

Washington Department of Ecology

Tire Chemicals OECD Toxicity Testing of Ozonated 6PPD and Related Alternatives (7PPD and 77PD)

Prepared for:

Washington State Department of Ecology

Prepared by:

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Date Submitted: April 10, 2024

Data Quality Assurance:

- Enthalpy Analytical (formerly Nautilus Environmental) is accredited in accordance with NELAP by the State of Oregon Environmental Laboratory Accreditation Program (Certificate No. 4053). It is also certified by the State of California Water Resources Control Board Environmental Laboratory Accreditation Program (Certificate No. 1802) and the State of Washington Department of Ecology (Lab ID C552). Specific fields of testing applicable to each accreditation are available upon request.
- All data have been reviewed and verified.
- All test results have met minimum test acceptability criteria under their respective EPA protocols, unless otherwise noted in this report.
- All test results have met internal Quality Assurance Program requirements.

Results verified by: _

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INTRODUCTION

Washington Department of Ecology engaged Enthalpy Analytical (Enthalpy) to generate acute toxicity data on the sensitivity of rainbow trout (*Oncorhynchus mykiss*) to 6PPD and potential alternative replacement compounds. 6PPD is an additive used in the process of tire manufacturing to protect the rubber polymers from ozone. When exposed to ozone, 6PPD creates the transformation product 6PPD-quinone, which has a published lethal effect to juvenile coho salmon (*Oncorhynchus kisutch*) at concentrations below 0.1 µg/L (Tian 2022). 6PPD-quinone has been found to be present in roadway runoff and stormwater-impacted watersheds throughout the Puget Sound basin (WDOE 2022).

In 2023, Enthalpy generated acute toxicity data on the sensitivity of rainbow trout to 6PPD, 6PPD-quinone, and four alternative parent (i.e. non-ozonated) compounds. This report contains the results of a follow-on study, where the objective is to compare the relative toxicity to rainbow trout of ozonated 6PPD and two ozonated alternatives (7PPD and 77PD). While the initial study in 2023 sought to understand the toxicity of the parent compounds and reagent grade 6PPD-quinone, this study measured the relative toxicity of the ozonated derivatives of the alternative compounds relative to ozonated 6PPD.

Testing was conducted in accordance with the Organization of Economic Cooperation and Development (OECD) method 203, as it would pertain to the United Nations Economic Commission for Europe (UNECE) Globally Harmonized System of Classification and Labeling of Chemicals (GHS; UNECE 2013). Testing was augmented by guidance in OECD method 23 for preparation of difficult to test substances.

The purpose of the GHS is to provide standard criteria for the determination and classification of health, physical, and environmental hazards of chemicals. As part of the current iteration of the GHS hazard characterization system, acute aquatic toxicity tests are conducted to measure the potential of chemicals to cause injury to aquatic organisms subjected to shortterm exposure.

Testing was performed to measure acute survival effects to the rainbow trout, *Oncorhynchus mykiss*. All testing was conducted at the Enthalpy Analytical laboratory in San Diego, California. Testing was conducted between February 21 and 25, 2024.

MATERIALS AND METHODS

The test materials were not produced at Enthalpy, but were generated by Flexsys, using the following procedure.

To determine how much ozone to expose the compounds to: 0.5 grams (g) of solid 6PPD was dissolved in 200 mililiters (mL) of chloroform. Ozone (approx. 7 mg/L at a 4 L/min flow rate) was then bubbled through the solution for 120 minutes and 1 mL aliquots were taken in tared vials at the following times: 0, 20, 40, 60, 80, 100, and 120 minutes. Each aliquot was evaporated for 20 minutes under a stream of nitrogen. Each residue aliquot was dissolved in 10 mL acetonitrile, and evaluated by High Performance Liquid Chromatography (HPLC). HPLC-UV (ultra violet) peak retention times for 6PPD and 6PPD-quinone were each identified using compound standards. 40 minutes of ozonation was identified as the condition to convert the greatest percentage of 6PPD into 6PPD-quinone; therefore, it was selected as the exposure time for creating the ozonated compounds used for toxicity testing.

On November 9, 2023, the compounds were created by dissolving 0.5g of each of the three test products (6PPD, 7PPD, and 77PD) in 200 mL of chloroform. Ozone (approx. 7 mg/L at 4 L/min flow rate) was bubbled through the solution for 40 minutes. The solution was then evaporated under reduced pressure at 40 °C and shipped in the evaporation flask (100 mL round bottom). Throughout this report, the material shipped in the final evaporation flask is referred to as the "final product". The portion of that final compound estimated to be in the quinone form is referred to as the "transformation product".

Upon receipt at the Enthalpy Analytical, the products were stored in cool, dry conditions until used for using.

| Compound | Product Description |
|---------------|---------------------|
| Ozonated 6PPD | Black tar |
| Ozonated 7PPD | Black tar |
| Ozonated 77PD | Black tar |

Based on the relatively low solubility of the chemical compounds in water, each compound was weighed and then dissolved in acetone, a solvent vehicle, prior to being introduced to water and exposed to the organisms for toxicity testing. Stock solutes containing the compounds and solvents were produced and test dilutions were subsequently created by

taking an aliquot of the solvent and compound stock and adding it to water to create the final desired exposure concentrations. A solvent control, consisting of the highest concentration of solvent used in the test series, was added to laboratory dilution water, and tested concurrently to ensure the addition of the solvent itself did not cause detrimental effects to the test organisms.

The concentrations used in this study were based on the results of the testing that was performed in 2023 with a reagent grade pure 6PPD-guinone, bracketing the LC₅₀ concentration of 1.8 µg/L 6PPD-quinone from that study. Based on the initial trials performed at Flexsys, an approximately 5 percent conversation rate for 6PPD guinone and the two alternatives was assumed to be present in the final product delivered to Enthalpy. Therefore, the nominal concentrations for the all exposures were 240, 110, 50, 22, 10, and 4 micrograms per liter $(\mu g/L)$ of product; this translates to estimated nominal quinone concentrations of 12, 5.5, 2.5, 1.1, 0.5, and 0.2 µg/L of 6PPD, 7PPD, and 77PD guinone (i.e. transformation product). It should be noted that conversion trials for the two alternatives (7PPD and 77PD) were not performed by Flexsys; therefore, a conversion rate similar to 6PPD was assumed for the purposes of estimating relative toxicity among the alternatives. Once the flasks of the ozonated products were opened, less than one hour elapsed before the solids were dissolved in acetone at Enthalpy. However, there is the potential for further degradation of the ozonated products between the time the flasks were unsealed and when they were introduced to acetone; it is not possible to estimate the extent of the degradation during the time the final products were exposed to air.

A 467 milligram per liter (mg/L) acetone control (the amount added to the highest test concentration) was also tested. No subsamples for verification of compound concentrations were collected and analyzed during the testing period. Nominal concentrations were used for all data analysis and reporting.

Toxicity tests were conducted using a listed fish species in accordance with OECD method 203. The concurrent laboratory reference toxicant test used for quality assurance followed OECD guidelines. Effects were evaluated statistically using the Comprehensive Environmental Toxicity Information System[™] (CETIS, version 2.1.4.11) from Tidepool Scientific Software. Organism performance in each test was compared to that observed in the concurrent control exposure. The No Observed Effect Levels (NOEL) and Lowest Observed Effect Levels (LOEL) were calculated using a parametric or nonparametric analysis, as appropriate. The

concentrations expected to cause a lethal effect to 25 and 50 percent of test organisms (LC_{25} or LC_{50} , respectively) were calculated using linear interpolation and Spearman-Karber.

| Test Period: | 2/21/24, 16:00 to 2/25/24, 16:00 |
|--|---|
| Test Organism: | Oncorhynchus mykiss (rainbow trout) |
| Endpoint(s): | 96-hour Acute Survival |
| Test Organism Source, Size: | Thomas Fish Company (Anderson, CA), 3-6 cm |
| Test Chamber: | 3.5-L glass jars |
| Volume per Replicate, Number of Replicates: | 3 L, 2 Replicates per concentration |
| Number of Organisms per Replicate: | 5 |
| Photoperiod: | 16 hours light:8 hours darkness, ambient laboratory levels (50 – 100 ft-c) |
| Feeding: | None during the test |
| Control/Dilution Water: | Moderately hard freshwater |
| Test Concentrations: | 240, 110, 50, 22, 10, and 4 $\mu g/L;$ lab and solvent controls |
| Protocol Used: | OECD 203 Fish, Acute Toxicity Test (OECD 2019) |
| Acceptability Criteria: | Mean lab control survival ≥ 90% |
| Reference Toxicant Test: | A concurrent reference toxicant test using copper chloride |

Larval Fish Toxicity Test Specifications

RESULTS

All results are presented as the true exposure concentrations of the final products provided by Flexys; note that the actual quinone concentration (transformation product), provided in parentheses after the test concentration, is an estimation at the assumed 5 percent conversion rate.

A statistically significant effect was detected in the 240 μ g/L (12 μ g/L) concentration for the ozonated 6PPD test, resulting in a NOEL of 110 μ g/L (5.5 μ g/L). The LC₅₀ was calculated as 128 μ g/L (6.4 μ g/L), and the LC₂₅ was calculated as 100 μ g/L (5 ug/L).

No statistically significant effects were detected in any concentration tested for the ozonated 7PPD and ozonated 77PD tests, resulting in a NOEL of 240 μ g/L (12 μ g/L). The LC₅₀ and LC₂₅ values for both samples were calculated as greater than 240 μ g/L (12 μ g/L).

It should be noted that the LC_{50} of 6PPD quinone in this round of testing was higher (i.e. less toxic) than the testing performed in 2023. Reasons for this might include 1) the 2023 6PPD quinone testing was performed with a reagent grade product where this study tested ozonated parent compounds to create the transformation product, 2) the nominal test concentrations were derived with the assumption that 5 percent of the final product was present in the transformation product (i.e. quinone) form; if this conversion rate was actually lower than 5 percent, that would reduce the proportion of quinone in the final product tested, 3) other transformation products could be present in the remaining 95 percent of the final product which made the 6PPD quinone less toxic.

Regardless, since all three parent compounds were ozonated using the same method, these data suggest that the quinone forms of both 7PPD and 77PD are relatively less toxic than 6PPD quinone.

No sublethal abnormalities were observed in any of the chemicals tested.

Summaries of statistical results are provided in Table 1. Raw datasheets and complete statistical summaries are provided in Appendix A.

| Tool Concentration | Ozonated 6PPD | Ozonated 7PPD | Ozonated 77PD |
|-------------------------|----------------------------|----------------------------|----------------------------|
| (µg/L) | Mean 96-hr Survival (%) | Mean 96-hr Survival (%) | Mean 96-hr Survival (%) |
| Lab Control | 100 | 100 | 100 |
| Solvent Control | 100 | 100 | 100 |
| 4 | 100 | 100 | 100 |
| 10 | 100 | 100 | 100 |
| 22 | 100 | 100 | 100 |
| 50 | 100 | 100 | 100 |
| 110 | 70.0 | 100 | 100 |
| 240 | 0.0 | 100 | 100 |
| NOEL (µg/L) | 110 (5.5 ug/L) | 240 (12 ug/L) | 240 (12 ug/L) |
| LOEL (µg/L) | 240 (12 ug/L) | >240 (12 ug/L) | >240 (12 ug/L) |
| LC ₅₀ (µg/L) | 128 (6.4 ug/L) | >240 (12 ug/L) | >240 (12 ug/L) |
| LC25 (µg/L) | 100 (5 ug/L) | >240 (12 ug/L) | >240 (12 ug/L) |

| Table 1. | Summary | / of | Toxicity | Test | Results |
|----------|--------------------|------|----------|------|----------|
| | O MITTIMI 9 | | | | 11000110 |

NOEL = No Observed Effect Level

LOEL = Lowest Observed Effect Level

LC50 = the concentration at which 50 percent of the organisms show a lethal effect

LC25 = the concentration at which 25 percent of the organisms show a lethal effect

Values in parentheses are an estimation at the assumed 5 percent conversion rate from the parent compound to quinone.

QUALITY ASSURANCE

The product material was received in good condition. Mean control responses in all tests met minimum test acceptability criteria, and all procedures followed protocol conditions and requirements, unless otherwise noted. The fish were acclimated to the required test temperature and laboratory control water source upon receipt and were held for a period of at least 9 days before test initiation. Fish were fed to satiation in holding (as often as daily); and feeding was discontinued 24 hours before the exposure began.

Minor QA/QC issues that were not likely to have any bearing on the test results are noted on the data sheets, and a list of data qualifier codes is available in Appendix B.

Reference Toxicant Tests

Concurrent reference toxicant test results are summarized in Table 2 and presented in full in Appendix C. The reference toxicant test met minimum test acceptability criteria, and the EC₅₀ was within two standard deviations of the historical mean, indicating the organisms exhibited typical sensitivity to copper as is usually observed in the laboratory.

Table 2. Reference Toxicant Test Results

| Species & Endpoint | NOEL (μg/L copper) | LC₅₀ (µg/L copper) | Historical LC₅₀ ± 2 SD (µg/L copper) | CV (%) |
|-------------------------------------|------------------------------|--------------------|--|-----------|
| Fathead Minnow: 96-hour Survival | 25 | 64.5 | 83.0 ± 71.8 | 43.2 |

NOEL = No Observed Effect Level

 LC_{50} = the concentration at which 50 percent of the organisms show a lethal effect

Historical $LC_{50} \pm 2$ SD = the mean LC_{50} from the previous tests performed by Enthalpy, plus or minus two standard deviations CV= Coefficient of Variation

References

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- Tidepool Scientific Software. 2000-2022. CETIS Comprehensive Environmental Toxicity Information System Software, Version 2.1.4.11.
- UNECE. 2013. Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Fifth Revised Edition.
- US EPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition (EPA/821/R-02/012). US EPA Office of Water, Washington, DC.

Appendix A

Datasheets and Statistical Summaries

| CETIS Summary Report | | | | | | | | Report Test Co | Date: ode/ID: | | 26 N 240 | Mar-24 17: [.] 2-S163 / 1 | l1 (p1 of1) 7-9617-7254 |
|--|--|---------------------------------|---|--|---------------------|---------|--------------|--------------------------------|----------------------------|----------------------------|---|---------------------------------------|----------------------------|
| Acute Fish S | urvival Test | | | | | | | | | | Nautilus | Environn | nental (CA) |
| Batch ID: Start Date: Ending Date: Test Length: | 04-6430-1924 21 Feb-24 16 25 Feb-24 16 96h | t :00 :00 | Test Type: Protocol: Species: Taxon: | Survival (96h) OECD 203 Oncorhynchus | mykiss | | | Anal Dilue Brine Sour | yst: ent: e: rce: | Labora Not Ap Thoma | tory Fres plicable is Fish Cc | hwater | Age: 51 |
| Sample ID: Sample Date: Receipt Date: Sample Age: | 01-8368-3120 -26-Mar-24-17 21 Feb-24 09 |) :07- (A) :30 | Code: Material: CAS (PC): Client: | 24-5060 Chemical Prod Washington De | uct epartment of | Ecology | | Proje Sour Stati | ect: rce: on: | 6PPD-6 Washir Ozonat | quinone (ngton Dep ted 6PPD | oartment of | Ecology |
| Multiple Com | parison Sumr | nary | | | | | | | | | | | |
| Analysis ID | Endpoint | | Comr | parison Method | | | \checkmark | NOEL | LOEL | т | OEL | PMSD | s |
| 11-0229-6633 | 96h Survival I | Rate | Dunne | ett Multiple Com | parison Tes | t | • | 110 | 240 | 1 | 62.5 | 47.9% | 1 |
| Point Estimat | e Summary | | | | | | | | | | | | |
| Analysis ID | Endpoint | | Point | Estimate Meth | od | | \checkmark | Levei | ua/L | 9 | 5% LCL | 95% UCL | . s |
| 09-4437-4080 | 96h Survival F | Rate | Linea | r Interpolation (I | CPIN) | | - | EC25 | 100 | | | 270 | |
| 19-3363-1923 | 96h Survival F | ₹ate | Spear | man-Kärber | | , , , , | | EC50 | 128 | 1 | 02 | 161 | 1 |
| 96h Survival | Rate Summar | у | | | | | | | | | | | |
| Conc-µg/L | Code | Coun | t Mean | 95% LCL | 95% UCL | Min | | Max | Std Ei | rr S | td Dev | CV% | %Effect |
| 0 | S | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | 0 | .000 | 0.00% | 0.00% |
| 0 | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | 0 | .000 | 0.00% | 0.00% |
| 4 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | 0 | .000 | 0.00% | 0.00% |
| 10 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | 0 | .000 | 0.00% | 0.00% |
| 22 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | 0 | .000 | 0.00% | 0.00% |
| 50 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | 0 | .000 | 0.00% | 0.00% |
| 110 | | 2 | 0.700 | -3.110 | 4.510 | 0.400 | | 1.000 | 0.300 | 0 | .424 | 60.61% | 30.00% |
| 240 | | 2 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0. | .000 | | 100.00% |
| 96h Survival I | Rate Detail | | | | | | | MD5 | 5: 3D8D | 449960 | C88EF65 | 4D1CE358 | A7AEABEB |
| Conc-µg/L | Code | Rep 1 | Rep 2 | | | | | | | | | | |
| 0 | S | 1.000 | 1.000 | | | | | | | | | | |
| 0 | LC | 1.000 | 1.000 | | | | | | | | | | |
| 4 | | 1.000 | 1.000 | | | | | | | | | | |

A Q18423/27-124

1.000

1.000

1.000

0.400

0.000

1.000

1.000

1.000

1.000

0.000

10

22

50

110

240

Analyst: _____ QA: MS 4/4/14

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S 1

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| CETIS Ana | alyti | cal Repo | ort | | | | | Report Test Co | Date: ode/ID: | 26 M 2402 | /lar-24 17:´ 2-S163 / 1` | l1 (p 1 of 2) 7-9617-7254 |
|---------------|---------|--------------|---------------|-----------------------------|-------------|---------------|----------|-------------------|------------------|----------------|-----------------------------|------------------------------|
| Acute Fish S | urviva | al Test | | | | | | · | | Nautilus | Environn | nental (CA) |
| Analysis ID: | 11-0 | 229-6633 | End | Endpoint: 96h Survival Rate | | | | | IS Version: | CETISv2. | CETISv2.1.4 | |
| Analyzed: | 26 N | lar-24 17:10 |) Anal | ysis: Par | ametric-Cor | ntrol vs Trea | tments | State | us Level: | 1 | | |
| Edit Date: | 26 N | 1ar-24 17:08 | 3 MD5 | MD5 Hash: 999C642D3B390E | | | BD38B0EF | 138E Edit | or ID: | 007-803-386-7 | | |
| Data Transfo | rm | | Alt Hyp | | - | | NOEL | LOEL | TOEL | Tox Units | MSDu | PMSD |
| Angular (Corr | ected) | | C > T | | <u></u> | | 110 | 240 | 162.5 | | 0.479 | 47.92% |
| Dunnett Mul | tiple C | omparison | n Test | | - - | | | | | | | |
| Control | vs | Conc-µg/l | L df | Test Stat | Critical | MSD | P-Type | P-Value | Decision(| α:5%) | | |
| Lab Control | | 4 | 2 | 0 | 2.83 | 0.539 | CDF | 0.8333 | Non-Signif | icant Effect | | |
| | | 10 | 2 | 0 | 2.83 | 0.539 | CDF | 0.8333 | Non-Signif | icant Effect | | |
| | | 22 | 2 | 0 | 2.83 | 0.539 | CDF | 0.8333 | Non-Signif | icant Effect | | |
| | | 50 | 2 | 0 | 2.83 | 0.539 | CDF | 0.8333 | Non-Signif | icant Effect | | |
| • | | 110 | 2 | 1.73 | 2.83 | 0.539 | CDF | 0.1959 | Non-Signif | icant Effect | | |
| ANOVA Table | e | | | · . | | | | | | | | |
| Source | | Sum Squ | ares | Mean Squ | are | DF | F Stat | P-Value | Decision(| α:5%) | | |
| Between | | 0.18181 | | 0.036362 | | 5 | 1 | 0.4894 | Non-Signif | icant Effect | | |
| Error | | 0.218172 | | 0.036362 | | 6 | _ | | | | | |
| Total | | 0.399982 | | | | 11 | | | | | | |
| ANOVA Assu | mptio | ons Tests | | | | · · · | | | | | | |
| Attribute | | Test | | | | Test Stat | Critical | P-Value | Decision(| α:1%) | | |
| Variance | | Bartlett Ec | uality of Var | iance Test | | | | | Indetermin | ate | | |
| Distribution | | Shapiro-W | /ilk W Norma | ality Test | | 0.599 | 0.802 | 0.0001 | Non-Norm | al Distributio | on | |
| 96h Survival | Rate | Summary | | | | | | | | | | |
| Conc-µg/L | | Code | Count | Mean | 95% LCL | 95% UCL | Median | Min | Max | Std Err | CV% | %Effect |
| 0 | | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 4 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 10 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 22 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 50 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 110 | | | 2 | 0.700 | 0.000 | 1.000 | 0.700 | 0.400 | 1.000 | 0.300 | 60.61% | 30.00% |
| 240 | | | 2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 100.00% |
| Angular (Cor | rected | I) Transfor | med Summa | ary | | | | | | | | |
| Conc-µg/L | | Code | Count | Mean | 95% LCL | 95% UCL | Median | Min | Max | Std Err | CV% | %Effect |
| 0 | | LC | 2 | 1.350 | 1.340 | 1.350 | 1.350 | 1.350 | 1.350 | 0.000 | 0.00% | 0.00% |
| 4 | | | 2 | 1.350 | 1.340 | 1.350 | 1.350 | 1.350 | 1.350 | 0.000 | 0.00% | 0.00% |
| 10 | | | 2 | 1.350 | 1.340 | 1.350 | 1.350 | 1.350 | 1.350 | 0.000 | 0.00% | 0.00% |
| 22 | | | 2 | 1.350 | 1.340 | 1.350 | 1.350 | 1.350 | 1.350 | 0.000 | 0.00% | 0.00% |
| 50 | | | 2 | 1.350 | 1.340 | 1.350 | 1.350 | 1.350 | 1.350 | 0.000 | 0.00% | 0.00% |
| 110 | | | 2 | 1.020 | -3.180 | 5.210 | 1.020 | 0.685 | 1.350 | 0.330 | 46.02% | 24.55% |
| 240 | | | 2 | 0.226 | 0.225 | 0.226 | 0.226 | 0.226 | 0.226 | 0.000 | 0.00% | 83.24% |

Analyst:_____ QA: ATLY/4/44



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Convergent Rounding (3 sf)

CETIS™ v2.1.4.11 x64 (007-803-386-7)

Analyst:_____ QA: 11 4/4/14

| CETIS Anal | ytical Rep | oort | | | | | Report Test Co | Date: ode/ID: | 26 24 | Mar-24 17: 02-S163 / 1 | 11 (p 1 of 1) 7-9617-7254 |
|---|--|----------------------------|--|--|--|--|--|---|--|---|---|
| Acute Fish Sur | vival Test | | • . | | | | | | Nautilu | us Environ | nental (CA) |
| Analysis ID: Analyzed: Edit Date: | 19-3363-1923 26 Mar-24 17: 26 Mar-24 17: | En 10 An 08 MD | ndpoint: 96h Survival Rate nalysis: Untrimmed Spearman-Kärber D5 Hash: 999C642D3B390E591AFABD38B0EF1 | | | | CETI Statu -138E Edito | S Version: Is Level: or ID: | CETISv2.1.4 1 007-803-386-7 | | |
| Spearman-Kär | ber Estimate | s | | | | | | | | | |
| Threshold Opt | ion | Threshold | Trim | Mu | Sigma | EC50 | 95% LCL | 95% UCL | | | |
| Control Thresho | bld | 0 | 0.00% | 2.11 | 0.0494 | 128 | 102 | 161 | | | |
| 96h Survival R | ate Summary | / | | | Calculate | d Variate(A | /B) | a a. | | Isotor | nic Variate |
| Conc-µg/L | Code | Count | Mean | Median | Min | Max | CV% | %Effect | ΣΑ/ΣΒ | Mean | %Effect |
| 0 4 10 22 50 110 240 Graphics 1.0 0.9 0.8 0.7 0.6 0.7 0.6 0.7 0.6 0.3 0.2 0.3 0.2 0.1 0.2 0.3 0.2 0.1 0.3 0.2 0.3 0.2 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 | LC | 2 2 2 2 2 2 | 1.000 1.000 1.000 1.000 0.700 0.000 | 1.000 1.000 1.000 1.000 0.700 0.000 | 1.000 1.000 1.000 1.000 0.400 0.000 | 1.000 1.000 1.000 1.000 1.000 0.000 | 0.00% 0.00% 0.00% 0.00% 60.61% | 0.00% 0.00% 0.00% 0.00% 30.00% 100.00% | 10/10 10/10 10/10 10/10 7/10 0/10 | 1.000 1.000 1.000 0.700 0.000 | 0.00% 0.00% 0.00% 0.00% 30.00% 100.00% |
| 0 | 50 | 100 | 150 | 200 | | | | | | | |
| | | Conc- | µg/L | | | | | | | | |

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Analyst: M QA: A15 4/4/24

| CETIS | S Ana | lytical Repo | ort | | | | | Repo Test (| rt Date: Code/ID: | 26 24 | 6 Mar-24 17: 402-S163 / 1 | 11 (p 1 of 1) 7-9617-7254 |
|--|-------------------------|--|----------------------|-------------------------------|---|-------------------------------|-------------------|-----------------------|---|-----------------------|------------------------------|------------------------------|
| Acute | Fish Sı | urvival Test | | | | | | | | Nautil | us Environi | nental (CA) |
| Analys Analyz Edit Da | sis ID: :ed: ate: | 09-4437-4080 26 Mar-24 17:10 26 Mar-24 17:08 | End) Ana 3 MD | lpoint: Ilysis: 5 Hash: | 96h Survival Ra Linear Interpola 999C642D3B39 | ate ation (ICP 90E591AF | IN) FABD38B0EF | CE Sta -138E Ed | TIS Version: atus Level: itor ID: | CETIS 1 007-803 | /2.1.4 3-386-7 | |
| Linear | Interpo | plation Options | | : | | | | | | | | |
| X Tran | sform | Y Transform | ı See | d | Resamples | Exp 95 | 5% CL Met | hod | | | | |
| Linear | | Linear | 884 | 398 | 1000 | Yes | Two | -Point Inter | polation | | | |
| Point I Level | Estimat µg/L | es 95% LCL | 95% UCL | ····· | · · · · | | | | | | | |
| EC25 | 100 | | 270 | | | | | | | | | |
| 96h St | Irvival | Rate Summary | | | | Calculat | ed Variate(A | /B) | | _ | Isoto | nic Variate |
| Conc- | ug/L | Code | Count | Mean | Median | Min | Мах | CV% | %Effect | ΣΑ/ΣΒ | Mean | %Effect |
| 0 4 | | LC | 2 2 | 1.000 1.000 | 1.000 1.000 | 1.000 1.000 | 1.000 1.000 | 0.00% 0.00% | 0.00% 0.00% | 10/10 10/10 | 1.000 1.000 | 0.00% 0.00% |
| 10 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00% | 0.00% | 10/10 | 1.000 | 0.00% |
| 22 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00% | 0.00% | 10/10 | 1.000 | 0.00% |
| 50 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00% | 0.00% | 10/10 | 1.000 | 0.00% |
| 240 | | | 2 | 0.000 | 0.700 | 0.400 | 0.000 | 60.61% | 100.00% | 0/10 | 0.000 | 30.00% 100.00% |
| Graphi | ics | | | <u></u> | | | | | · | | | |
| 96h Survival Rate 0 0 0 0 0 0 0 0 0 | 0 | 50 | 100 | 150 | 200 | | | | | | | |
| | | | Conc-µ | ug/L | | | | | | | | |

Analyst: 4 QA: ATS 4/4/24

| CETIS Sur | nmary Rep | oort | | | | | | Report Test C | t Date: ode/ID: | | 26 N 240 | Mar-24 17:2 2-S164 / 14 | 4 (p 1 of 1) -4113-4033 |
|--|--|--------------|---|--|--------------------|---------|--------------|----------------------------|-------------------------------|------------------|---|----------------------------|----------------------------|
| Acute Fish Su | urvival Test | | | | ŕ | | | | | | Nautilus | Environm | ental (CA) |
| Batch ID: Start Date: Ending Date: Test Length: | 07-0442-8221 21 Feb-24 16 25 Feb-24 16 96h | :00 :00 | Test Type: Protocol: Species: Taxon: | Survival (96h) OECD 203 Oncorhynchus | mykiss | | | Ana Dilu Brir Sou | lyst: ent: ne: irce: | Lai No The | ooratory Fres t Applicable omas Fish Co | hwater | Age: 51d |
| Sample ID: Sample Date: Receipt Date: Sample Age: | 03-3228-0861 26-Mar-24-17 21 Feb-24 09: | -14-Ô :30 | Code: Material: CAS (PC): Client: | 24-5061 Chemical Prod Washington De | uct partment of | Ecology | | Proj Sou Stat | iect: rce: ion: | 6Pl Wa Oz | PD- quinone shington Dep onated 7PPD | 6 partment of | Ecology |
| Multiple Com | parison Sumn | nary | | | | | | | | | | | |
| Analysis ID | Endpoint | | Com | oarison Method | | | V. | NOEL | LOEL | - | TOEL | PMSD | s |
| 12-8584-6715 | 96h Survival F | Rate | Fishe | r Exact Test | | | | 240 | >240 | | | | |
| Point Estimat | e Summary | | | | | | | | | | | | |
| Analysis ID | Endpoint | | Point | Estimate Meth | od | | \checkmark | Level | ua/L | | 95% LCL | 95% UCL | s |
| 14-4112-7177 | 96h Survival F | Rate | Linea | r Interpolation (I | CPIN) | | | EC25 EC50 | >240 >240 | | | | 1 |
| 96h Survival I | Rate Summary | / | | | | | | | | | | | |
| Conc-µg/L | Code | Cou | nt Mean | 95% LCL | 95% UCL | Min | | Max | Std E | rr | Std Dev | CV% | %Effect |
| 0. | S | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 0 | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 4 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 22 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 110 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 240 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 96h Survival I | Pato Dotail | - | | | | | | 1.000 MD | E: 770/ | 071 | 0.000 | | |
| Conc-ug/l | | Pen | 1 Pan 2 | | | | | | 5. 7704 | 1071 | | 4000040 | 20412003 |
| 0 | S | 1.00 | | | | | | | | | | | |
| 0 | | 1.00 | 0 1.000 | | | | | | | | | | |
| 4 | LO | 1.00 | 0 1.000 | | | | | | | | | | |
| 4 | | 1.00 | 0 1.000 | | | | | | | | | | |
| 10 | | 1.00 | 0 1.000 | | | | | | | | | | |
| 22 | | 1.00 | U 1.000 | | | | | | | | | | |
| 50 | | 1.00 | 0 1.000 | | | | | | | | | | |
| 110 | | 1.00 | 0 1.000 | | | | | | | | | | |
| 240 | | 1.00 | 0 1.000 | | | | | | | | | | |

@Q164 3/27/24

Baughes 4/4/24

Analyst: QA: #C 4/4/24

| Nautilus Acute Fish Survival Test Nautilus Analysis ID: 12-8584-6715 Endpoint: 96h Survival Rate CETIS Version: CETIS Version: 1 Analyzed: 26 Mar-24 17:23 Analysis: Single 2x2 Contingency Table Status Level: 1 Edit Date: 26 Mar-24 17:15 MDS Hash: 5014DA71A339DB760C490E96A6AC1B18 Editor ID: 007-803-3 Data Transform Alt Hyp NOEL LOEL TOEL Tox Units Untransformed C > T 240 >240 Fisher Exact Test Control 4 1.000 Exact 1.0000 Non-Significant Effect Lab Control 4 1.000 Exact 1.0000 Non-Significant Effect 22 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies 240 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Surmary Code | Environmental (CA) 1.4 186-7 |
|---|------------------------------------|
| Analysis ID: 12-8584-6715 26 Mar-24 17:23 Edit Date: Endpoint: 96h Survival Rate CETIS Version: CETIS Version: CETIS Version: 1 Edit Date: 26 Mar-24 17:23 MD5 Hash: Single 2x2 Contingency Table Status Level: 1 Data Transform Alt Hyp NOEL LOEL TOEL Tox Units Untransformed C > T 240 >240 Fisher Exact Test C > T Test Stat P-Type P-Value Decision(c:5%) Lab Control 4 1.000 Exact 1.0000 Non-Significant Effect 10 1.000 Exact 1.0000 Non-Significant Effect 22 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies 10 0 10 0.000 0.00% 240 | 1.4 |
| Latic Date: 26 Midi-24 17:15 MIDS Hash: 5014D/r/A339DB/60C490E96A6AC1B18 Editor ID: 007-803-3 Data Transform Alt Hyp NOEL LOEL TOEL TOEL Tost Units Untransformed C > T 240 >240 Fisher Exact Test Test Stat P-Type P-Value Decision(α:5%) Lab Control 4 1.000 Exact 1.0000 Non-Significant Effect 22 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies Conc-µg/L Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 100 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 240 10 0 10 | |
| Data Transform Alt Hyp NOEL LOEL TOEL TOEL Toel Toe Units Untransformed C > T 240 >240 Fisher Exact Test Test Stat P-Type P-Value Decision(a:5%) Lab Control 4 1.000 Exact 1.000 Non-Significant Effect 22 1.000 Exact 1.000 Non-Significant Effect 22 1.000 Exact 1.000 Non-Significant Effect 22 1.000 Exact 1.000 Non-Significant Effect 30 1.000 Exact 1.000 Non-Significant Effect 96h Survival Rate Frequencies 1.000 Exact 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 96h Survival Rate 10 0< | |
| Solution control C > 1 Z40 >Z40 Z40 Z40 <thz0< th=""> Z40 Z40</thz0<> | |
| Fisher Exact Test vs Conc-μg/L Test Stat P-Type P-Value Decision(α:5%) Lab Control 4 1.000 Exact 1.0000 Non-Significant Effect 10 1.000 Exact 1.0000 Non-Significant Effect 22 1.000 Exact 1.0000 Non-Significant Effect 50 1.000 Exact 1.0000 Non-Significant Effect 110 1.000 Exact 1.0000 Non-Significant Effect 240 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies I 1.000 Exact 1.0000 Non-Significant Effect 0 LC 10 0 10 Non-Significant Effect I 0 LC 10 0 1.0000 Non-Significant Effect I 22 10 0 1.0000 Non-Significant Effect I I 96h Survival Rate IC 10 0 1.000 0.0000 0.00% </td <td></td> | |
| Control vs Conc-μg/L Test Stat P-Type P-Value Decision(α:5%) Lab Control 4 1.000 Exact 1.0000 Non-Significant Effect 10 1.000 Exact 1.0000 Non-Significant Effect Image: Significant Effect 22 1.000 Exact 1.0000 Non-Significant Effect Image: Significant Effect 50 1.000 Exact 1.0000 Non-Significant Effect Image: Significant Effect 240 1.000 Exact 1.0000 Non-Significant Effect Image: Significant Effect 96h Survival Rate Frequencies 240 1.000 Exact 1.0000 0.000 0.00% 10 0 10 1.000 1.000 0.000 0.00% Image: Significant Effect Image: | |
| Lab Control 4 1.000 Exact 1.000 Non-Significant Effect 10 1.000 Exact 1.000 Non-Significant Effect Image: Significant Effect 22 1.000 Exact 1.000 Non-Significant Effect Image: Significant Effect 50 1.000 Exact 1.000 Non-Significant Effect Image: Significant Effect 110 1.000 Exact 1.000 Non-Significant Effect Image: Significant Effect 96h Survival Rate Frequencies Image: Significant Effect Image: Significant Effect Image: Significant Effect 0 LC 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% Image: Significant Effect Image: Significant Effect 22 10 0 10 1.000 0.000 0.00% Image: Significant Effect I | |
| 22 1.000 Exact 1.0000 Non-Significant Effect 50 1.000 Exact 1.0000 Non-Significant Effect 110 1.000 Exact 1.0000 Non-Significant Effect 240 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies Conc-µg/L Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 10 1.000 22 10 0 10 1.000 0.000 0.00% 10 10 0 10 1.000 0.000 0.00% 10 1.000 1.000 22 10 0 10 1.000 0.000 0.00% 10 110 0 10 1.000 0.000 0.00% 10 1.000 0.00% 240 10 0 10 1.000 0.000 | |
| 50 1.000 Exact 1.000 Non-Significant Effect 110 1.000 Exact 1.000 Non-Significant Effect 240 1.000 Exact 1.000 Non-Significant Effect 96h Survival Rate Frequencies Conc-µg/L Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 10 1.000 0.000 0.00% 4 10 0 10 1.000 0.000 0.00% 10 10 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% 240 10 0 10 0.000 0.00% 240 10 0 10 0.000 0.00% Sef | |
| 110 1.000 Exact 1.0000 Non-Significant Effect 240 1.000 Exact 1.0000 Non-Significant Effect 96h Survival Rate Frequencies Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 10 1.000 0.000 0.00% 4 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% 1.000 240 10 0 10 1.000 0.000 0.00% Semmary Conc-µg/L Code Count Mean 95% LCL< | |
| 240 1.000 Exact 1.000 Non-Significant Effect 96h Survival Rate Frequencies Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 10 1.000 0.000 0.00% 4 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% 1.000 240 10 0 10 1.000 0.000 0.00% 1.00% 96h Survival Rate Summary Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC < | |
| 96h Survival Rate Frequencies Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 10 0.000 0.00% 4 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% - 22 10 0 10 1.000 0.000 0.00% - 50 10 0 10 1.000 0.000 0.00% - - 110 0 10 1.000 0.000 0.00% - - 50 10 0 10 1.000 0.000 0.00% - 110 0 10 1.000 0.000 0.00% - - 240 10 0 10 0.000 0.000 0.00% - 96h Survival Rate Std Err 100 1.000 1.000 1.000 1.000 | |
| Conc-μg/L Code NR R NR + R Prop NR Prop R %Effect 0 LC 10 0 10 1.000 0.000 0.00% 4 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% - 240 10 0 10 1.000 0.000 0.00% - 96h Survival Rate Kummary Kummary Kummary Kummary Kummary Kummary Kummary 0 LC 2 1.000 1.000 1.000 1.000 1.000 0.000 | |
| 0 LC 10 0 10 1.000 0.000 0.00% 4 10 0 10 1.000 0.000 0.00% 10 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% 1.000 240 10 0 10 1.000 0.000 0.00% 1.000 240 10 0 10 1.000 0.000 0.00% 1.000 240 10 0 10 1.000 0.000 0.00% 1.000 1.000 96h Survival Rate Summary Std Err Std Err 0 LC 2 1.000 1.000 1.000 1.000 0.000 | |
| 4 10 0 10 1.000 0.000 0.00% 10 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 96h Survival Rate V Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 0.000 | |
| 10 10 0 10 1.000 0.000 0.00% 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 0 10 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 96h Survival Rate Summary Conc-µg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 0.000 | |
| 22 10 0 10 1.000 0.000 0.00% 50 10 0 10 1.000 0.000 0.00% 110 10 0 10 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 96h Survival Rate Summary Conc-μg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 0.000 | |
| 50 10 0 10 1.000 0.000 0.00% 110 10 0 10 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 96h Survival Rate Summary Conc-µg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 0.000 | |
| 10 0 10 1.000 0.000 0.00% 240 10 0 10 1.000 0.000 0.00% 96h Survival Rate Summary Conc-µg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 0.000 | |
| 240 10 0 10 1.000 0.000 0.00% 96h Survival Rate Summary Conc-μg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 1.000 0.000 | |
| 96h Survival Rate Summary Conc-μg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 1.000 0.000 | |
| Conc-µg/L Code Count Mean 95% LCL 95% UCL Median Min Max Std Err 0 LC 2 1.000 1.000 1.000 1.000 1.000 0.000 | |
| | CV% %Effect |
| | 0.00% 0.00% |
| 4 2 1.000 1.000 1.000 1.000 1.000 1.000 0.000 10 2 1.000 1.000 1.000 1.000 1.000 0.000 | 0.00% 0.00% |
| 22 1.000 1.000 1.000 1.000 1.000 1.000 0.000 | |
| 50 2 1,000 1,000 1,000 1,000 1,000 1,000 0,000 | |
| | |
| 240 2 1.000 1.000 1.000 1.000 1.000 0.000 | 0.00% 0.00% |
| Graphics | |
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| 0.8 - | |
| 2 0.7 - | |
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| ο 0.4 - Ξ | |
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| 0.2 - | |
| 0.1 - | |
| 0.0 - | |
| 0 LC 4 10 22 50 110 240 | |
| Conc-µg/L | |
| | |

19 QA: PTS 4/4/24 Analyst:____

17 of 34

| CETIS | 6 Ana | lytical Repo | ort | | | | | R Te | eport Date: est Code/ID: | 26 24 | Mar-24 17: 02-S164 / 1 | 25 (p 1 of 1) 4-4113-4033 |
|---|----------------------|--|---|---|--|--|--|---------|--|--|--|--|
| Acute F | Fish Su | urvival Test | | | | | | | | Nautil | us Environ | mental (CA) |
| Analysi Analyze Edit Da | is ID: ed: te: | 14-4112-7177 26 Mar-24 17:24 26 Mar-24 17:15 | Ene Ana MD | dpoint: 9 alysis: L 95 Hash: 5 | 6h Survival Ra inear Interpola 014DA71A33 | ate ation (ICPI 9DB760C4 | N) 190E96A6AC | C1B18 | CETIS Version Status Level: Editor ID: | CETISv 1 007-803 | 2.1.4 3-386-7 | |
| Linear | Interpo | olation Options | | | | | | | ······ | | | |
| X Trans | sform | Y Transform | See | ed | Resamples | Exp 95 | % CL Met | hod | | | | |
| Linear | | Linear | 117 | /0682 | 1000 | Yes | Two | -Point | Interpolation | - | | |
| Point E Level | stimat µg/L | es 95% LCL | 95% UCL | - | | | ····· | - | | | | |
| EC25 EC50 | >240 >240 | | | | | | | | | | | |
| 96h Su | rvival i | Rate Summary | | | | Calculate | ed Variate(A | /B) | | | Isoto | nic Variate |
| Conc-µ | g/L | Code | Count | Mean | Median | Min | Max | CV۶ | % %Effect | ΣΑ/ΣΒ | Mean | %Effect |
| 4 10 22 50 110 240 Graphic 1- 1- 1- 1- 1- 1- 1- 2- 50 1- 1- 1- 1- 2- 50 1- 2- 50 1- 50 1- 50 1- 50 2- 50 110 1- 50 110 1- 50 110 1- 50 110 1- 50 110 1- 50 110 1- 50 110 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- 1- | CS | LU | 2 | 1.000 1.000 1.000 1.000 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 | 0.00 | 0% 0.00% 0% 0.00% 0% 0.00% 0% 0.00% 0% 0.00% | 10/10 10/10 10/10 10/10 10/10 10/10 | 1.000 1.000 1.000 1.000 1.000 1.000 | 0.00% 0.00% 0.00% 0.00% 0.00% 0.00% |
| 2, 1 - 0 - 0 - 0 - 0 - 0 - | 0 | 50 | 100 Conc-µ | 150 g/L | 200 | | | | | | | |

Analyst: _____ QA: _____ QA: _____

| CETIS Sur | nmary Rep | ort | | | | | | Report Test C | t Date: ode/ID: | | 26 I 240 | Mar-24 17:2 2-S165 / 01 | 5 (p 1 of 1) -4895-4476 |
|--|---|------------|---|--|---------------------|---------|--------------|----------------------------|--------------------------------|------------------------|---|----------------------------|----------------------------|
| Acute Fish Su | urvival Test | | | | | | | | | | Nautilus | Environm | ental (CA) |
| Batch ID: Start Date: Ending Date: Test Length: | 07-2807-0381 21 Feb-24 16: 25 Feb-24 16: 96h | 00 00 | Test Type: Protocol: Species: Taxon: | Survival (96h) OECD 203 Oncorhynchus | mykiss | | | Ana Dilu Brir Sou | lyst: lent: ne: lrce: | Labo Not A Thorr | ratory Fres opplicable nas Fish Co | hwater | Age: 51d |
| Sample ID: Sample Date: Receipt Date: Sample Age: | 13-6777-6296 : 26 Mar-24 17: : 21 Feb-24 09: | 18 🕑 30 | Code: Material: CAS (PC): Client: | 24-5062 Chemical Prod Washington De | uct epartment of | Ecology | | Proj Sou Stat | ject: irce: ion: | 6PPE Wasł Ozon |) -quinone (hington Der ated 77PD | B) partment of | Ecology |
| Multiple Com | parison Summ | ary | | | | | | | | | | | |
| Analysis ID | Endpoint | | Com | oarison Method | I , | | \checkmark | NOEL | LOEL | | TOEL | PMSD | 5 |
| 20-0593-3733 | 96h Survival R | ate | Fishe | r Exact Test | | | | 240 | >240 | | | | |
| Point Estimat | te Summary | | | · · · · · · · · · · · · · · · · · · · | | | | | <u></u> | | | | |
| Analysis ID | Endpoint | | Point | Estimate Meth | od | | \checkmark | Level | ua/L | | 95% LCL | 95% UCL | |
| 10-6092-1087 | 96h Survival R | ate | Linea | r Interpolation (I | CPIN) | | | EC25 | >240 | | | | |
| | | | | | | | | EC50 | >240 | | | | |
| 96h Survival | Rate Summary | | | | | | | | | | | | |
| Conc-µg/L | Code | Cour | nt Mean | 95% LCL | 95% UCL | Min | | Max | Std E | rr | Std Dev | CV% | %Effect |
| 0 | S | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 0 | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 4 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 10 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 22 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 50 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 1110 | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 240 | ** | 2 | 1.000 | 1.000 | 1.000 | 1.000 | | 1.000 | 0.000 | | 0.000 | 0.00% | 0.00% |
| 96h Survival I | Rate Detail | | | | | | | MD | 5: 77C4 | 07B2 | F718B6D2 | 4E8A534DI | E8412863 |
| Conc-µg/L | Code | Rep | I Rep 2 | · · | | | | | | | | | |
| 0 | S | 1.000 | 1.000 | | | | | | | | | | |
| 0 | LC | 1.000 | 1.000 | | | | | | | | | | |
| 4 | | 1.000 | 1.000 | | | | | | | | | | |
| 10 | | 1.000 | 1.000 | | | | | | • | | | | |
| 22 | | 1.000 | 1.000 | | | | | | | | | | |
| 50 | | 1.000 | 1.000 | | | | | | | | | | |
| 110 | | 1.000 | 1.000 | | | | | | | | | | |
| 240 | | 1.000 | 1.000 | | | | | | | | | | |
| | | | | | | | | | | | | | |

@ a1843/27/24

(Saurito 4/4/24

Analyst: 4 QA: MS 4/4/24

| CETIS An | alyti | cal Rep | ort | | | | | Rep Tes | oort Date: t Code/ID: | 26 24 | Mar-24 17: 02-S165 / (| :26 (p 1 of 1) 01-4895-4476 |
|---------------------------|--------------|--------------------------|-------|--------------------------------|-----------------------------|---------------------------------------|----------|------------|--------------------------------|--------------|---------------------------|--------------------------------|
| Acute Fish S | Burviv | al Test | | | | | | | | Nautilu | is Environ | mental (CA) |
| Analysis ID: Analyzed: | 20-0 26 M |)593-3733 Mar-24 17:1 | 9 | Endpoint: 96h Analysis: Sin | n Survival R gle 2x2 Cor | ate itingency Ta | ble | (5 | ETIS Version: Status Level: | CETISv: 1 | 2.1.4 | |
| Edit Date: | 26 1 | Mar-24 17:1 | 8 | MD5 Hash: 501 | 4DA71A33 | 9DB760C49 | 0E96A6AC | 1B18 E | ditor ID: | 007-803 | -386-7 | |
| Data Transfo | orm | | Alt H | Іур | | | NOEL | LOEL | TOEL | Tox Unit | S | |
| Untransforme | ed | | C > T | · | | · · · · · · · · · · · · · · · · · · · | 240 | >240 | | | | |
| Fisher Exac | Test | | | | | | | | | | | |
| Control | vs | Conc-µç | g/L | Test Stat | P-Type | P-Value | Decision | (α:5%) | | | | |
| Lab Control | | 4 | | 1.000 | Exact | 1.0000 | Non-Sign | ificant E | fect | | | |
| | | 10 | | 1.000 | Exact | 1.0000 | Non-Sign | ificant Et | fect | | | |
| | | 22 | | 1.000 | Exact | 1.0000 | Non-Sign | ificant E | fect | | | |
| | | 50 | | 1.000 | Exact | 1.0000 | Non-Sign | ificant Et | fect | | | |
| | | 110 | | 1.000 | Exact | 1.0000 | Non-Sign | ificant Et | fect | | | |
| | | 240 | | 1.000 | Exact | 1.0000 | Non-Sign | ificant Ef | fect | | | |
| 96h Survival | Rate | Frequenci | es | | | | | | | | | |
| Conc-µg/L | | Code | NR | R | NR + R | Prop NR | Prop R | %Effe | ct | | , | |
| 0 | | LC | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | 1 | | | |
| 4 | | | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | | | | |
| 10 | | | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | | | | |
| 22 | | | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | | | | |
| 50 | | | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | | | | |
| 110 | | | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | | | | |
| 240 | | | 10 | 0 | 10 | 1.000 | 0.000 | 0.00% | | | | |
| 96h Survival | Rate | Summary | | | | | | | | | | |
| Conc-µg/L | | Code | Coun | t Mean | 95% LCL | 95% UCL | Median | Min | Max | Std Err | CV% | %Effect |
| 0 | ~ | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 4 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 10 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 22 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 50 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| 110 | | | 2 | 1.000 | 1 000 | 1 000 | 1 000 | 1 000 | 1 000 | 0.000 | 0.00% | 0.00% |
| 240 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% |
| <u> </u> | | | | | | ······ | | | | | | |
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Convergent Rounding (3 sf)

Analyst: M QA: Ars 1/4/24

| CETI | S Ana | alytical Repo | ort | - | | | | Re Te | eport Date: est Code/ID: | 26 24 | Mar-24 17: 102-S165 / 0 | 26 (p 1 of 1))1-4895-4476 |
|----------------------------|-------------------------|--|-------------------|-----------------------------|--|--------------------------------|------------------|----------|---|------------------------|----------------------------|-------------------------------|
| Acute | Fish Su | urvival Test | | | | | | | | Nautil | us Environ | mental (CA) |
| Analys Analyz Edit D | sis ID: zed: ate: | 10-6092-1087 26 Mar-24 17:19 26 Mar-24 17:18 | End Ana MD: | point: lysis: 5 Hash: | 96h Survival R Linear Interpol 5014DA71A33 | ate ation (ICPI 9DB760C4 | N) 490E96A6AC | :1B18 | CETIS Version: Status Level: Editor ID: | CETISv 1 007-803 | /2.1.4 3-386-7 | |
| Linear | Interpo | plation Options | | | | | | | | | | |
| X Tran | sform | Y Transform | See | d | Resamples | Exp 95 | % CL Met | hod | | | | |
| Linear | | Linear | 2224 | 430 | 1000 | Yes | Two | -Point | Interpolation | | | |
| Point Level | Estimat µg/L | tes 95% LCL | 95% UCL | | | | | | , | | | |
| EC25 | >240 | | | | | | | | | | | |
| EC50 | >240 | | | | | | | | | | | |
| 96h Sı | urvival I | Rate Summary | | | | Calculate | ed Variate(A | /B) | | | Isoto | nic Variate |
| Conc- | µg/L | Code | Count | Mean | Median | Min | Мах | CV% | % %Effect | ΣΑ/ΣΒ | Mean | %Effect |
| 0 | | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % 0.00% | 10/10 | 1.000 | 0.00% |
| 4 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % 0.00% | 10/10 | 1.000 | 0.00% |
| 10 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % 0.00% | 10/10 | 1.000 | 0.00% |
| 22 | - | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % 0.00% | 10/10 | 1.000 | 0.00% |
| 50 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % 0.00% | 10/10 | 1.000 | 0.00% |
| 110 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % 0.00% | 10/10 | 1.000 | 0.00% |
| 240 | | | 2 | 1.000 | 1.000 | 1.000 | 1.000 | 0.00 | % | 10/10 | 1.000 | 0.00% |
| Graph | ics | | | | | | | | | | | |
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| | 0 | 50 | 100 | 150 | 200 | | | | | | | |
| | | | Conc-µc | J/L | | | | | | | | |

Analyst: <u></u> QA: A((4/4/24

Water Quality Measurements & Test Organism Survival

| Client: V | VADOE | | | |
|------------|---------|----------|------|--|
| Sample ID: | gietone | control | | |
| Test No.: | 2402 - | ·5163 to | 2012 | |

| Test Species: <u>O. mykiss</u> | | |
|--------------------------------|------|--|
| Start Date/Time: 2/21/24 | 1600 | |
| End Date/Time: <u> </u> | 1600 | |

| Concentration | Ren | Γ | | N | umbe | r of | | | | pH | 、 | | 201 | Disso | lved C | Dxyge | n | 1 | Co | nduct | ivity | | 1 | Ter | npera | ture | | Percent |
|----------------------|-------------|---------------|------------|---------|----------|----------|----------|---------|-------|---------------|---------|---------------|----------|--------------|-------------|----------|----------|-------|-----------|-------|--------------|-------|----------|--------|--------------|--------|------|----------|
| Concentration | Тер | 0 | 1 | 24 | 48 | 72 | 96 | 0 | 24 | <u>(units</u> | ; 72 | 96 | 0 | 24 | (mg/L 48 | 72 | 96 | 0 | (u) 24 | | cm) 72 | 96 | | 24 | (°C) 48 | 72 | 90 | Survival |
| Acetone | A | 5 | 5 | 5 | S | 5 | 5 | 7.82 | 7.27 | 7.26 | 7.29 | 7.34 | 11.9 | 1803 | 8.8 | 9.3 | 89 | 299 | 300 | 247 | 798. | 295 | 12.5 | 11.9 | 12,0 | 12,1 | 12.1 | |
| Control | в | 5 | 5 | 3 | 5 | 5 | 5 | 7.86 | 7.32 | 7.32 | 7.35 | 7.38 | 11.8 | 130 | 8,6 | 9.3 | 8.9 | 299 | 300 | 296 | 298 | 295 | 12.5 | 11.8 | 119 | 11.9 | 12.0 | 100 |
| | | | | | | | 1 | | | | | | | | | | | | <u> </u> | | | | | | | | | |
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| | | | | | | | | | | <u> </u> | | | | | | <u> </u> | <u> </u> | | | | | | | | | - | | |
| | | | | | <u> </u> | | | | | | | | | | | | | ļ | | | | | - | | | | | |
| | | | | | | | <u> </u> | | | | | | | | | | | | | | | | | | | | | |
| Tech Initials | Counts | WF | WF | WF | WF | WF | Gm | | | | | | | | | | | | | | | | | | | | | |
| ····· | WQ | Mr | Х | WF | WF | WF | Gm | | | | | | | | | | | | | | | | | | | | | |
| | QC | ml | | | | | | | | | | . . | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | Fish | Size a | t test i | initiati | on*: | | | | | | | | | | | | | |
| | | | | _ | | (| | | | | Weig | hts (g |): C | 2.341 | 0.422 | 0.364 | 0.397 | 0.367 | , | | μ = <u>c</u> | .378 | 3 | | | | | |
| | Environ | mental | Chan | nber: | | 12 | | | | - | l ong | the (c | m). | 3.20 | २ उँ | 336 | 3 70 | 775 | | | | z วผ | | | اممر | | | mizili |
| | | 0 | <i>(</i>) | | | | | | | | Long | | | <u> </u> | <u></u> | | 3.30 | | | | μ | | - | | LUau | ung ra | ne – | <u></u> |
| Sample Descrip | otion: | crei | WL | idur | 0 | | | | | . A | nimal | Sourc | e/Dat | e Rece | eived: | Thon | nus | Fish | 10. | 2/9/2 | 4 | Age a | at Initi | ation: | 51 | da | γ S | |
| Comments: | | <u>*5 ran</u> | dom | fish a | re sac | rificed | l at ini | tiation | for s | ize de | termir | <u>atio</u> n | . Ø0 | <u>218</u> 6 | JF 2 | 1221 | 124 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QC Check: | | KL | - 31- | 26/- | 24 | _ | | | | | | | | | | | | | | | | Fi | nal Re | eview: | . | Ч/ч. | 124 | |
| Enthalpy Analytica | I. 4340 Vai | ndever A | lvenue | . San I | Diego, (| CA 921: | 20. | | | | | | | | | | | | | | | | | | | | j | |

OECD 203

Freshwater Acute Bioassay Static Conditions DF-018

Client: WADOE

Sample ID: Ozonated 6PPD

Test No.: 2402-5163

| Test Species: | O. mykiss | | |
|------------------|-----------|------|--|
| Start Date/Time: | 2121/24 | 1600 | |
| End Date/Time: | 2)25/24 | 1600 | |

Water Quality Measurements

& Test Organism Survival

| Concentration | | | | N | umber | of | | | | рΗ | | | | Disso | lved Ç | Dxyge | n | | Со | nducti | vity | | T | Ter | npera | ture | | Barrie |
|----------------|------------|--------|--|---------|---------|----------------|----------|------------|-----------|-----------|--------|----------|----------|-----------|--------|----------|----------|-------------|------------|--------|---|--------|----------|--------|-------|----------------------|----------------|----------|
| (ug/L) | Rep | | Na sana sa | Live | Orgar | isms | | | | (units |) | | Q14 | 014 | (mg)/L |) a14 | 1 | 1 | ur) | nhos/ | cm) | | | | (°C) | | | Percent |
| | | | 1 | 24 | 48 7 | 72 く | 96 | 0 7 Q I | 24 700 | 48 | 72 | 96 | 0 | 24 a < | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | |
| Lab Control | A | 5 | フ て | 13- | 3 | Z | 5 | 7.01 | 1.68 | 7.11 | 1.36 | 7.2-7 | 11.0 | (1.) | 8.6 | 9.6 | 9.0 | 200 | 201 | 295 | 247 | 293 | 1212 | 120 | 160 | 12.0 | 12-1 | 100 |
| | <u> </u> | 5 | 2 | | 1 | 12 | 5 | 118> | 1.56 | 1.24 | 1.72 | (/.2.) | 16-1 | 9.2 | 8.9 | 01) | 8.6 | 380 | 500 | 4716 | 298 | 294 | 14.0 | 11.4 | 12.0 | <u>12.0</u> | 12.1 | |
| 4 | A | 5 | 7 | 7 | > | | 5 | 7.8/ | 7.31 | 7.27 | 731 | 7.35 | 11.8 | 8.4 | 8.6 | 8.8 | ר.צ | 30 | 300 | 297 | 299 | 296 | 12.8 | 12.0 | 12.1 | 12,0 | 12.1 | 100 |
| | В | 5 | 5 | > | 5 | 7 | 5 | 7.89 | 7.33 | 7.31 | 7.36 | 7.38 | 11.8 | 8.4 | 9.0 | 8.8 | 8.6 | 301 | 299 | 296 | 298 | 294 | 12.8 | 119 | 2.0 | 12.0 | 21.1 | 0 |
| 10 | A | 5 | 5 | 5 | 5 | 5 | 5 | 7.87 | 7.33 | 7.3(| 7.36 | 7.39 | 11.8 | 8.2 | 8.5 | 8.7 | 8.Š | 301 | 300 | 297 | 299 | 295 | 12.9 | 12.0 | 12.1 | 12.0 | 12.1 | 100 |
| | В | 5 | 5 | 5 | 5 | 5 | 5 | 7.86 | 7.32 | 7.31 | 7.36 | 7.38 | 11.8 | 8.2 | 8.5 | 9.0 | 8.6 | 30,1 | 299 | 297 | 298 | 295 | 12.8 | 12.0 | 12.1 | 12.0 | 12-1 | 100 |
| 22 | A | 5 | 5 | В | Ś | 5 | S | 7.84 | 7.33 | 7.30 | 7.38 | 7.37 | 11.8 | 8.2 | 8.1 | 8.8 | 8-1 | 302 | 300 | 295 | 297 | 294 | 13.0 | 12.2 | 12,1 | 12.0 | 220 | 100 |
| | в | 5 | 5 | 5 | 5 | 5 | 5 | 7.86 | 7,29 | 7.29 | 7.33 | 7.35 | 11.7 | 8.0 | 8.3 | 8.9 | 8.0 | 302 | 300 | 296 | 298 | 294 | 13.0 | 12.1 | 12.1 | 12.1 | 12.7 | 100 |
| 50 | A | 5 | 5 | 5 | 5 | 5 | 5 | 7.87 | 7.24 | 1.23 | 7.35 | 7.39 | 11.9 | 8.5 | 8.7 | 8.9 | 8.6 | 301 | 2.99 | 295 | 297 | 292 | 12.8 | 11.8 | 11.8 | 11.7 | 11.5 | |
| | в | 5 | 5 | 5 | 5 | 3 | 5 | 7.87 | 7.30 | 7.27 | 7.35 | 720 | 11.8 | 8.6 | 8.6 | 8.6 | 4.6 | 301 | 300 | 297 | 299 | 294 | 12.7 | 11.7 | 11.7 | 11.7 | 117 | 100 |
| 110 | A . | 5 | 5 | 2 | 2 | 2 | 2. | 7.86 | 7.33 | 7.32 | 735 | 7.26 | 11.8 | 8.7 | 9.0 | 8.7 | \$8 | 301 | 301 | 296 | 297 | 297 | 128 | 11-8 | 119 | 11.9 | 11.9 | |
| | В | 5 | 5 | 3 | 5 | 5 | 5 | 7.85 | 7.32 | 7.36 | 7.35 | 7.24 | 11,8 | 8.5 | 8.4 | 8.4 | 8.5 | 301 | 299 | 295 | 297 | 293 | 12.8 | 11.6 | 11.7 | 11.7 | 11.7 | 70 |
| 240 | Α | 5 | 5 | 1 | 0 | $\overline{\}$ | | 7,83 | 7.38 | 7.38 | | 1.21 | 11.8 | 9.0 | 9.5 | | | 301 | 303 | 300 | _ | | 12.9 | 11.8 | 11.8 | $\overline{\langle}$ | | ~ |
| | B | 5 | 5 | Ō | - | | | 787 | 7.42 | | ·····` | | 11.7 | 9.4 | - | \vdash | \succ | 301 | 300 | | | | 12.9 | 11.7 | _ | | | 0 |
| L | Counts | WE | ME | NG | NE | 116 | (m | 1.01 | | • | | 1 | | | I | <u> </u> | <u> </u> | | 100 | | | | 12.1 | | | L | | |
| Tech Initials | wo | idf | v | 116 | 116 | INF | (~m | | | | | | | | | | | | | | | | | | | | | |
| | | mil | ^ | I WP | 101 | N/I | <u> </u> | l." | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | Fish | Size a | t test i | nitiati | on*: | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 00/1 | | A 71-7 | | | _ | . 770 | | | | | | |
| | Environn | nental | Cham | ber: | | F | | | | | weig | nts (g |): | 0.341 | 0.122 | 0.564 | 0.91) | 0.567 | | | μ = <u></u> |), 7/B | | | | | | 1 |
| | | | | | | | | 7.7.14 A | | | Leng | ths (ci | n): | 3.20 | 3.35 | 3:35 | 3.30 | <u>3.25</u> | | | μ= <u></u> | 3.29 | - | | Load | ling ra | ate = <u>C</u> | 1.63.9/L |
| Sample Descrip | tion: | Blu | uu | 501 | 19 | | | | | A | nima | l Sour | ce/Dat | e Rec | eived: | Tho | mas | Fiss | <u>Co.</u> | 21412 | 4 | Age | at Initi | ation: | 51 | 91 | y 5 | |
| Comments: | | *5 ran | idom i | fish ar | e sacr | ificed | at init | iation | for siz | e det | ermin | ation. | ٠ | 218 | 60 | 2/25 | 5 24 | | | | • · · · · · · · · · · · · · · · · · · · | | | | | | | |
| QC Check: | ¥1 | - 3 - | 266 | 24 | | | | | | , | | | | | | | | | | | | F | inal Re | eview: | Ars | 4/4/ | 124 | |

Enthalpy Analytical. 4340 Vandever Avenue. San Diego, CA 92120.

Freshwater Acute Bioassay Static Conditions DF-018

Client: WADOE

Sample ID: Ozonated 7PPD

Test No.: 2402 - 5164

Test Species: <u>0. mykiss</u> Start Date/Time: <u>2 (2)(24)600</u> End Date/Time: <u>2)な</u>) 24 1600

| Concentration | _ | | | N | umber | of | | | | рН | | | | Disso | lved C |)xyger | 1 | | Co | nducti | vity | | | Ter | nperat | ure | | Porcont |
|--------------------|-------------|----------|-------|------------|----------|----------|----------|--------|---------|--------|-----------|---------|----------|-------------|-------------|-------------------|------------|-------------|--------------|--------|--------------|-------|-----------|--------|--------|--------|---------|----------|
| (ug/L) | кер | 0 | | Live 24 | | 11SMS | 96 | | 24 | (units |) 72 | 06 | Chy | <u> 014</u> | (mĝ/Ľ |) Q14 | <u>a14</u> | <u> </u> | (ui | nhos/ | m) | ~~~ | | | (°C) | | | Survival |
| Lab Control | • | E E | 5 | 5 | 5 | 5 | 30 | 784 | 7.33 | 779 | 720 | 50 | 12.0 | 4 | 40 | 1 <u>2</u> a < | 90 | 201 | 24 | 48 | 12 | 90 | 12.2 | 118 | 48 | 12 | 96 | |
| Lab control | | 5 | 2 | 5 | < | 5 | 5 | 781 | 770 | 7.21 | 120 | 7:55 | 10 9 | 0 2 | 00 | 1.2 | 9.6 | 201 | 300 | 216 | 210 | 294 | 124 | 11.0 | 111 | 11.8 | 119 | 100 |
| | <u>в</u> | 5 | é | 2 | ~ | 6 | 5 | 701 | 727 | 7.54 | 1.71 | 7:34 | 14.2 | 1.2 | 9,0 | 1.1 | 9,0 | 501 | 300 | 212 | 291 | 294 | 12.2 | 167 | 11.8 | 11.7 | 11.8 | • |
| 4 | A | 5 | - | | 1 | | 5 | 1.86 | 7.36 | 1.54 | 1.58 | 7.39 | 12.1 | 9.1 | 9.0 | 9.4 | 9.1 | 301 | 500 | 296 | 298 | 295 | 12,3 | 11,9 | 11.9 | 11.9 | 11.9 | 100 |
| | В | 5 | 7 | <u> </u> | > | > | 5 | 7.86 | 7:36 | 7.36 | 7.40 | 7.38 | 11,01 | 8.7 | 4,0 | 9.4 | \$ 5 | 301 | 300 | 297 | 300 | 297 | 12.2 | 11.7 | (1.8 | 11.8 | 119 | 10 |
| 10 | A | 5 | S | 5 | S | 5 | 3 | 7.86 | 7.34 | 7.35 | 7.39 | 7:34 | 11.8 | 8.2 | 8.1 | 9.0 | 8.5 | 301 | 300 | 247 | 299 | 296 | 12.4 | 11.8 | 11.9 | 11.9 | 119 | 100 |
| | В | 5 | 5 | 5 | 5 | 5 | 5 | 7.85 | 7.34 | 7.30 | 7.35 | 7.3 | 11.8 | 8,5 | 8.2 | 9.0 | 83 | 301 | 300 | 296 | 248 | 294 | 12.3 | 11.8 | 11.9 | 11.9 | ทาส | 100 |
| 22 | A | 5 | 5 | 5 | 5 | 3 | 5 | 7.87 | 7.33 | 7.30 | 7.35 | 734 | 11.7 | 8,3 | 8.3 | 8.8 | 8.5 | 301 | 300 | 296 | 298 | 295 | 12.5 | 11.9 | 11.9 | 119 | 11.9 | |
| | в | 5 | 5 | 5 | 5 | 5 | 5 | 7.86 | 7.33 | 7.30 | 7.35 | 7:34 | 11.6 | 8,6 | 8.2 | 8.8 | 8 | 30 | 300 | 296 | 298 | 294 | 12.7 | 11.8 | 11.9 | 11.9 | 12.0 | 700 |
| 50 | Α | 5 | 5 | Ŝ | 5 | 5 | S | 7.84 | 7.30 | 7.31 | 7.36 | 7.36 | 11.8 | 8.5 | 8.5 | 87 | < 4 | 201 | 300 | 296 | 798 | 295 | 12.H | i1.9 | 12 0 | 12.0 | 12.0 | |
| | в | 5 | 5 | 5 | \$ | 5 | 5 | | 7:37 | 7.32 | 7.33 | 7.32 | 11.8 | 8.2 | 8.6 | 8.4 | 8.6 | 301 | 300 | 296 | 748 | 294 | 12.7 | (),9 | 12.0 | 12.0 | 12.1 | 100 |
| 110 | Α | 5 | 5 | 5 | 5 | \$ | 5 | 7.85 | 7.34 | 7.30 | 7.32 | 734 | 11.8 | 8.9 | 8.< | 8.6 | 87 | 301 | 300 | 247 | 248 | 245 | 12.8 | 119 | 12.1 | 12.0 | b.1 | |
| ····· | в | 5 | 5 | 5 | \$ | 3 | 5 | 7.86 | 7.34 | 7.32 | 1.2 | 7.35 | 41.7 | 8,6 | 8.6 | 8.6 | 5.5 | 302 | 299 | 293 | 297 | 293 | 170 | 11.9 | 121 | 12.1 | 121 | VQD |
| 240 | Α | 5 | 5 | 5 | 5 | 5 | ~ | 7.85 | 7.33 | 7.33 | 1.28 | 7.23 | 11.7 | 8.4 | 80 | 8.4 | 7.5 | 302 | 299 | 295 | 747 | 293 | 17.0 | 12.0 | 12.1 | 121 | 12 1 | |
| | в | 5 | 5 | 3 | \$ | 5 | 5 | 7.84 | 7.35 | 7.29 | 7.21 | 7,24 | 11.7 | 8.5 | 7.9 | 8,4- | 25 | 307 | 299 | 295 | 247 | 294 | 13.0 | 12.0 | 127 | 121 | j2.1 | 100 |
| | Counts | WE | NF | WF | WF | 26 | 1m | ' | | | I | 1 - | | | | | I | | | | • | | | 4,0 | 10.14 | | | |
| lech Initials | WQ | UF. | х | WF | J.F | WE | 1 m | | | | | | | | | | | | | | | | | | | | | |
| | QC | M | | | | | <u>v</u> | I. | | | | | | | | | | | | | | | | | | | | |
| | L | | | | | | | | | | Fish | Size at | t test i | nitiatio | on*: | | | | | | | | | | | | | |
| | | | | | | | | | | | Weig | hts (g) |): | 0.341 | 0.422 | . 0.364 | 0.397 | 70.36 | 7 | Ŷ. | ม = <i>0</i> | .378 | | | | | | |
| | Environ | nental | Cham | ber: | | F | | | | | | .0, | | | | | | | | | r | | | | | | | , l. |
| | | | | | | | | | | | Leng | ths (cr | n): | 3.20 | <u>3.35</u> | 3.35 | 3.30 | <u>3.25</u> | | | µ=.3 | . 29 | | | Load | ing ra | te = _(|).63g/L |
| Sample Descrip | tion: | BU | NH | 5011 | 9 | | | | | A | nima | l Sourc | ce/Dat | e Rece | eived: | Thor | ms i | Fish | <u>lo. 2</u> | 10/2 | ч | Age a | at Initia | ation: | Ç | 5 (å |)ays | |
| Comments: | | *5 ran | dom f | ish ar | e sacr | ificed a | at init | iation | for siz | e dete | ermin | ation. | | | | | | | | | | | | *** | | | | |
| | | | | <u> </u> | | | <u> </u> | | | | | | | | | | | | | | | | | | | | | |
| QC Check: | 43 | 26 | 24 | | | | | | | | | | | | | | | | | | | Fi | nal Re | view: | AIS | 4/4 | 124 | |
| Enthalpy Analytica | I. 4340 Var | idever A | venue | . San D |)iego, C | A 9212 | 0. | | | | | | | | | | | | | | | | | | | | | |

Water Quality Measurements & Test Organism Survival Freshwater Acute Bioassay **Static Conditions** DF-018

Client: WADOE

Sample ID: Ozonated 77PD

2402-5165 Test No.:

| Test Species: O. mykiss | | |
|--------------------------|------|--|
| Start Date/Time: 2/2//24 | 1600 | |
| End Date/Time: 2) 25 /24 | 1600 | |

| D 203 | Water Quality Measurements |
|-------|----------------------------|
| | & Test Organism Survival |

| Concentration | | | | N | umbei | of | - | 1 | | pН | | | 1 | Disso | lved (| Dxyge | n | | Co | nduct | ivity | | | Te | mperat | ure | - | |
|--------------------|-------------|---------|----------|---------|----------|---------|---------|----------|---------|--------|-------|---------|----------|----------------------|-----------|------------|--------|---------------------|-------------|--------|----------------|-------|----------|--------|--------|---------------|---------------|-------------------|
| (ug/L) | Rep | | . | Live | Orgar | nisms | | | | (units |) | _ | 074 | 614 | (mg/L | .) Q14 | Q14 | | (นเ | mhos/ | cm) | | | | (°C) | | | Percent |
| (3)/ | | 0 | 1 | 24 | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | Survival |
| Lab Control | A | 5 | 5 | 5 | 5 | 5 | 5 | 7.86 | 7.37 | 7.21 | 7.3 | 27.31 | 12.2 | 10.8 | 9.0 | 9.2 | 9.2 | 295 | 299 | 296 | 296 | 294 | 11.8 | 11.8 | 11.9 | 11.8 | 1)9 | 1.00 |
| | В | 5 | 5 | 5 | 5 | 5 | 5 | 7.89 | 7.39 | 7.28 | 7.3 | 57.34 | 12.2 | 8.9 | 8.6 | 9.2 | 9.1 | 298 | 298 | 295 | 295 | 292 | 11.6 | 11.7 | 11.8 | 11.7 | 11.8 | 100 |
| 4 | A | 5 | 5 | 5 | 5 | 5 | 5 | 7.89 | 7.37 | 7.32 | 7.3 | 67.34 | 12.0 | 8.2 | 8,3 | 8.6 | 8.6 | 300 | 299 | 296 | 296 | 293 | 11.9 | 11.9 | 11.9 | 11.8 |))9 | . 00 |
| | В | 5 | 5 | 5 | 5 | 5 | 5 | 7.90 | 7.36 | 7.32 | 7.3 | 57.38 | 12,0 | 8.5 | 8.6 | 9.0 | 8.8 | 300 | 300 | 297 | 298 | 295 | 11.9 | 11.7 | 11.7 | 11.7 | nя | 100 |
| 10 | A | 5 | 5 | 5 | 5 | 5 | 5 | 7.88 | 7.37 | 7.33 | 7.35 | 37.37 | 12.1 | 8.2 | 8.3 | 8.7 | 8.6 | 300 | 300 | 297 | 299 | 296 | 12.1 | 11.8 | 11.9 | 11.8 | 11.9 | 101 |
| | В | 5 | 5 | 5 | 5 | 5 | 5 | 7.88 | 1.31 | 7.37 | 7.38 | 37.37 | 11.9 | 8.4 | 8.5 | 8.6 | 8.6 | 300 | 299 | 295 | 296 | 297 | 12.0 | 11.7 | 11.8 | 11.7 | 11.8 | 100 |
| 22 | А | 5 | 5 | 5 | ß | 5 | 5 | 7.88 | 7,36 | 7.33 | 7.30 | 17.35 | 124 | 8.3 | 8.5 | 8.4 | 8- | 300 | 299 | 297 | 298 | 295 | 12,4 | 11.9 | 11.9 | 11,9 | 4.9 | |
| | В | 5 | 5 | 3 | 5 | 5 | 5 | 7.88 | 7.38 | 7.34 | 1.3 | 6735 | 11.9 | 14 | 8.7 | 8.6 | 8.4 | 300 | 299 | 296 | 297 | 294 | 12.2 | 11.7 | 11.8 | 11.8 | 11.8 | 100 |
| 50 | A | 5 | 5 | 5 | 5 | \$ | 5 | 7,86 | 7.40 | 7.33 | 2.37 | 27.38 | 11.9 | 8.6 | 8.3 | 8.8 | 8-8 | 301 | 300 | 296 | 244 | 294 | 12,3 | 119 | 11.9 | 11.9 | 12.0 | 1.00 |
| | В | 5 | 5 | 5 | 5 | \$ | 5 | 7.87 | 7.36 | 7.33 | 7.35 | 5 7.37 | 12.0 | 8.4 | 9.3 | 8.5 | 8.6 | 300 | 300 | 217 | 298 | 295 | 12.1 | 11.7 | 11.8 | 11.8 | 11.8 | 100 |
| 110 | A | 5 | 5 | 5 | 5 | Ŝ | 5 | 7.88 | 7.38 | 7.34 | 7.3 | 67.5 | 11.9 | 8.4 | 8.8 | 8.4 | 8.6 | 300 | 300 | 247 | 248 | 295 | 122 | 11.9 | 11.9 | 11.9 | 12.0 | , ww |
| | В | 5 | 5 | 5 | 5 | 5 | 5 | 7.87 | 7.38 | 7.34 | 7.38 | \$ 7.33 | 11.8 | 8,4 | 8.7 | 8.8 | 8.0 | 300 | 300 | 297 | 299 | 296 | 12.1 | 41.7 | 11.8 | 11.8 | 11.8 | $\gamma 00$ |
| 240 | A | 5 | 5 | 5 | 5 | 5 | 5 | 7.87 | 7.36 | 7.33 | 7.3 | 37-33 | 12.0 | 8.0 | 8.4 | 8.0 | 8.1 | 300 | 299 | 296 | 298 | 296 | 12.1 | 11.9 | 12.0 | 12.0 | 12.0 | <u>ന</u> റ |
| | В | 5 | 5 | Ś | 5 | 5 | 5 | 7.89 | 7.32 | 7.29 | 7.3 | 37.3 | 11.9 | 8.5 | 9.0 | 8.8 | 4-0 | 300 | 299 | 296 | 298 | 294 | 12.1 | 11.8 | 11.9 | 11.9 | 11.9 | V00 |
| Tech Initials | Counts | WF | WF | WF | WF | WF | (-m | | | | | | | | | | | | | | | | | | | | | |
| | WQ | WF | х | WF | WF | WF | Gm | | | | | | | | | | | | | | | | | | | | | |
| | QC | m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | Fish | Size a | t test i | nitiati | on*: | | | | | | | | | | | | | |
| | | | | | | _ | | | | | Weig | ghts (g |): | <u>6,341</u> | 0.422 | 0.364 | 10.397 | 0.36 | ז | | µ=0 | .378 | | | | | | |
| | Environn | nental | Cham | ber: | | F | | | | | | | | 3.2.0 | 3.35 | 3.35 | 3,30 | 3.25 | | | . – | 3,29 | | | | | _ | 17 /1 |
| | | ~ | | • | | | | | | | Leng | gtns (c | m): | yero D | 27.7 D | *7. 5 Ø | Ø (| - <u>54:-5</u> © | - | | µ = <u>-</u> ∡ | 2.9 | | | Load | ing ra | te = <u>0</u> | <u>.6>g/</u> c |
| Sample Descript | tion: | BLU | ИЦ | Soli | 9 | | | <u> </u> | | A | nima | al Sour | ce/Dat | e Rec | eived: | ARS | · Thou | mus Fi | si Co | . 2/9/ | 24 | Age a | at Initi | ation: | _51 | Jax | 5 | |
| Comments: | | *5 ran | idom f | ish ar | e sacr | ificed | at init | iation | for siz | e dete | ermin | ation. | ØQI | <u>B WF</u> | 2/21 | 124 | BQ | 18 12 | <u>= 21</u> | 2217 | ų | | | | | | | <u> </u> |
| QC Check: | <u>FI</u> | /3 | 26 | 24 | | | | | | | | | | | | | | | | | | Fi | nal Re | view: | A/S | y/y/. | 24 | |
| Enthalpy Analytica | l. 4340 Van | dever A | venue. | . San D |)iego, C | CA 9212 | 20. | | | | | | | | | | | | | | | | | | | <u>., , ,</u> | | |

OECD 203

Enthalpy Analytical 4340 Vandever Avenue San Diego, CA 92120

Chemical Product Sample Check-in Information

Client: WADDE

Test No.: 2402-5163 to 5165

Test Type: DELD O, Mykiss awte

| Enthalpy Log-in 24-xxxx | Sample ID | Collection Date & Time | Receipt Date & Time | No. Containers | Container Type | Approx. amount of sample received | Sample Description | Receipt Condition | Tech Initials |
|-------------------------------|---------------|---------------------------|------------------------|-------------------|-------------------|--|--------------------|-------------------|------------------|
| 5060 | Ozonated 6PPD | NIA | 2/21/24 0930 | 1 | boiling flash | Soong | black tar | Grood | Bo |
| 5061 | Obonated 7880 | AIU | 2/11/10930 | | boiling Haste | 500mg | black tar | (grosel | |
| 5062 | Ozonated 7740 | NIA | 2/2/20930 | (| boiling | 500mg | black far | Good | |
| | | | | | | , | | | |
| | | · | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | · | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

 Samples Shipped Via:
 Fellox
 Comments:
 NA = not applicable

 COC Present?
 Y (N)

 Sub-samples for additional chemistry:
 N0

QC Check:

K 3/26/24

Final Review: MS 4/4/24

Appendix B

Data Qualifier Codes

Glossary of Qualifier Codes

- Q1 Temperature out of recommended range; corrective action taken and recorded in Test Temperature Correction Log
- Q2 Temperature out of recommended range; no action taken, test terminated same day
- Q3 Sample pH adjusted to within range of 6-9 with reagent grade NaOH or HCl, as needed
- Q4 Test aerated; D.O. levels dropped below 4.0 mg/L
- Q5 Test initiated with continuous aeration due to an anticipated drop in D.O.
- Q6 Airline obstructed or fell out of replicate and replaced; drop in D.O. occurred
- Q7 Salinity out of recommended range
- Q8 Spilled test chamber/ Unable to recover test organism(s)
- Q9 Inadequate sample volume remaining, partial renewal performed
- Q10 Inadequate sample volume remaining, no renewal performed
- Q11 Sample out of holding time; refer to QA section of report
- Q12 Replicate(s) not initiated; excluded from data analysis
- Q13 Survival counts not recorded due to poor visibility or heavy debris
- Q14 D.O. percent saturation was checked and was ≤ 110%
- Q15 Did not meet minimum test acceptability criteria. Refer to QA section of report.
- Q16 Percent minimum significant difference (PMSD) was <u>below</u> the lower bound limit for acceptability. This indicates that statistics may be over-sensitive in detecting a difference from the control due to low variability in the data set. Test results were reviewed and reported in accordance with guidance found in EPA-833-R-00-003, 2000 unless otherwise specified.
- Q17 Percent minimum significant difference (PMSD) was <u>above</u> the upper bound limit for acceptability. This indicates that statistics may be under-sensitive in detecting a difference from the control due to high variability in the data set. Test results were reviewed and reported in accordance with EPA-833-R-00-003, 2000 guidance unless otherwise specified.
- Q18 Incorrect or illegible Entry
- Q19 Miscalculation
- Q20 PMSD criteria do not apply to the test of significant toxicity (TST) analysis
- Q21 Other (provide reason in comments section)
- Q22 Greater than 10% batch <u>mortality</u> observed upon receipt and/or in holding prior to test initiation. Organisms acclimated to test conditions at Enthalpy and ultimately deemed fit to use for testing.
- Q23 Test organisms experienced a <u>temperature</u> shift greater than 3°C within 1 day or were received at a temperature greater than 3°C outside the recommended test temperature range and had minimal time to acclimate prior to test initiation. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate test(s). Organisms were ultimately deemed fit to use for testing.
- Q24 Test organisms experienced a <u>salinity</u> shift greater than 3 ppt within 1 day or were received at a salinity greater than 3 ppt outside the recommended test salinity range and had minimal time to acclimate prior to test initiation. However, due to age-specific protocol requirements and/or sample holding time constraints, the organisms were used to initiate test(s). Organisms were ultimately deemed fit to use for testing.





Appendix C

Reference Toxicant Test Data

| CETIS Su | mmary Rep | ort | | Report Date: 26 Mar-24 16:57 (p 1 of Test Code/ID: 240221omra / 14-8789-526 | | | | | | | | | | |
|--|---|------------------------------|---|--|---------------------|----------|--|--------|-----------|-----------|--|------------|--|--|
| Acute Fish S | urvival Test | | | | | | | 1051 0 | ouend. | Nautilus | Environm | ental (CA) | | |
| Batch ID: Start Date: Ending Date: Test Length: | 11-9729-1219 21 Feb-24 16: 25 Feb-24 17: 4d 1m | 00 90 ^(j) /6;9 | Test Type: Protocol: Species: Taxon: | Survival (96h) Washington DC Oncorhynchus | DE (2009) mykiss | | Analyst: Diluent: Laboratory Freshwater Brine: Not Applicable Source: Aquatic Biosystems, CO Age: 3 | | | | | | | |
| Sample ID: Sample Date Receipt Date Sample Age: | 11-9596-7582 : 21 Feb-24 : 21 Feb-24 16h | | Code: Material: CAS (PC): Client: | 24022 Tomra Project: Internal Copper chloride Source: Copper Chloride Station: | | | | | | | | | | |
| Multiple Com | parison Summ | ary | | | | | | | | | | | | |
| Analysis ID | Endpoint | | Comp | oarison Method | · · · · · | | \checkmark | NOEL | LOEL | TOEL | PMSD | S | | |
| 05-8113-2774 | 96h Survival R | ate | Fishe | r Exact Test | 35.36 | | 1 | | | | | | | |
| Point Estima | te Summary | | | | | | | | | | | | | |
| Analysis ID | Endpoint | | Point | Estimate Meth | od | | \checkmark | Level | ua/L | 95% LCL | 95% UCL | s | | |
| 12-7192-5702 | 96h Survival R | ate | Trimm | ned Spearman-K | ärber | | | EC50 | 64.5 | 52.3 | 240221omra / 14-8789- Nautilus Environmental (ory Freshwater blicable Biosystems, CO Age: Chloride 5% LCL 95% UCL 2.3 79.6 td Dev CV% 000 0.00% 0.00 071 7.44% 5.00 141 20.20% 30.0 000 100. DADE62B6DAC5F53C22F DADE62B6DAC5F53C22F | | | |
| 96h Survival | Rate Summary | | , | | - | | | | | | | | | |
| Conc-µg/L | Code | Cour | nt Mean | 95% LCL | 95% UCL | Min | | Max | Std Err | Std Dev | CV% | %Effect | | |
| 0 | LC | 2 | 1.000 | 1.000 | 1.000 | 1.000 | - | 1.000 | 0.000 | 0.000 | 0.00% | 0.00% | | |
| 25 | | 2 | 0.950 | 0.315 | 1.590 | 0.900 | | 1.000 | 0.050 | 0.071 | 7.44% | 5.00% | | |
| 50 | | 2 | 0.700 | -0.571 | 1.970 | 0.600 | | 0.800 | 0.100 | 0.141 | 20.20% | 30.00% | | |
| 100 | | 2 | 0.200 | 0.200 | 0.200 | 0.200 | | 0.200 | 0.000 | 0.000 | 0.00% | 80.00% | | |
| 200 | | 2 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | | 100.00% | | |
| 400 | | 2 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | | 100.00% | | |
| 96h Survival | Rate Detail | | | | | 1 | | MD | 5: B4A820 | F1FDADE62 | B6DAC5F53 | C22F44F3 | | |
| Conc-µg/L | Code | Rep | 1 Rep 2 | | | | | | | | | | | |
| 0 | LC | 1.000 | 1.000 | - | | | | | | | | | | |
| 25 | | 0.900 |) 1.000 | | | | | | | | | | | |
| 50 | | 0.800 | 0.600 | | | | | | | | | | | |
| 100 | | 0.200 | 0.200 | | | | | | | | | | | |
| 200 | | 0.000 | 0.000 | | | | | | | | | } | | |
| 400 | | 0.000 | 0.000 | | | • | | • | | | | | | |
| | | | | | | | | | | | | | | |

(A) QUSHTS 4/4/24

Convergent Rounding (3 sf)

CETIS™ v2.1.4.11 x64 (007-803-386-7)

Analyst:_____ QA: Mrs y/4/24

| CETIS Ana | alyti | cal Rep | ort | | | | | , | Report Test Cc | Date: ode/ID: | 26 Mar-24 16:58 (p 1 of 1) 240221omra / 14-8789-5260 | | | | | |
|---|----------------------|---|----------|---------------------|---|---|--------------------------------|---------------------------------------|--|-----------------------------------|---|-----------------------------------|--|--|--|--|
| Acute Fish S | urviva | al Test | | | | | | | · · | | Nautilu | s Environn | nental (CA) | | | |
| Analysis ID: Analyzed: Edit Date: | 05-8 26 N 26 N |)113-2774 /ar-24 16:5 /ar-24 16:5 | 56 54 | Endı Anal MD5 | point: 96h lysis: Sin i Hash: B4/ | Survival Ra gle 2x2 Con \820F1FDA | ate tingency Ta DE62B6DA | ble C5F53C22F | CETI Statu F44F3 Edito | S Version: us Level: or ID: | CETISv2 1 007-803- | CETISv2.1.4 1 007-803-386-7 | | | | |
| Data Transfo | rm | | Alt | Нур | | | | NOEL | LOEL | TOEL | Tox Units | | | | | |
| Untransforme | d | | C > ' | Т | | | | 25 | 50 | 35.36 | | | | | | |
| Fisher Exact | Test | | | | | | H | | | | | | | | | |
| Control | vs | Conc-µ | g/L | | Test Stat | Р-Туре | P-Value | Decision | (α:5%) | | | | | | | |
| Lab Control | | 25 50* 100* | | | 0.500 0.010 0.000 | Exact Exact Exact | 0.5000 0.0101 <1.0E-05 | Non-Signi Significan Significan | ificant Effect It Effect It Effect | | | | ······································ | | | |
| 96h Survival Rate Frequencies | | | | | | | | | | | | | | | | |
| Conc-µg/L | | Code | NR | | R | NR + R | Prop NR | Prop R | %Effect | | | | | | | |
| 0 | | LC | 20 | | 0 | 20 | 1.000 | 0.000 | 0.00% | | | | | | | |
| 25 | | | 19 | | 1 | 20 | 0.950 | 0.050 | 5.00% | | | | | | | |
| 50 | | | 14 | | 6 | 20 | 0.700 | 0.300 | 30.00% | | | | | | | |
| 100 | | | 4 | 1 | 16 | 20 | 0.200 | 0.800 | 80.00% | | | | | | | |
| 200 | | | 0 | | 20 | 20 | 0.000 | 1.000 | 100.00% | | | | | | | |
| 400 | | | 0 | | 20 | 20 | 0.000 | 1.000 | 100.00% | | | | | | | |
| 96h Survival | Rate | Summary | | | | | | | | | | | | | | |
| Conc-µg/L | | Code | Cou | nt | Mean | 95% LCL | 95% UCL | Median | Min | Max | Std Err | CV% | %Effect | | | |
| 0 | | LC | 2 | | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 0.000 | 0.00% | 0.00% | | | |
| 25 | | | 2 | | 0.950 | 0.315 | 1.000 | 0.950 | 0.900 | 1.000 | 0.050 | 7.44% | 5.00% | | | |
| 50 | | | 2 | | 0.700 | 0.000 | 1.000 | 0.700 | 0.600 | 0.800 | 0.100 | 20.20% | 30.00% | | | |
| 100 | | | 2 | | 0.200 | 0.199 | 0.201 | 0.200 | 0.200 | 0.200 | 0.000 | 0.00% | 80.00% | | | |
| 200 | | | 2 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 100.00% | | | |
| 400 | | | 2 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 100.00% | | | |
| Graphics | | | | | | | | | | | | | | | | |
| 1.0 - 0.9 - 0.8 - | • | | | | | | | | | | | | | | | |



QA: AS 4/4/14 K Analyst:

| CETIS Ana | alytical R | eport | | Report Test Co | Date: de/ID: | 26 Mar-24 16:58 (p 1 of 1) 240221omra / 14-8789-5260 | | | | | | | | | |
|---|---|-------------------------------|---------------------------------------|--|---------------------------------|---|-------------------------------|-----------------------------------|-----------------------------|-----------------------------------|----------------|--|--|--|--|
| Acute Fish S | urvival Test | | | | | | | | Nautilus Environmental (CA) | | | | | | |
| Analysis ID: Analyzed: Edit Date: | 12-7192-570 26 Mar-24 1 26 Mar-24 1 | 02 End 6:57 And 6:54 MD | dpoint: 96 alysis: T 95 Hash: B | 6h Survival R rimmed Spea 4A820F1FDA | ate arman-Kärbo \DE62B6DA | er AC5F53C22 | CETI Statu 2F44F3 Edito | S Version: us Level: or ID: | CETISv 1 007-803 | CETISv2.1.4 1 007-803-386-7 | | | | | |
| Trimmed Spo | earman-Kärb | er Estimates | | | | | | | , | | | | | | |
| Threshold O | ption | Threshold | Trim | Mu | Sigma | EC50 | 95% LCL | 95% UCL | | | | | | | |
| Control Thres | hold | 0 | 5.00% | 1.81 | 0.0456 | 64.5 | 52.3 | 79.6 | | | | | | | |
| 96h Survival | Rate Summa | ary | | | Calculate | d Variate(A | VB) | | | Isoto | nic Variate | | | | |
| Conc-µg/L | Code | Count | Mean | Median | Min | Max | CV% | %Effect | ΣΑ/ΣΒ | Mean | %Effect | | | | |
| 0 25 | LC | 2 2 | 1.000 0.950 | 1.000 0.950 | 1.000 0.900 | 1.000 1.000 | 0.00% 7.44% | 0.00% 5.00% | 20/20 19/20 | 1.000 0.950 | 0.00% 5.00% | | | | |
| 50 | | 2 | 0.700 | 0.700 | 0.600 | 0.800 | 20.20% | 30.00% | 14/20 | 0.700 | 30.00% | | | | |
| 100 | 2 | | | 0.200 | 0.200 | 0.200 | 0.00% | 80.00% | 4/20 | 0.200 | 80.00% | | | | |
| 400 | | 2 | 0.000 | 0.000 | 0.000 | 0.000 | · | 0.000 | 100.00% 100.00% | | | | | | |
| Graphics | | ····· | | | | | | <u></u> | | | | | | | |
| 1.0 - 0.9 - 0.8 - 0.7 - 0.6 - 0.5 - 0.4 - 0.4 - 0.3 - 0.4 - 0.3 - 0.2 - 0.1 - 0.0 - 0.1 - 0.0 - 0.0 - | 50 100 | 0 150 200 Conc- | ,) 250 μg/L | , , 300 350 | 400 | | | | | | | | | | |

Analyst: K QA: <u>A'5 4/4/</u>24



+3s

+2s

Mean

-2s



| | 15 Dec 16 | 21 Jul-17 | 10 Aug-17 | 26 Sep-17 | 14 Nov-17 | 20 Sep-18 | 10 Oct-18 | 28 Nov-18 | 12 Mar-19 | 14 Nov-19 | 16 Jan-20 | 02 Dec-20 | 19 Aug-21 | 19 May-22 | 02 Nov-22 | 15 Feb-23 | 13 Apr-23 | 06 Sep-23 | 01 Feb-24 | 21 Feb-24 | |
|-------|-----------|-----------|----------------|----------------|-----------|---------------|-------------|-----------|-----------|----------------|------------------|------------------|-------------|-----------|-----------|------------------|------------------|-------------|-----------|-----------|--|
| | | | | | | | | С | umula | tive M | ean Pl | lot | | | | | | | | | |
| | | N S | lean: igma: | 83.01 35.88 | c | Count: CV: | 20 43.20 | % | -2 +2 | s War s War | ning L ning L | .imit: .imit: | 11.3 155 | | -3s / | Action Action | Limit: Limit: | -24. 191 | 6 | · | |
| Quali | ty Con | trol Da | ta | | | | | | | | | | | | | | | | | | |
| Point | Year | Month | Day | Time | QC Data | u Delt | a S | igma | w | arning | Ac | tion | Test II |) . | An | alysis | ID | | | | |
| 1 | 2016 | Dec | 15 | 13:00 | 59.46 | -23.5 | 55 -0 |).6563 | | | | | 07-205 | 9-193 | 0 21- | 0698-8 | 3947 | | | | |
| 2 | 2017 | Jul | 21 | 11:45 | 75.79 | -7.22 | 24 -(|).2013 | | | | | 12-623 | 0-437 | 3 10- | 5665-4 | 1943 | | | | |
| 3 | | Aug | 10 | 13:35 | 119.1 | 36.0 | 51 | 1.005 | | | | | 09-739 | 0-468 | 8 11- | 1885-9 | 9400 | | | | |
| 1 | | Sep | 26 | 15:10 | 120.1 | 37.0 | 61 | 1.033 | | | | | 12-076 | 7-725 | 9 14- | 1478-0 | 0761 | | | | |

| 3 | | Aug | ίŪ | 13:35 | 119.1 | 36.05 | 1.005 | 09-7390-4688 11-1885-9400 |
|----|------|-----|----|-------|-------|--------|---------|---------------------------|
| 4 | | Sep | 26 | 15:10 | 120.1 | 37.06 | 1.033 | 12-0767-7259 14-1478-0761 |
| 5 | | Nov | 14 | 11:25 | 96.22 | 13.21 | 0.3682 | 21-0521-5529 14-2305-2435 |
| 6 | 2018 | Feb | 15 | 15:00 | 114.5 | 31.53 | 0.8787 | 08-5122-1964 18-9847-1069 |
| 7 | | Sep | 20 | 14:05 | 114.9 | 31.86 | 0.888 | 14-1527-8451 21-3828-6142 |
| 8 | | Oct | 10 | 16:40 | 72.55 | -10.46 | -0.2915 | 06-8408-1163 05-7761-5868 |
| 9 | | Nov | 28 | 12:00 | 35.36 | -47.65 | -1.328 | 21-0374-7072 19-9377-5872 |
| 10 | 2019 | Mar | 12 | 12:10 | 93.3 | 10.29 | 0.2869 | 11-1972-1376 05-1051-7815 |
| 11 | | Nov | 14 | 11:55 | 77.34 | -5.674 | -0.1581 | 08-3948-6775 01-9304-4998 |
| 12 | 2020 | Jan | 16 | 12:50 | 30.63 | -52.38 | -1.46 | 15-5355-8442 09-8383-1081 |
| 13 | | Dec | 2 | 13:30 | 133.3 | 50.32 | 1.403 | 07-0223-4669 10-8492-8883 |
| 14 | 2021 | Aug | 19 | 14:25 | 65.98 | -17.03 | -0.4748 | 11-4973-5943 08-1400-5422 |
| 15 | 2022 | May | 19 | 12:45 | 93.3 | 10.29 | 0.2869 | 03-2996-8953 07-9626-2312 |
| 16 | | Nov | 2 | 10:05 | 136.6 | 53.59 | 1.494 | 14-6511-1746 10-0042-0505 |
| 17 | 2023 | Feb | 15 | 11:30 | 14.71 | -68.3 | -1.904 | 17-0773-8757 02-8314-6307 |
| 18 | | Apr | 13 | 15:15 | 107.2 | 24.17 | 0.6736 | 04-5815-1771 04-7188-7445 |
| 19 | | Sep | 6 | 15:30 | 65.98 | -17.03 | -0.4748 | 19-8080-9942 18-9941-8060 |
| 20 | 2024 | Feb | 1 | 12:35 | 34.02 | -48.99 | -1.365 | 00-8109-2501 16-6938-0720 |
| 21 | | | 21 | 16:00 | 64.53 | -18.48 | -0.515 | 14-8789-5260 12-7192-5702 |
| | | | | | | | | |

Analyst: K QA: ATS 4/4/24

007-803-386-7

33 of 34

Dangerous Waste Characterization

Client: Internal

Sample ID: CuCl₂

Test No .: 240221 omra

 Test Species:
 O. mykiss

 Start Date/Time:
 2(2)(2)(2)(0)

 End Date/Time:
 2)25)23
)600

| Concentration | DAND # | | N | umber | of | | | | pH | 、 | | | Disso | lved (| ed Oxygen | | Conductivity (umbos/cm) | | | | | Temperature | | | | | Percent |
|---------------------------|--|------------------|--------|------------------|-----------|-------------|---------|---------|----------|------|------------|--------|----------------|-------------|----------------------|-------------------|----------------------------|-----------|----------------------|-----------|----------------|-------------|-----------------|--------------|-------------------|----------------------|--------------------|
| (μg/L) | | 0 | 24 | 48 | 72 | 96 | 0 | 24 | 48 | 72 | 96 | 0 | 24 | (mg/L 48 | 72 | 96 | | (u) 24 | 1005/ 48 | cm) 72 | 96 | 0 | 24 | (°C) 84 | 72 | 30 | Survival |
| Lab Control | 10 | 10 | 10 | 10 | 10 | 10 | 7,73 | 7.17 | 7.23 | 7.16 | 7.46 | 12.2 | 9.4 | 8.2 | 8.3 | 9.2 | 296 | 290 | 287 | 289 | 281 | 12.0 | 17.1 | 12.1 | 12.1 | 12.2 | 100 |
| | 8 | 10 | 10 | 67 | 10 | 10 | 7.78 | 7.32 | 7.26 | 7.21 | 7:29 | 11.8 | 8.8 | 8.6 | 8.4 | 88 | 299 | 296 | 289 | 291 | 285 | 12.5 | 11.8 | 12.0 | 12.0 | 12.2 | 100 |
| 25 | 9 | 10 | 10 | 10 | 9 | 9 | 7.79 | 7.33 | 7.29 | 7.24 | 7.36 | 118 | 8.6 | 9.0 | 8.7 | 9.7 | 299 | 297 | 291 | 292 | 2.88 | 12.5 | 12.0 | CENZ.I | 12.0 | 12.1 | 9.0 |
| | 5 | 10 | 10 | 10 | 10 | 10 | 7,81 | 7.34 | 7.31 | 1.27 | 7.32 | 11.8 | 9.9 | 8.6 | 8,4 | 8.8 | 299 | 246 | 291 | 292 | 288 | 125 | 11.8 | 12.0 | 12.0 | 12 0 | 100 |
| 50 | 7 | 10 | 10 | 10 | 8 | 8 | 7.78 | 7.32 | 7.31 | 7.26 | 7.26 | 11.8 | 9.0 | 8.9 | 8.5 | 89 | 299 | 296 | 292 | 293 | 289 | 12,5 | 11.8 | 11.9 | 12.0 | 500 | 90 |
| | 4 | 10 | 10 | 61 | 6 | 6 | 7.78 | 7.32 | 7.28 | 7.28 | 7.32 | 11.8 | 9.0 | 9.0 | 9.0 | 9.3 | 298 | 297 | 247 | 292 | 288 | 12,5 | 11.9 | 12.0 | 114 | 120 | 60 |
| 100 | 12 | 10 | 5 | 4 | 2 | 2 | 7,74 | 7.30 | 7.28 | 7.35 | 7.39 | 11.8 | <u>65</u> | 8.6 | 9.0 | <u>, у</u> а ч | 299 | 298 | 293 | 292 | 25- | 12,6 | 12.2 | 12.7 | 12.1 | 12.1 | 20 |
| | 3 | 10 | 8 | 4 | ù | 2 | 7.77 | 7.29 | 7.30 | 7.36 | 7.37 | 11.9 | 8.9 | 8.8 | 9.2 | 93 | 298 | 297 | 293 | 292 | 18- | 12.4 | 11.9 | 11,9 | 11.8 | 119 | 7.0 |
| 200 | 1 | 10 | 2 | 0 | * | | 7.72 | 7.27 | 7.30 | 1 | | 11.6 | 8.5 | 9.2 | 1 | | 302 | 300 | 294 | | ~ / | 12.9 | 11.8 | 11.9 | | 11, 1 | 0 |
| | 11 | 10 | 1. | 0 | | | 7.72 | 7.26 | 7.31 | | | 11.8 | 8.7 | 9.4 | | , | 299 | 299 | 293 | | | 17.5 | 12.1 | 12.1 | | | 0 |
| 400 | 2 | 10 | 0 | / | | | 7.76 | 7.79 | <u> </u> | | | 11.8 | 9.2 | | | | 2901 | 299 | $\overline{\langle}$ | | | 12.7 | 11.9 | ~ | | | 0 |
| | 6 | 10 | 0 | | | - | 7.63 | 7.33 | | | | +1.8 | 9.2 | | | | 298 | 299 | | | | 12,5 | 11.9 | | | - | -0 |
| Tooh Initialou | Counts | LIF. | WF | WF | WF | Gm | | | | | | | | | | | | | | | L | Rec | orded | in Lo | g Pass | s/Fail: | NIA |
| | Readings | WF | VP | WF | WF | GM | | | | | | | | | | | | | | | | | | | | L | |
| Dilution Coloo /fin | QC | ML. | r | | a da h | | | | | | Envir | onme | ntal C | hamb | er: | F | | | | | | | | | | | |
| Cone well | | 0∟) 25 | 50 | 100 | 200 | y:∿ ₹ | | | | | | | 6 71JJ | n U97 | a 7/11 | . 767 | *** | | . . | | | ~ 4. | | | | | |
| Vol Cu stock add | ed (ml.) | 2.2 | 4.4 | 89 | 17.8 | 24.6 | | | | v | Veight | s (g): | 0.511 | 0.14- | 0.307 | 0.57/ | | 0.365 | 0.54 | C.35 | 40.364 | 0.50 | ч | | | μ = <u>0</u> | <u>. 36 4</u> 2. J |
| Cu Stock Conc. (u | | 10,000 | 0000 | 0000 | 000 | 0000 | | | | 1 | | | 71 A | 77 K | 775 | 17.7 0 | 791 | 715 | •7 3 f | S 91) 1 | | n. e | | | | *9 | PL (72 |
| | .g/⊏/ [| 1-1 | 40,0- | M ⁰ 1 | <u>av</u> | an | | | | Len | igtns (| mm): | 52,0 | 31.3 | »»,» L | 33.0 | | <u> </u> | 30.0 | 32.0 | 52.2 | 50.5 | - | | | <u>د</u> = µ | <u>263</u> Min |
| | | | | | | | | | | Loa | ading: | 0 | .45 | <u>'3 a</u> | <u>[L</u> | | | | | | Ra | atio of | Le | ngth r | nax/m shorte | $\sin = \frac{3}{2}$ | 3.5/30.5 |
| Animal S | ource/Date | Rece | eived: | Tho | ma | <u>5 Fi</u> | 51-14 | ۵. | 219 | 124 | <u> </u> | | | | ŀ | latch | Date: | 1/1 | 124 | | | | longe | | Shorte | 5t – <u> </u> | <u>, 10</u> |
| | | | | | | | | | | | | | | | Swi | m-up | Date: | 111 | 512 | Ψ | | | | | | | |
| Commonte | | ^b 10 | ndom | fich | | arifiaa | d at in | itiatia | n for - | | - 6 | | | # Day | /s pos | t Swii | n-up: | 36 | 9 3. | 78 | | | | | | | |
| comments. | | Da | (S t) | F Z | /2 (| /24 | B (| US L | JF 2 | -122 | LI 2 V | | 1. 1ne)Q\Q | stand WF | 2 ard le | ngth | of the | ionge | St fish | 1 Shou | iid be i Lu | no mo UU | re that $r = r$ | n 2X 1 | the she x OOLS | ortest (ab | fish. |
| QC Check: | Check: Mashulla (Devriller Valence Val | | | | | | | | | | | | | <u> </u> | | | | | | | | | | | | | |
| - Enthalpy Analytical. | 4340 Vandev | er Ave | nue. S | an Die <u>c</u> | jo, CA | 92120. | | | | | | | | | | | | | | | CH. | | | <u>CJT-1</u> | <u> </u> | 421 | |