86.7	1.5	70.5
Ref 6.25%	2.5	<0.1U	<0.2U	87.3	1.6	63.4
Ref 12.5%	2.2	<0.1U	<0.2U	87.1	1.1	63.6
Ref 25%	2.6	<0.1U	<0.2U	86.3	1.1	60.4
Ref 50%	3.6	<0.1U	<0.2U	87.5	2.9	61.8
Ref 100%	3.5	<0.1U	<0.2U	87.5	3.3	56.2

Qualifiers:  
D= Diluted sample  
J= Estimated value  
U= Non-detect

Prepared by: EC 3/8/13  
Reviewed by: EB 3/13/13

Table 2.5-9a: Initial and Final Average Ammonia Results for November 2012 Upper Animas River Surface Water Toxicity Test Using Juvenile O.mykiss

Replicate ID	Day 0 Measured Ammonia Conc. (mg N/L)	Day 0 Measured pH	Day 0 Average Measured Ammonia Conc. (mg N/L)	Day 0 Average Measured pH	Day 0 Ammonia Criterion (mg N/L) <sup>a</sup>	Day 4 Measured Ammonia Conc. (mg N/L) <sup>b</sup>	Day 4 Measured pH <sup>b</sup>	Day 4 Average Measured Ammonia Conc. (mg N/L)	Day 4 Average Measured pH	Day 4 Ammonia Criterion (mg N/L) <sup>a</sup>
<b>PROFILE TEST</b>										
Profile Control -01	0.09915	7.6	0.0938	7.63	10.92	1.0820	7.5	1.1470	7.50	13.33
Profile Control -02	0.09042	7.6				1.1090	7.5			
Profile Control -03	0.09398	7.6				1.1560	7.5			
Profile Control -04	0.09148	7.7				1.2410	7.5			
M34-01	0.10580	5.5	0.0931	5.45	38.33	1.5840	6.9	1.2936	6.58	31.60
M34-02	0.08369	5.5				1.6090	6.6			
M34-03	0.09395	5.4				0.1302	6.4			
M34-04	0.08881	5.4				1.8510	6.5			
A68-01	0.07452	7.4	0.0734	7.40	15.34	0.9252	6.3	1.1336	6.53	32.26
A68-02	0.07001	7.4				1.2240	6.6			
A68-03	0.07439	7.4				1.1930	6.6			
A68-04	0.07466	7.4				1.1920	6.6			
<b>SERIAL DILUTION OF SAMPLE A72 WITH A68 AS THE DILUENT</b>										
A68/A72-Control-01	0.04135	7.4	0.0440	7.35	16.41	1.1260	7.1	1.2693	7.07	22.55
A68/A72-Control-02	0.04542	7.4				1.2280	7.1			
A68/A72-Control-03	0.04386	7.3				1.3020	7.1			
A68/A72-Control-04	0.04523	7.3				1.4210	7.1			
A68/A72-5%-01	0.04698	7.8	0.0476	7.80	8.11	1.2880	6.9	1.1100	6.93	25.55
A68/A72-5%-02	0.04922	7.8				1.0150	7.0			
A68/A72-5%-03	0.04737	7.8				1.1230	6.9			
A68/A72-5%-04	0.04678	7.8				1.0140	7.0			
A68/A72 10% -01	0.04988	7.7	0.0372	7.63	10.92	0.9636	6.9	0.9880	6.95	25.19
A68/A72 10% -02	ND	7.6				0.9351	7.0			
A68/A72 10% -03	0.04844	7.6				0.9634	7.0			
A68/A72 10% -04	0.05062	7.6				1.0900	6.9			
A68/A72 25% -01	0.05549	7.5	0.0544	7.43	14.81	0.9789	6.9	1.2147	6.92	25.70
A68/A72 25% -02	0.05454	7.4				1.2540	6.9			
A68/A72 25% -03	0.05449	7.4				1.3120	6.9			
A68/A72 25% -04	0.05306	7.4				1.3140	6.9			
A68/A72 50% -01	0.05491	7.2	0.0551	7.15	20.84	1.2970	6.9	1.2483	6.89	26.35
A68/A72 50% -02	0.05637	7.2				1.3870	6.9			
A68/A72 50% -03	0.05432	7.1				1.1950	6.9			
A68/A72 50% -04	0.05488	7.1				1.1140	6.9			
A68/A72 75% -01	0.06126	6.7	0.0606	6.50	32.61	1.3580	6.9	1.5163	6.81	27.91
A68/A72 75% -02	0.06013	6.5				1.5560	6.8			
A68/A72 75% -03	0.05979	6.4				1.6440	6.8			
A68/A72 75% -04	0.06129	6.4				1.5070	6.8			
A68/A72 100% -01	0.06464	5.6	0.0636	5.60	38.06	0.3088	6.2	0.5028	5.91	37.12
A68/A72 100% -02	0.06302	5.6				0.6791	6.0			
A68/A72 100% -03	0.06331	5.6				0.6192	5.8			
A68/A72 100% -04	0.06358	5.6				0.4039	5.6			
<b>SERIAL DILUTION OF SAMPLE CC48 WITH A68 AS THE DILUENT</b>										
A68/CC48 Control-01	0.08444	7.6	0.0904	7.65	10.49	1.1240	7.2	1.2055	7.31	17.40
A68/CC48 Control-02	0.08753	7.6				1.0750	7.4			
A68/CC48 Control-03	0.09032	7.7				1.2050	7.4			
A68/CC48 Control-04	0.09938	7.7				1.4180	7.2			
A68/CC48 1% -01	0.09961	7.6	0.1049	7.50	13.28	1.3070	7.1	1.2458	7.09	22.11
A68/CC48 1% -02	0.10530	7.5				1.5330	7.1			
A68/CC48 1% -03	0.11370	7.5				1.2920	7.1			
A68/CC48 1% -04	0.10080	7.4				0.8512	7.1			
A68/CC48 3% -01	0.11190	7.4	0.1115	7.40	15.34	1.2220	7.1	1.2065	7.10	21.94
A68/CC48 3% -02	0.10720	7.4				1.3410	7.1			
A68/CC48 3% -03	0.10940	7.4				1.0690	7.1			
A68/CC48 3% -04	0.11750	7.4				1.1940	7.1			
A68/CC48 6% -01	0.12730	7.4	0.1213	7.30	17.51	1.0900	7.1	1.3280	7.09	22.27
A68/CC48 6% -02	0.10770	7.3				1.4650	7.1			
A68/CC48 6% -03	0.11730	7.2				1.1930	7.1			
A68/CC48 6% -04	0.13300	7.3				1.5640	7.1			
A68/CC48 12% -01	0.12320	7.1	0.1320	7.08	22.49	1.0650	7.1	1.2238	7.06	22.93
A68/CC48 12% -02	0.12810	7.1				1.5190	7.1			
A68/CC48 12% -03	0.13000	7.1				1.2540	7.1			
A68/CC48 12% -04	0.14660	7.0				1.0570	7.0			
A68/CC48 25% -01	0.12710	6.4	0.1340	6.28	34.92	0.7729	7.0	1.3542	6.96	24.94
A68/CC48 25% -02	0.13970	6.3				1.5710	7.0			
A68/CC48 25% -03	0.13020	6.2				1.4080	7.0			
A68/CC48 25% -04	0.13910	6.2				1.6650	6.9			
A68/CC48 50% -01	0.11610	4.8	0.1217	4.80	38.85	1.7450	5.2	1.9440	5.20	38.62
A68/CC48 50% -02	0.12460	4.8				1.8930	5.2			
A68/CC48 50% -03	0.11380	4.8				1.9700	5.2			
A68/CC48 50% -04	0.13210	4.8				2.1680	5.2			

Table 2.5-9a: Initial and Final Average Ammonia Results for November 2012 Upper Animas River Surface Water Toxicity Test Using Juvenile O.mykiss

Replicate ID	Day 0 Measured Ammonia Conc. (mg N/L)	Day 0 Measured pH	Day 0 Average Measured Ammonia Conc. (mg N/L)	Day 0 Average Measured pH	Day 0 Ammonia Criterion (mg N/L) <sup>a</sup>	Day 4 Measured Ammonia Conc. (mg N/L) <sup>b</sup>	Day 4 Measured pH <sup>b</sup>	Day 4 Average Measured Ammonia Conc. (mg N/L)	Day 4 Average Measured pH	Day 4 Ammonia Criterion (mg N/L) <sup>a</sup>
SERIAL DILUTION OF SAMPLE M34/CC48 WITH A68 AS THE DILUTENT										
A68/M34/CC48 Control -01	0.04273	7.7	0.0421	7.63	10.92	1.0710	7.3	1.1590	7.35	16.36
A68/M34/CC48 Control -02	0.04165	7.6				1.3430	7.4			
A68/M34/CC48 Control -03	0.04259	7.6				1.1660	7.4			
A68/M34/CC48 Control -04	0.04136	7.6				1.0560	7.4			
A68/M34/CC48 4% -01	0.04308	7.4	0.0434	7.40	15.34	1.1190	7.1	1.2160	7.07	22.60
A68/M34/CC48 4% -02	0.04428	7.4				1.0230	7.1			
A68/M34/CC48 4% -03	0.04365	7.4				1.4570	7.1			
A68/M34/CC48 4% -04	0.04270	7.4				1.2650	7.1			
A68/M34/CC48 9% -01	0.04428	7.4	0.0445	7.33	16.96	1.1650	7.1	1.1380	7.08	22.33
A68/M34/CC48 9% -02	0.04636	7.3				1.2340	7.1			
A68/M34/CC48 9% -03	0.04378	7.3				0.9838	7.1			
A68/M34/CC48 9% -04	0.04353	7.3				1.1690	7.1			
A68/M34/CC48 20% -01	0.04468	7.3	0.0439	7.25	18.61	1.1900	7.1	1.1478	7.08	22.49
A68/M34/CC48 20% -02	0.04355	7.3				1.1460	7.1			
A68/M34/CC48 20% -03	0.04479	7.2				1.1490	7.1			
A68/M34/CC48 20% -04	0.04263	7.2				1.1060	7.1			
A68/M34/CC48 40% -01	0.04493	7.1	0.0448	7.08	22.49	1.4140	7.0	1.4218	6.99	24.26
A68/M34/CC48 40% -02	0.04445	7.1				1.4350	7.0			
A68/M34/CC48 40% -03	0.04535	7.1				1.2290	7.0			
A68/M34/CC48 40% -04	0.04454	7.0				1.6090	7.0			
A68/M34/CC48 65% -01	0.04417	5.7	0.0448	5.63	38.01	0.2124	6.5	0.3039	6.10	36.20
A68/M34/CC48 65% -02	0.04407	5.6				0.1931	6.4			
A68/M34/CC48 65% -03	0.04552	5.6				0.3011	5.8			
A68/M34/CC48 65% -04	0.04535	5.6				0.5090	5.6			
A68/M34/CC48 85% -01	0.04524	4.8	0.0461	4.75	38.86	1.7680	5.1	1.7890	5.10	38.70
A68/M34/CC48 85% -02	0.04522	4.8				1.7120	5.1			
A68/M34/CC48 85% -03	0.04697	4.7				2.0110	5.1			
A68/M34/CC48 85% -04	0.04696	4.7				1.6650	5.1			

<sup>a</sup>The sample-specific acute ammonia criterion was calculated using the "salmon present" formula on p. 54 of the Colorado Department of Public Health and Environment, Water Quality Control Commission, Regulation No. 31: The Basic Standards and Methodologies for Surface Water (5 CCR 1002-31).

<sup>b</sup>Values shown are either the measurements made at the end of the test (day 4) or earlier if all test organisms died before the 4-day exposure period was completed.

Prepared by: EC 3/7/13

Reviewed by: EB 3/13/13

Table 2.5-9b Initial and Final Average Ammonia Results for November 2012 Upper Animas River Concurrent Reference Toxicity Toxicity Test Using Juvenile *O.mykiss*

Replicate ID	Initial (Day 0) Measured Ammonia Conc. (mg N/L) <sup>a</sup>	Initial (Day 0) Measured pH	Initial (Day 0) Average Measured Ammonia Conc. (mg N/L)	Initial (Day 0) Average Measured pH	Initial (Day 0) Ammonia Criterion (mg N/L) <sup>a</sup>	Final Measured Ammonia Conc. (mg N/L)	Final Measured pH	Final Average Measured Ammonia Conc. (mg N/L)	Final Average Measured pH	Final Ammonia Criterion (mg N/L) <sup>a</sup>
Ref Control-01	0.04525	8.00	0.0431	8.00	5.62	1.0190	7.47	1.0740	7.46	14.04
Ref Control-02	0.04274	8.00				1.1450	7.47			
Ref Control-03	0.04226	8.00				1.0550	7.46			
Ref Control-04	0.04211	8.00				1.0770	7.45			
6.25%-01	0.04487	8.00	0.0429	8.05	5.11	1.1310	7.46	1.1548	7.46	14.14
6.25%-02	0.04148	8.10				1.2320	7.46			
6.25%-03	0.04279	8.00				1.2320	7.46			
6.25%-04	0.04244	8.10				1.0240	7.45			
12.5%-01	0.04344	8.00	0.0434	8.08	4.87	0.6100	7.46	0.9802	7.45	14.40
12.5%-02	0.04696	8.00				1.2480	7.46			
12.5%-03	0.04195	8.20				1.1050	7.43			
12.5%-04	0.04107	8.10				0.9578	7.43			
25%-01	0.04180	8.00	0.0422	8.00	5.62	1.5420	7.20	0.4968	7.28	18.00
25%-02	0.04242	8.00				0.1751	7.30			
25%-03	0.04186	8.00				0.1281	7.31			
25%-04	0.04271	8.00				0.1420	7.30			
50%-01	0.04197	8.00	0.0428	8.03	5.36	0.9176	7.24	0.9436	7.26	18.34
50%-02	0.04282	8.00				1.2000	7.25			
50%-03	0.04278	8.10				0.9934	7.27			
50%-04	0.04359	8.00				0.6633	7.29			
100%-01	0.04281	8.00	0.0425	8.00	5.62	0.4526	6.50	0.4550	6.73	29.35
100%-02	0.04205	8.00				0.4628	6.60			
100%-03	0.04292	8.00				0.3182	6.90			
100%-04	0.04216	8.00				0.5862	6.90			

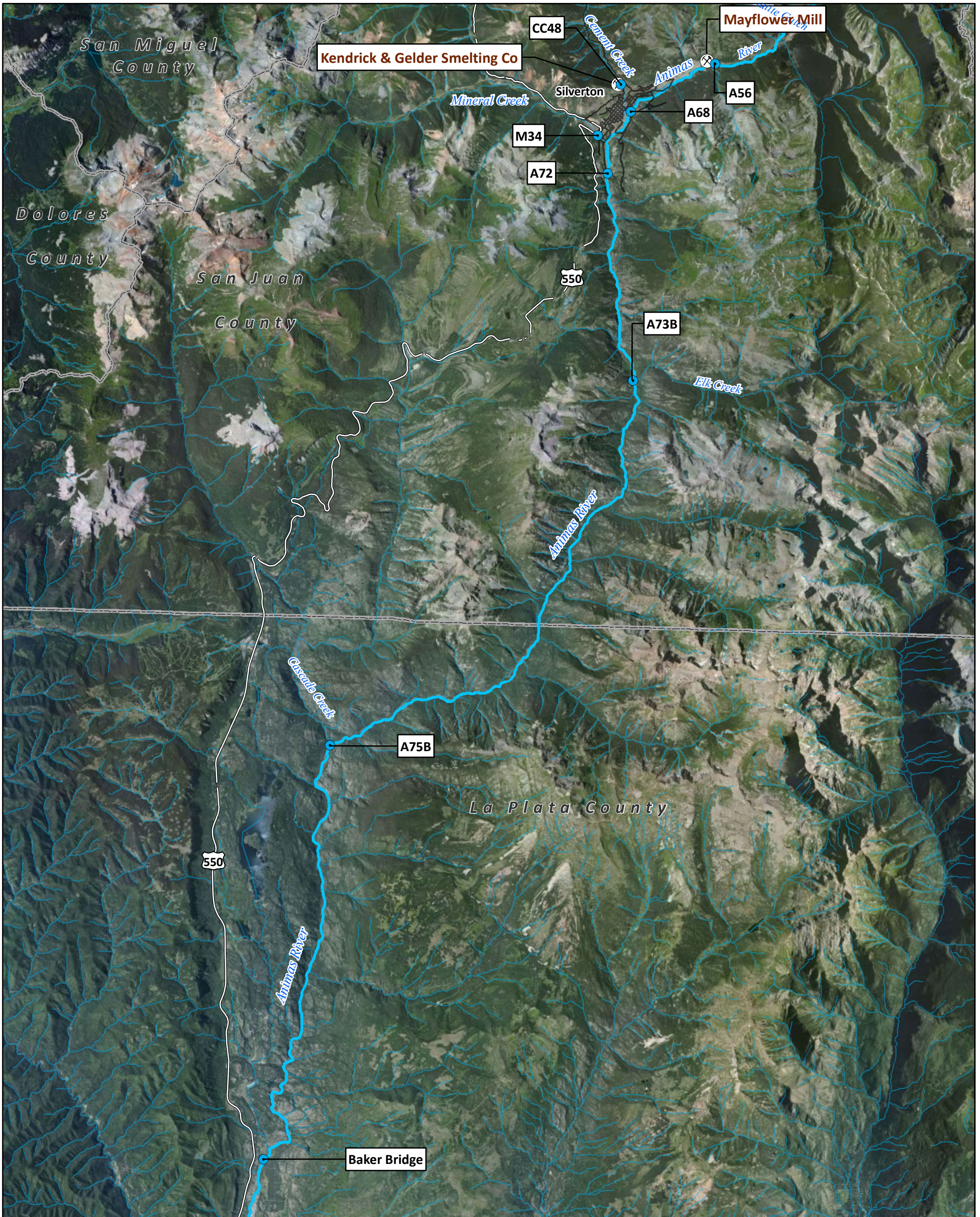
<sup>a</sup> The sample-specific acute ammonia criterion was calculated using the "salmon present" formula on p. 54 of the Colorado Department of Public Health and Environment, Water Quality Control Commission, Regulation No. 31: The Basic Standards and Methodologies for Surface Water (5 CCR 1002-31).

<sup>b</sup> Values shown are either the measurements made at the end of the test (day 4) or earlier if all test organisms died before the 4-day exposure period was completed.

Prepared by: EC 3/7/13  
 Reviewed by: EB 3/13/13








## **Figures**



**Figure 2.1-1**  
**Upper Animas Mining District**  
**2012 Surface Water Toxicity Test**



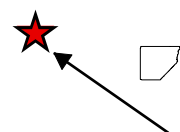
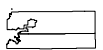
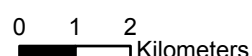
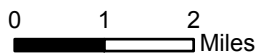
Colorado

-  Sample Locations
-  Mine Locations
-  Rivers and Streams
-  Roads
-  County Boundaries

**Date:** July 15, 2013

**Data Sources:**  
*Sample Locations:* U.S. EPA Region 8 and UOS (2013)  
*Mine Locations:* U.S. EPA and ESAT (2012)  
*Roads:* Navteq (2011)  
*Rivers and Streams:* CDOW 1:24k (2004)  
*County Boundaries:* U.S. Census Bureau (2011)  
*Image:* Bing (2013)

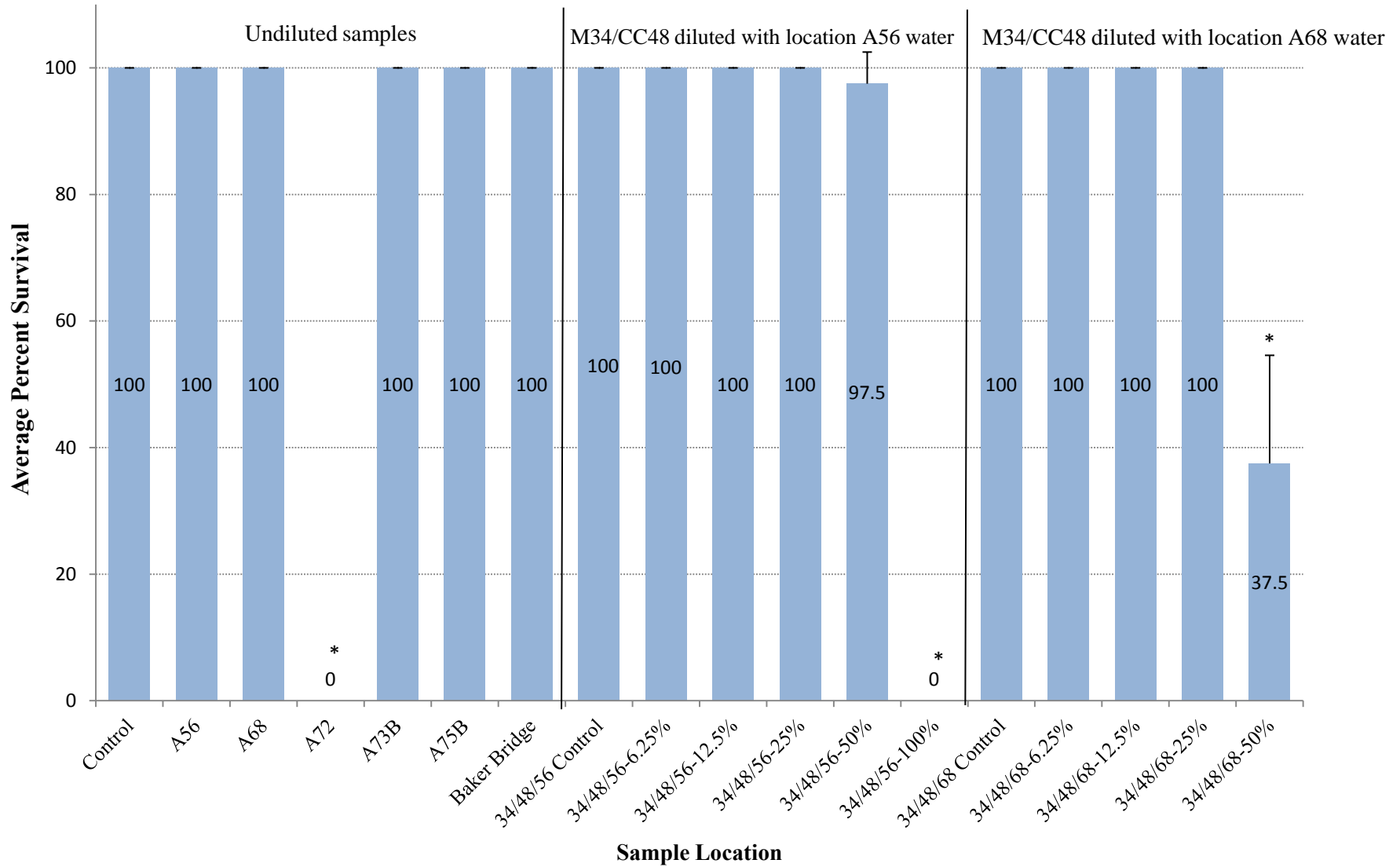
**Coordinate System/Projection:**  
 UTM Zone 13 North, NAD 83, Meters



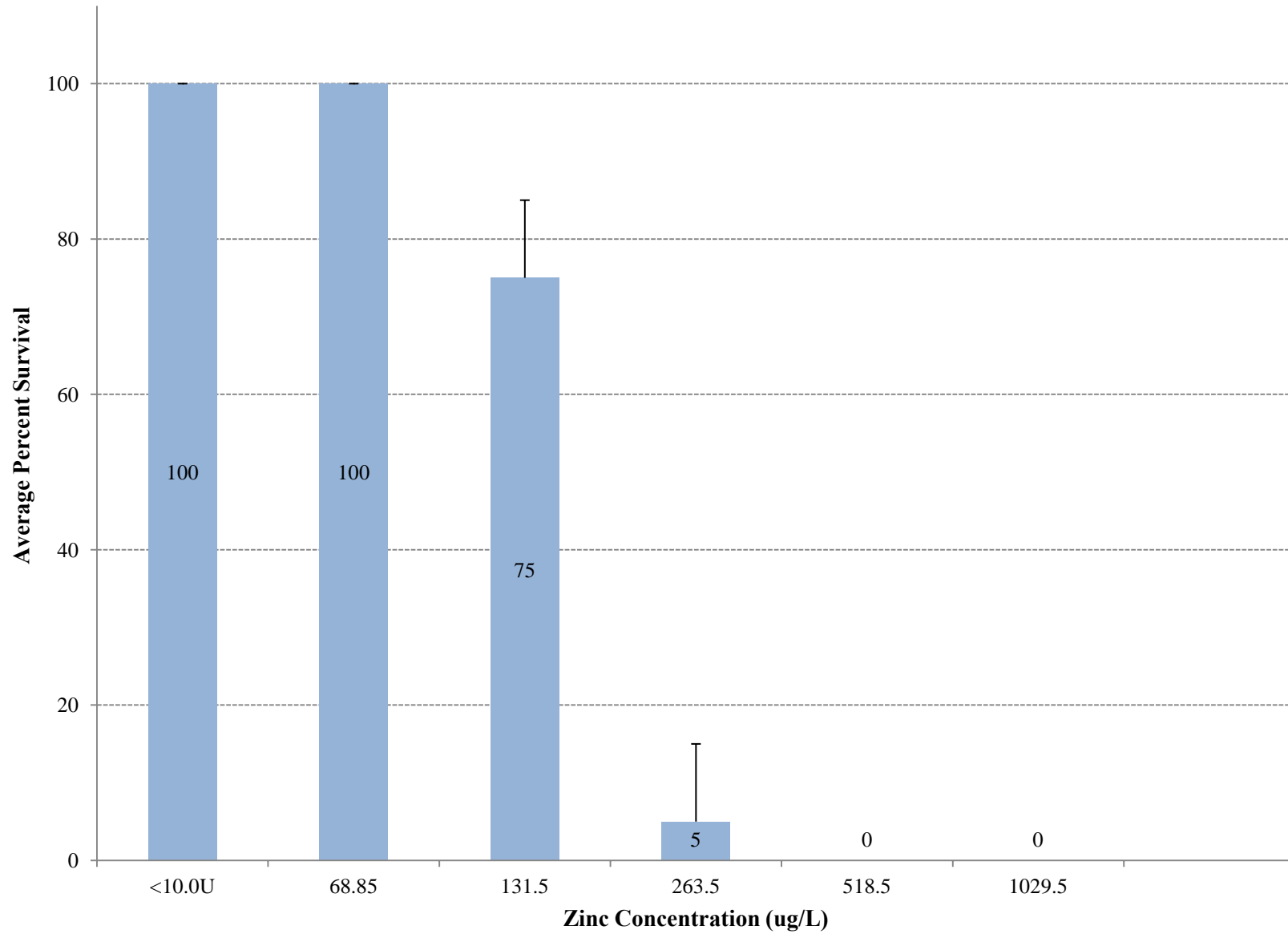
Area of Interest

**Figure 3.1-1**  
**October 2012 Upper Animas River**  
**Acute Surface Water Toxicity Test Using *O. mykiss***  
**Average Percent Survival + Percent SD per Location**

\* = Samples are statistically different when compared to their corresponding control

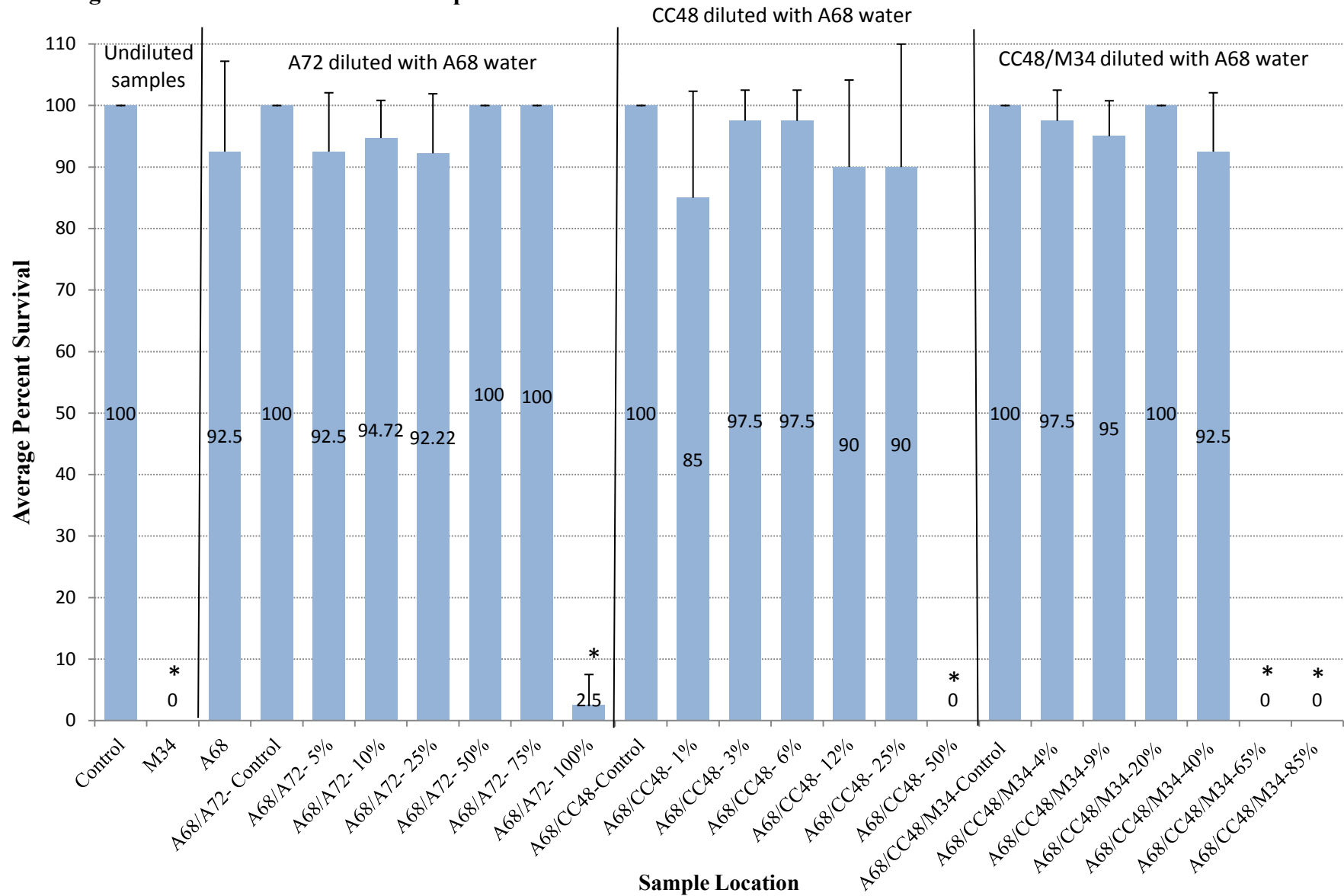


**Figure 3.2-1**  
**October 2012 Acute Reference Toxicity Test Using *O. mykiss* and Zinc Sulfate (ZnSO<sub>4</sub>)**  
**Average Percent Survival + Percent SD per Zinc Concentration**

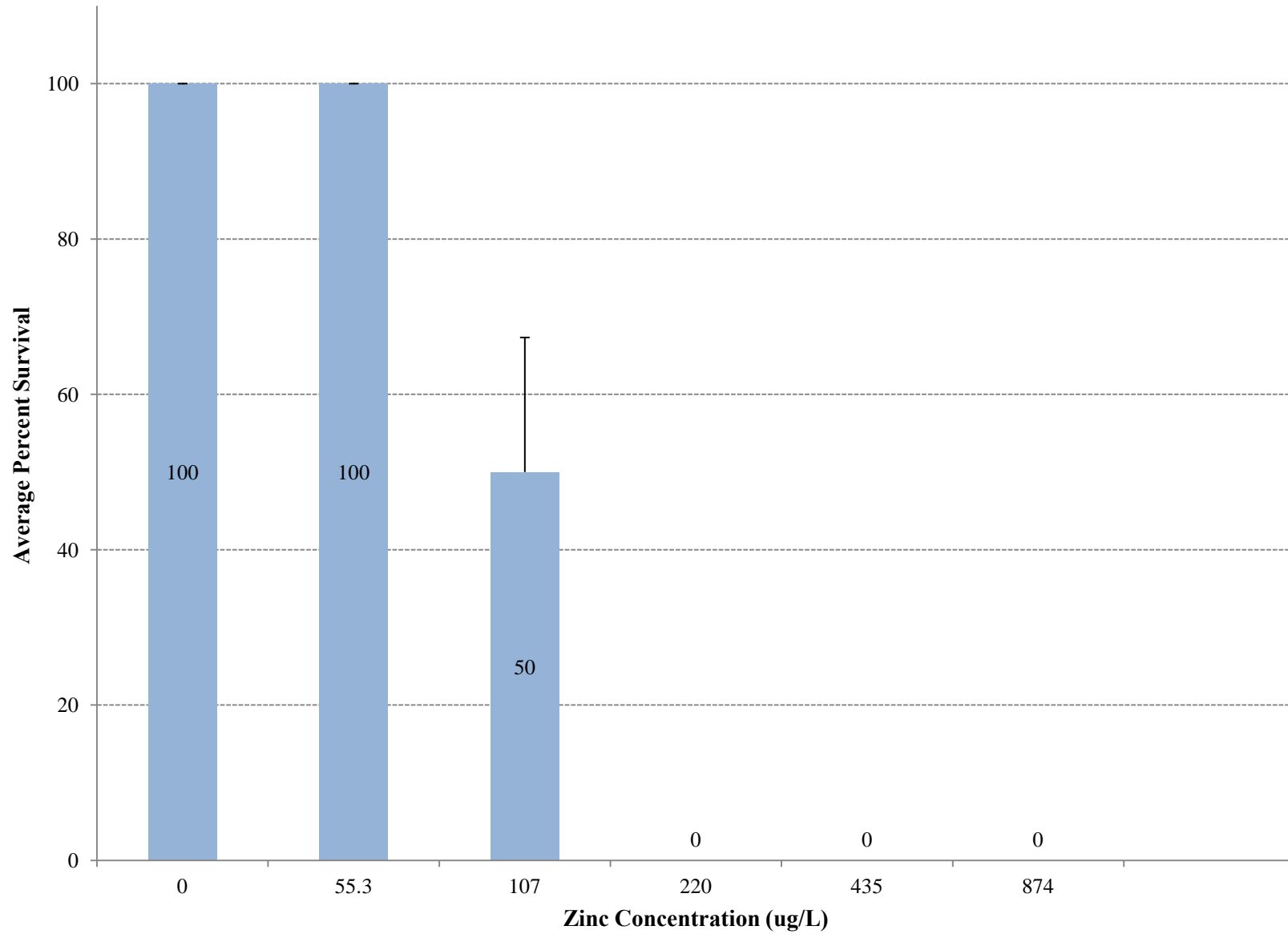


**Figure 3.3-1**  
**November 2012 Upper Animas River**  
**Acute Surface Water Toxicity Test Using *O. mykiss***  
**Average Percent Survival + Percent SD per Location**

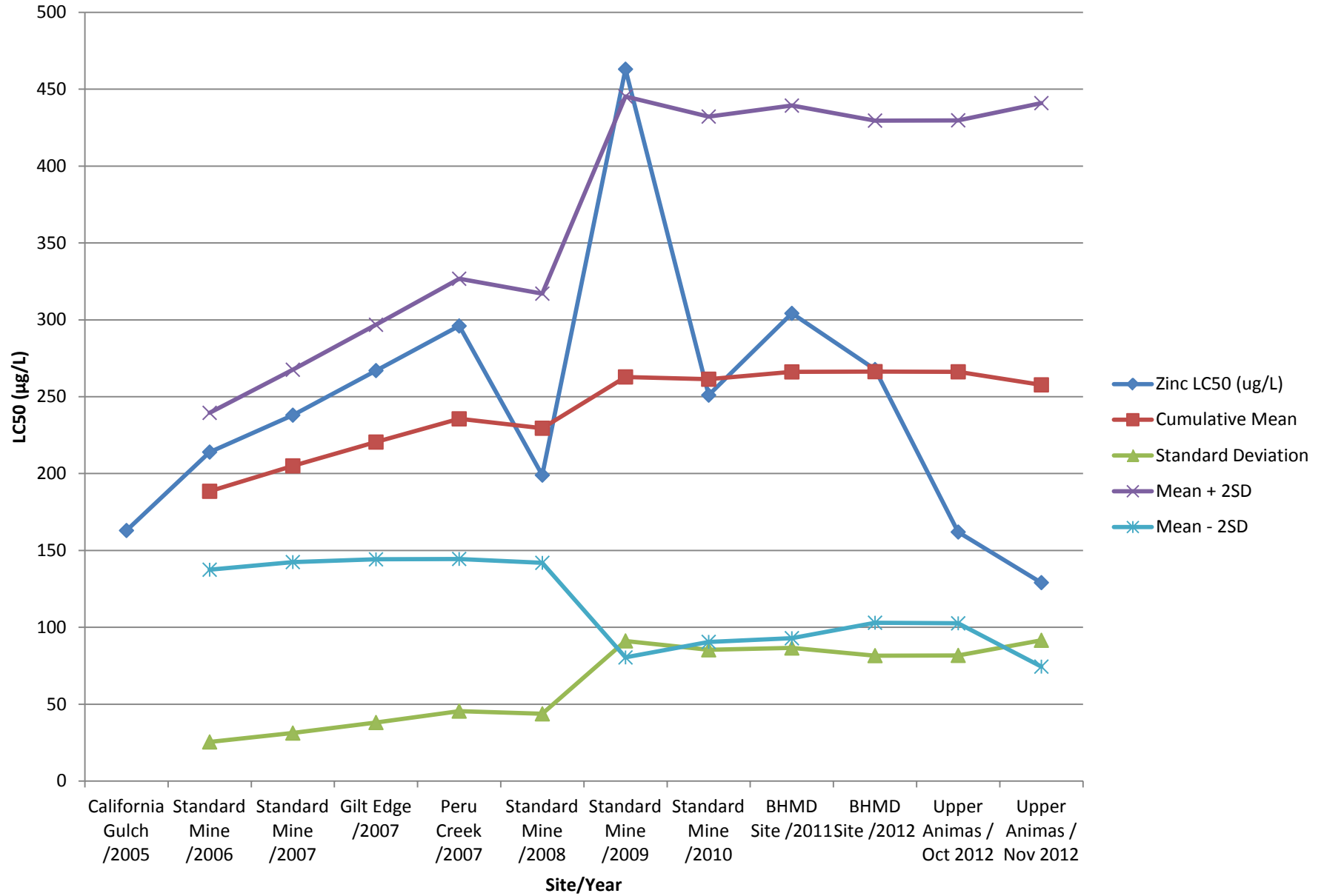
\* = Samples are statistically different when compared to the corresponding control.



**Figure 3.4-1**  
**November 2012 Acute Reference Toxicity Test Using *O. mykiss* and Zinc Sulfate (ZnSO<sub>4</sub>)**  
**Average Percent Survival + Percent SD per Zinc Concentration**



**Figure 3.5-1 Zinc LC<sub>50</sub> Reference Chart**



**Appendix A**  
**October 2012 Upper Animas River Superfund Site**  
**Site Water Toxicity Test and Reference Toxicity Test**  
**Daily Water Chemistries**



Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Profile Test						
Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-01	No. Alive	10	10	10	10	10
Control-01	pH	7.3	7.1	7.3	7.4	7.5
Control-01	Temp °(C)	11.91	11.63	11.77	11.97	11.66
Control-01	D.O. (mg/L)	7.76	7.93	7.76	7.9	8.14
Control-01	Conductivity (us/cm)	310.9	315.4	316.8	319.5	319.3
Control-01	Alkalinity (mg CaCO <sub>3</sub> /L)	59.4	-	-	-	61
Control-01	Hardness (mg /L)	96	-	-	-	95

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-02	No. Alive	10	10	10	10	10
Control-02	pH	7.4	7.2	7.3	7.4	7.6
Control-02	Temp °(C)	11.8	11.61	11.65	11.82	11.6
Control-02	D.O. (mg/L)	8.31	7.87	7.76	7.95	8.06
Control-02	Conductivity (us/cm)	312.2	314.7	318.3	318.8	320.5
Control-02	Alkalinity (mg CaCO <sub>3</sub> /L)	59.4	-	-	-	61
Control-02	Hardness (mg /L)	96	-	-	-	95

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-03	No. Alive	10	10	10	10	10
Control-03	pH	7.4	7.3	7.3	7.4	7.6
Control-03	Temp °(C)	11.76	11.62	11.64	11.83	11.63
Control-03	D.O. (mg/L)	8.48	7.89	7.76	7.99	8.11
Control-03	Conductivity (us/cm)	309.9	315.5	318.5	319.1	320.9
Control-03	Alkalinity (mg CaCO <sub>3</sub> /L)	59.4	-	-	-	61
Control-03	Hardness (mg /L)	96	-	-	-	95

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-04	No. Alive	10	10	10	10	10
Control-04	pH	7.4	7.4	7.4	7.4	7.6
Control-04	Temp °(C)	11.79	11.61	11.65	11.82	11.64
Control-04	D.O. (mg/L)	8.52	8.05	7.83	8.13	8.12
Control-04	Conductivity (us/cm)	311.2	315.4	318.6	320.4	321.7
Control-04	Alkalinity (mg CaCO <sub>3</sub> /L)	59.4	-	-	-	61
Control-04	Hardness (mg /L)	96	-	-	-	95

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Baker-01	No. Alive	10	10	10	10	10
Baker-01	pH	7.1	7.2	7.1	7.3	7.4
Baker-01	Temp °(C)	12.49	11.69	11.76	11.92	11.69
Baker-01	D.O. (mg/L)	8.63	7.18	7.37	7.39	7.55
Baker-01	Conductivity (us/cm)	427.4	430	435.9	433.3	434.7
Baker-01	Alkalinity (mg CaCO <sub>3</sub> /L)	26.5	-	-	-	31.8
Baker-01	Hardness (mg /L)	206	-	-	-	197

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Baker-02	No. Alive	10	10	10	10	10
Baker-02	pH	7.1	7.3	7.1	7.4	7.4
Baker-02	Temp °(C)	11.79	11.61	11.65	11.86	11.66
Baker-02	D.O. (mg/L)	8.64	7.4	7.47	7.57	7.77
Baker-02	Conductivity (us/cm)	423.1	429	431.7	431	432.6
Baker-02	Alkalinity (mg CaCO <sub>3</sub> /L)	26.5	-	-	-	31.8
Baker-02	Hardness (mg /L)	206	-	-	-	197

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Baker-03	No. Alive	10	10	10	10	10
Baker-03	pH	7.1	7.3	7.1	7.4	7.4
Baker-03	Temp °(C)	11.79	11.58	11.58	11.78	11.6
Baker-03	D.O. (mg/L)	8.69	7.42	7.66	7.68	7.97
Baker-03	Conductivity (us/cm)	424	428.8	432.3	431.5	431.6
Baker-03	Alkalinity (mg CaCO <sub>3</sub> /L)	26.5	-	-	-	31.8
Baker-03	Hardness (mg /L)	206	-	-	-	197

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Baker-04	No. Alive	10	10	10	10	10
Baker-04	pH	7.1	7.2	7.2	7.3	7.4
Baker-04	Temp °(C)	11.76	11.55	11.59	11.8	11.58
Baker-04	D.O. (mg/L)	8.69	7.62	7.71	7.81	7.96
Baker-04	Conductivity (us/cm)	422	430	431.8	431.2	431.5
Baker-04	Alkalinity (mg CaCO <sub>3</sub> /L)	26.5	-	-	-	31.8
Baker-04	Hardness (mg /L)	206	-	-	-	197

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A75B-01	No. Alive	10	10	10	10	10
A75B-01	pH	7.1	7.3	7.1	7.3	7.4
A75B-01	Temp °(C)	11.76	11.52	11.6	11.78	11.69
A75B-01	D.O. (mg/L)	8.7	8.24	8.1	8.09	8.05
A75B-01	Conductivity (us/cm)	432	438.5	438.1	440.4	440.5
A75B-01	Alkalinity (mg CaCO <sub>3</sub> /L)	17.1	-	-	-	20.5
A75B-01	Hardness (mg /L)	208	-	-	-	205

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A75B-02	No. Alive	10	10	10	10	10
A75B-02	pH	7.1	7.2	7.1	7.2	7.4
A75B-02	Temp °(C)	11.77	11.56	11.59	11.78	11.6
A75B-02	D.O. (mg/L)	8.73	8.16	7.87	8.04	8.06
A75B-02	Conductivity (us/cm)	433.6	437.8	440.1	439.2	440.9
A75B-02	Alkalinity (mg CaCO <sub>3</sub> /L)	17.1	-	-	-	20.5
A75B-02	Hardness (mg /L)	208	-	-	-	205

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A75B-03	No. Alive	10	10	10	10	10
A75B-03	pH	7.1	7.2	7.1	7.2	7.3
A75B-03	Temp °(C)	11.77	11.56	11.59	11.77	11.61
A75B-03	D.O. (mg/L)	8.73	8.12	7.85	7.95	7.99
A75B-03	Conductivity (us/cm)	433.8	438	439	438.5	438.8
A75B-03	Alkalinity (mg CaCO <sub>3</sub> /L)	17.1	-	-	-	20.5
A75B-03	Hardness (mg /L)	208	-	-	-	205

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A75B-04	No. Alive	10	10	10	10	10
A75B-04	pH	7.1	7.2	7.1	7.2	7.3
A75B-04	Temp °(C)	11.75	11.55	11.58	11.78	11.6
A75B-04	D.O. (mg/L)	8.69	7.82	7.83	8	8.13
A75B-04	Conductivity (us/cm)	430.6	438.8	439.8	440.1	440.5
A75B-04	Alkalinity (mg CaCO <sub>3</sub> /L)	17.1	-	-	-	20.5
A75B-04	Hardness (mg /L)	208	-	-	-	205

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A73B-01	No. Alive	10	10	10	10	10
A73B-01	pH	6.3	6.9	6.8	7	7.1
A73B-01	Temp °(C)	11.7	11.56	11.56	11.78	11.57
A73B-01	D.O. (mg/L)	8.69	7.98	8.2	8.29	8.33
A73B-01	Conductivity (us/cm)	505	509.9	512.2	512.6	515
A73B-01	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	<5.00U
A73B-01	Hardness (mg /L)	243	-	-	-	239

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A73B-02	No. Alive	10	10	10	10	10
A73B-02	pH	6.1	6.8	6.6	6.9	6.9
A73B-02	Temp °(C)	11.67	11.55	11.61	11.77	11.58
A73B-02	D.O. (mg/L)	8.72	8	8.07	8.29	8.27
A73B-02	Conductivity (us/cm)	502.8	510.1	511.3	511.3	512.2
A73B-02	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	<5.00U
A73B-02	Hardness (mg /L)	243	-	-	-	239

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A73B-03	No. Alive	10	10	10	10	10
A73B-03	pH	6.1	6.7	6.5	6.8	6.7
A73B-03	Temp °(C)	11.69	11.55	11.59	11.74	11.59
A73B-03	D.O. (mg/L)	8.72	7.89	8.02	8.22	8.13
A73B-03	Conductivity (us/cm)	501.9	508.7	510.7	511.3	511.1
A73B-03	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	<5.00U
A73B-03	Hardness (mg /L)	243	-	-	-	239

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A73B-04	No. Alive	10	10	10	10	10
A73B-04	pH	6.1	6.6	6.5	6.7	6.7
A73B-04	Temp °(C)	11.75	11.56	11.58	11.77	11.59
A73B-04	D.O. (mg/L)	8.71	7.94	8	8.1	8.2
A73B-04	Conductivity (us/cm)	504	507.3	510.5	509.1	510.3
A73B-04	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	<5.00U
A73B-04	Hardness (mg /L)	243	-	-	-	239

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A56-01	No. Alive	10	10	10	10	10
A56-01	pH	6.9	7.1	7.1	7.5	7
A56-01	Temp °(C)	12.02	11.59	11.65	11.84	11.57
A56-01	D.O. (mg/L)	7.91	7.82	8.16	7.99	8.38
A56-01	Conductivity (us/cm)	350.4	358.1	358.9	359.2	360.9
A56-01	Alkalinity (mg CaCO <sub>3</sub> /L)	37.8	-	-	-	40.9
A56-01	Hardness (mg /L)	170	-	-	-	166

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A56-02	No. Alive	10	10	10	10	10
A56-02	pH	7	7.1	7.2	7.6	7.2
A56-02	Temp °(C)	11.71	11.6	11.58	11.8	11.6
A56-02	D.O. (mg/L)	8.4	7.59	8.24	8.28	8.4
A56-02	Conductivity (us/cm)	351.2	356.7	359.2	358.2	359.9
A56-02	Alkalinity (mg CaCO <sub>3</sub> /L)	37.8	-	-	-	40.9
A56-02	Hardness (mg /L)	170	-	-	-	166

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A56-03	No. Alive	10	10	10	10	10
A56-03	pH	7	7.2	7.2	7.5	7.1
A56-03	Temp °(C)	11.73	11.59	11.59	11.79	11.57
A56-03	D.O. (mg/L)	8.57	7.67	8.21	8.28	8.28
A56-03	Conductivity (us/cm)	352.6	356.6	358.9	359.8	360.2
A56-03	Alkalinity (mg CaCO <sub>3</sub> /L)	37.8	-	-	-	40.9
A56-03	Hardness (mg /L)	170	-	-	-	166

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A56-04	No. Alive	10	10	10	10	10
A56-04	pH	7.1	7.2	7.2	7.5	7.1
A56-04	Temp °(C)	11.76	11.59	11.6	11.77	11.53
A56-04	D.O. (mg/L)	8.6	7.74	7.92	8.07	8.16
A56-04	Conductivity (us/cm)	353.1	356.4	359.1	357.6	358.4
A56-04	Alkalinity (mg CaCO <sub>3</sub> /L)	37.8	-	-	-	40.9
A56-04	Hardness (mg /L)	170	-	-	-	166

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A72-01	No. Alive	10	10	9	0	-
A72-01	pH	5.5	6.1	6.2	6.2	-
A72-01	Temp °(C)	11.94	11.57	11.59	11.8	-
A72-01	D.O. (mg/L)	8.13	8.23	8.47	8.54	-
A72-01	Conductivity (us/cm)	607.2	612.5	612.3	614.1	-
A72-01	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	<5.00U	-
A72-01	Hardness (mg /L)	299	-	-	296	-

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A72-02	No. Alive	10	10	8	0	-
A72-02	pH	5.5	6.1	6.1	6.1	-
A72-02	Temp °(C)	11.88	11.57	11.61	11.79	-
A72-02	D.O. (mg/L)	8.29	8.29	7.99	8.61	-
A72-02	Conductivity (us/cm)	605.6	613.1	616.6	615.3	-
A72-02	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	<5.00U	-
A72-02	Hardness (mg /L)	299	-	-	296	-

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A72-03	No. Alive	10	10	4	0	-
A72-03	pH	5.5	6.1	6.1	5.9	-
A72-03	Temp °(C)	11.73	11.6	11.59	11.78	-
A72-03	D.O. (mg/L)	8.51	8.17	8.21	8.67	-
A72-03	Conductivity (us/cm)	607.7	613	618.6	610	-
A72-03	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	<5.00U	-
A72-03	Hardness (mg /L)	299	-	-	296	-

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A72-04	No. Alive	10	10	7	0	-
A72-04	pH	5.5	6.1	6.1	5.9	-
A72-04	Temp °(C)	11.73	11.59	11.6	11.8	-
A72-04	D.O. (mg/L)	8.63	8.21	8.41	8.71	-
A72-04	Conductivity (us/cm)	603.3	613.3	616.3	612.6	-
A72-04	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U			<5.00U	
A72-04	Hardness (mg /L)	299			296	

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-01	No. Alive	10	10	10	10	10
A68-01	pH	7.2	7.4	7.4	7.1	7.3
A68-01	Temp °(C)	11.77	11.75	11.85	11.95	11.86
A68-01	D.O. (mg/L)	8.41	8.34	8.4	7.99	8.08
A68-01	Conductivity (us/cm)	379.9	384.1	386	382.6	385
A68-01	Alkalinity (mg CaCO <sub>3</sub> /L)	35.8	-	-	-	42.7
A68-01	Hardness (mg /L)	183	-	-	-	180

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-02	No. Alive	10	10	10	10	10
A68-02	pH	7.2	7.3	7.4	7.2	7.4
A68-02	Temp °(C)	11.78	11.74	11.83	11.93	11.82
A68-02	D.O. (mg/L)	8.37	8.32	8.44	8.07	8.14
A68-02	Conductivity (us/cm)	382.5	385.7	386.9	386.7	386.1
A68-02	Alkalinity (mg CaCO <sub>3</sub> /L)	35.8	-	-	-	42.7
A68-02	Hardness (mg /L)	183	-	-	-	180

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-03	No. Alive	10	10	10	10	10
A68-03	pH	7.2	7.3	7.4	7.3	7.4
A68-03	Temp °(C)	11.76	11.81	11.83	11.93	11.81
A68-03	D.O. (mg/L)	8.3	7.98	8.24	8.01	8.06
A68-03	Conductivity (us/cm)	380.9	385.1	386.9	386.3	388.7
A68-03	Alkalinity (mg CaCO <sub>3</sub> /L)	35.8	-	-	-	42.7
A68-03	Hardness (mg /L)	183	-	-	-	180

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-04	No. Alive	10	10	10	10	10
A68-04	pH	7.3	7.3	7.4	7.4	7.4
A68-04	Temp °(C)	11.78	11.82	11.83	11.91	11.8
A68-04	D.O. (mg/L)	8.24	8.03	7.84	7.87	7.92
A68-04	Conductivity (us/cm)	379.8	385	388.7	387.6	388.6
A68-04	Alkalinity (mg CaCO <sub>3</sub> /L)	35.8	-	-	-	42.7
A68-04	Hardness (mg /L)	183	-	-	-	180

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Serial dilution of M34/CC48 with A56						
Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-control-01	No. Alive	10	10	10	10	10
34/48/56-control-01	pH	7.6	7.4	7.5	7.5	7.6
34/48/56-control-01	Temp °(C)	11.79	11.63	11.68	11.9	11.8
34/48/56-control-01	D.O. (mg/L)	7.73	7.87	8.32	8.4	8.08
34/48/56-control-01	Conductivity (us/cm)	309.6	316.5	319.1	319	320.9
34/48/56-control-01	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	*
34/48/56-control-01	Hardness (mg /L)	*	-	-	-	*

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-control-02	No. Alive	10	10	10	10	10
34/48/56-control-02	pH	7.4	7.4	7.5	7.6	7.7
34/48/56-control-02	Temp °(C)	11.69	11.63	11.69	11.86	11.68
34/48/56-control-02	D.O. (mg/L)	7.82	7.86	8.27	8.41	8.07
34/48/56-control-02	Conductivity (us/cm)	309.9	315.3	318.8	319.6	320.9
34/48/56-control-02	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	*
34/48/56-control-02	Hardness (mg /L)	*	-	-	-	*

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-control-03	No. Alive	10	10	10	10	10
34/48/56-control-03	pH	7.4	7.4	7.5	7.6	7.7
34/48/56-control-03	Temp °(C)	11.65	11.62	11.67	11.85	11.66
34/48/56-control-03	D.O. (mg/L)	7.79	8.06	8.25	8.26	8.32
34/48/56-control-03	Conductivity (us/cm)	311.9	315	318.5	319.2	320.5
34/48/56-control-03	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	*
34/48/56-control-03	Hardness (mg /L)	*	-	-	-	*

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-control-04	No. Alive	10	10	10	10	10
34/48/56-control-04	pH	7.4	7.4	7.4	7.5	7.7
34/48/56-control-04	Temp °(C)	11.63	11.64	11.65	11.85	11.67
34/48/56-control-04	D.O. (mg/L)	7.88	7.84	8.13	8.21	8.17
34/48/56-control-04	Conductivity (us/cm)	311.4	314.9	320.1	318.9	321
34/48/56-control-04	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	*
34/48/56-control-04	Hardness (mg /L)	*	-	-	-	*



Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-6.25%-01	No. Alive	10	10	10	10	10
34/48/56-6.25%-01	pH	7.3	7.1	7.4	7.4	7.6
34/48/56-6.25%-01	Temp °(C)	11.68	11.62	11.64	11.86	11.67
34/48/56-6.25%-01	D.O. (mg/L)	7.92	7.54	8.27	8.3	7.99
34/48/56-6.25%-01	Conductivity (us/cm)	382.3	384.4	386.1	386.8	388.8
34/48/56-6.25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	32.3	-	-	-	37.1
34/48/56-6.25%-01	Hardness (mg /L)	193	-	-	-	177

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-6.25%-02	No. Alive	10	10	10	10	10
34/48/56-6.25%-02	pH	7.2	7.2	7.3	7.4	7.5
34/48/56-6.25%-02	Temp °(C)	11.65	11.63	11.66	11.87	11.66
34/48/56-6.25%-02	D.O. (mg/L)	7.97	7.69	8.11	8.25	8.04
34/48/56-6.25%-02	Conductivity (us/cm)	377.2	380.7	385	384	385.6
34/48/56-6.25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	32.3	-	-	-	37.1
34/48/56-6.25%-02	Hardness (mg /L)	193	-	-	-	177

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-6.25%-03	No. Alive	10	10	10	10	10
34/48/56-6.25%-03	pH	7.3	7.2	7.4	7.4	7.5
34/48/56-6.25%-03	Temp °(C)	11.65	11.65	11.66	11.85	11.66
34/48/56-6.25%-03	D.O. (mg/L)	8.13	7.82	8.19	8.24	8.25
34/48/56-6.25%-03	Conductivity (us/cm)	380.6	382.4	385.2	384.9	387
34/48/56-6.25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	32.3	-	-	-	37.1
34/48/56-6.25%-03	Hardness (mg /L)	193	-	-	-	177

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-6.25%-04	No. Alive	10	10	10	10	10
34/48/56-6.25%-04	pH	7.3	7.2	7.4	7.4	7.5
34/48/56-6.25%-04	Temp °(C)	11.66	11.64	11.66	11.85	11.65
34/48/56-6.25%-04	D.O. (mg/L)	8.2	7.76	8.19	8.31	8.31
34/48/56-6.25%-04	Conductivity (us/cm)	377	383	385.5	385	386
34/48/56-6.25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	32.3	-	-	-	37.1
34/48/56-6.25%-04	Hardness (mg /L)	193	-	-	-	177

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-12.5%-01	No. Alive	10	10	10	10	10
34/48/56-12.5%-01	pH	7.2	7.2	7.3	7.3	7.5
34/48/56-12.5%-01	Temp °(C)	11.65	11.61	11.68	11.84	11.66
34/48/56-12.5%-01	D.O. (mg/L)	8.25	8.12	7.93	8.29	8.36
34/48/56-12.5%-01	Conductivity (us/cm)	405.9	408	412.7	410.5	413.6
34/48/56-12.5%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	27.5	-	-	-	32
34/48/56-12.5%-01	Hardness (mg /L)	194	-	-	-	192

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-12.5%-02	No. Alive	10	10	10	10	10
34/48/56-12.5%-02	pH	7.2	7.3	7.2	7.3	7.4
34/48/56-12.5%-02	Temp °(C)	11.65	11.63	11.67	11.83	11.66
34/48/56-12.5%-02	D.O. (mg/L)	8.29	8.17	7.86	8.06	7.94
34/48/56-12.5%-02	Conductivity (us/cm)	405.5	409.8	413.3	411	412.3
34/48/56-12.5%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	27.5	-	-	-	32
34/48/56-12.5%-02	Hardness (mg /L)	194	-	-	-	192

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-12.5%-03	No. Alive	10	10	10	10	10
34/48/56-12.5%-03	pH	7.2	7.3	7.2	7.3	7.4
34/48/56-12.5%-03	Temp °(C)	11.64	11.62	11.68	11.85	11.65
34/48/56-12.5%-03	D.O. (mg/L)	8.32	8.3	7.7	7.85	7.82
34/48/56-12.5%-03	Conductivity (us/cm)	408	408.9	412	410.5	409.4
34/48/56-12.5%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	27.5	-	-	-	32
34/48/56-12.5%-03	Hardness (mg /L)	194	-	-	-	192

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-12.5%-04	No. Alive	10	10	10	10	10
34/48/56-12.5%-04	pH	7.2	7.2	7.3	7.3	7.4
34/48/56-12.5%-04	Temp °(C)	11.66	11.62	11.67	11.85	11.66
34/48/56-12.5%-04	D.O. (mg/L)	8.31	8.28	7.93	7.86	8.18
34/48/56-12.5%-04	Conductivity (us/cm)	404.6	408.3	412.7	410.4	412.1
34/48/56-12.5%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	27.5	-	-	-	32
34/48/56-12.5%-04	Hardness (mg /L)	194	-	-	-	192

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-25%-01	No. Alive	10	10	10	10	10
34/48/56-25%-01	pH	7.1	7.1	7.2	7.2	7.4
34/48/56-25%-01	Temp °(C)	11.66	11.66	11.68	11.88	11.67
34/48/56-25%-01	D.O. (mg/L)	8.23	7.76	8.07	8.28	8.27
34/48/56-25%-01	Conductivity (us/cm)	456.6	458.5	461.7	462.9	465.4
34/48/56-25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	17.5	-	-	-	19.5
34/48/56-25%-01	Hardness (mg /L)	220	-	-	-	217

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-25%-02	No. Alive	10	10	10	10	10
34/48/56-25%-02	pH	7.1	7.1	7.2	7.2	7.4
34/48/56-25%-02	Temp °(C)	11.66	11.66	11.67	11.87	11.59
34/48/56-25%-02	D.O. (mg/L)	8.15	7.84	8.06	8.17	8.29
34/48/56-25%-02	Conductivity (us/cm)	452.2	457.9	463.4	461.8	464.4
34/48/56-25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	17.5	-	-	-	19.5
34/48/56-25%-02	Hardness (mg /L)	220	-	-	-	217

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-25%-03	No. Alive	10	10	10	10	10
34/48/56-25%-03	pH	7.1	7.1	7.1	7.2	7.3
34/48/56-25%-03	Temp °(C)	11.68	11.66	11.66	11.86	11.66
34/48/56-25%-03	D.O. (mg/L)	8.21	7.9	8.08	8.05	8.27
34/48/56-25%-03	Conductivity (us/cm)	456.1	458	464.8	461.1	465.4
34/48/56-25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	17.5	-	-	-	19.5
34/48/56-25%-03	Hardness (mg /L)	220	-	-	-	217

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-25%-04	No. Alive	10	10	10	10	10
34/48/56-25%-04	pH	7	7.1	7.1	7.1	7.4
34/48/56-25%-04	Temp °(C)	11.67	11.65	11.66	11.86	11.66
34/48/56-25%-04	D.O. (mg/L)	8.24	7.75	8.1	7.99	8.29
34/48/56-25%-04	Conductivity (us/cm)	458.8	458.2	463	460.9	464.1
34/48/56-25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	17.5	-	-	-	19.5
34/48/56-25%-04	Hardness (mg /L)	220	-	-	-	217

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-50%-01	No. Alive	10	10	10	10	10
34/48/56-50%-01	pH	6.2	6.5	6.7	6.9	7.1
34/48/56-50%-01	Temp °(C)	11.66	11.66	11.69	11.87	11.67
34/48/56-50%-01	D.O. (mg/L)	8.25	8.1	7.84	8.55	8.48
34/48/56-50%-01	Conductivity (us/cm)	559.1	563.6	569.4	567.1	569.1
34/48/56-50%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.82
34/48/56-50%-01	Hardness (mg /L)	270	-	-	-	272

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-50%-02	No. Alive	10	10	10	10	10
34/48/56-50%-02	pH	6.2	6.5	6.7	6.8	7
34/48/56-50%-02	Temp °(C)	11.66	11.67	11.65	11.91	11.69
34/48/56-50%-02	D.O. (mg/L)	8.28	7.95	7.84	8.35	8.54
34/48/56-50%-02	Conductivity (us/cm)	563.2	564	568.8	568.1	568.9
34/48/56-50%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.82
34/48/56-50%-02	Hardness (mg /L)	270	-	-	-	272

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-50%-03	No. Alive	10	10	10	9	9
34/48/56-50%-03	pH	6.2	6.5	6.6	6.7	6.9
34/48/56-50%-03	Temp °(C)	11.67	11.67	11.65	11.89	11.69
34/48/56-50%-03	D.O. (mg/L)	8.28	7.96	8.1	8.31	8.43
34/48/56-50%-03	Conductivity (us/cm)	556	563	569.3	565.6	565.5
34/48/56-50%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.82
34/48/56-50%-03	Hardness (mg /L)	270	-	-	-	272

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-50%-04	No. Alive	10	10	10	10	10
34/48/56-50%-04	pH	6.1	6.5	6.6	6.7	6.9
34/48/56-50%-04	Temp °(C)	11.68	11.67	11.68	11.88	11.69
34/48/56-50%-04	D.O. (mg/L)	8.24	8.16	8.23	8.35	8.49
34/48/56-50%-04	Conductivity (us/cm)	555.3	563.3	568.1	566.7	568.4
34/48/56-50%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.82
34/48/56-50%-04	Hardness (mg /L)	270	-	-	-	272

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-100%-01	No. Alive	10	10	0	-	-
34/48/56-100%-01	pH	3.9	4.5	4.2	-	-
34/48/56-100%-01	Temp °(C)	11.68	11.67	11.69	-	-
34/48/56-100%-01	D.O. (mg/L)	8.32	8.51	8.58	-	-
34/48/56-100%-01	Conductivity (us/cm)	814.1	798.6	841.3	-	-
34/48/56-100%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	<5.00U	-	-
34/48/56-100%-01	Hardness (mg /L)	382	-	385	-	-

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-100%-02	No. Alive	10	4	0	-	-
34/48/56-100%-02	pH	3.9	4.5	4.1	-	-
34/48/56-100%-02	Temp °(C)	11.67	11.65	11.69	-	-
34/48/56-100%-02	D.O. (mg/L)	8.33	8.43	8.61	-	-
34/48/56-100%-02	Conductivity (us/cm)	818.9	802.4	816.7	-	-
34/48/56-100%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	<5.00U	-	-
34/48/56-100%-02	Hardness (mg /L)	382	-	385	-	-

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-100%-03	No. Alive	10	2	0	-	-
34/48/56-100%-03	pH	3.8	4.1	4.1	-	-
34/48/56-100%-03	Temp °(C)	11.7	11.69	11.65	-	-
34/48/56-100%-03	D.O. (mg/L)	8.22	8.37	8.67	-	-
34/48/56-100%-03	Conductivity (us/cm)	836	822.4	816	-	-
34/48/56-100%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	<5.00U	-	-
34/48/56-100%-03	Hardness (mg /L)	382	-	385	-	-

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/56-100%-04	No. Alive	10	7	0	-	-
34/48/56-100%-04	pH	3.8	4.3	4.2	-	-
34/48/56-100%-04	Temp °(C)	11.72	11.7	11.71	-	-
34/48/56-100%-04	D.O. (mg/L)	8.17	8.19	8.63	-	-
34/48/56-100%-04	Conductivity (us/cm)	825.4	807.5	817.6	-	-
34/48/56-100%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	<5.00U	-	-
34/48/56-100%-04	Hardness (mg /L)	382	-	385	-	-

Serial dilution of M34/CC48 with A68

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-control-01	No. Alive	10	10	10	10	10
34/48/68-control-01	pH	7.2	7	7.1	7.6	7.3
34/48/68-control-01	Temp °(C)	12.05	11.76	12.05	11.95	11.82
34/48/68-control-01	D.O. (mg/L)	7.74	7.54	7.7	7.66	7.85
34/48/68-control-01	Conductivity (us/cm)	308.4	314.9	315.4	318.1	321.3
34/48/68-control-01	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	72.2
34/48/68-control-01	Hardness (mg /L)	*	-	-	-	94

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-control-02	No. Alive	10	10	10	10	10
34/48/68-control-02	pH	7.2	7.1	7.2	7.6	7.4
34/48/68-control-02	Temp °(C)	12.01	11.72	11.74	11.91	11.73
34/48/68-control-02	D.O. (mg/L)	7.79	7.69	8.07	8.1	7.78
34/48/68-control-02	Conductivity (us/cm)	287.5	315.3	318.5	319.1	321.4
34/48/68-control-02	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	72.2
34/48/68-control-02	Hardness (mg /L)	*	-	-	-	94

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-control-03	No. Alive	10	10	10	10	10
34/48/68-control-03	pH	7.2	7.1	7.3	7.6	7.6
34/48/68-control-03	Temp °(C)	11.91	11.71	11.74	11.91	11.71
34/48/68-control-03	D.O. (mg/L)	7.88	7.96	8.08	8.22	8.15
34/48/68-control-03	Conductivity (us/cm)	310.8	314.7	318	318.6	320.4
34/48/68-control-03	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	72.2
34/48/68-control-03	Hardness (mg /L)	*	-	-	-	94

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-control-04	No. Alive	10	10	10	10	10
34/48/68-control-04	pH	7.3	7.1	7.3	7.6	7.6
34/48/68-control-04	Temp °(C)	11.88	11.72	11.73	11.91	11.72
34/48/68-control-04	D.O. (mg/L)	7.87	7.87	7.94	8.09	8.13
34/48/68-control-04	Conductivity (us/cm)	311.2	314	318.4	318.7	320.6
34/48/68-control-04	Alkalinity (mg CaCO <sub>3</sub> /L)	*	-	-	-	72.2
34/48/68-control-04	Hardness (mg /L)	*	-	-	-	94

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-6.25%-01	No. Alive	10	10	10	10	10
34/48/68-6.25%-01	pH	7.3	7	7.4	7.3	7.7
34/48/68-6.25%-01	Temp °(C)	11.84	11.76	11.91	11.73	11.91
34/48/68-6.25%-01	D.O. (mg/L)	8.12	6.29	7.9	7.7	8.04
34/48/68-6.25%-01	Conductivity (us/cm)	406.2	426.9	415.3	412.3	414.4
34/48/68-6.25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	31.6	-	-	-	35.7
34/48/68-6.25%-01	Hardness (mg /L)	180	-	-	-	194

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-6.25%-02	No. Alive	10	10	10	10	10
34/48/68-6.25%-02	pH	7.3	7.1	7.4	7.3	7.6
34/48/68-6.25%-02	Temp °(C)	11.76	11.75	11.9	11.73	11.8
34/48/68-6.25%-02	D.O. (mg/L)	8.3	6.47	7.75	7.61	7.78
34/48/68-6.25%-02	Conductivity (us/cm)	406.6	423.8	414.4	411.5	414.3
34/48/68-6.25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	31.6	-	-	-	35.7
34/48/68-6.25%-02	Hardness (mg /L)	180	-	-	-	194

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-6.25%-03	No. Alive	10	10	10	10	10
34/48/68-6.25%-03	pH	7.3	7.1	7.3	7.3	7.6
34/48/68-6.25%-03	Temp °(C)	11.75	11.76	11.86	11.72	11.81
34/48/68-6.25%-03	D.O. (mg/L)	8.37	6.87	7.86	7.77	7.61
34/48/68-6.25%-03	Conductivity (us/cm)	406.1	424.1	416.5	415.9	413
34/48/68-6.25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	31.6	-	-	-	35.7
34/48/68-6.25%-03	Hardness (mg /L)	180	-	-	-	194

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-6.25%-04	No. Alive	10	10	10	10	10
34/48/68-6.25%-04	pH	7.4	7.1	7.3	7.3	7.5
34/48/68-6.25%-04	Temp °(C)	11.72	11.77	11.89	11.7	11.81
34/48/68-6.25%-04	D.O. (mg/L)	8.4	7.18	7.78	7.66	7.61
34/48/68-6.25%-04	Conductivity (us/cm)	405.9	423	415.6	419.9	413
34/48/68-6.25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	31.6	-	-	-	35.7
34/48/68-6.25%-04	Hardness (mg /L)	180	-	-	-	194

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-12.5%-01	No. Alive	10	10	10	10	10
34/48/68-12.5%-01	pH	7.3	7.3	7.4	7.3	7.6
34/48/68-12.5%-01	Temp °(C)	11.75	11.77	11.93	11.74	11.82
34/48/68-12.5%-01	D.O. (mg/L)	8.47	7.88	8.18	7.74	8.3
34/48/68-12.5%-01	Conductivity (us/cm)	430	449	440.7	442.9	443.1
34/48/68-12.5%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	31.2	-	-	-	28.1
34/48/68-12.5%-01	Hardness (mg /L)	196	-	-	-	203

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-12.5%-02	No. Alive	10	10	10	10	10
34/48/68-12.5%-02	pH	7.3	7.2	7.4	7.3	7.6
34/48/68-12.5%-02	Temp °(C)	11.73	11.77	11.93	11.73	11.8
34/48/68-12.5%-02	D.O. (mg/L)	8.5	8.03	8.25	8.03	8.02
34/48/68-12.5%-02	Conductivity (us/cm)	429.7	446.8	440.4	442.4	440.2
34/48/68-12.5%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	31.2	-	-	-	28.1
34/48/68-12.5%-02	Hardness (mg /L)	196	-	-	-	203

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-12.5%-03	No. Alive	10	10	10	10	10
34/48/68-12.5%-03	pH	7.2	7.2	7.4	7.4	7.5
34/48/68-12.5%-03	Temp °(C)	11.67	11.77	11.93	11.72	11.81
34/48/68-12.5%-03	D.O. (mg/L)	8.57	7.86	8.21	8.18	7.99
34/48/68-12.5%-03	Conductivity (us/cm)	429.6	447.9	440.1	444.3	441.7
34/48/68-12.5%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	31.2	-	-	-	28.1
34/48/68-12.5%-03	Hardness (mg /L)	196	-	-	-	203

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-12.5%-04	No. Alive	10	10	10	10	10
34/48/68-12.5%-04	pH	7.2	7.2	7.3	7.4	7.5
34/48/68-12.5%-04	Temp °(C)	11.68	11.76	11.92	11.74	11.81
34/48/68-12.5%-04	D.O. (mg/L)	8.56	7.81	8.1	8.31	7.78
34/48/68-12.5%-04	Conductivity (us/cm)	429.9	449.4	442	443.7	441.2
34/48/68-12.5%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	31.2	-	-	-	28.1
34/48/68-12.5%-04	Hardness (mg /L)	196	-	-	-	203



Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-25%-01	No. Alive	10	10	10	10	10
34/48/68-25%-01	pH	7.1	7.2	7.3	7.3	7.4
34/48/68-25%-01	Temp °(C)	11.8	11.76	11.81	11.73	11.8
34/48/68-25%-01	D.O. (mg/L)	8.55	7.84	8.24	8.29	7.77
34/48/68-25%-01	Conductivity (us/cm)	480.8	497	489.2	490.4	491.1
34/48/68-25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	17.6	-	-	-	19.5
34/48/68-25%-01	Hardness (mg /L)	231	-	-	-	230

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-25%-02	No. Alive	10	10	10	10	10
34/48/68-25%-02	pH	6.9	7.1	7.2	7.3	7.5
34/48/68-25%-02	Temp °(C)	11.77	11.77	11.91	11.72	11.82
34/48/68-25%-02	D.O. (mg/L)	8.54	8.02	8.01	8.12	8.07
34/48/68-25%-02	Conductivity (us/cm)	479.2	496.8	489	493.1	492.1
34/48/68-25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	17.6	-	-	-	19.5
34/48/68-25%-02	Hardness (mg /L)	231	-	-	-	230

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-25%-03	No. Alive	10	10	10	10	10
34/48/68-25%-03	pH	7	7.2	7.3	7.3	7.4
34/48/68-25%-03	Temp °(C)	11.74	11.75	11.92	11.72	11.84
34/48/68-25%-03	D.O. (mg/L)	8.55	7.79	7.94	8.05	8.01
34/48/68-25%-03	Conductivity (us/cm)	480	495.9	489	491.8	490.1
34/48/68-25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	17.6	-	-	-	19.5
34/48/68-25%-03	Hardness (mg /L)	231	-	-	-	230

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-25%-04	No. Alive	10	10	10	10	10
34/48/68-25%-04	pH	6.9	7.1	7.2	7.3	7.5
34/48/68-25%-04	Temp °(C)	11.73	11.76	11.94	11.72	11.85
34/48/68-25%-04	D.O. (mg/L)	8.57	8.05	8.08	8.23	7.9
34/48/68-25%-04	Conductivity (us/cm)	480	497.9	488	490.2	486.2
34/48/68-25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	17.6	-	-	-	19.5
34/48/68-25%-04	Hardness (mg /L)	231	-	-	-	230

Appendix A 1: Upper Animas October 2012  
Aquatic Toxicity Test  
Site Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms per replicate: 10
End Date	10/26/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts SA,CL,LC

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-50%-01	No. Alive	10	10	10	7	3
34/48/68-50%-01	pH	6.1	6.9	7.1	7.1	7.1
34/48/68-50%-01	Temp °(C)	11.94	11.79	11.79	11.74	11.86
34/48/68-50%-01	D.O. (mg/L)	8.5	7.9	8.3	8.23	7.97
34/48/68-50%-01	Conductivity (us/cm)	574.7	590	582.3	588.7	590.1
34/48/68-50%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.00
34/48/68-50%-01	Hardness (mg /L)	278	-	-	-	278

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-50%-02	No. Alive	10	10	8	5	2
34/48/68-50%-02	pH	5.9	6.9	6.9	7	7.1
34/48/68-50%-02	Temp °(C)	11.66	11.77	11.78	11.74	11.84
34/48/68-50%-02	D.O. (mg/L)	8.53	7.94	8.48	8.43	8.11
34/48/68-50%-02	Conductivity (us/cm)	572.7	591.4	584.6	587.4	589.2
34/48/68-50%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.00
34/48/68-50%-02	Hardness (mg /L)	278	-	-	-	278

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-50%-03	No. Alive	10	10	10	8	6
34/48/68-50%-03	pH	6	6.9	6.9	6.9	6.9
34/48/68-50%-03	Temp °(C)	11.6	11.77	11.89	11.75	11.9
34/48/68-50%-03	D.O. (mg/L)	8.58	7.8	8.33	8.57	8.21
34/48/68-50%-03	Conductivity (us/cm)	572.7	592	585.1	589.9	588.3
34/48/68-50%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.00
34/48/68-50%-03	Hardness (mg /L)	278	-	-	-	278

Replicate I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
34/48/68-50%-04	No. Alive	10	10	10	8	4
34/48/68-50%-04	pH	6.1	6.9	6.9	6.9	6.9
34/48/68-50%-04	Temp °(C)	11.59	11.77	11.91	11.69	11.87
34/48/68-50%-04	D.O. (mg/L)	8.61	8.03	8.37	8.63	7.92
34/48/68-50%-04	Conductivity (us/cm)	572	588.2	582	587.2	591.2
34/48/68-50%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00U	-	-	-	5.00
34/48/68-50%-04	Hardness (mg /L)	278	-	-	-	278

\* No data available

Qualifiers:

U= Non Detect

Prepared by: EC 3/6/13

QC'd by: BGK 3/13/13

Appendix A 2: October 2012 Aquatic Toxicity Test  
Reference Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms	10
End Date	10/26/12	No. of Replicates	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-01	No. Alive	10	10	10	10	10
Control-01	pH	7.4	7.5	7.6	7.6	7.6
Control-01	Temp °(C)	11.73	11.85	11.91	11.94	11.64
Control-01	D.O. (mg/L)	8.33	8.18	8.14	7.99	8.42
Control-01	Conductivity (us/cm)	309.6	315.2	317.9	317.7	318.4
Control-01	Alkalinity (mg CaCO <sub>3</sub> /L)	56.6	-	-	-	70.5
Control-01	Hardness (mg/L)	96	-	-	-	94

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-02	No. Alive	10	10	10	10	10
Control-02	pH	7.5	7.6	7.6	7.6	7.6
Control-02	Temp °(C)	11.68	11.83	11.88	11.88	11.65
Control-02	D.O. (mg/L)	8.66	8.27	8.27	8.25	8.44
Control-02	Conductivity (us/cm)	308.4	316.2	318.5	319	320
Control-02	Alkalinity (mg CaCO <sub>3</sub> /L)	56.6	-	-	-	70.5
Control-02	Hardness (mg/L)	96	-	-	-	94

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-03	No. Alive	10	10	10	10	10
Control-03	pH	7.5	7.6	7.6	7.6	7.7
Control-03	Temp °(C)	11.71	11.84	11.84	11.86	11.64
Control-03	D.O. (mg/L)	8.65	8.13	8.28	8.32	8.46
Control-03	Conductivity (us/cm)	310.1	315.8	317.4	317.7	319.3
Control-03	Alkalinity (mg CaCO <sub>3</sub> /L)	56.6	-	-	-	70.5
Control-03	Hardness (mg/L)	96	-	-	-	94

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-04	No. Alive	10	10	10	10	10
Control-04	pH	7.6	7.6	7.6	7.6	7.6
Control-04	Temp °(C)	11.72	11.84	11.85	11.83	11.63
Control-04	D.O. (mg/L)	8.64	7.73	8.12	8.25	8.33
Control-04	Conductivity (us/cm)	308	315.4	317.4	318.3	319.3
Control-04	Alkalinity (mg CaCO <sub>3</sub> /L)	56.6	-	-	-	70.5
Control-04	Hardness (mg/L)	96	-	-	-	94

Appendix A 2: October 2012 Aquatic Toxicity Test  
Reference Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms	10
End Date	10/26/12	No. of Replicates	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-01	No. Alive	10	10	10	10	10
6.25%-01	pH	7.5	7.5	7.6	7.6	7.6
6.25%-01	Temp °(C)	11.71	11.84	11.84	11.85	11.62
6.25%-01	D.O. (mg/L)	8.65	7.72	8.03	8.23	8.34
6.25%-01	Conductivity (us/cm)	311.6	316.8	318.4	318.8	320.2
6.25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	60	-	-	-	63.8
6.25%-01	Hardness (mg/L)	96	-	-	-	97

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-02	No. Alive	10	10	10	10	10
6.25%-02	pH	7.5	7.6	7.5	7.6	7.6
6.25%-02	Temp °(C)	11.71	11.85	11.83	11.82	11.63
6.25%-02	D.O. (mg/L)	8.62	7.72	7.6	7.87	8.43
6.25%-02	Conductivity (us/cm)	308.1	315.5	317.7	317.6	318.9
6.25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	60	-	-	-	63.8
6.25%-02	Hardness (mg/L)	96	-	-	-	97

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-03	No. Alive	10	10	10	10	10
6.25%-03	pH	7.6	7.5	7.5	7.5	7.6
6.25%-03	Temp °(C)	11.66	11.86	11.83	11.83	11.63
6.25%-03	D.O. (mg/L)	8.6	7.65	7.54	7.71	8.01
6.25%-03	Conductivity (us/cm)	307.7	316	318.4	317.9	319
6.25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	60	-	-	-	63.8
6.25%-03	Hardness (mg/L)	96	-	-	-	97

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-04	No. Alive	10	10	10	10	10
6.25%-04	pH	7.6	7.6	7.6	7.6	7.6
6.25%-04	Temp °(C)	11.66	11.85	11.84	11.76	11.65
6.25%-04	D.O. (mg/L)	8.61	7.58	7.77	8.16	7.97
6.25%-04	Conductivity (us/cm)	311.5	316.4	318.9	319	319.9
6.25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	60	-	-	-	63.8
6.25%-04	Hardness (mg/L)	96	-	-	-	97

Appendix A 2: October 2012 Aquatic Toxicity Test  
Reference Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms	10
End Date	10/26/12	No. of Replicates	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-01	No. Alive	10	10	8	8	8
12.5%-01	pH	7.6	7.5	7.6	7.6	7.6
12.5%-01	Temp °(C)	11.67	11.85	11.83	11.79	11.64
12.5%-01	D.O. (mg/L)	8.67	7.81	8.17	8.24	8.45
12.5%-01	Conductivity (us/cm)	311.4	317.5	319.7	316.5	318
12.5%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	56.7	-	-	-	66.3
12.5%-01	Hardness (mg/L)	96	-	-	-	91

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-02	No. Alive	10	10	6	6	6
12.5%-02	pH	7.6	7.5	7.6	7.6	7.7
12.5%-02	Temp °(C)	11.65	11.86	11.84	11.75	11.64
12.5%-02	D.O. (mg/L)	8.67	7.76	8.2	8.25	8.52
12.5%-02	Conductivity (us/cm)	311.8	318.3	322.9	317.4	318.4
12.5%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	56.7	-	-	-	66.3
12.5%-02	Hardness (mg/L)	96	-	-	-	91

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-03	No. Alive	10	10	8	8	8
12.5%-03	pH	7.6	7.5	7.6	7.6	7.7
12.5%-03	Temp °(C)	11.66	11.86	11.84	11.77	11.65
12.5%-03	D.O. (mg/L)	8.68	7.63	8.15	8.38	8.51
12.5%-03	Conductivity (us/cm)	309.8	317.8	321.8	319.6	320.1
12.5%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	56.7	-	-	-	66.3
12.5%-03	Hardness (mg/L)	96	-	-	-	91

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-04	No. Alive	10	10	8	8	8
12.5%-04	pH	7.6	7.5	7.6	7.6	7.6
12.5%-04	Temp °(C)	11.67	11.86	11.85	11.77	11.64
12.5%-04	D.O. (mg/L)	8.69	7.78	8	8.32	8.44
12.5%-04	Conductivity (us/cm)	308.2	319.2	323.5	318.9	319.1
12.5%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	56.7	-	-	-	66.3
12.5%-04	Hardness (mg/L)	96	-	-	-	91

Appendix A 2: October 2012 Aquatic Toxicity Test  
Reference Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms	10
End Date	10/26/12	No. of Replicates	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-01	No. Alive	10	6	0	-	-
25%-01	pH	7.6	7.5	7.6	-	-
25%-01	Temp °(C)	11.69	11.86	11.77	-	-
25%-01	D.O. (mg/L)	8.68	7.82	8.32	-	-
25%-01	Conductivity (us/cm)	311.3	318.6	319.2	-	-
25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	59.5		64	-	-
25%-01	Hardness (mg/L)	96		95	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-02	No. Alive	10	10	0	-	-
25%-02	pH	7.6	7.4	7.7	-	-
25%-02	Temp °(C)	11.69	11.87	11.86	-	-
25%-02	D.O. (mg/L)	8.64	7.6	8.49	-	-
25%-02	Conductivity (us/cm)	308.2	320.4	324	-	-
25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	59.5	-	64	-	-
25%-02	Hardness (mg/L)	96	-	95	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-03	No. Alive	10	9	2	2	2
25%-03	pH	7.6	7.4	7.7	7.7	7.7
25%-03	Temp °(C)	11.7	11.87	11.88	11.75	11.67
25%-03	D.O. (mg/L)	8.62	6.83	8.51	8.51	8.6
25%-03	Conductivity (us/cm)	309.2	318.6	323.1	313.9	315.1
25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	59.5	-	64	-	-
25%-03	Hardness (mg/L)	96	-	95	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-04	No. Alive	10	7	0	-	-
25%-04	pH	7.6	7.4	7.8	-	-
25%-04	Temp °(C)	11.67	11.88	11.88	-	-
25%-04	D.O. (mg/L)	8.65	7.39	8.49	-	-
25%-04	Conductivity (us/cm)	311	319.5	319.3	-	-
25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	59.5	-	64	-	-
25%-04	Hardness (mg/L)	96	-	95	-	-

Appendix A 2: October 2012 Aquatic Toxicity Test  
Reference Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms	10
End Date	10/26/12	No. of Replicates	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-01	No. Alive	10	7	0	-	-
50%-01	pH	7.6	7.4	7.7	-	-
50%-01	Temp °(C)	11.68	11.84	11.86	-	-
50%-01	D.O. (mg/L)	8.7	7.87	8.63	-	-
50%-01	Conductivity (us/cm)	308.9	319.5	316.4	-	-
50%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	58.4	-	62.4	-	-
50%-01	Hardness (mg/L)	96	-	95	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-02	No. Alive	10	7	0	-	-
50%-02	pH	7.6	7.4	7.8	-	-
50%-02	Temp °(C)	11.7	11.88	11.88	-	-
50%-02	D.O. (mg/L)	8.67	7.42	8.63	-	-
50%-02	Conductivity (us/cm)	308.6	319.3	316	-	-
50%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	58.4	-	62.4	-	-
50%-02	Hardness (mg/L)	96	-	95	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-03	No. Alive	10	9	0	-	-
50%-03	pH	7.6	7.4	7.7	-	-
50%-03	Temp °(C)	11.71	11.91	11.89	-	-
50%-03	D.O. (mg/L)	8.65	7.2	8.63	-	-
50%-03	Conductivity (us/cm)	308.9	319.5	322.8	-	-
50%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	58.4	-	62.4	-	-
50%-03	Hardness (mg/L)	96	-	95	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-04	No. Alive	10	6	0	-	-
50%-04	pH	7.6	7.4	7.8	-	-
50%-04	Temp °(C)	11.68	11.91	11.88	-	-
50%-04	D.O. (mg/L)	8.68	7.87	8.57	-	-
50%-04	Conductivity (us/cm)	309.6	320.2	318.4	-	-
50%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	58.4	-	62.4	-	-
50%-04	Hardness (mg/L)	96	-	95	-	-

Appendix A 2: October 2012 Aquatic Toxicity Test  
Reference Static Renewal Data Sheets

Start Date	10/22/12	No. Organisms	10
End Date	10/26/12	No. of Replicates	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-01	No. Alive	10	4	0	-	-
100%-01	pH	7.6	7.4	7.7	-	-
100%-01	Temp °(C)	11.72	11.88	11.88	-	-
100%-01	D.O. (mg/L)	8.67	8	8.66	-	-
100%-01	Conductivity (us/cm)	309.8	319.5	315.8	-	-
100%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	59.7	-	-
100%-01	Hardness (mg/L)	96	-	94	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-02	No. Alive	10	3	0	-	-
100%-02	pH	7.6	7.4	7.7	-	-
100%-02	Temp °(C)	11.69	11.88	11.89	-	-
100%-02	D.O. (mg/L)	8.69	8.15	8.6	-	-
100%-02	Conductivity (us/cm)	310.9	320.4	316	-	-
100%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	59.7	-	-
100%-02	Hardness (mg/L)	96	-	94	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-03	No. Alive	10	5	0	-	-
100%-03	pH	7.6	7.5	7.8	-	-
100%-03	Temp °(C)	11.68	11.9	11.88	-	-
100%-03	D.O. (mg/L)	8.71	8.19	8.66	-	-
100%-03	Conductivity (us/cm)	311.9	319.7	318	-	-
100%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	59.7	-	-
100%-03	Hardness (mg/L)	96	-	94	-	-

Site I.D.	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-04	No. Alive	10	7	1	0	-
100%-04	pH	7.6	7.4	7.8	7.6	-
100%-04	Temp °(C)	11.67	11.9	11.9	11.79	-
100%-04	D.O. (mg/L)	8.8	8.09	8.66	8.7	-
100%-04	Conductivity (us/cm)	313.1	320.4	318.3	313.2	-
100%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	59.7	-	-
100%-04	Hardness (mg/L)	96	-	94	-	-



**Appendix B**  
**November 2012 Upper Animas River Superfund Site**  
**Site Water Toxicity Test and Reference Toxicity Test**  
**Daily Water Chemistries**

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Profile Test						
Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-01	No. Alive	10	10	10	10	10
Control-01	pH	7.6	7.3	7.27	7.22	7.52
Control-01	Temp (°C)	11.87	11.83	11.62	11.97	11.74
Control-01	D.O. (mg/L)	8.59	7.61	8.01	8.33	8.15
Control-01	Conductivity (us/cm)	298.3	304.2	322	327.2	318.9
Control-01	Alkalinity (mg CaCO <sub>3</sub> /L)	55.2	-	-	-	65.8
Control-01	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-02	No. Alive	10	10	10	10	10
Control-02	pH	7.6	7.2	7.21	7.24	7.51
Control-02	Temp (°C)	11.71	11.82	11.83	11.94	11.79
Control-02	D.O. (mg/L)	8.71	7.51	8	8.27	8.03
Control-02	Conductivity (us/cm)	297.3	303.3	318	324.6	317.7
Control-02	Alkalinity (mg CaCO <sub>3</sub> /L)	55.2	-	-	-	65.8
Control-02	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-03	No. Alive	10	10	10	10	10
Control-03	pH	7.6	7.2	7.2	7.26	7.5
Control-03	Temp (°C)	11.71	11.82	11.61	11.89	11.74
Control-03	D.O. (mg/L)	8.71	7.68	8.2	8.11	8
Control-03	Conductivity (us/cm)	297.4	303.6	316	326.8	319.3
Control-03	Alkalinity (mg CaCO <sub>3</sub> /L)	55.2	-	-	-	65.8
Control-03	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-04	No. Alive	10	10	10	10	10
Control-04	pH	7.7	7.3	7.3	7.28	7.46
Control-04	Temp (°C)	11.74	11.82	11.52	11.88	11.77
Control-04	D.O. (mg/L)	8.72	7.95	7.7	8.03	7.77
Control-04	Conductivity (us/cm)	297.2	303.6	311	328.1	318.6
Control-04	Alkalinity (mg CaCO <sub>3</sub> /L)	55.2	-	-	-	65.8
Control-04	Hardness (mg/L)	91	-	-	-	93

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
M34-01	No. Alive	10	9	0	-	-
M34-01	pH	5.5	6.5	6.87	-	-
M34-01	Temp (°C)	11.75	11.84	11.83	-	-
M34-01	D.O. (mg/L)	8.79	8.15	8.09	-	-
M34-01	Conductivity (us/cm)	574.2	600.8	621	-	-
M34-01	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	8.16	-	-
M34-01	Hardness (mg/L)	276	-	282	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
M34-02	No. Alive	10	8	1	0	-
M34-02	pH	5.5	6.4	6.67	6.61	-
M34-02	Temp (°C)	11.7	11.8	11.87	11.82	-
M34-02	D.O. (mg/L)	8.81	8.37	8	8.7	-
M34-02	Conductivity (us/cm)	577	602.4	627	622.3	-
M34-02	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	8.16	-
M34-02	Hardness (mg/L)	276	-	-	282	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
M34-03	No. Alive	10	10	1	1	0
M34-03	pH	5.4	6.5	6.71	6.54	6.35
M34-03	Temp (°C)	11.69	11.86	11.9	11.76	11.67
M34-03	D.O. (mg/L)	8.81	8.32	7.87	8.74	8.33
M34-03	Conductivity (us/cm)	577.2	608.1	629	632.1	591.9
M34-03	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	8.16
M34-03	Hardness (mg/L)	276	-	-	-	282

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
M34-04	No. Alive	10	8	1	0	-
M34-04	pH	5.4	6.4	6.61	6.48	-
M34-04	Temp (°C)	11.75	11.85	11.83	11.73	-
M34-04	D.O. (mg/L)	8.8	8.18	8.01	8.75	-
M34-04	Conductivity (us/cm)	577.4	609.1	629	633.1	-
M34-04	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	8.16	-
M34-04	Hardness (mg/L)	276	-	-	282	-

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-01	No. Alive	10	10	10	9	9
A68-01	pH	7.4	7	6.93	7.08	6.29
A68-01	Temp (°C)	11.7	11.85	11.68	11.76	11.65
A68-01	D.O. (mg/L)	8.73	7.6	8.05	8.18	8
A68-01	Conductivity (us/cm)	378.4	389.6	406	413.5	393.9
A68-01	Alkalinity (mg CaCO <sub>3</sub> /L)	37.6	-	-	-	47
A68-01	Hardness (mg/L)	181	-	-	-	177

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-02	No. Alive	10	10	9	8	8
A68-02	pH	7.4	7	6.98	7.05	6.61
A68-02	Temp (°C)	11.68	11.85	11.59	11.79	11.62
A68-02	D.O. (mg/L)	8.79	7.54	8.05	7.4	8
A68-02	Conductivity (us/cm)	378.6	388.3	406	421.3	395.8
A68-02	Alkalinity (mg CaCO <sub>3</sub> /L)	37.6	-	-	-	47
A68-02	Hardness (mg/L)	181	-	-	-	177

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-03	No. Alive	10	10	10	10	10
A68-03	pH	7.4	7	6.93	7.06	6.6
A68-03	Temp (°C)	11.66	11.86	11.58	11.79	11.59
A68-03	D.O. (mg/L)	8.79	7.09	8.32	7.41	7.82
A68-03	Conductivity (us/cm)	378.7	388.7	405	413.3	395.2
A68-03	Alkalinity (mg CaCO <sub>3</sub> /L)	37.6	-	-	-	47
A68-03	Hardness (mg/L)	181	-	-	-	177

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68-04	No. Alive	10	10	10	10	10
A68-04	pH	7.4	6.9	6.97	7.05	6.61
A68-04	Temp (°C)	11.68	11.87	11.57	11.79	11.6
A68-04	D.O. (mg/L)	8.8	6.62	6.97	7.53	7.66
A68-04	Conductivity (us/cm)	378.5	387.6	404	414.3	395.1
A68-04	Alkalinity (mg CaCO <sub>3</sub> /L)	37.6	-	-	-	47
A68-04	Hardness (mg/L)	181	-	-	-	177

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Serial dilution of A72 with A68						
Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-100%-Rep1	No. Alive	10	10	3	2	0
A68/A72-100%-Rep1	pH	5.6	6.5	6.84	6.8	6.23
A68/A72-100%-Rep1	Temp (°C)	12.2	11.77	11.7	11.91	11.58
A68/A72-100%-Rep1	D.O. (mg/L)	8.66	8.33	8.06	8.63	8.67
A68/A72-100%-Rep1	Conductivity (us/cm)	602.2	632.3	664	672	624.7
A68/A72-100%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/A72-100%-Rep1	Hardness (mg/L)	298	-	-	-	298

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-100%-Rep2	No. Alive	10	10	5	4	1
A68/A72-100%-Rep2	pH	5.6	6.3	6.72	6.79	6
A68/A72-100%-Rep2	Temp (°C)	12.21	11.77	11.62	11.91	11.62
A68/A72-100%-Rep2	D.O. (mg/L)	8.62	8.37	8.35	8.53	8.71
A68/A72-100%-Rep2	Conductivity (us/cm)	602.4	623.9	660	672.2	627.1
A68/A72-100%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/A72-100%-Rep2	Hardness (mg/L)	298	-	-	-	298

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-100%-Rep3	No. Alive	10	10	5	4	0
A68/A72-100%-Rep3	pH	5.6	6.3	6.66	6.79	5.81
A68/A72-100%-Rep3	Temp (°C)	12.24	11.76	11.6	11.91	11.62
A68/A72-100%-Rep3	D.O. (mg/L)	8.63	8.24	8.43	8.47	8.71
A68/A72-100%-Rep3	Conductivity (us/cm)	602.3	626.1	655	667.5	626.7
A68/A72-100%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/A72-100%-Rep3	Hardness (mg/L)	298	-	-	-	298

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-100%-Rep4	No. Alive	10	10	5	3	0
A68/A72-100%-Rep4	pH	5.6	6.3	6.64	6.77	5.61
A68/A72-100%-Rep4	Temp (°C)	12.25	11.78	11.58	11.91	11.59
A68/A72-100%-Rep4	D.O. (mg/L)	8.68	8.36	8.54	8.69	8.75
A68/A72-100%-Rep4	Conductivity (us/cm)	603	626.2	665	678.4	628
A68/A72-100%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/A72-100%-Rep4	Hardness (mg/L)	298	-	-	-	298

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-75%-Rep1	No. Alive	10	9	9	9	9
A68/A72-75%-Rep1	pH	6.7	6.5	6.93	6.91	6.85
A68/A72-75%-Rep1	Temp (°C)	12.04	11.7	11.75	11.89	11.58
A68/A72-75%-Rep1	D.O. (mg/L)	8.71	8.23	8.26	8.16	8.35
A68/A72-75%-Rep1	Conductivity (us/cm)	547	560.6	582.6	597	566.4
A68/A72-75%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	7.5
A68/A72-75%-Rep1	Hardness (mg/L)	250	-	-	-	267

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-75%-Rep2	No. Alive	10	9	9	9	9
A68/A72-75%-Rep2	pH	6.5	6.4	6.88	6.89	6.82
A68/A72-75%-Rep2	Temp (°C)	12.02	11.7	11.72	11.88	11.59
A68/A72-75%-Rep2	D.O. (mg/L)	8.74	8.09	8.11	8.21	8.3
A68/A72-75%-Rep2	Conductivity (us/cm)	546.4	559.5	582	591.9	569.4
A68/A72-75%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	7.5
A68/A72-75%-Rep2	Hardness (mg/L)	250	-	-	-	267

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-75%-Rep3	No. Alive	10	10	10	10	10
A68/A72-75%-Rep3	pH	6.4	6.6	6.86	6.88	6.79
A68/A72-75%-Rep3	Temp (°C)	12.02	11.73	11.76	11.87	11.61
A68/A72-75%-Rep3	D.O. (mg/L)	8.74	7.98	6.96	8.02	8.09
A68/A72-75%-Rep3	Conductivity (us/cm)	546.4	564.9	580	595.8	569.8
A68/A72-75%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	7.5
A68/A72-75%-Rep3	Hardness (mg/L)	250	-	-	-	267

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-75%-Rep4	No. Alive	10	10	10	10	10
A68/A72-75%-Rep4	pH	6.4	6.6	6.84	6.88	6.77
A68/A72-75%-Rep4	Temp (°C)	12.1	11.72	11.72	11.88	11.6
A68/A72-75%-Rep4	D.O. (mg/L)	8.72	8.06	7.6	8.31	8.13
A68/A72-75%-Rep4	Conductivity (us/cm)	546.9	557.5	577.4	587.3	577.4
A68/A72-75%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	7.5
A68/A72-75%-Rep4	Hardness (mg/L)	250	-	-	-	267

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-50%-Rep1	No. Alive	10	10	10	10	10
A68/A72-50%-Rep1	pH	7.2	7.3	7.2	6.99	6.9
A68/A72-50%-Rep1	Temp (°C)	11.96	11.67	11.86	11.87	11.6
A68/A72-50%-Rep1	D.O. (mg/L)	8.78	7.8	7.87	8.03	8.19
A68/A72-50%-Rep1	Conductivity (us/cm)	489.6	499.2	515	527.4	512.3
A68/A72-50%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	16.6	-	-	-	17.5
A68/A72-50%-Rep1	Hardness (mg/L)	238	-	-	-	238

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-50%-Rep2	No. Alive	10	10	10	10	10
A68/A72-50%-Rep2	pH	7.2	7.3	7.1	6.96	6.89
A68/A72-50%-Rep2	Temp (°C)	11.96	11.68	11.85	11.87	11.6
A68/A72-50%-Rep2	D.O. (mg/L)	8.79	7.87	7.96	7.97	8.14
A68/A72-50%-Rep2	Conductivity (us/cm)	489.7	499.7	520	532.5	513.4
A68/A72-50%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	16.6	-	-	-	17.5
A68/A72-50%-Rep2	Hardness (mg/L)	238	-	-	-	238

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-50%-Rep3	No. Alive	10	9	9	9	9
A68/A72-50%-Rep3	pH	7.1	7.3	7	6.97	6.89
A68/A72-50%-Rep3	Temp (°C)	12	11.66	11.84	11.87	11.64
A68/A72-50%-Rep3	D.O. (mg/L)	8.8	7.97	8.36	8.05	8.16
A68/A72-50%-Rep3	Conductivity (us/cm)	490	499.6	523.5	532.5	509.8
A68/A72-50%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	16.6	-	-	-	17.5
A68/A72-50%-Rep3	Hardness (mg/L)	238	-	-	-	238

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-50%-Rep4	No. Alive	10	10	10	10	10
A68/A72-50%-Rep4	pH	7.1	7.3	6.99	6.93	6.88
A68/A72-50%-Rep4	Temp (°C)	12.07	11.67	11.84	11.86	11.63
A68/A72-50%-Rep4	D.O. (mg/L)	8.77	7.87	8.28	8.19	8.14
A68/A72-50%-Rep4	Conductivity (us/cm)	489.8	499.6	518	527	507.7
A68/A72-50%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	16.6	-	-	-	17.5
A68/A72-50%-Rep4	Hardness (mg/L)	238	-	-	-	238

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-25%-Rep1	No. Alive	10	10	10	8	8
A68/A72-25%-Rep1	pH	7.5	7.4	7.24	7	6.93
A68/A72-25%-Rep1	Temp (°C)	12.18	11.65	11.88	11.85	11.58
A68/A72-25%-Rep1	D.O. (mg/L)	8.76	7.58	8.1	7.51	8.37
A68/A72-25%-Rep1	Conductivity (us/cm)	435.3	445.4	471	486.8	459.1
A68/A72-25%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	25.9	-	-	-	33.4
A68/A72-25%-Rep1	Hardness (mg/L)	209	-	-	-	209

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-25%-Rep2	No. Alive	10	10	10	10	10
A68/A72-25%-Rep2	pH	7.4	7.4	7.15	7	6.92
A68/A72-25%-Rep2	Temp (°C)	12.21	11.65	11.88	11.85	11.6
A68/A72-25%-Rep2	D.O. (mg/L)	8.75	7.35	8.31	7.74	8.4
A68/A72-25%-Rep2	Conductivity (us/cm)	435.4	445.4	467	480.9	460.6
A68/A72-25%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	25.9	-	-	-	33.4
A68/A72-25%-Rep2	Hardness (mg/L)	209	-	-	-	209

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-25%-Rep3	No. Alive	10	9	9	8	8
A68/A72-25%-Rep3	pH	7.4	7.4	7.12	7.02	6.92
A68/A72-25%-Rep3	Temp (°C)	12.22	11.66	11.88	11.86	11.66
A68/A72-25%-Rep3	D.O. (mg/L)	8.74	7.47	8.23	7.62	7.65
A68/A72-25%-Rep3	Conductivity (us/cm)	435.3	447.4	470	481	455.4
A68/A72-25%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	25.9	-	-	-	33.4
A68/A72-25%-Rep3	Hardness (mg/L)	209	-	-	-	209

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-25%-Rep4	No. Alive	10	10	10	10	10
A68/A72-25%-Rep4	pH	7.4	7.4	7.06	7.02	6.92
A68/A72-25%-Rep4	Temp (°C)	12.35	11.66	11.89	11.84	11.6
A68/A72-25%-Rep4	D.O. (mg/L)	8.74	7.76	8.24	7.59	7.54
A68/A72-25%-Rep4	Conductivity (us/cm)	435	445.5	454	464.6	447.9
A68/A72-25%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	25.9	-	-	-	33.4
A68/A72-25%-Rep4	Hardness (mg/L)	209	-	-	-	209



## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-10%-Rep1	No. Alive	10	9	8	8	8
A68/A72-10%-Rep1	pH	7.7	7.4	7.16	7.1	6.94
A68/A72-10%-Rep1	Temp (°C)	11.82	11.64	11.83	11.85	11.63
A68/A72-10%-Rep1	D.O. (mg/L)	8.79	8.01	8.3	8.37	8.25
A68/A72-10%-Rep1	Conductivity (us/cm)	401.3	414.9	453	443.1	420
A68/A72-10%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	29.9	-	-	-	33.8
A68/A72-10%-Rep1	Hardness (mg/L)	193	-	-	-	192

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-10%-Rep2	No. Alive	10	10	10	8	8
A68/A72-10%-Rep2	pH	7.6	7.5	7.17	7.1	6.96
A68/A72-10%-Rep2	Temp (°C)	11.81	11.66	11.84	11.85	11.64
A68/A72-10%-Rep2	D.O. (mg/L)	8.82	7.76	8.24	8.34	8.25
A68/A72-10%-Rep2	Conductivity (us/cm)	401.2	413.4	433	444.2	420.2
A68/A72-10%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	29.9	-	-	-	33.8
A68/A72-10%-Rep2	Hardness (mg/L)	193	-	-	-	192

2 Jumpers

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-10%-Rep3	No. Alive	10	10	10	9	9
A68/A72-10%-Rep3	pH	7.6	7.4	7.06	7.1	6.95
A68/A72-10%-Rep3	Temp (°C)	11.82	11.63	11.84	11.85	11.6
A68/A72-10%-Rep3	D.O. (mg/L)	8.84	7.55	8.06	8.05	8.28
A68/A72-10%-Rep3	Conductivity (us/cm)	401.4	414.9	433	443.7	419.8
A68/A72-10%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	29.9	-	-	-	33.8
A68/A72-10%-Rep3	Hardness (mg/L)	193	-	-	-	192

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-10%-Rep4	No. Alive	10	10	10	10	10
A68/A72-10%-Rep4	pH	7.6	7.4	7.06	7.07	6.94
A68/A72-10%-Rep4	Temp (°C)	11.89	11.64	11.86	11.83	11.66
A68/A72-10%-Rep4	D.O. (mg/L)	8.87	7.76	7.87	8.34	8.24
A68/A72-10%-Rep4	Conductivity (us/cm)	401.3	414.1	432	440	420.5
A68/A72-10%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	29.9	-	-	-	33.8
A68/A72-10%-Rep4	Hardness (mg/L)	193	-	-	-	192

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-5%-Rep1	No. Alive	10	10	10	10	10
A68/A72-5%-Rep1	pH	7.8	7.4	7.19	7.1	6.88
A68/A72-5%-Rep1	Temp (°C)	12.27	11.67	11.81	11.84	11.72
A68/A72-5%-Rep1	D.O. (mg/L)	8.36	7.37	7.2	7.91	7.98
A68/A72-5%-Rep1	Conductivity (us/cm)	392.6	407.1	442	436.6	413.8
A68/A72-5%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	38.5	-	-	-	39.2
A68/A72-5%-Rep1	Hardness (mg/L)	187	-	-	-	187

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-5%-Rep2	No. Alive	10	10	10	8	8
A68/A72-5%-Rep2	pH	7.8	7.4	7.17	7.1	6.98
A68/A72-5%-Rep2	Temp (°C)	12.21	11.64	11.83	11.85	11.73
A68/A72-5%-Rep2	D.O. (mg/L)	8.75	7.39	7.83	8.06	8.12
A68/A72-5%-Rep2	Conductivity (us/cm)	390.4	402.2	422	436.7	410.5
A68/A72-5%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	38.5	-	-	-	39.2
A68/A72-5%-Rep2	Hardness (mg/L)	187	-	-	-	187

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-5%-Rep3	No. Alive	10	10	10	10	10
A68/A72-5%-Rep3	pH	7.8	7.4	7.16	7.1	6.9
A68/A72-5%-Rep3	Temp (°C)	12.18	11.59	11.83	11.82	11.67
A68/A72-5%-Rep3	D.O. (mg/L)	8.78	7.32	7.57	8.18	8.09
A68/A72-5%-Rep3	Conductivity (us/cm)	391.4	402.5	419	429.3	412.5
A68/A72-5%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	38.5	-	-	-	39.2
A68/A72-5%-Rep3	Hardness (mg/L)	187	-	-	-	187

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-5%-Rep4	No. Alive	10	10	10	9	9
A68/A72-5%-Rep4	pH	7.8	7.5	7.17	7.1	6.96
A68/A72-5%-Rep4	Temp (°C)	12.27	11.63	11.83	11.84	11.65
A68/A72-5%-Rep4	D.O. (mg/L)	8.78	7.64	7.89	8.34	8.25
A68/A72-5%-Rep4	Conductivity (us/cm)	390.8	401.2	418	430.2	412.1
A68/A72-5%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	38.5	-	-	-	39.2
A68/A72-5%-Rep4	Hardness (mg/L)	187	-	-	-	187

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-Control-Rep1	No. Alive	10	10	10	10	10
A68/A72-Control-Rep1	pH	7.4	7.6	7.48	7.3	7.05
A68/A72-Control-Rep1	Temp (°C)	11.63	11.79	11.9	11.87	11.93
A68/A72-Control-Rep1	D.O. (mg/L)	7.42	7.74	8.32	8.1	7.88
A68/A72-Control-Rep1	Conductivity (us/cm)	301.5	307.7	326	337.4	321.8
A68/A72-Control-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	63.1	-	-	-	72.9
A68/A72-Control-Rep1	Hardness (mg/L)	92	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-Control-Rep2	No. Alive	10	10	10	10	10
A68/A72-Control-Rep2	pH	7.4	7.6	7.5	7.3	7.07
A68/A72-Control-Rep2	Temp (°C)	11.6	11.65	11.83	11.85	11.89
A68/A72-Control-Rep2	D.O. (mg/L)	6.38	7.61	7.97	7.86	7.82
A68/A72-Control-Rep2	Conductivity (us/cm)	299.9	306.6	323	333.9	320.7
A68/A72-Control-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	63.1	-	-	-	72.9
A68/A72-Control-Rep2	Hardness (mg/L)	92	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-Control-Rep3	No. Alive	10	10	10	10	10
A68/A72-Control-Rep3	pH	7.3	7.6	7.43	7.31	7.08
A68/A72-Control-Rep3	Temp (°C)	11.62	11.64	11.81	11.86	11.85
A68/A72-Control-Rep3	D.O. (mg/L)	6.19	7.76	8.16	7.64	7.57
A68/A72-Control-Rep3	Conductivity (us/cm)	299.6	306	325.8	336.6	320.9
A68/A72-Control-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	63.1	-	-	-	72.9
A68/A72-Control-Rep3	Hardness (mg/L)	92	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/A72-Control-Rep4	No. Alive	10	10	10	10	10
A68/A72-Control-Rep4	pH	7.3	7.6	7.35	7.3	7.09
A68/A72-Control-Rep4	Temp (°C)	11.6	11.64	11.8	11.84	11.8
A68/A72-Control-Rep4	D.O. (mg/L)	6.04	7.62	8.28	7.63	7.4
A68/A72-Control-Rep4	Conductivity (us/cm)	299.2	304.8	324.6	336.2	321.4
A68/A72-Control-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	63.1	-	-	-	72.9
A68/A72-Control-Rep4	Hardness (mg/L)	92	-	-	-	93

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Serial dilution of CC48 with A68

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-Control-Rep1	No. Alive	10	9	9	9	9
A68/CC48-Control-Rep1	pH	7.6	7.5	7.29	7.2	7.24
A68/CC48-Control-Rep1	Temp (°C)	15.42	11.62	11.63	11.72	11.9
A68/CC48-Control-Rep1	D.O. (mg/L)	7.75	7.88	7.9	8.11	8.02
A68/CC48-Control-Rep1	Conductivity (us/cm)	299.1	306.2	323	329.8	318.1
A68/CC48-Control-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	62.4	-	-	-	68.7
A68/CC48-Control-Rep1	Hardness (mg/L)	92	-	-	-	93

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-Control-Rep2	No. Alive	10	10	10	10	10
A68/CC48-Control-Rep2	pH	7.6	7.7	7.3	7.22	7.4
A68/CC48-Control-Rep2	Temp (°C)	14.67	11.56	11.59	11.71	11.87
A68/CC48-Control-Rep2	D.O. (mg/L)	7.77	8.3	8.13	7.91	7.5
A68/CC48-Control-Rep2	Conductivity (us/cm)	299	304.4	323	332.5	331
A68/CC48-Control-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	62.4	-	-	-	68.7
A68/CC48-Control-Rep2	Hardness (mg/L)	92	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-Control-Rep3	No. Alive	10	10	10	10	10
A68/CC48-Control-Rep3	pH	7.7	7.8	7.34	7.24	7.4
A68/CC48-Control-Rep3	Temp (°C)	15.24	11.54	11.58	11.62	11.84
A68/CC48-Control-Rep3	D.O. (mg/L)	7.85	8.18	8.29	8.3	8.11
A68/CC48-Control-Rep3	Conductivity (us/cm)	298.8	304.4	324	333.9	334
A68/CC48-Control-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	62.4	-	-	-	68.7
A68/CC48-Control-Rep3	Hardness (mg/L)	92	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-Control-Rep4	No. Alive	10	10	10	10	10
A68/CC48-Control-Rep4	pH	7.7	7.8	7.35	7.25	7.18
A68/CC48-Control-Rep4	Temp (°C)	14.48	11.55	11.58	11.61	11.92
A68/CC48-Control-Rep4	D.O. (mg/L)	7.89	8.37	8.09	8.28	8.14
A68/CC48-Control-Rep4	Conductivity (us/cm)	298.6	304.3	324	334.2	331
A68/CC48-Control-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	62.4	-	-	-	68.7
A68/CC48-Control-Rep4	Hardness (mg/L)	92	-	-	-	93

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-50%-Rep1	No. Alive	10	0	-	-	-
A68/CC48-50%-Rep1	pH	4.8	5.2	-	-	-
A68/CC48-50%-Rep1	Temp (°C)	12.45	11.65	-	-	-
A68/CC48-50%-Rep1	D.O. (mg/L)	8.68	8.73	-	-	-
A68/CC48-50%-Rep1	Conductivity (us/cm)	732.6	760.5	-	-	-
A68/CC48-50%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48-50%-Rep1	Hardness (mg/L)	368	371	-	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-50%-Rep2	No. Alive	10	0	-	-	-
A68/CC48-50%-Rep2	pH	4.8	5.2	-	-	-
A68/CC48-50%-Rep2	Temp (°C)	12.2	11.63	-	-	-
A68/CC48-50%-Rep2	D.O. (mg/L)	8.72	8.67	-	-	-
A68/CC48-50%-Rep2	Conductivity (us/cm)	736.5	768.6	-	-	-
A68/CC48-50%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48-50%-Rep2	Hardness (mg/L)	368	371	-	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-50%-Rep3	No. Alive	10	0	-	-	-
A68/CC48-50%-Rep3	pH	4.8	5.2	-	-	-
A68/CC48-50%-Rep3	Temp (°C)	12.04	11.65	-	-	-
A68/CC48-50%-Rep3	D.O. (mg/L)	8.76	8.7	-	-	-
A68/CC48-50%-Rep3	Conductivity (us/cm)	735.8	761.9	-	-	-
A68/CC48-50%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48-50%-Rep3	Hardness (mg/L)	368	371	-	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-50%-Rep4	No. Alive	10	0	-	-	-
A68/CC48-50%-Rep4	pH	4.8	5.2	-	-	-
A68/CC48-50%-Rep4	Temp (°C)	12.21	11.63	-	-	-
A68/CC48-50%-Rep4	D.O. (mg/L)	8.73	8.67	-	-	-
A68/CC48-50%-Rep4	Conductivity (us/cm)	737	772.6	-	-	-
A68/CC48-50%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48-50%-Rep4	Hardness (mg/L)	368	371	-	-	-

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-25%-Rep1	No. Alive	10	10	10	6	6
A68/CC48-25%-Rep1	pH	6.4	6.9	7.09	6.98	6.98
A68/CC48-25%-Rep1	Temp (°C)	12.12	11.68	11.83	11.64	11.86
A68/CC48-25%-Rep1	D.O. (mg/L)	8.78	8.15	8.31	8.2	8.38
A68/CC48-25%-Rep1	Conductivity (us/cm)	554.6	566.9	599.7	612.4	578
A68/CC48-25%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	10.2	-	-	-	13.4
A68/CC48-25%-Rep1	Hardness (mg/L)	272	-	-	-	269

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-25%-Rep2	No. Alive	10	10	10	10	10
A68/CC48-25%-Rep2	pH	6.3	6.9	7	6.96	6.96
A68/CC48-25%-Rep2	Temp (°C)	12.17	11.63	11.84	11.65	11.85
A68/CC48-25%-Rep2	D.O. (mg/L)	8.81	8.17	8.12	7.93	8.34
A68/CC48-25%-Rep2	Conductivity (us/cm)	553.6	565.8	600	611.8	572
A68/CC48-25%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	10.2	-	-	-	13.4
A68/CC48-25%-Rep2	Hardness (mg/L)	272	-	-	-	269

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-25%-Rep3	No. Alive	10	10	10	10	10
A68/CC48-25%-Rep3	pH	6.2	6.9	6.98	6.95	6.96
A68/CC48-25%-Rep3	Temp (°C)	12.78	11.62	11.83	11.64	11.83
A68/CC48-25%-Rep3	D.O. (mg/L)	8.53	8.24	8.27	7.65	8.14
A68/CC48-25%-Rep3	Conductivity (us/cm)	548.1	565.9	599.8	609.4	568.5
A68/CC48-25%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	10.2	-	-	-	13.4
A68/CC48-25%-Rep3	Hardness (mg/L)	272	-	-	-	269

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-25%-Rep4	No. Alive	10	10	10	10	10
A68/CC48-25%-Rep4	pH	6.2	6.9	6.96	6.93	6.94
A68/CC48-25%-Rep4	Temp (°C)	12.34	11.65	11.84	11.64	11.38
A68/CC48-25%-Rep4	D.O. (mg/L)	8.67	8.26	8.23	7.1	8.14
A68/CC48-25%-Rep4	Conductivity (us/cm)	552.9	567.2	601.2	614.1	571.1
A68/CC48-25%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	10.2	-	-	-	13.4
A68/CC48-25%-Rep4	Hardness (mg/L)	272	-	-	-	269

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-12%-Rep1	No. Alive	10	10	10	9	9
A68/CC48-12%-Rep1	pH	7.1	7.2	7.05	7.06	7.06
A68/CC48-12%-Rep1	Temp (°C)	12.62	11.64	11.79	11.65	11.94
A68/CC48-12%-Rep1	D.O. (mg/L)	8.59	7.85	8.05	7.96	7.84
A68/CC48-12%-Rep1	Conductivity (us/cm)	464.6	475.5	500	508.6	484.1
A68/CC48-12%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	22.4	-	-	-	32
A68/CC48-12%-Rep1	Hardness (mg/L)	226	-	-	-	225

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-12%-Rep2	No. Alive	10	10	10	10	10
A68/CC48-12%-Rep2	pH	7.1	7.2	7.05	7.04	7.05
A68/CC48-12%-Rep2	Temp (°C)	12.1	11.63	11.78	11.61	11.9
A68/CC48-12%-Rep2	D.O. (mg/L)	8.62	7.83	8.11	7.85	8.01
A68/CC48-12%-Rep2	Conductivity (us/cm)	465.4	476.1	505	519.9	490.4
A68/CC48-12%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	22.4	-	-	-	32
A68/CC48-12%-Rep2	Hardness (mg/L)	226	-	-	-	225

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-12%-Rep3	No. Alive	10	10	10	10	10
A68/CC48-12%-Rep3	pH	7.1	7.2	7.06	7.05	7.07
A68/CC48-12%-Rep3	Temp (°C)	12.5	11.62	11.79	11.62	11.88
A68/CC48-12%-Rep3	D.O. (mg/L)	8.5	7.38	8.13	7.77	7.45
A68/CC48-12%-Rep3	Conductivity (us/cm)	467.8	476.4	505	509.3	486.7
A68/CC48-12%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	22.4	-	-	-	32
A68/CC48-12%-Rep3	Hardness (mg/L)	226	-	-	-	225

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-12%-Rep4	No. Alive	10	10	8	7	7
A68/CC48-12%-Rep4	pH	7	7.2	7.06	7.03	7.04
A68/CC48-12%-Rep4	Temp (°C)	12.19	11.62	11.78	11.01	11.88
A68/CC48-12%-Rep4	D.O. (mg/L)	8.43	7.93	8.34	8.26	7.53
A68/CC48-12%-Rep4	Conductivity (us/cm)	466.1	479.7	513.9	531.1	484
A68/CC48-12%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	22.4	-	-	-	32
A68/CC48-12%-Rep4	Hardness (mg/L)	226	-	-	-	225

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-6%-Rep1	No. Alive	10	10	9	9	9
A68/CC48-6%-Rep1	pH	7.4	7.4	7.07	7.08	7.08
A68/CC48-6%-Rep1	Temp (°C)	12.04	11.62	11.69	11.6	11.94
A68/CC48-6%-Rep1	D.O. (mg/L)	8.83	7.94	7.13	8.41	7.84
A68/CC48-6%-Rep1	Conductivity (us/cm)	422.7	435.7	460	466.6	441.3
A68/CC48-6%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	29.1	-	-	-	36.8
A68/CC48-6%-Rep1	Hardness (mg/L)	204	-	-	-	201

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-6%-Rep2	No. Alive	10	10	10	10	10
A68/CC48-6%-Rep2	pH	7.3	7.2	7.04	7.09	7.08
A68/CC48-6%-Rep2	Temp (°C)	11.88	11.61	11.77	11.62	11.93
A68/CC48-6%-Rep2	D.O. (mg/L)	8.85	7.1	7.25	8.16	7.99
A68/CC48-6%-Rep2	Conductivity (us/cm)	422.6	431.4	456	465.1	443.8
A68/CC48-6%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	29.1	-	-	-	36.8
A68/CC48-6%-Rep2	Hardness (mg/L)	204	-	-	-	201

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-6%-Rep3	No. Alive	10	10	10	10	10
A68/CC48-6%-Rep3	pH	7.2	7.2	7.13	7.09	7.09
A68/CC48-6%-Rep3	Temp (°C)	11.81	11.6	11.71	11.61	11.93
A68/CC48-6%-Rep3	D.O. (mg/L)	8.89	7.36	7.97	7.98	8.23
A68/CC48-6%-Rep3	Conductivity (us/cm)	422	432	458	467.2	439.7
A68/CC48-6%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	29.1	-	-	-	36.8
A68/CC48-6%-Rep3	Hardness (mg/L)	204	-	-	-	201

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-6%-Rep4	No. Alive	10	10	10	10	10
A68/CC48-6%-Rep4	pH	7.3	7.2	7.07	7.08	7.09
A68/CC48-6%-Rep4	Temp (°C)	11.82	11.59	11.74	11.6	11.92
A68/CC48-6%-Rep4	D.O. (mg/L)	8.87	7.13	7.57	8.04	8.26
A68/CC48-6%-Rep4	Conductivity (us/cm)	423.9	435	463	473.7	443
A68/CC48-6%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	29.1	-	-	-	36.8
A68/CC48-6%-Rep4	Hardness (mg/L)	204	-	-	-	201



## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-3%-Rep1	No. Alive	10	10	10	10	10
A68/CC48-3%-Rep1	pH	7.4	7.2	7.12	7.03	7.09
A68/CC48-3%-Rep1	Temp (°C)	11.91	11.61	11.63	11.62	11.95
A68/CC48-3%-Rep1	D.O. (mg/L)	8.87	6.59	8.12	7.56	8.07
A68/CC48-3%-Rep1	Conductivity (us/cm)	401.5	410.8	437	447.2	422.4
A68/CC48-3%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	35.9	-	-	-	36.2
A68/CC48-3%-Rep1	Hardness (mg/L)	193	-	-	-	182

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-3%-Rep2	No. Alive	10	10	10	9	9
A68/CC48-3%-Rep2	pH	7.4	7.3	7.03	7.06	7.1
A68/CC48-3%-Rep2	Temp (°C)	12.01	11.58	11.63	11.6	11.93
A68/CC48-3%-Rep2	D.O. (mg/L)	8.82	7.14	8.1	8.24	8.27
A68/CC48-3%-Rep2	Conductivity (us/cm)	399.9	410.6	437	448.1	420.8
A68/CC48-3%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	35.9	-	-	-	36.2
A68/CC48-3%-Rep2	Hardness (mg/L)	193	-	-	-	182

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-3%-Rep3	No. Alive	10	10	9	9	9
A68/CC48-3%-Rep3	pH	7.4	7.3	7.11	7.08	7.11
A68/CC48-3%-Rep3	Temp (°C)	12.06	11.56	11.63	11.58	11.93
A68/CC48-3%-Rep3	D.O. (mg/L)	8.84	7.11	8.22	8.3	8.23
A68/CC48-3%-Rep3	Conductivity (us/cm)	401.3	411	437	446.4	418.8
A68/CC48-3%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	35.9	-	-	-	36.2
A68/CC48-3%-Rep3	Hardness (mg/L)	193	-	-	-	182

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-3%-Rep4	No. Alive	10	10	10	10	10
A68/CC48-3%-Rep4	pH	7.4	7.2	7.12	7.1	7.1
A68/CC48-3%-Rep4	Temp (°C)	12.1	11.59	11.65	11.61	11.95
A68/CC48-3%-Rep4	D.O. (mg/L)	8.82	6.72	7.92	8	8.12
A68/CC48-3%-Rep4	Conductivity (us/cm)	401.7	410.4	432	439.8	419
A68/CC48-3%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	35.9	-	-	-	36.2
A68/CC48-3%-Rep4	Hardness (mg/L)	193	-	-	-	182

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-1%-Rep1	No. Alive	10	10	9	9	9
A68/CC48-1%-Rep1	pH	7.6	7.4	7.13	7.02	7.1
A68/CC48-1%-Rep1	Temp (°C)	11.43	11.44	11.62	11.64	11.93
A68/CC48-1%-Rep1	D.O. (mg/L)	8.54	8.13	7.92	7.79	7.44
A68/CC48-1%-Rep1	Conductivity (us/cm)	390.5	396.5	421	432.8	407
A68/CC48-1%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	33.1				39.4
A68/CC48-1%-Rep1	Hardness (mg/L)	184				183

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-1%-Rep2	No. Alive	10	10	9	9	9
A68/CC48-1%-Rep2	pH	7.5	7.4	7.1	6.99	7.08
A68/CC48-1%-Rep2	Temp (°C)	11.56	11.58	11.61	11.64	11.9
A68/CC48-1%-Rep2	D.O. (mg/L)	8.71	7.62	7.82	7.53	7.5
A68/CC48-1%-Rep2	Conductivity (us/cm)	386.2	397.7	423	434.4	412.6
A68/CC48-1%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	33.1	-	-	-	39.4
A68/CC48-1%-Rep2	Hardness (mg/L)	184	-	-	-	183

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-1%-Rep3	No. Alive	10	10	10	10	10
A68/CC48-1%-Rep3	pH	7.5	7.4	7.09	7.04	7.09
A68/CC48-1%-Rep3	Temp (°C)	11.54	11.58	11.61	11.63	11.91
A68/CC48-1%-Rep3	D.O. (mg/L)	8.84	7.63	7.66	7.04	7.74
A68/CC48-1%-Rep3	Conductivity (us/cm)	386.3	396.8	419	426.6	408.8
A68/CC48-1%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	33.1	-	-	-	39.4
A68/CC48-1%-Rep3	Hardness (mg/L)	184	-	-	-	183

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48-1%-Rep4	No. Alive	10	10	8	6	6
A68/CC48-1%-Rep4	pH	7.4	7.3	7.07	6.99	7.1
A68/CC48-1%-Rep4	Temp (°C)	11.67	11.58	11.61	11.59	11.92
A68/CC48-1%-Rep4	D.O. (mg/L)	8.87	6.92	7.68	8.16	8.07
A68/CC48-1%-Rep4	Conductivity (us/cm)	386.4	396.2	422	431.6	405.4
A68/CC48-1%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	33.1	-	-	-	39.4
A68/CC48-1%-Rep4	Hardness (mg/L)	184	-	-	-	183

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

#### Serial dilution of M34/CC48 with A68

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-85%-Rep1	No. Alive	10	0	-	-	-
A68/CC48/M34-85%-Rep1	pH	4.8	5.1	-	-	-
A68/CC48/M34-85%-Rep1	Temp (°C)	11.69	11.82	-	-	-
A68/CC48/M34-85%-Rep1	D.O. (mg/L)	8.25	8.5	-	-	-
A68/CC48/M34-85%-Rep1	Conductivity (us/cm)	695.5	719.8	-	-	-
A68/CC48/M34-85%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48/M34-85%-Rep1	Hardness (mg/L)	328	341	-	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-85%-Rep2	No. Alive	10	0	-	-	-
A68/CC48/M34-85%-Rep2	pH	4.8	5.1	-	-	-
A68/CC48/M34-85%-Rep2	Temp (°C)	11.66	11.84	-	-	-
A68/CC48/M34-85%-Rep2	D.O. (mg/L)	8.14	8.6	-	-	-
A68/CC48/M34-85%-Rep2	Conductivity (us/cm)	697.4	724.5	-	-	-
A68/CC48/M34-85%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48/M34-85%-Rep2	Hardness (mg/L)	328	341	-	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-85%-Rep3	No. Alive	10	0	-	-	-
A68/CC48/M34-85%-Rep3	pH	4.7	5.1	-	-	-
A68/CC48/M34-85%-Rep3	Temp (°C)	11.67	11.84	-	-	-
A68/CC48/M34-85%-Rep3	D.O. (mg/L)	8.09	8.46	-	-	-
A68/CC48/M34-85%-Rep3	Conductivity (us/cm)	694.3	719.2	-	-	-
A68/CC48/M34-85%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48/M34-85%-Rep3	Hardness (mg/L)	328	341	-	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-85%-Rep4	No. Alive	10	0	-	-	-
A68/CC48/M34-85%-Rep4	pH	4.7	5.1	-	-	-
A68/CC48/M34-85%-Rep4	Temp (°C)	11.66	11.86	-	-	-
A68/CC48/M34-85%-Rep4	D.O. (mg/L)	7.56	8.53	-	-	-
A68/CC48/M34-85%-Rep4	Conductivity (us/cm)	698.8	722.2	-	-	-
A68/CC48/M34-85%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	<5.00 U	-	-	-
A68/CC48/M34-85%-Rep4	Hardness (mg/L)	328	341	-	-	-

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-65%-Rep1	No. Alive	10	7	3	1	0
A68/CC48/M34-65%-Rep1	pH	5.7	6.3	6.93	6.85	6.49
A68/CC48/M34-65%-Rep1	Temp (°C)	11.67	11.82	11.58	11.72	11.75
A68/CC48/M34-65%-Rep1	D.O. (mg/L)	7.96	7.92	8.03	8.62	8.61
A68/CC48/M34-65%-Rep1	Conductivity (us/cm)	615.5	641.5	685	688.5	632.7
A68/CC48/M34-65%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/CC48/M34-65%-Rep1	Hardness (mg/L)	296	-	-	-	302

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-65%-Rep2	No. Alive	10	9	3	1	0
A68/CC48/M34-65%-Rep2	pH	5.6	6.4	6.93	6.83	6.42
A68/CC48/M34-65%-Rep2	Temp (°C)	11.64	11.82	11.58	11.75	11.73
A68/CC48/M34-65%-Rep2	D.O. (mg/L)	7.92	8.14	8.03	8.65	8.71
A68/CC48/M34-65%-Rep2	Conductivity (us/cm)	615.8	646.3	685	699.6	634.1
A68/CC48/M34-65%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/CC48/M34-65%-Rep2	Hardness (mg/L)	296	-	-	-	302

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-65%-Rep3	No. Alive	10	9	2	2	0
A68/CC48/M34-65%-Rep3	pH	5.6	6.4	6.93	6.82	5.83
A68/CC48/M34-65%-Rep3	Temp (°C)	11.64	11.83	11.58	11.75	11.68
A68/CC48/M34-65%-Rep3	D.O. (mg/L)	7.89	8.22	8.03	8.67	8.6
A68/CC48/M34-65%-Rep3	Conductivity (us/cm)	614.5	641.1	685	685	640.6
A68/CC48/M34-65%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/CC48/M34-65%-Rep3	Hardness (mg/L)	296	-	-	-	302

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-65%-Rep4	No. Alive	10	10	4	4	0
A68/CC48/M34-65%-Rep4	pH	5.6	6.5	6.93	6.81	5.64
A68/CC48/M34-65%-Rep4	Temp (°C)	11.61	11.83	11.58	11.77	11.68
A68/CC48/M34-65%-Rep4	D.O. (mg/L)	7.99	8.3	8.03	8.67	8.78
A68/CC48/M34-65%-Rep4	Conductivity (us/cm)	613.1	642.1	685	692.6	639.6
A68/CC48/M34-65%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	<5.00 U	-	-	-	<5.00 U
A68/CC48/M34-65%-Rep4	Hardness (mg/L)	296	-	-	-	302

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-40%-Rep1	No. Alive	10	10	10	10	9
A68/CC48/M34-40%-Rep1	pH	7.1	6.9	7.07	7.04	7.01
A68/CC48/M34-40%-Rep1	Temp (°C)	11.68	11.78	11.71	11.72	11.73
A68/CC48/M34-40%-Rep1	D.O. (mg/L)	7.78	7.81	8.02	7.78	7.43
A68/CC48/M34-40%-Rep1	Conductivity (us/cm)	524.5	533.7	569	575.9	543.5
A68/CC48/M34-40%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	10.8	-	-	-	12.5
A68/CC48/M34-40%-Rep1	Hardness (mg/L)	244	-	-	-	250

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-40%-Rep2	No. Alive	10	10	10	10	10
A68/CC48/M34-40%-Rep2	pH	7.1	6.9	7.03	7.02	7
A68/CC48/M34-40%-Rep2	Temp (°C)	11.67	11.78	11.68	11.71	11.7
A68/CC48/M34-40%-Rep2	D.O. (mg/L)	7.69	7.82	8.09	7.79	7.45
A68/CC48/M34-40%-Rep2	Conductivity (us/cm)	524.7	533.9	568	575.6	530.4
A68/CC48/M34-40%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	10.8	-	-	-	12.5
A68/CC48/M34-40%-Rep2	Hardness (mg/L)	244	-	-	-	250

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-40%-Rep3	No. Alive	10	10	10	10	8
A68/CC48/M34-40%-Rep3	pH	7.1	6.9	7.01	7.01	6.99
A68/CC48/M34-40%-Rep3	Temp (°C)	11.62	11.8	11.63	11.72	11.3
A68/CC48/M34-40%-Rep3	D.O. (mg/L)	7.88	7.63	8.1	7.63	7.52
A68/CC48/M34-40%-Rep3	Conductivity (us/cm)	523.9	534.4	572	575.6	530.2
A68/CC48/M34-40%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	10.8	-	-	-	12.5
A68/CC48/M34-40%-Rep3	Hardness (mg/L)	244	-	-	-	250

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-40%-Rep4	No. Alive	10	10	10	10	10
A68/CC48/M34-40%-Rep4	pH	7	6.9	7	7.01	6.97
A68/CC48/M34-40%-Rep4	Temp (°C)	11.62	11.8	11.66	11.72	11.66
A68/CC48/M34-40%-Rep4	D.O. (mg/L)	7.97	7.64	8.02	7.63	7.98
A68/CC48/M34-40%-Rep4	Conductivity (us/cm)	524.5	533.8	568	575.6	545.6
A68/CC48/M34-40%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	10.8	-	-	-	12.5
A68/CC48/M34-40%-Rep4	Hardness (mg/L)	244	-	-	-	250

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test

#### Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-20%-Rep1	No. Alive	10	10	10	10	10
A68/CC48/M34-20%-Rep1	pH	7.3	7.1	7.12	7.11	7.08
A68/CC48/M34-20%-Rep1	Temp (°C)	11.71	11.77	11.78	11.7	11.65
A68/CC48/M34-20%-Rep1	D.O. (mg/L)	7.91	7.78	8.06	7.82	8.07
A68/CC48/M34-20%-Rep1	Conductivity (us/cm)	451.9	459.8	492	499.3	469.1
A68/CC48/M34-20%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	25.2	-	-	-	26
A68/CC48/M34-20%-Rep1	Hardness (mg/L)	213	-	-	-	217

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-20%-Rep2	No. Alive	10	10	10	10	10
A68/CC48/M34-20%-Rep2	pH	7.3	7.1	7.12	7.11	7.07
A68/CC48/M34-20%-Rep2	Temp (°C)	11.68	11.77	11.77	11.7	11.68
A68/CC48/M34-20%-Rep2	D.O. (mg/L)	7.2	7.84	8.18	8.07	8.28
A68/CC48/M34-20%-Rep2	Conductivity (us/cm)	451.9	459.7	487	495.3	471.1
A68/CC48/M34-20%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	25.2	-	-	-	26
A68/CC48/M34-20%-Rep2	Hardness (mg/L)	213	-	-	-	217

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-20%-Rep3	No. Alive	10	10	10	10	10
A68/CC48/M34-20%-Rep3	pH	7.2	7.1	7.12	7.11	7.08
A68/CC48/M34-20%-Rep3	Temp (°C)	11.66	11.77	11.72	11.7	11.66
A68/CC48/M34-20%-Rep3	D.O. (mg/L)	7.99	7.66	8.03	8.09	8.42
A68/CC48/M34-20%-Rep3	Conductivity (us/cm)	452	458.6	487	495.4	470.6
A68/CC48/M34-20%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	25.2	-	-	-	26
A68/CC48/M34-20%-Rep3	Hardness (mg/L)	213	-	-	-	217

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-20%-Rep4	No. Alive	10	10	10	10	10
A68/CC48/M34-20%-Rep4	pH	7.2	7.1	7.12	7.09	7.07
A68/CC48/M34-20%-Rep4	Temp (°C)	11.62	11.79	11.72	11.71	11.7
A68/CC48/M34-20%-Rep4	D.O. (mg/L)	7.96	7.52	8.11	7.83	8.18
A68/CC48/M34-20%-Rep4	Conductivity (us/cm)	451.5	461.2	488	493.5	469.5
A68/CC48/M34-20%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	25.2	-	-	-	26
A68/CC48/M34-20%-Rep4	Hardness (mg/L)	213	-	-	-	217

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test

#### Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-9%-Rep1	No. Alive	10	10	10	10	10
A68/CC48/M34-9%-Rep1	pH	7.4	7.2	7.15	7.16	7.07
A68/CC48/M34-9%-Rep1	Temp (°C)	11.79	11.74	11.84	11.67	11.74
A68/CC48/M34-9%-Rep1	D.O. (mg/L)	7.64	7.65	8.11	8.02	7.91
A68/CC48/M34-9%-Rep1	Conductivity (us/cm)	413	422.2	446	453.6	430.9
A68/CC48/M34-9%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	28.2	-	-	-	38.9
A68/CC48/M34-9%-Rep1	Hardness (mg/L)	199	-	-	-	196

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-9%-Rep2	No. Alive	10	10	9	9	9
A68/CC48/M34-9%-Rep2	pH	7.3	7.3	7.16	7.14	7.07
A68/CC48/M34-9%-Rep2	Temp (°C)	11.74	11.73	11.81	11.66	11.77
A68/CC48/M34-9%-Rep2	D.O. (mg/L)	7.69	8.05	8.26	8.08	8.1
A68/CC48/M34-9%-Rep2	Conductivity (us/cm)	412.5	421.4	448	456.4	429.6
A68/CC48/M34-9%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	28.2	-	-	-	38.9
A68/CC48/M34-9%-Rep2	Hardness (mg/L)	199	-	-	-	196

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-9%-Rep3	No. Alive	10	10	10	10	10
A68/CC48/M34-9%-Rep3	pH	7.3	7.2	7.17	7.15	7.09
A68/CC48/M34-9%-Rep3	Temp (°C)	11.76	11.73	11.79	11.66	11.68
A68/CC48/M34-9%-Rep3	D.O. (mg/L)	7.6	7.65	8.28	8.17	8.31
A68/CC48/M34-9%-Rep3	Conductivity (us/cm)	412.4	419.7	443	450	427.5
A68/CC48/M34-9%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	28.2	-	-	-	38.9
A68/CC48/M34-9%-Rep3	Hardness (mg/L)	199	-	-	-	196

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-9%-Rep4	No. Alive	10	10	10	9	9
A68/CC48/M34-9%-Rep4	pH	7.3	7.2	7.15	7.15	7.1
A68/CC48/M34-9%-Rep4	Temp (°C)	11.7	11.77	11.78	11.68	11.67
A68/CC48/M34-9%-Rep4	D.O. (mg/L)	7.65	7.73	7.69	8.04	7.94
A68/CC48/M34-9%-Rep4	Conductivity (us/cm)	412.8	421.2	445	455.3	428.4
A68/CC48/M34-9%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	28.2	-	-	-	38.9
A68/CC48/M34-9%-Rep4	Hardness (mg/L)	199	-	-	-	196

## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-4%-Rep1	No. Alive	10	10	10	10	10
A68/CC48/M34-4%-Rep1	pH	7.4	7.3	7.18	7.17	7.07
A68/CC48/M34-4%-Rep1	Temp (°C)	11.89	11.68	11.91	11.67	11.91
A68/CC48/M34-4%-Rep1	D.O. (mg/L)	7.53	8	8.46	8.41	8.37
A68/CC48/M34-4%-Rep1	Conductivity (us/cm)	394.7	403.2	428	434.9	412.4
A68/CC48/M34-4%-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	34.9	-	-	-	40.8
A68/CC48/M34-4%-Rep1	Hardness (mg/L)	185	-	-	-	187

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-4%-Rep2	No. Alive	10	9	9	9	9
A68/CC48/M34-4%-Rep2	pH	7.4	7.3	7.21	7.18	7.06
A68/CC48/M34-4%-Rep2	Temp (°C)	11.82	11.71	11.88	11.66	11.79
A68/CC48/M34-4%-Rep2	D.O. (mg/L)	7.76	8.09	8.19	8.34	8.31
A68/CC48/M34-4%-Rep2	Conductivity (us/cm)	394.6	401.4	421	427.2	408
A68/CC48/M34-4%-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	34.9	-	-	-	40.8
A68/CC48/M34-4%-Rep2	Hardness (mg/L)	185	-	-	-	187

1 Jumper

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-4%-Rep3	No. Alive	10	10	10	10	10
A68/CC48/M34-4%-Rep3	pH	7.4	7.3	7.17	7.16	7.07
A68/CC48/M34-4%-Rep3	Temp (°C)	11.79	11.72	11.87	11.68	11.75
A68/CC48/M34-4%-Rep3	D.O. (mg/L)	7.72	7.96	8.03	8.21	8.02
A68/CC48/M34-4%-Rep3	Conductivity (us/cm)	394.9	403.5	426	435.7	412.5
A68/CC48/M34-4%-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	34.9	-	-	-	40.8
A68/CC48/M34-4%-Rep3	Hardness (mg/L)	185	-	-	-	187

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-4%-Rep4	No. Alive	10	10	10	9	9
A68/CC48/M34-4%-Rep4	pH	7.4	7.3	7.16	7.16	7.08
A68/CC48/M34-4%-Rep4	Temp (°C)	11.77	11.71	11.88	11.68	11.71
A68/CC48/M34-4%-Rep4	D.O. (mg/L)	7.77	7.66	7.61	8.04	7.7
A68/CC48/M34-4%-Rep4	Conductivity (us/cm)	394.5	404.2	427	436.7	411.1
A68/CC48/M34-4%-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	34.9	-	-	-	40.8
A68/CC48/M34-4%-Rep4	Hardness (mg/L)	185	-	-	-	187



## Appendix B 1: Upper Animas November 2012

### Aquatic Toxicity Test Site Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate: 10
End Date	11/06/12	No. of Replicates: 4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout) (0.84 grams)	Analysts SA,CL,LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-Control-Rep1	No. Alive	10	10	10	10	10
A68/CC48/M34-Control-Rep1	pH	7.7	7.4	7.28	7.33	7.33
A68/CC48/M34-Control-Rep1	Temp (°C)	12.14	11.75	12.02	11.68	12.12
A68/CC48/M34-Control-Rep1	D.O. (mg/L)	7.19	7.81	8.06	8.08	7.77
A68/CC48/M34-Control-Rep1	Conductivity (us/cm)	298.1	302.8	317	323.8	319.5
A68/CC48/M34-Control-Rep1	Alkalinity (mg CaCO <sub>3</sub> /L)	54.8	-	-	-	63.4
A68/CC48/M34-Control-Rep1	Hardness (mg/L)	91	-	-	-	92

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-Control-Rep2	No. Alive	10	10	10	10	10
A68/CC48/M34-Control-Rep2	pH	7.6	7.4	7.36	7.34	7.35
A68/CC48/M34-Control-Rep2	Temp (°C)	12.01	11.72	11.92	11.71	11.91
A68/CC48/M34-Control-Rep2	D.O. (mg/L)	6.97	8.1	8.08	8.11	7.21
A68/CC48/M34-Control-Rep2	Conductivity (us/cm)	299.1	305.8	319	327.9	319.1
A68/CC48/M34-Control-Rep2	Alkalinity (mg CaCO <sub>3</sub> /L)	54.8	-	-	-	63.4
A68/CC48/M34-Control-Rep2	Hardness (mg/L)	91	-	-	-	92

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-Control-Rep3	No. Alive	10	10	10	10	10
A68/CC48/M34-Control-Rep3	pH	7.6	7.5	7.41	7.37	7.36
A68/CC48/M34-Control-Rep3	Temp (°C)	12.08	11.71	11.9	11.65	11.88
A68/CC48/M34-Control-Rep3	D.O. (mg/L)	6.71	8.14	8.15	8.11	7.92
A68/CC48/M34-Control-Rep3	Conductivity (us/cm)	298.7	304	318	326.9	320.8
A68/CC48/M34-Control-Rep3	Alkalinity (mg CaCO <sub>3</sub> /L)	54.8	-	-	-	63.4
A68/CC48/M34-Control-Rep3	Hardness (mg/L)	91	-	-	-	92

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
A68/CC48/M34-Control-Rep4	No. Alive	10	10	10	10	10
A68/CC48/M34-Control-Rep4	pH	7.6	7.5	7.39	7.37	7.37
A68/CC48/M34-Control-Rep4	Temp (°C)	11.98	11.71	11.91	11.68	11.91
A68/CC48/M34-Control-Rep4	D.O. (mg/L)	6.69	7.93	7.39	8.01	7.91
A68/CC48/M34-Control-Rep4	Conductivity (us/cm)	298.9	304.1	318	325.2	323.6
A68/CC48/M34-Control-Rep4	Alkalinity (mg CaCO <sub>3</sub> /L)	54.8	-	-	-	63.4
A68/CC48/M34-Control-Rep4	Hardness (mg/L)	91	-	-	-	92

Prepared by: EC 3/8/13  
Reviewed by: EB 3/13/13

**Appendix B 2: November 2012 Aquatic Toxicity Test**  
Reference Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate:	10
End Date	11/06/12	No. of Replicates:	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-01	No. Alive	10	10	10	10	10
Control-01	pH	8	7.4	7.4	7.4	7.47
Control-01	Temp (°C)	13.9	11.91	11.76	11.71	11.74
Control-01	D.O. (mg/L)	7.81	7.74	8.3	8.18	8.31
Control-01	Conductivity (us/cm)	302	308.5	317	319	319.8
Control-01	Alkalinity (mg CaCO <sub>3</sub> /L)	61.9	-	-	-	70.5
Control-01	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-02	No. Alive	10	10	10	10	10
Control-02	pH	8	7.5	7.5	7.4	7.47
Control-02	Temp (°C)	13.79	11.94	11.92	11.67	11.75
Control-02	D.O. (mg/L)	8.17	7.67	8.03	8.26	8.2
Control-02	Conductivity (us/cm)	298.9	304.6	311.3	319.4	318.6
Control-02	Alkalinity (mg CaCO <sub>3</sub> /L)	61.9	-	-	-	70.5
Control-02	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-03	No. Alive	10	10	10	10	10
Control-03	pH	8	7.4	7.5	7.4	7.46
Control-03	Temp (°C)	13.7	11.92	11.63	11.68	11.77
Control-03	D.O. (mg/L)	8.14	7.21	8.02	8.09	8.03
Control-03	Conductivity (us/cm)	298.5	303.9	316.5	316.9	318.9
Control-03	Alkalinity (mg CaCO <sub>3</sub> /L)	61.9	-	-	-	70.5
Control-03	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
Control-04	No. Alive	10	10	10	10	10
Control-04	pH	8	7.4	7.4	7.4	7.45
Control-04	Temp (°C)	13.75	11.9	11.63	11.69	11.77
Control-04	D.O. (mg/L)	8.15	6.62	7.95	8.12	8.12
Control-04	Conductivity (us/cm)	298.1	303.9	317.9	317.7	318.3
Control-04	Alkalinity (mg CaCO <sub>3</sub> /L)	61.9	-	-	-	70.5
Control-04	Hardness (mg/L)	91	-	-	-	93

**Appendix B 2: November 2012 Aquatic Toxicity Test**  
Reference Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate:	10
End Date	11/06/12	No. of Replicates:	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-01	No. Alive	10	10	10	10	10
6.25%-01	pH	8	7.5	7.6	7.3	7.46
6.25%-01	Temp (°C)	13.64	11.91	11.65	11.73	11.76
6.25%-01	D.O. (mg/L)	8.17	6.69	8.24	8.26	8.35
6.25%-01	Conductivity (us/cm)	297.8	303.7	321	319.5	318.1
6.25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	58.9	-	-	-	63.4
6.25%-01	Hardness (mg/L)	90	-	-	-	92

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-02	No. Alive	10	10	10	10	10
6.25%-02	pH	8.1	7.4	7.5	7.3	7.46
6.25%-02	Temp (°C)	13.71	11.92	11.62	11.69	11.75
6.25%-02	D.O. (mg/L)	8.17	7.5	8.17	8.39	8.35
6.25%-02	Conductivity (us/cm)	297.6	304.6	320	321.2	320.1
6.25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	58.9	-	-	-	63.4
6.25%-02	Hardness (mg/L)	90	-	-	-	92

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-03	No. Alive	10	10	10	10	10
6.25%-03	pH	8	7.4	7.6	7.3	7.46
6.25%-03	Temp (°C)	13.67	11.91	11.63	11.7	11.78
6.25%-03	D.O. (mg/L)	8.19	6.74	8.16	8.35	8.15
6.25%-03	Conductivity (us/cm)	297.7	304.5	321	319.8	318.7
6.25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	58.9	-	-	-	63.4
6.25%-03	Hardness (mg/L)	90	-	-	-	92

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
6.25%-04	No. Alive	10	10	10	10	10
6.25%-04	pH	8.1	7.4	7.6	7.3	7.45
6.25%-04	Temp (°C)	13.73	11.89	11.65	11.72	11.78
6.25%-04	D.O. (mg/L)	8.22	6.85	8.17	8.21	8.13
6.25%-04	Conductivity (us/cm)	296.3	304.3	320.7	318.3	317.3
6.25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	58.9	-	-	-	63.4
6.25%-04	Hardness (mg/L)	90	-	-	-	92

**Appendix B 2: November 2012 Aquatic Toxicity Test**  
Reference Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate:	10
End Date	11/06/12	No. of Replicates:	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-01	No. Alive	10	10	5	5	5
12.5%-01	pH	8	7.6	7.5	7.3	7.46
12.5%-01	Temp (°C)	13.74	11.89	11.63	11.74	11.79
12.5%-01	D.O. (mg/L)	8.18	7.8	8.16	8.58	8.55
12.5%-01	Conductivity (us/cm)	298.4	309.1	329	315.7	314.1
12.5%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	61.4	-	-	-	63.6
12.5%-01	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-02	No. Alive	10	10	9	8	8
12.5%-02	pH	8	7.6	7.6	7.3	7.46
12.5%-02	Temp (°C)	13.69	11.88	11.65	11.73	11.8
12.5%-02	D.O. (mg/L)	8.2	7.8	8.36	8.34	8.5
12.5%-02	Conductivity (us/cm)	297.8	308	328	320.1	318.8
12.5%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	61.4	-	-	-	63.6
12.5%-02	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-03	No. Alive	10	10	9	9	9
12.5%-03	pH	8.2	7.5	7.5	7.3	7.43
12.5%-03	Temp (°C)	13.66	11.89	11.67	11.73	11.82
12.5%-03	D.O. (mg/L)	8.21	7.75	8.22	8.37	7.93
12.5%-03	Conductivity (us/cm)	297.7	306.5	324	320	316.7
12.5%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	61.4	-	-	-	63.6
12.5%-03	Hardness (mg/L)	91	-	-	-	93

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
12.5%-04	No. Alive	10	9	9	8	8
12.5%-04	pH	8.1	7.5	7.5	7.3	7.43
12.5%-04	Temp (°C)	13.86	11.86	11.67	11.75	11.81
12.5%-04	D.O. (mg/L)	8.22	7.34	8.17	8.41	8.12
12.5%-04	Conductivity (us/cm)	297.8	306	322.9	321	315.4
12.5%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	61.4	-	-	-	63.6
12.5%-04	Hardness (mg/L)	91	-	-	-	93

**Appendix B 2: November 2012 Aquatic Toxicity Test**  
Reference Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate:	10
End Date	11/06/12	No. of Replicates:	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-01	No. Alive	10	10	0	-	-
25%-01	pH	8	7.5	7.2	-	-
25%-01	Temp (°C)	13.79	11.85	11.64	-	-
25%-01	D.O. (mg/L)	8.22	7.79	8.62	-	-
25%-01	Conductivity (us/cm)	297.9	307.3	333.6	-	-
25%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	58.2	-	-	60.4	-
25%-01	Hardness (mg/L)	91	-	-	94	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-02	No. Alive	10	9	1	0	-
25%-02	pH	8	7.4	7.19	7.3	-
25%-02	Temp (°C)	13.89	11.82	11.68	11.76	-
25%-02	D.O. (mg/L)	8.21	7.15	8.62	8.78	-
25%-02	Conductivity (us/cm)	297.8	310.7	328.7	315.2	-
25%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	58.2	-	-	60.4	-
25%-02	Hardness (mg/L)	91	-	-	94	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-03	No. Alive	10	8	1	0	-
25%-03	pH	8	7.4	7.31	7.31	-
25%-03	Temp (°C)	13.74	11.8	11.7	11.77	-
25%-03	D.O. (mg/L)	8.2	6.88	8.56	8.79	-
25%-03	Conductivity (us/cm)	297.8	308.7	324.8	312.9	-
25%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	58.2	-	-	60.4	-
25%-03	Hardness (mg/L)	91	-	-	94	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
25%-04	No. Alive	10	10	2	0	-
25%-04	pH	8	7.4	7.22	7.3	-
25%-04	Temp (°C)	13.86	11.76	11.68	11.76	-
25%-04	D.O. (mg/L)	8.22	6.66	8.61	8.78	-
25%-04	Conductivity (us/cm)	297.8	309.6	335	312.9	-
25%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	58.2	-	-	60.4	-
25%-04	Hardness (mg/L)	91	-	-	94	-

**Appendix B 2: November 2012 Aquatic Toxicity Test**  
Reference Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate:	10
End Date	11/06/12	No. of Replicates:	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-01	No. Alive	10	6	0	-	-
50%-01	pH	8	7.4	7.24	-	-
50%-01	Temp (°C)	12.95	11.75	11.71	-	-
50%-01	D.O. (mg/L)	8.28	7.29	8.61	-	-
50%-01	Conductivity (us/cm)	297.3	311.7	323.4	-	-
50%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	57.7	-	61.8	-	-
50%-01	Hardness (mg/L)	91	-	94	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-02	No. Alive	10	10	0	-	-
50%-02	pH	8	7.4	7.25	-	-
50%-02	Temp (°C)	12.7	11.7	11.73	-	-
50%-02	D.O. (mg/L)	8.32	7.4	8.64	-	-
50%-02	Conductivity (us/cm)	297.2	311.4	331.4	-	-
50%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	57.7	-	61.8	-	-
50%-02	Hardness (mg/L)	91	-	94	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-03	No. Alive	10	9	0	-	-
50%-03	pH	8.1	7.4	7.27	-	-
50%-03	Temp (°C)	12.79	11.68	11.72	-	-
50%-03	D.O. (mg/L)	8.3	7.38	8.62	-	-
50%-03	Conductivity (us/cm)	297.2	310.4	330.2	-	-
50%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	57.7	-	61.8	-	-
50%-03	Hardness (mg/L)	91	-	94	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
50%-04	No. Alive	10	6	0	-	-
50%-04	pH	8	7.4	7.29	-	-
50%-04	Temp (°C)	13.74	11.66	11.73	-	-
50%-04	D.O. (mg/L)	8.25	7.49	8.74	-	-
50%-04	Conductivity (us/cm)	297.8	310.7	324.6	-	-
50%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	57.7	-	61.8	-	-
50%-04	Hardness (mg/L)	91	-	94	-	-

1 Jumper

**Appendix B 2: November 2012 Aquatic Toxicity Test**  
Reference Static Renewal Data Sheets

Start Date	11/02/12	No. Organisms per replicate:	10
End Date	11/06/12	No. of Replicates:	4
Organism	Juvenile <i>O.mykiss</i> (rainbow trout)	Analysts	SA, CL, LC

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-01	No. Alive	10	5	0	-	-
100%-01	pH	8	7.4	6.5	-	-
100%-01	Temp (°C)	12.61	11.68	12.08	-	-
100%-01	D.O. (mg/L)	8.31	7.63	8.55	-	-
100%-01	Conductivity (us/cm)	297.3	311.9	322	-	-
100%-01	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	56.2	-	-
100%-01	Hardness (mg/L)	90	-	94	-	-

2 Jumpers

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-02	No. Alive	10	5	0	-	-
100%-02	pH	8	7.4	6.6	-	-
100%-02	Temp (°C)	12.71	11.67	11.87	-	-
100%-02	D.O. (mg/L)	8.32	7.35	8.6	-	-
100%-02	Conductivity (us/cm)	297.3	311.9	*	-	-
100%-02	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	56.2	-	-
100%-02	Hardness (mg/L)	90	-	94	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-03	No. Alive	10	4	0	-	-
100%-03	pH	8	7.3	6.9	-	-
100%-03	Temp (°C)	12.62	11.65	11.92	-	-
100%-03	D.O. (mg/L)	8.37	6.74	6.48	-	-
100%-03	Conductivity (us/cm)	297.1	313.2	322	-	-
100%-03	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	56.2	-	-
100%-03	Hardness (mg/L)	90	-	94	-	-

Replicate ID	Parameter	Day 0	Day 1	Day 2	Day 3	Day 4
100%-04	No. Alive	10	5	0	-	-
100%-04	pH	8	7.3	6.9	-	-
100%-04	Temp (°C)	12.68	11.65	11.97	-	-
100%-04	D.O. (mg/L)	8.37	6.36	8.65	-	-
100%-04	Conductivity (us/cm)	297.1	310.5	324	-	-
100%-04	Alkalinity (mg CaCO <sub>3</sub> /L)	60.5	-	56.2	-	-
100%-04	Hardness (mg/L)	90	-	94	-	-

1 Jumper

\* No data available

Prepared by: EC 3/8/13

Reviewed by: EB 3/13/13

**Attachment 1**  
**October 2012 Upper Animas River Surface Water Toxicity Report**  
**CETIS Analytical Reports**



**CETIS Test Data Worksheet**

Report Date: 13 Mar-13 12:50 (p 1 of 1)  
 Test Code: 05-7143-8472/220F7588

**Fish 96-h Acute Survival Test**

**U.S. EPA Region 8 Lab**

Start Date: 22 Oct-12      Species: Oncorhynchus mykiss      Sample Code: Control  
 End Date: 26 Oct-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 22 Oct-12      Material: Lab Control      Sample Station: Control

Batch Note: R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED)

Sample Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
Control	1	1	10	10	10	10	10	
Control	2	25	10	10	10	10	10	
Control	3	26	10	10	10	10	10	
Control	4	15	10	10	10	10	10	
A56	1	23	10	10	10	10	10	
A56	2	13	10	10	10	10	10	
A56	3	7	10	10	10	10	10	
A56	4	9	10	10	10	10	10	
A68	1	27	10	10	10	10	10	
A68	2	2	10	10	10	10	10	
A68	3	24	10	10	10	10	10	
A68	4	20	10	10	10	10	10	
A72	1	5	10	10	9	0	0	
A72	2	17	10	10	8	0	0	
A72	3	16	10	10	4	0	0	
A72	4	28	10	10	7	0	0	
A73B	1	11	10	10	10	10	10	
A73B	2	14	10	10	10	10	10	
A73B	3	8	10	10	10	10	10	
A73B	4	19	10	10	10	10	10	
A75B	1	22	10	10	10	10	10	
A75B	2	12	10	10	10	10	10	
A75B	3	10	10	10	10	10	10	
A75B	4	6	10	10	10	10	10	
Baker Bridge	1	18	10	10	10	10	10	
Baker Bridge	2	4	10	10	10	10	10	
Baker Bridge	3	21	10	10	10	10	10	
Baker Bridge	4	3	10	10	10	10	10	

**CETIS Analytical Report**

Report Date: 13 Mar-13 12:52 (p 1 of 6)  
 Test Code: 220F7588 | 05-7143-8472

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 14-7261-3366      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 13 Mar-13 12:51      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
Control	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A56	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A68	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A72	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A73B	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A75B	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
Baker Bridge	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run					2.5%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
Control		A56	18	10	6	1	0.8571	Non-Significant Effect
		A68	18	10	6	1	0.8571	Non-Significant Effect
		A72	10	10	6	0	0.0480	Significant Effect
		A73B	18	10	6	1	0.8571	Non-Significant Effect
		A75B	18	10	6	1	0.8571	Non-Significant Effect
		Baker Bridge	18	10	6	1	0.8571	Non-Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.384915	0.8974859	6	65540	<0.0001	Significant Effect
Error	0	0	21			
Total	5.384915	0.8974859	27			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	65540	3.812	<0.0001	Unequal Variances

**96h Survival Rate Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control	4	1	1	1	1	1	0	0	0.0%	0.0%
A56	4	1	1	1	1	1	0	0	0.0%	0.0%
A68	4	1	1	1	1	1	0	0	0.0%	0.0%
A72	4	0	0	0	0	0	0	0		100.0%
A73B	4	1	1	1	1	1	0	0	0.0%	0.0%
A75B	4	1	1	1	1	1	0	0	0.0%	0.0%
Baker Bridge	4	1	1	1	1	1	0	0	0.0%	0.0%

**Angular (Corrected) Transformed Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
Control	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A56	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A68	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A72	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.76%
A73B	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A75B	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
Baker Bridge	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%

# CETIS Analytical Report

Report Date: 13 Mar-13 12:52 (p 2 of 6)  
 Test Code: 220F7588 | 05-7143-8472

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 14-7261-3366  
 Analyzed: 13 Mar-13 12:51

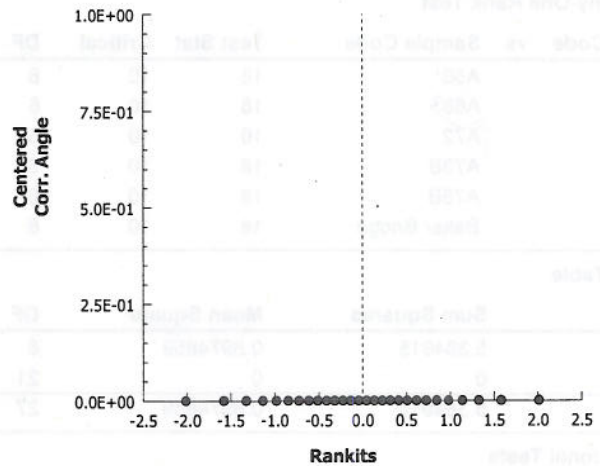
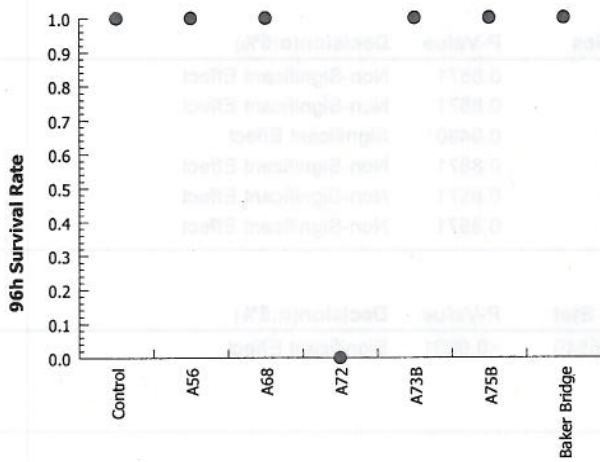
Endpoint: 96h Survival Rate  
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

### 96h Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4
Control	1	1	1	1
A56	1	1	1	1
A68	1	1	1	1
A72	0	0	0	0
A73B	1	1	1	1
A75B	1	1	1	1
Baker Bridge	1	1	1	1

### Graphics



Sample Code	Count	Mean	StDev	Min	Max	Q1	Q3	Lower CL	Upper CL	StDev	CV
Control	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000
A56	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000
A68	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000
A72	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A73B	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000
A75B	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000
Baker Bridge	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	0.000	0.000

# CETIS Analytical Report

Report Date: 13 Mar-13 12:52 (p 3 of 6)  
 Test Code: 220F7588 | 05-7143-8472

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 14-2444-3659      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 13 Mar-13 12:51      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
Control	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A56	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A68	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A72	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A73B	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A75B	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
Baker Bridge	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run					2.5%

### Steel Many-One Rank Test

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
A56		A72	10	10	6	0	0.0350	Significant Effect
		A73B	18	10	6	1	0.8000	Non-Significant Effect
		A75B	18	10	6	1	0.8000	Non-Significant Effect
		Baker Bridge	18	10	6	1	0.8000	Non-Significant Effect

### ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.025921	1.25648	4	65540	<0.0001	Significant Effect
Error	0	0	15			
Total	5.025921	1.25648	19			

### Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	65540	4.893	<0.0001	Unequal Variances

### 96h Survival Rate Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A56	4	1	1	1	1	1	0	0	0.0%	0.0%
A72	4	0	0	0	0	0	0	0	0.0%	100.0%
A73B	4	1	1	1	1	1	0	0	0.0%	0.0%
A75B	4	1	1	1	1	1	0	0	0.0%	0.0%
Baker Bridge	4	1	1	1	1	1	0	0	0.0%	0.0%

### Angular (Corrected) Transformed Summary

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A56	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A72	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.76%
A73B	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A75B	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
Baker Bridge	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%

# CETIS Analytical Report

Report Date: 13 Mar-13 12:52 (p 4 of 6)  
 Test Code: 220F7588 | 05-7143-8472

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 14-2444-3659  
 Analyzed: 13 Mar-13 12:51

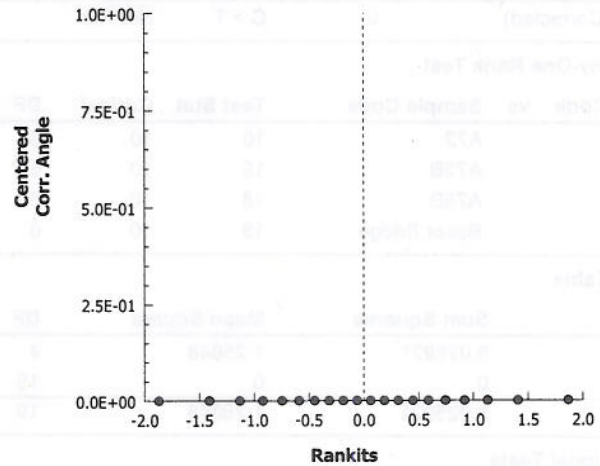
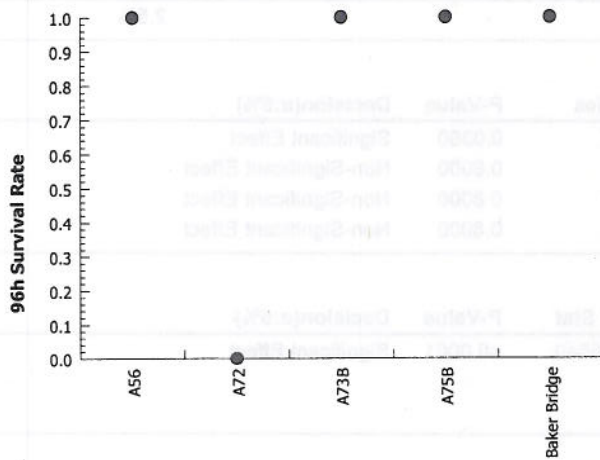
Endpoint: 96h Survival Rate  
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

### 96h Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4
A56	1	1	1	1
A72	0	0	0	0
A73B	1	1	1	1
A75B	1	1	1	1
Baker Bridge	1	1	1	1

### Graphics



Sample Code	Mean	Stdev	CV%	Min	Max	95% LCL	95% UCL	95% LCL	95% UCL
A56	1.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000
A72	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A73B	1.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000
A75B	1.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000
Baker Bridge	1.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000

**CETIS Analytical Report**

Report Date: 13 Mar-13 12:52 (p 5 of 6)  
 Test Code: 220F7588 | 05-7143-8472

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 02-5955-8725      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 13 Mar-13 12:51      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
Control	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A56	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A68	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A72	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A73B	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
A75B	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
Baker Bridge	R8: October 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run					2.5%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
A68		A72	10	10	6	0	0.0350	Significant Effect
		A73B	18	10	6	1	0.8000	Non-Significant Effect
		A75B	18	10	6	1	0.8000	Non-Significant Effect
		Baker Bridge	18	10	6	1	0.8000	Non-Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.025921	1.25648	4	65540	<0.0001	Significant Effect
Error	0	0	15			
Total	5.025921	1.25648	19			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	65540	4.893	<0.0001	Unequal Variances

**96h Survival Rate Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68	4	1	1	1	1	1	0	0	0.0%	0.0%
A72	4	0	0	0	0	0	0	0	0.0%	100.0%
A73B	4	1	1	1	1	1	0	0	0.0%	0.0%
A75B	4	1	1	1	1	1	0	0	0.0%	0.0%
Baker Bridge	4	1	1	1	1	1	0	0	0.0%	0.0%

**Angular (Corrected) Transformed Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A72	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.76%
A73B	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A75B	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
Baker Bridge	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%

# CETIS Analytical Report

Report Date: 13 Mar-13 12:52 (p 6 of 6)  
 Test Code: 220F7588 | 05-7143-8472

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 02-5955-8725  
 Analyzed: 13 Mar-13 12:51

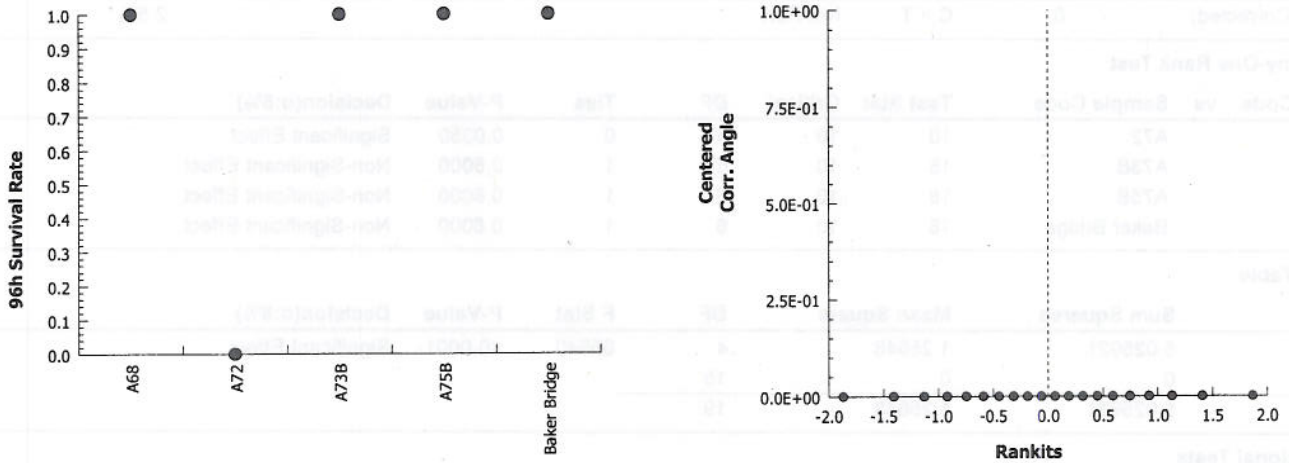
Endpoint: 96h Survival Rate  
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

### 96h Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4
A68	1	1	1	1
A72	0	0	0	0
A73B	1	1	1	1
A75B	1	1	1	1
Baker Bridge	1	1	1	1

### Graphics



Sample Code	Count	Mean	Std Dev	Min	Max	90% LCL	95% LCL	99% LCL	90% UCL	95% UCL	99% UCL
A68	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
A72	4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A73B	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
A75B	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Baker Bridge	4	1.000	0.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

**CETIS Test Data Worksheet**

Report Date: 15 Mar-13 11:14 (p 1 of 1)  
 Test Code: 19-6852-7945/75555A49

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Start Date: 22 Oct-12      Species: *Oncorhynchus mykiss*      Sample Code: 34/48/56 6.25%  
 End Date: 26 Oct-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 22 Oct-12      Material: Mining Discharge/Runoff      Sample Station: M34/CC48/A56 6.25%

Batch Note: R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water)

Sample Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
M34/CC48/A56CON	1	22	10	10	10	10	10	
M34/CC48/A56CON	2	10	10	10	10	10	10	
M34/CC48/A56CON	3	11	10	10	10	10	10	
M34/CC48/A56CON	4	14	10	10	10	10	10	
34/48/56 6.25%	1	13	10	10	10	10	10	
34/48/56 6.25%	2	2	10	10	10	10	10	
34/48/56 6.25%	3	7	10	10	10	10	10	
34/48/56 6.25%	4	8	10	10	10	10	10	
34/48/56 12.5%	1	19	10	10	10	10	10	
34/48/56 12.5%	2	17	10	10	10	10	10	
34/48/56 12.5%	3	3	10	10	10	10	10	
34/48/56 12.5%	4	18	10	10	10	10	10	
34/48/56 25%	1	1	10	10	10	10	10	
34/48/56 25%	2	23	10	10	10	10	10	
34/48/56 25%	3	6	10	10	10	10	10	
34/48/56 25%	4	9	10	10	10	10	10	
34/48/56 50%	1	21	10	10	10	10	10	
34/48/56 50%	2	15	10	10	10	10	10	
34/48/56 50%	3	20	10	10	10	9	9	
34/48/56 50%	4	24	10	10	10	10	10	
34/48/56 100%	1	5	10	10	0	0	0	
34/48/56 100%	2	16	10	4	0	0	0	
34/48/56 100%	3	4	10	2	0	0	0	
34/48/56 100%	4	12	10	7	0	0	0	



**CETIS Analytical Report**

Report Date: 15 Mar-13 11:14 (p 1 of 2)  
 Test Code: 7555A49 | 19-6852-7945

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 07-7333-0804      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 13 Mar-13 13:50      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
M34/CC48/A56CON	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water).
34/48/56 6.25%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water).
34/48/56 12.5%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water).
34/48/56 25%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water).
34/48/56 50%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water).
34/48/56 100%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A56 water).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run				N/A	4.57%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
M34/CC48/A56CO		34/48/56 6.25%	18	10	6	1	0.8333	Non-Significant Effect
		34/48/56 12.5%	18	10	6	1	0.8333	Non-Significant Effect
		34/48/56 25%	18	10	6	1	0.8333	Non-Significant Effect
		34/48/56 50%	16	10	6	1	0.6105	Non-Significant Effect
		34/48/56 100%	10	10	6	0	0.0417	Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.172787	1.034557	5	934.9	<0.0001	Significant Effect
Error	0.0199195	0.001106639	18			
Total	5.192707	1.035664	23			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	1	4.248	0.4457	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.4634	0.884	<0.0001	Non-normal Distribution

**96h Survival Rate Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
M34/CC48/A56CON	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/56 6.25%	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/56 12.5%	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/56 25%	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/56 50%	4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	2.5%
34/48/56 100%	4	0	0	0	0	0	0	0	0.0%	100.0%

**Angular (Corrected) Transformed Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
M34/CC48/A56CON	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/56 6.25%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/56 12.5%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/56 25%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/56 50%	4	1.371	1.34	1.402	1.249	1.412	0.04074	0.08149	5.94%	2.89%
34/48/56 100%	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.76%

# CETIS Analytical Report

Report Date: 15 Mar-13 11:14 (p 2 of 2)  
 Test Code: 75555A49 | 19-6852-7945

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 07-7333-0804  
 Analyzed: 13 Mar-13 13:50

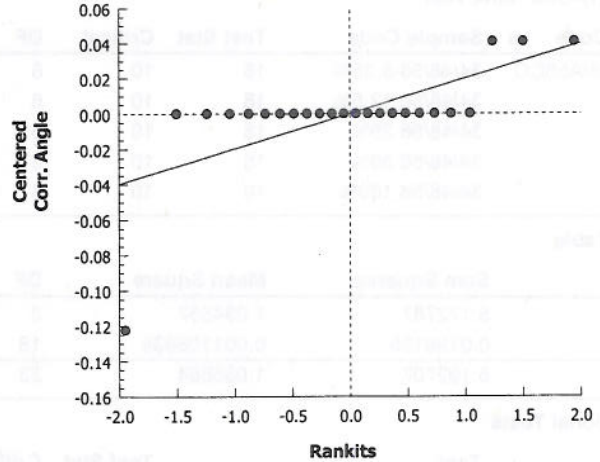
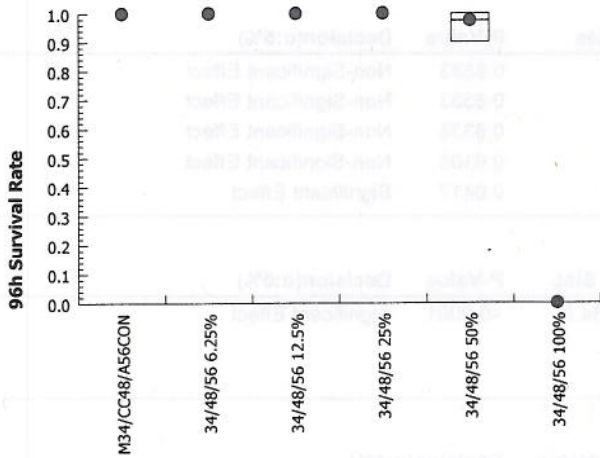
Endpoint: 96h Survival Rate  
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

### 96h Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4
M34/CC48/A56CON	1	1	1	1
34/48/56 6.25%	1	1	1	1
34/48/56 12.5%	1	1	1	1
34/48/56 25%	1	1	1	1
34/48/56 50%	1	1	0.9	1
34/48/56 100%	0	0	0	0

### Graphics



**CETIS Test Data Worksheet**

Report Date: 13 Mar-13 16:51 (p 1 of 1)  
 Test Code: 15-2718-5092/5B06FEC4

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Start Date: 22 Oct-12      Species: Oncorhynchus mykiss      Sample Code: 34/48/68 CON  
 End Date:                      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 22 Oct-12      Material: Mining Discharge/Runoff      Sample Station: M34/CC48/A68 Control

Batch Note: R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A68 water)

Conc-%	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
34/48/68 CON	1	11	10	10	10	10	10	
34/48/68 CON	2	13	10	10	10	10	10	
34/48/68 CON	3	14	10	10	10	10	10	
34/48/68 CON	4	6	10	10	10	10	10	
34/48/68 6.25%	1	12	10	10	10	10	10	
34/48/68 6.25%	2	8	10	10	10	10	10	
34/48/68 6.25%	3	10	10	10	10	10	10	
34/48/68 6.25%	4	16	10	10	10	10	10	
34/48/68 12.5%	1	4	10	10	10	10	10	
34/48/68 12.5%	2	15	10	10	10	10	10	
34/48/68 12.5%	3	7	10	10	10	10	10	
34/48/68 12.5%	4	5	10	10	10	10	10	
34/48/68 25%	1	17	10	10	10	10	10	
34/48/68 25%	2	2	10	10	10	10	10	
34/48/68 25%	3	3	10	10	10	10	10	
34/48/68 25%	4	20	10	10	10	10	10	
34/48/68 50%	1	9	10	10	10	7	3	
34/48/68 50%	2	1	10	10	8	5	2	
34/48/68 50%	3	19	10	10	10	8	6	
34/48/68 50%	4	18	10	10	10	8	4	

**CETIS Analytical Report**

Report Date: 13 Mar-13 16:51 (p 1 of 2)  
 Test Code: 5B06FEC4 | 15-2718-5092

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 00-4654-0837      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 13 Mar-13 16:51      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
34/48/68 CON	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A68 water).
34/48/68 6.25%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A68 water).
34/48/68 12.5%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A68 water).
34/48/68 25%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A68 water).
34/48/68 50%	R8: October 2012 Upper Animas RBT Acute SW Tox Test (DILUTED with A68 water).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run				N/A	8.31%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
34/48/68 CON		34/48/68 6.25%	18	10	6	1	0.8000	Non-Significant Effect
		34/48/68 12.5%	18	10	6	1	0.8000	Non-Significant Effect
		34/48/68 25%	18	10	6	1	0.8000	Non-Significant Effect
		34/48/68 50%	10	10	6	0	0.0350	Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.841008	0.460252	4	71.49	<0.0001	Significant Effect
Error	0.09656602	0.006437735	15			
Total	1.937574	0.4666897	19			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	7.241	4.893	0.0019	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.5659	0.866	<0.0001	Non-normal Distribution

**96h Survival Rate Summary**

Conc-%	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
34/48/68 CON	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/68 6.25%	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/68 12.5%	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/68 25%	4	1	1	1	1	1	0	0	0.0%	0.0%
34/48/68 50%	4	0.375	0.31	0.44	0.2	0.6	0.08539	0.1708	45.54%	62.5%

**Angular (Corrected) Transformed Summary**

Conc-%	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
34/48/68 CON	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/68 6.25%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/68 12.5%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/68 25%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
34/48/68 50%	4	0.6535	0.5853	0.7218	0.4636	0.8861	0.08971	0.1794	27.45%	53.72%

Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

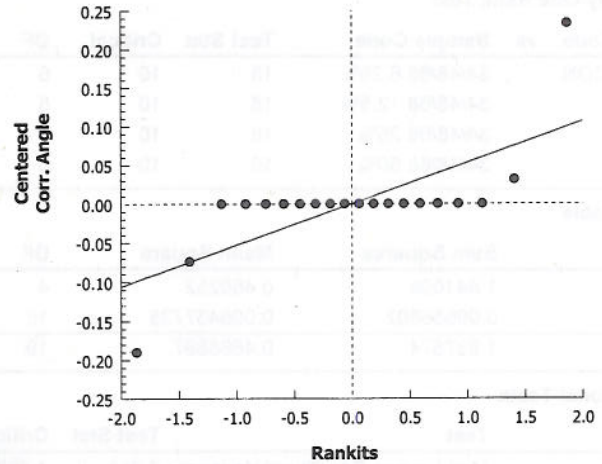
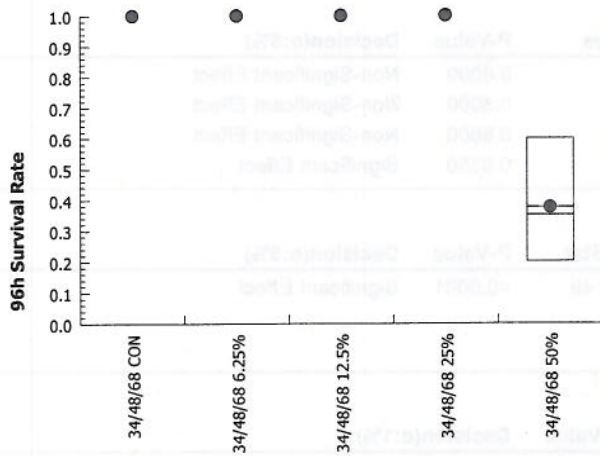
Analysis ID: 00-4654-0837      Endpoint: 96h Survival Rate  
 Analyzed: 13 Mar-13 16:51      Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

96h Survival Rate Detail

Conc-%	Rep 1	Rep 2	Rep 3	Rep 4
34/48/68 CON	1	1	1	1
34/48/68 6.25%	1	1	1	1
34/48/68 12.5%	1	1	1	1
34/48/68 25%	1	1	1	1
34/48/68 50%	0.3	0.2	0.6	0.4

Graphics



**CETIS Test Data Worksheet**

Report Date: 08 Mar-13 12:01 (p 1 of 1)  
 Test Code: 20-3796-8056/7978ECB8

**Fish 96-h Acute Survival Test**

U.S. EPA Region I Lab

Start Date: 22 Oct-12      Species: *Oncorhynchus mykiss*      Sample Code: 1012OMARTT  
 End Date: 26 Oct-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Reference Toxicant  
 Sample Date: 22 Oct-12      Material: Zinc sulfate      Sample Station:

Batch Note: Region 8: Acute RBT Ref Tox Test (concurrent to Oct 2012 Upper Animas SW Tox Test)

Sample Note: Region 8: Acute RBT Ref Tox Test (concurrent to Oct 2012 Upper Animas SW Tox Test)

Conc-µg/L	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	L	1	19	10	10	10	10	10	
0	L	2	18	10	10	10	10	10	
0	L	3	12	10	10	10	10	10	
0	L	4	17	10	10	10	10	10	
68.85		1	16	10	10	10	10	10	
68.85		2	23	10	10	10	10	10	
68.85		3	11	10	10	10	10	10	
68.85		4	6	10	10	10	10	10	
131.5		1	21	10	10	8	8	8	
131.5		2	10	10	10	6	6	6	
131.5		3	5	10	10	8	8	8	
131.5		4	20	10	10	8	8	8	
263.5		1	4	10	6	0	0	0	
263.5		2	24	10	10	0	0	0	
263.5		3	14	10	9	2	2	2	
263.5		4	9	10	7	0	0	0	
518.5		1	22	10	7	0	0	0	
518.5		2	2	10	7	0	0	0	
518.5		3	7	10	9	0	0	0	
518.5		4	13	10	6	0	0	0	
1029.5		1	15	10	4	0	0	0	
1029.5		2	3	10	3	0	0	0	
1029.5		3	8	10	5	0	0	0	
1029.5		4	1	10	7	1	0	0	

# CETIS Analytical Report

Report Date: 14 Mar-13 10:27 (p 1 of 1)  
 Test Code: 7978ECB8 | 20-3796-8056

## Fish 96-h Acute Survival Test

U.S. EPA Region I Lab

Analysis ID: 09-5896-4300      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 10:27      Analysis: Untrimmed Spearman-Kärber      Official Results: Yes

### Spearman-Kärber Estimates

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	2.212	0.02244	162.9	146.9	180.6

### 96h Survival Rate Summary

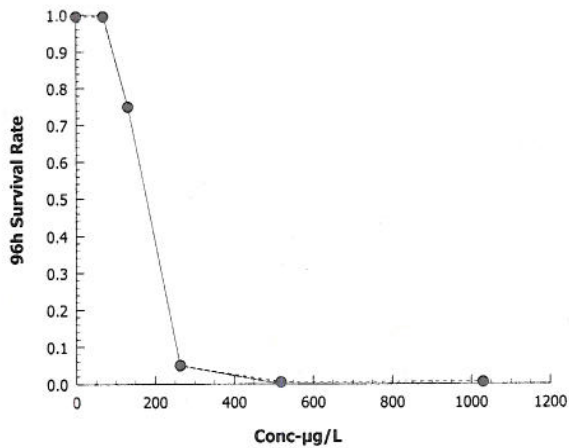
#### Calculated Variate(A/B)

Conc-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	Lab Water	4	1	1	1	0	0	0.0%	0.0%	40	40
68.85		4	1	1	1	0	0	0.0%	0.0%	40	40
131.5		4	0.75	0.6	0.8	0.05	0.1	13.33%	25.0%	30	40
263.5		4	0.05	0	0.2	0.05	0.1	200.0%	95.0%	2	40
518.5		4	0	0	0	0	0		100.0%	0	40
1029.5		4	0	0	0	0	0		100.0%	0	40

### 96h Survival Rate Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	1	1	1
68.85		1	1	1	1
131.5		0.8	0.6	0.8	0.8
263.5		0	0	0.2	0
518.5		0	0	0	0
1029.5		0	0	0	0

### Graphics



**Attachment 2**  
**November 2012 Upper Animas River Surface Water Toxicity Report**  
**CETIS Analytical Reports**



**CETIS Test Data Worksheet**

Report Date: 14 Mar-13 11:25 (p 1 of 1)  
 Test Code: 04-0904-1595/18617ABB

Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Start Date: 02 Nov-12      Species: Oncorhynchus mykiss      Sample Code: M34  
 End Date: 06 Nov-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 02 Nov-12      Material: Mining Discharge/Runoff      Sample Station: M34

Batch Note: R8: November 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED)

Conc-NA	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
A68	1	7	10	10	10	9	9	
A68	2	2	10	10	9	8	8	
A68	3	3	10	10	10	10	10	
A68	4	5	10	10	10	10	10	
M34	1	4	10	9	0	0	0	
M34	2	8	10	8	1	0	0	
M34	3	1	10	10	1	1	0	
M34	4	6	10	8	1	0	0	

# CETIS Analytical Report

Report Date: 14 Mar-13 11:25 (p 1 of 1)  
 Test Code: 18617ABB | 04-0904-1595

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 14-8077-4318      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 11:25      Analysis: Parametric-Two Sample      Official Results: Yes

Sample Code	Sample Comments
A68	R8: November 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).
M34	R8: November 2012 Upper Animas RBT Acute SW Tox Test (UNDILUTED).

Data Transform	Zeta	Alt Hyp	MC Trials	Test Result	PMSD
Angular (Corrected)	0	C > T	Not Run	Sample passes 96h survival rate endpoint	9.75%

### Equal Variance t Two-Sample Test

Sample Code	vs Sample Code	Test Stat	Critical	DF	MSD	P-Value	Decision(α:5%)
A68	M34	15.46	1.943	6	0.1428	<0.0001	Significant Effect

### ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.582248	2.582248	1	239.2	<0.0001	Significant Effect
Error	0.06478542	0.01079757	6			
Total	2.647034	2.593046	7			

### Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	10.87	13.75	0.0165	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8598	0.6451	0.1195	Normal Distribution

### 96h Survival Rate Summary

Conc-NA	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68	4	0.925	0.8886	0.9614	0.8	1	0.04787	0.09574	10.35%	0.0%
M34	4	0	0	0	0	0	0	0	0.0%	100.0%

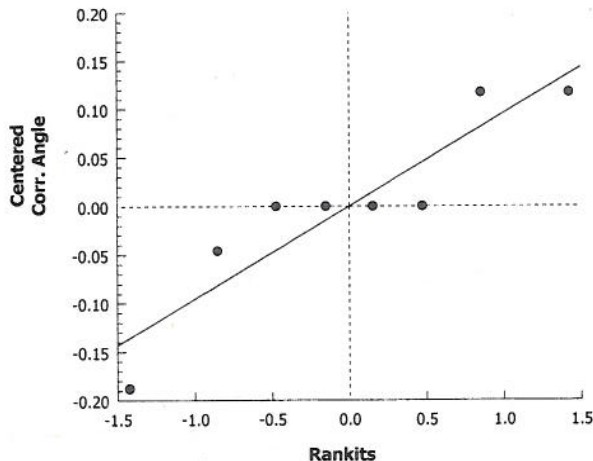
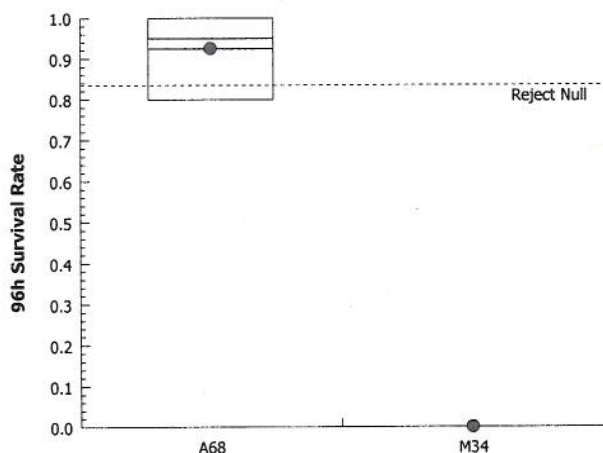
### Angular (Corrected) Transformed Summary

Conc-NA	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68	4	1.295	1.239	1.351	1.107	1.412	0.07348	0.147	11.35%	0.0%
M34	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	87.74%

### 96h Survival Rate Detail

Conc-NA	Rep 1	Rep 2	Rep 3	Rep 4
A68	0.9	0.8	1	1
M34	0	0	0	0

### Graphics



**CETIS Test Data Worksheet**

Report Date: 14 Mar-13 14:38 (p 1 of 1)  
 Test Code: 08-8242-7016/3498C488

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Start Date: 02 Nov-12      Species: *Oncorhynchus mykiss*      Sample Code: A68/A72 100%  
 End Date: 06 Nov-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 02 Nov-12      Material: Mining Discharge/Runoff      Sample Station: A68/A72 100%

Batch Note: R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68)

Conc-NA	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
A68/A72 Control	1	8	10	10	10	10	10	
A68/A72 Control	2	5	10	10	10	10	10	
A68/A72 Control	3	3	10	10	10	10	10	
A68/A72 Control	4	10	10	10	10	10	10	
A68/A72 5%	1	4	10	10	10	10	10	
A68/A72 5%	2	1	10	10	10	8	8	
A68/A72 5%	3	26	10	10	10	10	10	
A68/A72 5%	4	12	10	10	10	9	9	
A68/A72 10%	1	20	9	9	8	8	8	
A68/A72 10%	2	17	8	8	8	8	8	
A68/A72 10%	3	2	10	10	10	9	9	
A68/A72 10%	4	22	10	10	10	10	10	
A68/A72 25%	1	28	10	10	10	8	8	
A68/A72 25%	2	16	10	10	10	10	10	
A68/A72 25%	3	15	9	9	9	8	8	
A68/A72 25%	4	11	10	10	10	10	10	
A68/A72 50%	1	27	10	10	10	10	10	
A68/A72 50%	2	24	10	10	10	10	10	
A68/A72 50%	3	14	9	9	9	9	9	
A68/A72 50%	4	25	10	10	10	10	10	
A68/A72 75%	1	23	9	9	9	9	9	
A68/A72 75%	2	6	9	9	9	9	9	
A68/A72 75%	3	13	10	10	10	10	10	
A68/A72 75%	4	9	10	10	10	10	10	
A68/A72 100%	1	7	10	10	3	2	0	
A68/A72 100%	2	21	10	10	5	4	1	
A68/A72 100%	3	18	10	10	5	4	0	
A68/A72 100%	4	19	10	10	5	3	0	

**CETIS Analytical Report**

Report Date: 14 Mar-13 14:38 (p 1 of 2)  
 Test Code: 3498C488 | 08-8242-7016

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 12-0049-8676      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 14:38      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
A68/A72 Control	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).
A68/A72 5%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).
A68/A72 10%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).
A68/A72 25%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).
A68/A72 50%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).
A68/A72 75%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).
A68/A72 100%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (A72 DILUTED w/A68).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run					9.79%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
A68/A72 Control		A68/A72 5%	14	10	6	1	0.3760	Non-Significant Effect
		A68/A72 10%	14	10	6	1	0.3760	Non-Significant Effect
		A68/A72 25%	14	10	6	1	0.3760	Non-Significant Effect
		A68/A72 50%	18	10	6	1	0.8571	Non-Significant Effect
		A68/A72 75%	18	10	6	1	0.8571	Non-Significant Effect
		A68/A72 100%	10	10	6	0	0.0480	Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.657713	0.7762855	6	91.43	<0.0001	Significant Effect
Error	0.1782962	0.008490295	21			
Total	4.836009	0.7847758	27			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	5.219	3.812	0.0020	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.9013	0.8975	0.0123	Normal Distribution

**96h Survival Rate Summary**

Conc-NA	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68/A72 Control	4	1	1	1	1	1	0	0	0.0%	0.0%
A68/A72 5%	4	0.925	0.8886	0.9614	0.8	1	0.04787	0.09574	10.35%	7.5%
A68/A72 10%	4	0.9472	0.924	0.9705	0.8889	1	0.03056	0.06111	6.45%	5.28%
A68/A72 25%	4	0.9222	0.8854	0.9591	0.8	1	0.04843	0.09686	10.5%	7.78%
A68/A72 50%	4	1	1	1	1	1	0	0	0.0%	0.0%
A68/A72 75%	4	1	1	1	1	1	0	0	0.0%	0.0%
A68/A72 100%	4	0.025	0.005981	0.04402	0	0.1	0.025	0.05	200.0%	97.5%

**Angular (Corrected) Transformed Summary**

Conc-NA	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68/A72 Control	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
A68/A72 5%	4	1.295	1.239	1.351	1.107	1.412	0.07348	0.147	11.35%	8.28%
A68/A72 10%	4	1.321	1.285	1.357	1.231	1.412	0.04723	0.09445	7.15%	6.43%
A68/A72 25%	4	1.291	1.234	1.347	1.107	1.412	0.07455	0.1491	11.55%	8.6%
A68/A72 50%	4	1.41	1.408	1.412	1.403	1.412	0.002171	0.004341	0.31%	0.15%
A68/A72 75%	4	1.408	1.406	1.41	1.403	1.412	0.002505	0.00501	0.36%	0.31%
A68/A72 100%	4	0.1995	0.1685	0.2305	0.1588	0.3218	0.04074	0.08149	40.84%	85.87%

# CETIS Analytical Report

Report Date: 14 Mar-13 14:38 (p 2 of 2)  
 Test Code: 3498C488 | 08-8242-7016

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 12-0049-8676  
 Analyzed: 14 Mar-13 14:38

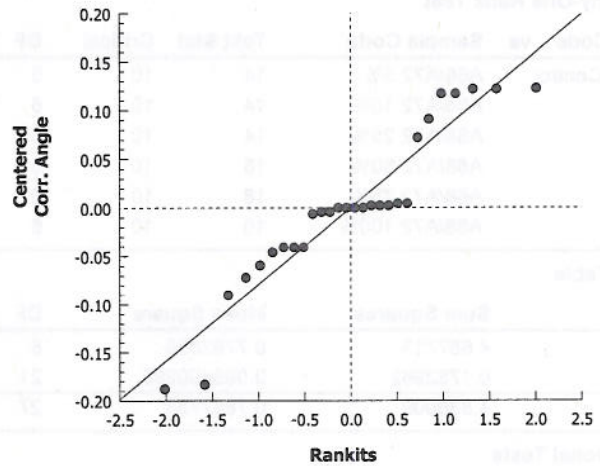
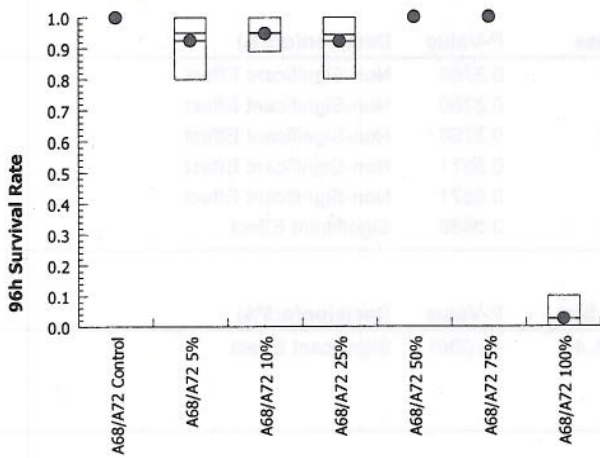
Endpoint: 96h Survival Rate  
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

### 96h Survival Rate Detail

Conc-NA	Rep 1	Rep 2	Rep 3	Rep 4
A68/A72 Control	1	1	1	1
A68/A72 5%	1	0.8	1	0.9
A68/A72 10%	0.8889	1	0.9	1
A68/A72 25%	0.8	1	0.8889	1
A68/A72 50%	1	1	1	1
A68/A72 75%	1	1	1	1
A68/A72 100%	0	0.1	0	0

### Graphics



**CETIS Test Data Worksheet**

Report Date: 14 Mar-13 11:42 (p 1 of 1)  
 Test Code: 04-7825-5370/1C81990A

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Start Date: 02 Nov-12      Species: *Oncorhynchus mykiss*      Sample Code: A68/CC48 Con  
 End Date: 06 Nov-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 02 Nov-12      Material: Mining Discharge/Runoff      Sample Station: A68/CC48 Control

Batch Note: R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68)

Conc-NA	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
A68/CC48 Con	1	25	9	9	9	9	9	
A68/CC48 Con	2	23	10	10	10	10	10	
A68/CC48 Con	3	28	10	10	10	10	10	
A68/CC48 Con	4	22	10	10	10	10	10	
A68/CC48 1%	1	18	10	10	9	9	9	
A68/CC48 1%	2	16	10	10	9	9	9	
A68/CC48 1%	3	15	10	10	10	10	10	
A68/CC48 1%	4	14	10	10	8	6	6	
A68/CC48 3%	1	9	10	10	10	10	10	
A68/CC48 3%	2	3	9	9	9	9	9	
A68/CC48 3%	3	2	10	10	9	9	9	
A68/CC48 3%	4	27	10	10	10	10	10	
A68/CC48 6%	1	6	10	10	9	9	9	
A68/CC48 6%	2	4	10	10	10	10	10	
A68/CC48 6%	3	5	10	10	10	10	10	
A68/CC48 6%	4	13	10	10	10	10	10	
A68/CC48 12%	1	24	10	10	10	9	9	
A68/CC48 12%	2	17	10	10	10	10	10	
A68/CC48 12%	3	20	10	10	10	10	10	
A68/CC48 12%	4	21	10	10	8	7	7	
A68/CC48 25%	1	7	10	10	10	6	6	
A68/CC48 25%	2	1	10	10	10	10	10	
A68/CC48 25%	3	10	10	10	10	10	10	
A68/CC48 25%	4	8	10	10	10	10	10	
A68/CC48 50%	1	26	10	0	0	0	0	
A68/CC48 50%	2	12	10	0	0	0	0	
A68/CC48 50%	3	19	10	0	0	0	0	
A68/CC48 50%	4	11	10	0	0	0	0	

**CETIS Analytical Report**

Report Date: 25 Mar-13 13:02 (p 1 of 2)  
 Test Code: 1C81990A | 04-7825-5370

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 15-7164-8232      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 11:42      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
A68/CC48 Con	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).
A68/CC48 1%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).
A68/CC48 3%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).
A68/CC48 6%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).
A68/CC48 12%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).
A68/CC48 25%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).
A68/CC48 50%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48 DILUTED w/A68).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run					17.5%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
A68/CC48 Con		A68/CC48 1%	12	10	6	1	0.1598	Non-Significant Effect
		A68/CC48 3%	16	10	6	1	0.6450	Non-Significant Effect
		A68/CC48 6%	16	10	6	1	0.6450	Non-Significant Effect
		A68/CC48 12%	14	10	6	1	0.3760	Non-Significant Effect
		A68/CC48 25%	16	10	6	1	0.6450	Non-Significant Effect
		A68/CC48 50%	10	10	6	0	0.0480	Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.719674	0.7866123	6	32.17	<0.0001	Significant Effect
Error	0.5134777	0.02445132	21			
Total	5.233151	0.8110636	27			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	0.8895	3.812	0.5201	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.8407	0.8975	0.0006	Non-normal Distribution

**96h Survival Rate Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68/CC48 Con	4	1	1	1	1	1	0	0	0.0%	0.0%
A68/CC48 1%	4	0.85	0.7841	0.9159	0.6	1	0.0866	0.1732	20.38%	15.0%
A68/CC48 3%	4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	2.5%
A68/CC48 6%	4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	2.5%
A68/CC48 12%	4	0.9	0.8462	0.9538	0.7	1	0.07071	0.1414	15.71%	10.0%
A68/CC48 25%	4	0.9	0.8239	0.9761	0.6	1	0.1	0.2	22.22%	10.0%
A68/CC48 50%	4	0	0	0	0	0	0	0	0.0%	100.0%

**Angular (Corrected) Transformed Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68/CC48 Con	4	1.41	1.408	1.412	1.403	1.412	0.002171	0.004341	0.31%	0.0%
A68/CC48 1%	4	1.199	1.114	1.284	0.8861	1.412	0.1112	0.2223	18.54%	14.95%
A68/CC48 3%	4	1.369	1.339	1.4	1.249	1.412	0.04007	0.08015	5.85%	2.89%
A68/CC48 6%	4	1.371	1.34	1.402	1.249	1.412	0.04074	0.08149	5.94%	2.74%
A68/CC48 12%	4	1.266	1.19	1.342	0.9912	1.412	0.09936	0.1987	15.7%	10.2%
A68/CC48 25%	4	1.281	1.181	1.381	0.8861	1.412	0.1315	0.263	20.54%	9.17%
A68/CC48 50%	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.74%

**CETIS Analytical Report**

Report Date: 25 Mar-13 13:02 (p 2 of 2)  
 Test Code: 1C81990A | 04-7825-5370

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 15-7164-8232      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 11:42      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

**96h Survival Rate Detail**

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4
A68/CC48 Con	1	1	1	1
A68/CC48 1%	0.9	0.9	1	0.6
A68/CC48 3%	1	1	0.9	1
A68/CC48 6%	0.9	1	1	1
A68/CC48 12%	0.9	1	1	0.7
A68/CC48 25%	0.6	1	1	1
A68/CC48 50%	0	0	0	0

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4	Survival Rate	Standard Error	95% CI Lower	95% CI Upper
A68/CC48 Con	1	1	1	1	1.0000	0.0000	1.0000	1.0000
A68/CC48 1%	0.9	0.9	1	0.6	0.8750	0.0375	0.8000	0.9500
A68/CC48 3%	1	1	0.9	1	0.9750	0.0125	0.9250	1.0000
A68/CC48 6%	0.9	1	1	1	0.9750	0.0125	0.9250	1.0000
A68/CC48 12%	0.9	1	1	0.7	0.9250	0.0125	0.8750	0.9750
A68/CC48 25%	0.6	1	1	1	0.8750	0.0375	0.8000	0.9500
A68/CC48 50%	0	0	0	0	0.0000	0.0000	0.0000	0.0000



**CETIS Test Data Worksheet**

Report Date: 25 Mar-13 12:58 (p 1 of 1)  
 Test Code: 13-6195-9587/512DDAA3

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Start Date: 02 Nov-12      Species: Oncorhynchus mykiss      Sample Code: A68/CC48/M34CON  
 End Date: 06 Nov-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Upper Animas River  
 Sample Date: 02 Nov-12      Material: Mining Discharge/Runoff      Sample Station: A68/CC48/M34 Control

Batch Note: R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68)

Sample Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
A68/CC48/M34CON	1	2	10	10	10	10	10	
A68/CC48/M34CON	2	16	10	10	10	10	10	
A68/CC48/M34CON	3	27	10	10	10	10	10	
A68/CC48/M34CON	4	21	10	10	10	10	10	
68/48/34 4%	1	5	10	10	10	10	10	
68/48/34 4%	2	26	9	9	9	9	9	
68/48/34 4%	3	19	10	10	10	10	10	
68/48/34 4%	4	17	10	10	10	9	9	
68/48/34 9%	1	12	10	10	10	10	10	
68/48/34 9%	2	6	10	10	9	9	9	
68/48/34 9%	3	8	10	10	10	10	10	
68/48/34 9%	4	10	10	10	10	9	9	
68/48/34 20%	1	22	10	10	10	10	10	
68/48/34 20%	2	15	10	10	10	10	10	
68/48/34 20%	3	4	10	10	10	10	10	
68/48/34 20%	4	11	10	10	10	10	10	
68/48/34 40%	1	9	10	10	10	10	9	
68/48/34 40%	2	13	10	10	10	10	10	
68/48/34 40%	3	18	10	10	10	10	8	
68/48/34 40%	4	24	10	10	10	10	10	
68/48/34 65%	1	7	10	7	3	1	0	
68/48/34 65%	2	14	10	9	3	1	0	
68/48/34 65%	3	25	10	9	2	2	0	
68/48/34 65%	4	23	10	10	4	4	0	
68/48/34 85%	1	1	10	0	0	0	0	
68/48/34 85%	2	20	10	0	0	0	0	
68/48/34 85%	3	3	10	0	0	0	0	
68/48/34 85%	4	28	10	0	0	0	0	

**CETIS Analytical Report**

Report Date: 25 Mar-13 12:58 (p 1 of 2)  
 Test Code: 512DDAA3 | 13-6195-9587

**Fish 96-h Acute Survival Test**

U.S. EPA Region 8 Lab

Analysis ID: 19-2177-9212      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 15:03      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

Sample Code	Sample Comments
A68/CC48/M34CON	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).
68/48/34 4%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).
68/48/34 9%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).
68/48/34 20%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).
68/48/34 40%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).
68/48/34 65%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).
68/48/34 85%	R8: November 2012 Upper Animas RBT Acute SW Tox Test (CC48/M34 DILUTED with A68).

Data Transform	Zeta	Alt Hyp	MC Trials	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	0	C > T	Not Run					7.87%

**Steel Many-One Rank Test**

Sample Code	vs	Sample Code	Test Stat	Critical	DF	Ties	P-Value	Decision(α:5%)
A68/CC48/M34CO		68/48/34 4%	16	10	6	1	0.6450	Non-Significant Effect
		68/48/34 9%	14	10	6	1	0.3760	Non-Significant Effect
		68/48/34 20%	18	10	6	1	0.8571	Non-Significant Effect
		68/48/34 40%	14	10	6	1	0.3760	Non-Significant Effect
		68/48/34 65%	10	10	6	0	0.0480	Significant Effect
		68/48/34 85%	10	10	6	0	0.0480	Significant Effect

**ANOVA Table**

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.338845	1.389808	6	263.9	<0.0001	Significant Effect
Error	0.1106143	0.005267348	21			
Total	8.449459	1.395075	27			

**Distributional Tests**

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	5.879	3.812	0.0010	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.8503	0.8975	0.0009	Non-normal Distribution

**96h Survival Rate Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68/CC48/M34CON	4	1	1	1	1	1	0	0	0.0%	0.0%
68/48/34 4%	4	0.975	0.956	0.994	0.9	1	0.025	0.05	5.13%	2.5%
68/48/34 9%	4	0.95	0.928	0.972	0.9	1	0.02887	0.05773	6.08%	5.0%
68/48/34 20%	4	1	1	1	1	1	0	0	0.0%	0.0%
68/48/34 40%	4	0.925	0.8886	0.9614	0.8	1	0.04787	0.09574	10.35%	7.5%
68/48/34 65%	4	0	0	0	0	0	0	0		100.0%
68/48/34 85%	4	0	0	0	0	0	0	0		100.0%

**Angular (Corrected) Transformed Summary**

Sample Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
A68/CC48/M34CON	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
68/48/34 4%	4	1.369	1.339	1.4	1.249	1.412	0.04007	0.08015	5.85%	3.04%
68/48/34 9%	4	1.331	1.295	1.366	1.249	1.412	0.04705	0.09409	7.07%	5.77%
68/48/34 20%	4	1.412	1.412	1.412	1.412	1.412	0	0	0.0%	0.0%
68/48/34 40%	4	1.295	1.239	1.351	1.107	1.412	0.07348	0.147	11.35%	8.28%
68/48/34 65%	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.76%
68/48/34 85%	4	0.1588	0.1588	0.1588	0.1588	0.1588	0	0	0.0%	88.76%

# CETIS Analytical Report

Report Date: 25 Mar-13 12:58 (p 2 of 2)  
 Test Code: 512DDAA3 | 13-6195-9587

## Fish 96-h Acute Survival Test

U.S. EPA Region 8 Lab

Analysis ID: 19-2177-9212  
 Analyzed: 14 Mar-13 15:03

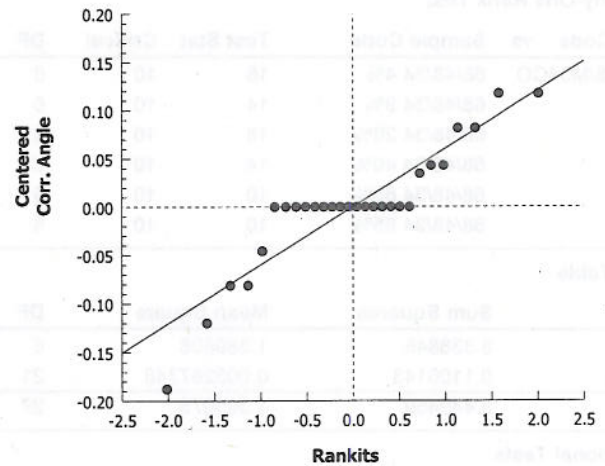
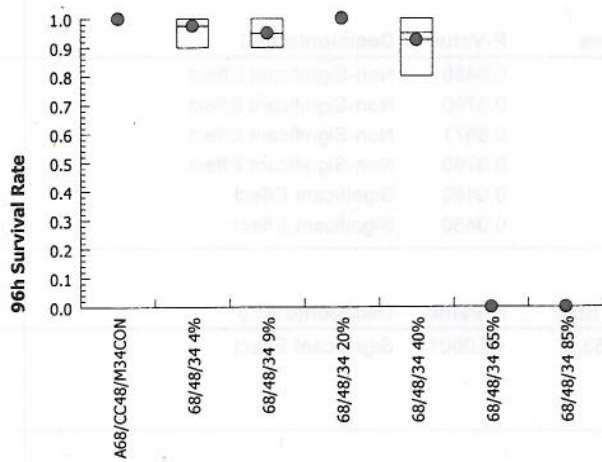
Endpoint: 96h Survival Rate  
 Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.8.0  
 Official Results: Yes

### 96h Survival Rate Detail

Sample Code	Rep 1	Rep 2	Rep 3	Rep 4
A68/CC48/M34CON	1	1	1	1
68/48/34 4%	1	1	1	0.9
68/48/34 9%	1	0.9	1	0.9
68/48/34 20%	1	1	1	1
68/48/34 40%	0.9	1	0.8	1
68/48/34 65%	0	0	0	0
68/48/34 85%	0	0	0	0

### Graphics



**CETIS Test Data Worksheet**

Report Date: 14 Mar-13 12:01 (p 1 of 1)  
 Test Code: 08-3088-5134/1112OMARTT

**Fish 96-h Acute Survival Test**

U.S. EPA Region I Lab

Start Date: 02 Nov-12      Species: *Oncorhynchus mykiss*      Sample Code: 1112OMARTT  
 End Date: 06 Nov-12      Protocol: EPA/821/R-02-012 (2002)      Sample Source: Reference Toxicant  
 Sample Date: 02 Nov-12      Material: Zinc sulfate      Sample Station:

Batch Note: Region 8: Acute RBT Ref Tox Test (concurrent to Nov 2012 Upper Animas SW Tox Test)

Sample Note: Region 8: Acute RBT Ref Tox Test (concurrent to Nov 2012 Upper Animas SW Tox Test)

Conc-µg/L	Code	Rep	Pos	# Exposed	24h Survival	48h Survival	72h Survival	96h Survival	Notes
0	L	1	1	10	10	10	10	10	
0	L	2	6	10	10	10	10	10	
0	L	3	22	10	10	10	10	10	
0	L	4	3	10	10	10	10	10	
55.3		1	14	10	10	10	10	10	
55.3		2	17	10	10	10	10	10	
55.3		3	16	10	10	10	10	10	
55.3		4	10	10	10	10	10	10	
107		1	4	10	10	5	5	5	
107		2	15	10	10	9	8	8	
107		3	5	10	10	9	9	9	
107		4	8	10	9	9	8	8	
220		1	9	10	10	0	0	0	
220		2	13	10	9	1	0	0	
220		3	20	10	8	1	0	0	
220		4	7	10	10	2	0	0	
435		1	11	10	6	0	0	0	
435		2	21	10	10	0	0	0	
435		3	12	10	9	0	0	0	
435		4	18	9	6	0	0	0	
874		1	24	8	5	0	0	0	
874		2	2	10	5	0	0	0	
874		3	19	10	4	0	0	0	
874		4	23	9	5	0	0	0	

**CETIS Analytical Report**

Report Date: 14 Mar-13 12:02 (p 1 of 1)  
 Test Code: 1112OMARTT | 08-3088-5134

**Fish 96-h Acute Survival Test**

U.S. EPA Region I Lab

Analysis ID: 12-5759-7385      Endpoint: 96h Survival Rate      CETIS Version: CETISv1.8.0  
 Analyzed: 14 Mar-13 12:01      Analysis: Untrimmed Spearman-Kärber      Official Results: Yes

**Spearman-Kärber Estimates**

Threshold Option	Threshold	Trim	Mu	Sigma	EC50	95% LCL	95% UCL
Control Threshold	0	0.00%	2.111	0.02053	129.1	117.5	141.9

**96h Survival Rate Summary**

Conc-µg/L	Control Type	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	Calculated Variate(A/B)	
										A	B
0	Lab Water	4	1	1	1	0	0	0.0%	0.0%	40	40
55.3		4	1	1	1	0	0	0.0%	0.0%	40	40
107		4	0.75	0.5	0.9	0.0866	0.1732	23.09%	25.0%	30	40
220		4	0	0	0	0	0		100.0%	0	40
435		4	0	0	0	0	0		100.0%	0	39
874		4	0	0	0	0	0		100.0%	0	37

**96h Survival Rate Detail**

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Lab Water	1	1	1	1
55.3		1	1	1	1
107		0.5	0.8	0.9	0.8
220		0	0	0	0
435		0	0	0	0
874		0	0	0	0

**Graphics**

