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CITY OF SANTA ANA PUBLIC WORKS AGENCY

20 Civic Center Plaza • P.O. Box 1988 Santa Ana, California 92702 www.santa-ana.org

January 18, 2022

Mr. Warren Teitz Metropolitan Water District of Southern California FSAfundingprogram@mwdh20.com

RE: Future Supply Actions Funding Program Final Report for Restoration of Local Recharge Sources from Invasive Dreissenid Mussels

Dear Mr. Teitz:

This final report on the *Restoration of Local Recharge Sources from Invasive Dreissenid Mussels* provides a comprehensive summary of the project efforts, findings, and lessons learned. During the period of May 2019 through September 2021, the project team completed coordination, planning, and implementation of five rounds of testing with EarthTec QZ for both 1) quagga veliger dose-response and 2) non-target acute toxicity from three project test locations.

A total of \$122,773.84 was disbursed by Metropolitan Water District of Southern California as part of the cost-sharing arrangements for the Future Supply Actions Funding Program for a total of \$245,547.65 incurred by the project team for work completed between May 2019 through September 2021.

I am informed and believe that the information contained in this report is true and that the supporting data is accurate and complete.

Sincerely,

Nabil Saba, P.E. Executive Director City of Santa Ana Public Works Agency

Thai Viet Phan

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# **Final Report**

# Restoration of Local Recharge Sources from Invasive Dreissenid Mussels



Prepared for: Metropolitan Water District of Southern California City of Santa Ana Orange County Water District





#### January 2022



- Prepared for:Metropolitan Water District of Southern CaliforniaCity of Santa AnaOrange County Water District
- Copies to:Water Replenishment District of Southern California<br/>United Water Conservation District<br/>Main San Gabriel Basin Watermaster<br/>Central Basin Municipal Water District<br/>California Department of Fish and Wildlife<br/>California Department of Water Resources
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## **1** Executive Summary

Invasive quagga mussels (Dreissena bugensis) have impacted critical imported water systems in Southern California, which restricts the beneficial uses of affected reservoirs, rivers, streams, and recharge basins. A study entitled "Restoration of Local Recharge Sources from Invasive Dreissenid Mussels" (Study) was conducted to evaluate the efficacy of the molluscicide EarthTec QZ<sup>™</sup> (active ingredient is copper sulfate pentahydrate) in controlling the veliger stage of quagga mussels, which is the larval stage when the guagga mussels are mobile. For the remainder of this report, guagga mussel veligers will be referred to as veligers. Veliger mortality was evaluated via bench-scale testing using veligers collected from three Southern California locations identified in Table 1-1 – Lake Piru, Lake Mathews, and Weymouth Water Treatment Plant (WTP). Lake Piru is a mix of State Water Project water and local run-off and Lake Mathews is Colorado River Aqueduct water. The Weymouth WTP receives untreated water from two sources: Colorado River water from Lake Mathews via the Upper Feeder and State Water Project (SWP) water from the East Branch of the SWP via the Rialto Pipeline or from the Upper Feeder via the Etiwanda Pipeline from the Rialto Pipeline. During this study, sampling at the Weymouth WTP was during periods of exclusive delivery of Colorado River water from Lake Mathews that had been chlorinated prior to entering the Upper Feeder. The travel time from Lake Matthews to the Weymouth WTP is approximately 8 hours. The same experimental conditions were used for each of the locations: a range of EarthTec QZ concentrations and exposure times at two different testing temperatures.

Sampling Site	Location	Owner
Lake Piru	Ventura County, CA	United Water Conservation District
Lake Mathews	Riverside County, CA	Metropolitan Water District of Southern California
Weymouth WTP	La Verne, CA	Metropolitan Water District of Southern California

Table 1-1.	Sampling	site	location	and	owner
------------	----------	------	----------	-----	-------

EarthTec QZ was able to produce 100% veliger mortality; however, several variables contributed to the efficacy of EarthTec QZ on veliger mortality, including EarthTec QZ dose, exposure duration, sampling location, and site-specific water quality. Veliger mortality was found to increase with both EarthTec QZ dose and exposure time. The veligers collected from Weymouth WTP exhibited the highest response to EarthTec QZ at lower concentrations and shorter exposure times, compared to the same conditions tested at Lake Mathews and Lake Piru. This is likely due to the cumulative exposure to chlorine and EarthTec QZ for the veligers collected from Weymouth WTP.

The toxicity of EarthTec QZ to veligers from each test location was compared to that of non-target indicator organisms (water flea, rainbow trout, or fathead minnow) from all locations using a time-dose variable representing total exposure (Figure 1-1), presented in terms of hours x mg/L of copper. Non-target organisms were exposed to EarthTec QZ for 96 hours, following standard test methods for measuring the acute toxicity of

effluents and receiving water to freshwater and marine organisms (EPA-821-R-02-012, 2002; EPA/600/4-90/027F, 1993). Water fleas and rainbow trout were very sensitive to EarthTec QZ and fathead minnows were the least susceptible. Veligers had similar sensitivity to EarthTec QZ as the water fleas and rainbow trout.

The Study results can be applied to other Southern California waterbodies with high hardness values and similar alkalinity and DOC levels. Since variations of mortality results were observed, which were attributed to water quality parameters, it is recommended that site-specific field assessments be conducted to assess the appropriate dose and exposure time to achieve the desired mortality. During field treatment, veliger mortality should be monitored along with relevant water quality parameters – hardness, alkalinity, dissolved organic carbon, pH, dissolved oxygen, temperature, and ions. To limit exposure of EarthTec QZ and resulting toxicity to non-target aquatic organisms, it is ideal to identify treatment configurations that allow for long exposure times to veligers with a low dose of EarthTec QZ (e.g., within an aqueduct or pipeline) prior to discharge to a lake, river, or stream.

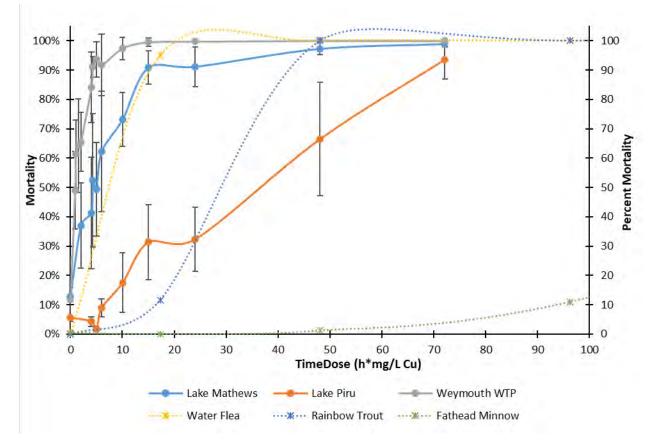


Figure 1-1. Mortality with cumulative exposure to EarthTec QZ (hours x mg/L copper) For veligers by location, plus water flea, rainbow trout, and fathead minnow (non-target indicator results for all locations combined).

Key lessons learned from the Study include the following:

- Although a prior study with veligers exposed to EarthTec QZ in water from Lake Mead found 100% mortality at 3 µL/L EarthTec QZ with 30 minutes of exposure time, the 3 µL/L EarthTec QZ dose did not result in 100% veliger mortality with any of the southern California waters tested as part of this Study, even after 24 hours of exposure time.
- No tested concentration of EarthTec QZ achieved 100% veliger mortality with an exposure duration of 30 minutes.
- The use of a 24-hour recovery period, during which veligers were exposed to clean water following each tested exposure duration with EarthTec QZ, allowed for improved determination of veliger mortality.
- Lower doses of EarthTec QZ are safer for non-target aquatic organisms but require longer contact time to achieve high veliger mortality.

## 2 Introduction

The communities of Southern California rely heavily on water supplied from the Colorado River Aqueduct (CRA) and California State Water Project (SWP). These vital water supplies are conveyed hundreds of miles from their sources and stored within a network of reservoirs. Since 2007, invasive quagga mussels (*Dreissena bugensis*) have spread from Lake Mead in Nevada through the CRA system to many California lakes, reservoirs, and watersheds that receive raw water from the CRA. MWD implements quagga mussel controls on the CRA system, including chlorination, desiccation, and physical removal. Quagga mussels in the SWP system have been more limited, to-date, with detections in Pyramid Lake, Castaic Lake, and Lake Piru, as well as downstream rivers and streams.

The presence of quagga mussels in imported water systems threatens the beneficial uses of the reservoirs, rivers, streams, and recharge basins. Key uses include providing habitat for aquatic species, recharging groundwater with local and imported water, storing local runoff, and facilitating flood control. The California Department of Fish and Wildlife (CDFW) requires impacted facilities to implement control strategies and complete monitoring to prevent the spread of invasive quagga mussels. Desiccation (allowing a basin or stream bed to dry) is the primary control method for quagga mussels, but this strategy can only be implemented on a small scale. Without a viable quagga mussel control strategy for rivers and reservoirs, the use of the imported water systems for valuable groundwater replenishment has been restricted.

This Study, entitled "Restoration of Local Recharge Sources from Invasive Dreissenid Mussels" was conducted to evaluate the efficacy of the molluscicide EarthTec QZ (active ingredient is copper sulfate pentahydrate) for controlling quagga veligers (veligers for the remainder of this report), which are the larval stage of the mussels. Five rounds of bench-scale dose-response testing were completed between December 2019 and July 2021 using veligers collected from three Southern California locations impacted by quagga mussels representing distinct water qualities (SWP with local

runoff, CRA, and combined impact of CRA water with pipeline chlorine treatment). For each round of testing, veligers were exposed to five concentrations of EarthTec QZ at two temperatures and mortality was evaluated over a range of hold times. This robust testing matrix allowed for comparison of veliger mortality based on EarthTec QZ concentration, exposure time, cumulative time-dose exposure, veliger size, and site-specific water quality.

In addition to assessing veliger mortality with exposure to EarthTec QZ, the Study also measured residual free and total copper for all test conditions along with other water quality parameters. Acute toxicity of EarthTec QZ to three non-target aquatic indicator species was also evaluated. Limiting the EarthTec QZ dose and residual total copper concentration is important if this treatment strategy is going to be viable for use on a larger scale. Residual copper levels must be compatible with the United States Environmental Protection Agency (USEPA) regulations for copper in drinking water, which include an action level of 1.3 mg/L as Cu and a secondary maximum contaminant level (sMCL) of 1.0 mg/L as Cu. The toxicity of EarthTec QZ in aquatic organisms is also an important consideration, as the imported water systems, associated reservoirs, and potential conveyance systems for recharge provide habitat for a variety of aquatic organisms.

This Final Report provides an overview of the Study efforts, summarizes results and key findings, and puts these findings in context by identifying lessons learned and potential next steps. In addition, this document compares the costs incurred and funds distributed to support the Study with the planned budget. Finally, the project schedule is discussed, along with adjustments made over the course of the Study, and the tasks accomplished.

Overall, EarthTec QZ was found to be effective in controlling veligers with exposure times of 24 hours or less. The efficacy of this treatment method varied as a function of the EarthTec QZ dose concentration, exposure duration, and site-specific water quality. Transitioning from the proof-of-concept bench-scale testing approach adopted for the Study, it is recommended to complete additional site-specific testing to optimize EarthTec QZ dosing and exposure times based on available full-scale treatment configurations (e.g., pipeline, basin, tank, lake).

The Study was conducted by Trussell Technologies (Trussell), KASF Consulting, and Orange County Water District (OCWD). Funding was provided by the Metropolitan Water District of Southern California (MWD) Future Supply Actions Funding Program, along with project partners including OCWD, the Water Replenishment District of Southern California (WRD), the United Water Conservation District (UWCD), the Main San Gabriel Basin Watermaster, and the Central Basin Municipal Water District (CBMWD). Additional technical assistance and support were provided by CDFW and the California Department of Water Resources (DWR). As a member agency of MWD, the City of Santa Ana was involved as a partner with OCWD and thus the FSA funding agreement with MWD was between MWD and the City of Santa Ana.

## 3 Cost Summary

Cumulative costs and funds disbursed (May 2019 through September 2021) associated with the original Study scope of work (testing at 4 locations) are summarized by invoice and task in Table 3-1. All project costs that are reported in Table 3-1 were incurred by Trussell and project partner KASF Consulting. The FSA funds were dispersed from MWD to the City of Santa Ana, then to the project team, and the totals are summarized in Table 3-1.

The originally planned budget that was funded through the FSA Funding Program with additional financial support from the aforementioned project partners included a single round of testing at four different locations. Challenges with scheduling in the first half of 2020 related to Covid-19 restrictions precluded sampling from one of the original test locations, OCWD's OC-28 turnout. The project team met with MWD to identify an alternative sampling location with representative water quality (chlorinated water from Lake Mathews) and Weymouth WTP was determined to be the most appropriate location. Both Weymouth WTP and OC-28 receive water from Lake Matthews with nearly the same travel time. As a result, both locations are essentially equivalent having equal contact times with the chlorine dosage. Since Weymouth WTP was already one of the project test locations, it was decided to complete another round of testing at both Weymouth WTP and the upstream Lake Mathews location in 2021. This resulted in five rounds of testing overall, which would allow for investigation of seasonality variability and variability of the quagga veliger size distribution. The fifth round of testing was funded separately by OCWD, WRD, Main San Gabriel Basin Watermaster and CBMWD, without additional funding from the FSA Funding Program; the associated costs from the fifth round of testing are thus not reflected in Table 3-1.

#### Table 3-1. Summary of project costs incurred and FSA funds dispersed

	Cost Incurred and Funds Disbursed Thoughout the Duration of the Study																					
Task No.	Cost Estimate from FSA Agreement between 18928001Rev3 City of Santa Ana (2019) and Metropolitan		18928001Rev3 18928002Rev2 189280		3003	Invoice No. 18928004 (2020 Q3)		Invoice No. 18928005 (2020 Q4)		Invoice No. 18928006 (2021 Q1)		Invoice No. 18928007 (2021 Q2)		Invoice No. 18928008 (2021 Q3)		Invoice Totals		Invoice No. 18928009 Retention	Total Funds Disbursed (Invoice			
	Total Study Cost	Requested Metropolitan Funding Match	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Costs Incurred	Funds Disbursed	Funds Disbursed	Totals plus Retention)
Task 1: Evaluation																						
of EarthTec QZ																						1
Veliger Treatment	\$154,180	\$77,090	\$71,039.09	\$35,519.55	\$6,504.82	\$3,252.41	\$500.00	\$250.00	\$36,935.93	\$18,467.97	\$3,747.09	\$1,873.55	\$9,352.50	\$4,676.25	\$200.00	\$100.00	\$25,865.72	\$12,932.86	\$154,145.15	\$77,072.59		\$77,072.59
Task 2: Toxicity Assessment	\$62,228	\$31,114	\$19,364.56	\$9,682.28	\$1,910.00	\$955.00	\$0.00	\$0.00	\$10,509.94	\$5,254.97	\$12,890.00	\$6,445.00	\$12,520.00	\$6,260.00	\$540.00	\$270.00	\$4,492.50	\$2,246.25	\$62,227.00	\$31,113.50		\$31,113.50
Task 3: Project Management	\$29,184	\$14,592	\$16,062.50	\$8,031.25	\$4,778.00	\$2,389.00	\$5,155.00	\$2,577.50	\$2,910.00	\$1,455.00	\$0.00	\$0.00	\$270.00	\$135.00	\$0.00	\$0.00	\$0.00	\$0.00	\$29,175.50	\$14,587.75		\$14,587.75
Subtotals	\$245,592	\$122,796	\$106,466.15	\$53,233.08	\$13,192.82	\$6,596.41	\$5,655.00	\$2,827.50	\$50,355.87	\$25,177.94	\$16,637.09	\$8,318.55	\$22,142.50	\$11,071.25	\$740.00	\$370.00	\$30,358.22	\$15,179.11	\$245,547.65	\$122,773.84		\$122,773.84
Retention @ 25%				-\$13,308.27		-\$1,649.10		-\$706.88		-\$6,294.48		-\$2,079.64		-\$2,767.81		-\$92.50		-\$3,794.78		-\$30,693.46		
Totals	\$245,592	\$122,796	\$106,466.15	\$39,924.81	\$13,192.82	\$4,947.31	\$5,655.00	\$2,120.62	\$50,355.87	\$18,883.46	\$16,637.09	\$6,238.91	\$22,142.50		\$740.00	\$277.50	\$30,358.22	\$11,384.33		\$92,080.38		\$122,773.84
Note: Reported costs		ed disbursement			•					the date of this	Final Report,	but are not an	icipated to ch	ange.								

Invoice No. 18928002Rev2 Costs Incurred for Task 1 includes a \$0.18 deduction due to a prior overcharge in Invoice No. 18928001Rev3. Invoice No. 18928005 Costs Incurred for Task 1 includes a \$32.91 deduction due to a prior overcharge in Invoice No. 18928004.

## 4 Schedule Summary

This collaborative Study involved multiple meetings with various stakeholders, planning efforts for the veliger and non-target toxicity testing, permitting for collection of invasive quagga mussels, field sampling and testing, as well as reporting. A summary of the main project efforts and deliverables is provided in Table 4-1.

Project Effort	Timing				
Task 1 Evaluation of EarthTec QZ Vo	eliger Treatment				
Veliger Dose-Response Test Plan	Q2 2019				
CDFW Scientific Collecting Permit Approval	Q4 2019				
Lake Piru Testing	Q4 2019				
Lake Mathews Testing, Part 1	Q3 2020				
Weymouth WTP Testing, Part 1	Q3 2020				
Draft Technical Memorandum 1	Q4 2020				
Lake Mathews Testing, Part 2	Q3 2021				
Weymouth WTP Testing, Part 2	Q3 2021				
Final Technical Memorandum 1	Q3 2021				
Task 2 Toxicity Assessn	nent				
Non-Target Toxicity Test Plan	Q2 2019				
Lake Piru Testing	Q4 2019				
Lake Mathews Testing, Part 1	Q3 2020				
Weymouth WTP Testing, Part 1	Q3 2020				
Draft Technical Memorandum 2	Q4 2020				
Lake Mathews Testing, Part 2	Q3 2021				
Weymouth WTP Testing, Part 2	Q3 2021				
Final Technical Memorandum 2	Q3 2021				
Combined Task 1 and 2 E	Efforts				
Project Kickoff Meeting	Q2 2019				
Stakeholder Review Meeting (Internal)	Q2 2019				
FSA Funding Agreement Meeting	Q1 2020				
Semi Annual Progress Report 2019 No. 1	Q1 2020				
Semi Annual Progress Report 2020 No. 1	Q3 2020				
Semi Annual Progress Report 2020 No. 2	Q1 2021				
Draft Final Report	Q3 2021				
Final Report	Q4 2021				
Task 3 Project Manager	ment				
Webinar Presentation of Final Report	Q4 2021				

Table 4-1. Summary of project efforts by task

The Study schedule is provided in Table 4-2. Yellow shading represents the original schedule established in the Final Agreement between MWD and the City of Santa Ana,

and blue shading (or cross hatching where the original and actual schedules coincided) represents the actual timing of project activities.

A Specific Use Scientific Collecting Permit is required by CDFW prior to collecting, transporting, or using quagga veligers in any tests. This effort was not anticipated as part of the original project planning, and testing was delayed until the permit was secured. The project team worked with CDFW to apply for this permit and provide the supporting documentation. The permit was finalized in November 2019, and the first round of testing at Lake Piru was completed in December 2019.

As discussed in Section 3, testing planned for Lake Mathews, Weymouth WTP, and OCWD's OC-28 turnout in quarter 2 of 2020 was delayed due to Covid-19 restrictions. The OC-28 turnout location was unavailable in fiscal year 2021, and the project team worked with MWD to identify Weymouth WTP as the most appropriate surrogate location for OC-28. Repeating the testing at Weymouth WTP was expected to also introduce some seasonal variability in the veliger size and water quality. Considering the benefit of the repeat testing, as well as the desired correlation of the veliger dose-response for Weymouth WTP with the upstream, unchlorinated water from Lake Mathews, OCWD, WRD, Main San Gabriel Basin Watermaster and CBMWD funded one additional round of testing at Lake Mathews in July 2021. These additional 2021 testing efforts delayed the development of the Final Report.

#### Table 4-2. Study schedule

The original plan is indicated in yellow, with actual timing indicated in blue; where these period coincide, the shading is striped.

		Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec	Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec	Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec
Task	Task Name		20	19			20	20	•	2021			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Collect and compile available data												
1	Develop Draft Veliger Dose Response Test Plan												
1	Stakeholder Review Meeting 1												
1	Finalize Veliger Dose Response Test Plan												
1	Obtain Scientific Collecting Permit from CDFW												
1	Conduct Field Sampling/Dose Response Testing												
1	Compile Results												
1,2	Semi-Annual Progress Report 2019 No. 1 (May 2019 – December 2019)												
1	Conduct Additional Sampling (If needed)												
1,2	Semi-Annual Progress Report 2020 No. 1 (January 2020 – June 2020)												
1	Compile Season 2 Results (If needed)												
1	Stakeholder Review Meeting 2 (If needed)												
1	Prepare Draft Technical Memorandum 1												
1	Review Draft Technical Memorandum 1												
1	Submit Final Technical Memorandum 1												
1,2	Semi-Annual Progress Report 2020 No. 2 (July 2020 – December 2020)												
2	Develop Toxicity Test Plan												
2	Stakeholder Review Meeting 1												

# Einal Report: Quagga Mussel Evaluation

		Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec	Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec	Jan- Mar	Apr- Jun	Jul- Sep	Oct- Dec
Task	Task Name		20	19		2020				2021			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2	Finalize Toxicity Test Plan												
2	Conduct Toxicity Testing												
2	Compile Results												
2	Conduct Additional Testing (If needed)												
2	Compile Season 2 Results (If needed)												
2	Stakeholder Review Meeting 2 (If needed)												
2	Prepare Draft Technical Memorandum 2												
2	Review Draft Technical Memorandum 2												
2	Submit Final Technical Memorandum 2												
1,2	Draft Final Report												
1,2	Final Report												
3	Symposium Presentation of Study Findings												
3	Project Management												

## 5 Study Results and Analysis

Three locations, indicated in Figure 5-1, were sampled over a two-year period of December 2019 to July 2021: Lake Piru, Lake Mathews, and Weymouth WTP. Lake Piru is managed by UWCD. This reservoir, located in Ventura County, CA, impounds storm flows from the Piru Creek watershed and supplemental imported SWP water supplied by DWR via Pyramid Lake. Lake Mathews, a reservoir located in Riverside County, CA owned and operated by MWD, is primarily used to store CRA water. Water from Lake Mathews is delivered into raw water pipelines that are dosed with chlorine for quagga mussel control. One location that receives chlorinated Lake Mathews water is MWD's Weymouth WTP which is connected to the Upper Feeder pipeline (Figure 5-1). Testing was completed on samples from a) Lake Piru in December 2019, b) Lake Mathews in September 2020 and July 2021, and c) Weymouth WTP in September 2020 and June-July 2021.



Figure 5-1. Map of Study sample locations in Southern California

### 5.1 Susceptibility of Quagga Veligers to Earth Tec QZ

Live guagga veligers and raw water were collected from each aforementioned location. Subsets of the collected veligers were placed in beakers with raw water for testing a range of EarthTec QZ doses, various exposure times, and two different temperatures (15°C and 20°C). The same test conditions were repeated using water from each location. The range of EarthTec QZ (ET) doses tested include 0, 3.0, 16.7, 33.4, 50.1 µL/L (equivalent to 0, 0.18, 1.0, 2.0, and 3.0 mg/L as Cu). Copper ions are the active ingredient in EarthTec QZ that cause veliger mortality. Veliger mortality was evaluated with the Fast Green method (Stockton-Fiti and Claudi 2017) after 0.5, 2, 5, and 24 hours of exposure time (i.e., end mortality) for each EarthTec QZ dose and temperature condition. Directly following this count at the end of the exposure time, the veligers were placed in a beaker and exposed to raw sample water (without the addition of EarthTec QZ) for a 24-hour recovery period. A final mortality assessment was made at the end of the recovery time to allow for analysis of delayed mortality. The complete set of quagga veliger dose-response results from each location is summarized in a separate Technical Memorandum 1 (TM1) in Appendix A. The discussion in this Final Report is focused on significant trends and findings from TM1.

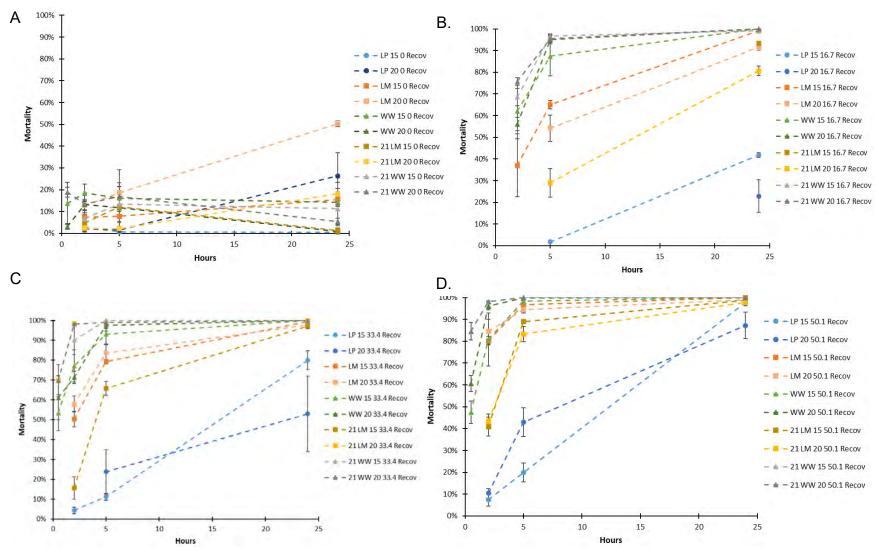
In general, veliger mortality increased with EarthTec QZ dose at all sampling locations. Veliger mortality increased with exposure time to EarthTec QZ (see TM1 in Appendix A for individual site results). Recovery mortality results for all three locations were greater

than the corresponding end mortality assessment for each condition. Considering the objective of the study to characterize the impact of EarthTec QZ treatment on the quagga veligers, the recovery results are displayed in this Final Report; all data can be found in TM1 (Appendix A). Statistical analysis showed that EarthTec QZ concentration, exposure duration, and location were significant variables. Recovery mortality results for veliger dose-response test conditions are presented in Figure 5-2.

Weymouth WTP veligers were the most susceptible to EarthTec QZ, exhibiting higher mortality in shorter times at lower concentrations (Figure 5-2) when compared with the corresponding results from Lake Piru and Lake Mathews. The results for the 16.7  $\mu$ L/L EarthTec QZ dose (1.0 mg/L as Cu) test condition (see Figure 5-2 part B) are the main point of reference for assessing the efficacy of EarthTec QZ as a viable treatment strategy. This corresponds to the established drinking water limits for copper of 1.0 mg/L as Cu. In the Weymouth WTP tests, greater than 85% mortality was achieved at the 5 hours of exposure at 16.7  $\mu$ L/L EarthTec QZ. Mortality increased with exposure time and concentration beyond this condition. Veligers from Lake Mathews were not as susceptible to EarthTec QZ (1.0 mg/L as Cu). Lake Piru only achieved approximately 30% mortality at the 24-hour exposure time at 16.7  $\mu$ L/L EarthTec QZ (1.0 mg/L as Cu). The two higher concentrations tested, 33.4 and 50.1  $\mu$ L/L EarthTec QZ, exhibited higher mortality and quicker response (Figure 5-2 parts C and D).

Control condition veliger mortality was usually less than 20% with two exceptions for 24hour recovery (Figure 5-2, part A): Lake Piru at 20°C and Lake Mathews 2020 at 20°C. The control showed that there is a baseline mortality, which can increase with time for batch tests. Holding the veligers in beakers for 48 hours contributes to mortality regardless of EarthTec QZ dosing, so longer duration studies are not advisable without flowing water. The lowest dose tested was 3  $\mu$ L/L EarthTec QZ. Although this condition achieved high mortality (>85%) in the Weymouth WTP samples at 24 hours of exposure, the Lake Mathews and Lake Piru samples did not exhibit significant increased mortality when compared with the control. For this reason, the 3  $\mu$ L/L EarthTec QZ results are not presented in Figure 5-2. Additional discussion of the 3  $\mu$ L/L EarthTec QZ experimental results is provided in Section 6 (Figure 6-1).

## Einal Report: Quagga Mussel Evaluation





Standard deviation bars for the 24-hour recovery (Recov) measurement for each test condition from Lake Piru (LP), Lake Mathews (LM) in 2020 and 2021, and Weymouth WTP (WW) in 2020 and 2021 at the two test temperatures (15 & 20°C). (A) 0  $\mu$ L/L control mortality; (B) 16.7  $\mu$ L/L EarthTec QZ; (C) 33.4  $\mu$ L/L EarthTec QZ; (D) 50.1  $\mu$ L/L EarthTec QZ.

The water quality while testing was suitable for veliger survival. As expected, the pH decreased with increasing EarthTec QZ concentration. The free and total copper concentrations increased with increased EarthTec QZ concentration. Over the 24-hour exposure time for each experimental condition (EarthTec QZ dose and temperature), copper concentrations decreased but were still within 20% of the initial dosed concentration for all sampling locations. The water at Weymouth WTP represents CRA water from Lake Mathews that had been exposed to free chlorine during the approximate 8 hours of travel time within the Upper Feeder pipeline (chlorine is dosed at the pipeline inlet, as the water leaves Lake Mathews). The measured residual chlorine levels in the Weymouth WTP influent samples were very low (0.07 mg/L), consistent with levels measured from Lake Mathews samples (0.06 mg/L); these levels, which approach the method detection limit (0.02 mg/L), are expected to be related to interferences from other ions in the water and not residual oxidant.

Further analysis was completed on the veliger mortality data to look for significant trends. The recovery mortality data was used to perform linear regression modeling. In order to get the data to fit normality assumptions, the recovery mortality was transformed with a square root of the arcsine value of the recovery mortality. Linear regression modeling showed that concentration, duration, and location were significant variables. For simplicity, the copper concentration of each dose was multiplied by the testing duration to get a time-dose variable (Table 5-1). Testing temperature (15 or 20°C) and year conducted were not significant variables in mortality results, therefore results were combined for each location to get a simplified model with a good fit (linear regression fit of  $r^2=0.91$ ) (Figure 5-3).

Veligers collected from Weymouth WTP had the highest mortality and quickest response. Veligers from Lake Mathews were not as susceptible to the copper: longer times and higher concentration required to achieve close to 100% mortality. Similarly, Lake Piru water veligers were less susceptible to copper.

#### Table 5-1. Time-Dose variable calculation

Units are hours of exposure duration multiplied by concentration of EarthTec QZ as Cu (h\*mg/L Cu)

		Duration	n (hours)	
Concentration as EarthTec QZ (as Cu)	0.5	2	5	24
3 µL/L (0.18 mg/L)	0.09	0.36	0.9	4.32
16.7 µL/L (1 mg/L)	0.5	2	5	24
33.4 µL/L (2 mg/L)	1	4	10	48
50.1 µL/L (3 mg/L)	1.5	6	15	72

# Einal Report: Quagga Mussel Evaluation

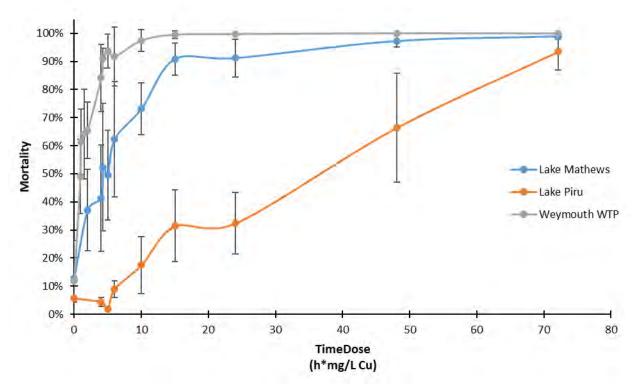


Figure 5-3. Veliger mortality for cumulative exposure to EarthTec QZ Standard deviation bars for each sample location combine all temperatures and years tested.

### 5.2 Susceptibility of Non-targets to EarthTec QZ

Large volumes of water were collected from each test location and delivered to Aquatic Bioassay and Consulting Laboratories (ABC Labs) in Ventura, CA to conduct acute toxicity testing on three non-targeted indicator species: water flea (*Ceriodaphnia dubia*), rainbow trout (*Oncorhynchus mykiss*), and fathead minnow (*Pimephales promelas*).

ABC Labs completed acute toxicity tests using guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (EPA-821-R-02-012, 2002; EPA/600/4-90/027F, 1993), where the indicator species are exposed to the test water (sample water collected a given test location and spiked with the selected dose of EarthTec QZ) and evaluated over a 96hour exposure period. This testing was completed in parallel with the dose-response veliger testing. Each round of toxicity testing utilized the same site-specific water and EarthTec QZ stock that was used during the veliger dose-response testing and results are presented in Technical Memorandum 2 (TM2) in Appendix B. The selected EarthTec QZ doses used for the acute toxicity testing were determined based on the most effective dose identified from the preliminary veliger dose-response results for each location.

For all sampling locations, the water flea was the most susceptible to EarthTec QZ (Figure 5-4). One round of testing with the Weymouth WTP influent water reported 0%



mortality for the 8.35 and 16.7  $\mu$ L/L EarthTec QZ (0.5 and 1.0 mg/L as Cu), but test condition repeats demonstrated 100% mortality which caused the large standard deviation bars. The reason for the discrepancy between the two tests is unknown: possible hypotheses include different size classes of test subjects used, laboratory error (though ABC Labs provided quality assurance/quality control (QA/QC) review and did not identify any deviation from their protocol), or water quality differences. The chlorine for the 2021 testing at Weymouth WTP was higher than in 2020 and the water flea test subjects are very sensitive to chlorine exposures (the lethal concentration for 50% of the sample population (LC50) for free chlorine species hypochlorous acid and hypochlorite ion are 0.14 mg/L and 0.08 mg/L, respectively (Taylor 1993)). The repeated test results with 100% mortality were used to provide conservative estimates for evaluating EarthTec QZ toxicity for the non-target indicator species.

Rainbow trout were very sensitive to Earth Tec QZ concentrations (Figure 5-4). All sample locations had the same mortality curves. Fathead minnows were not as sensitive to copper as EarthTec QZ (Figure 5-4). In Lake Mathews and Weymouth WTP water, there was little to no mortality observed even at 16.7  $\mu$ L/L EarthTec QZ or 1.0 mg/L as Cu. In Lake Piru water 42.5% mortality was observed at 16.7  $\mu$ L/L EarthTec QZ (1.0 mg/L as Cu). However, it should be noted that Lake Piru water had an initial copper concentration of 0.15 mg/L (Table 5-2) whereas Lake Mathews and Weymouth had an initial copper concentration of 0.01 mg/L. This could have increased the dose of copper to 1.15 mg/L, which could be a tipping point in the toxicity to fathead minnows given the Lake Piru water quality.

The difference in acute toxicity response observed between the two different waters can potentially be further explained by the differences in water quality that affect the bioavailability of metals in water as well as competitive ions. Copper toxicity in fish can be predicted using the biotic ligand model which uses a wide array of water quality to predict bioavailability and toxicity: pH, dissolved organic carbon (DOC), ions, alkalinity, and temperature (USEPA 2016). As discussed in Section 5.3, these water quality parameters affect the chemical composition of copper in the water and determine the bioavailability. For example, alkalinity, pH, hardness, and anions affect the saturation indices for copper and the percentage of total copper existing in dissolved form. It has been demonstrated that copper toxicity decreases when pH and hardness increase (Welsh et al. 1995). Meanwhile, other cations, especially sodium, can compete with free copper ions for binding sites in the gills of fish (Nelson et al., 1986; Welsh et al. 1995, Parametrix and HydroQual 2006; USEPA 2016). In other studies conducted by KASF Consulting, sodium levels in Lake Piru in 2019 were lower (65 mg/L) than those measured in Colorado River water (100 mg/L) in 2015. While sodium measurements were not included in this study, the higher sodium concentration for Lake Mathews and Weymouth WTP should have provided more protection from the copper toxicity. The suite of water quality for predicting toxicity with the biotic ligand model was not measured for the tests; however, the water quality clearly affects copper toxicity and could be the reason for the difference in Lake Piru fathead minnow mortality.



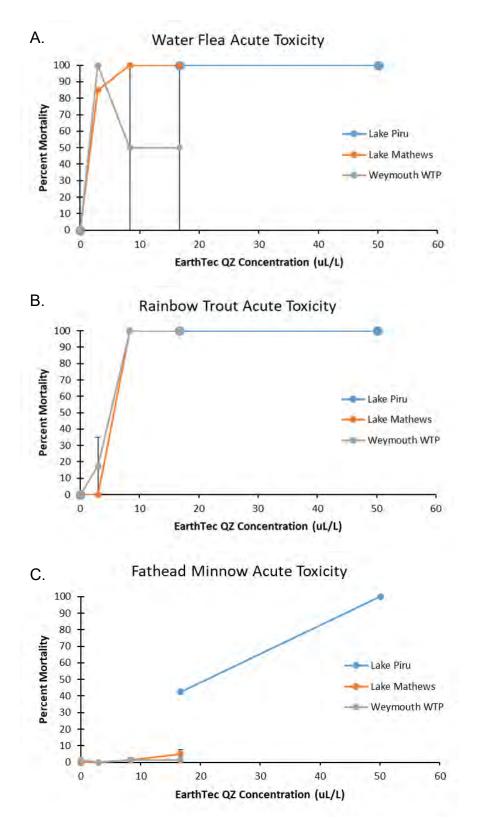


Figure 5-4. Average acute toxicity for (A)water flea; (B)rainbow trout; and (C)fathead minnow with EarthTec QZ following 96=hour exposure durations Standard deviation bars for each sample location combine all acute toxicity results.

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The acute toxicity tests were 96-hour exposure durations for the water flea, rainbow trout, and the fathead minnow. To obtain a similar metric to compare the veliger mortality, the exposure time was multiplied by the EarthTec QZ concentration as mg/L of copper tested to obtain a time-dose variable. Mortality is correlated with cumulative EarthTec QZ exposure in Figure 5-5 for veligers from each test location (data from each temperature condition is combined) and for all non-target indicator species (combined data from all locations) for exposures of up to 100 h\*mg/L.

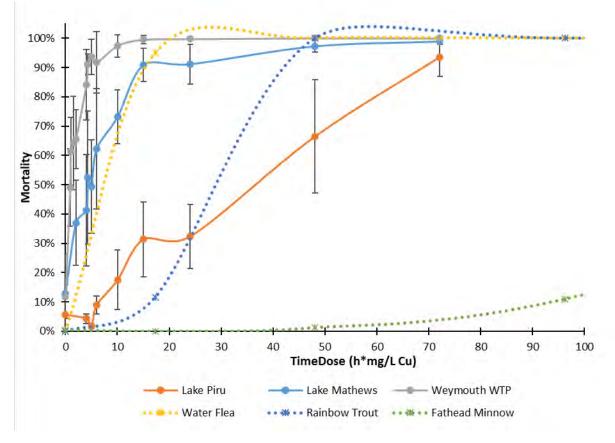


Figure 5-5. Mortality with cumulative exposure to EarthTec QZ For veligers by location, plus water flea, rainbow trout, and fathead minnow (non-target indicator results for all locations combined).

Higher veliger mortality was observed in Weymouth WTP water with lower cumulative exposure (e.g., shorter time exposure, lower EarthTecQZ dose, or both) to EarthTec QZ relative to the exposure required for similar mortality levels in the water flea, rainbow trout, or fathead minnow (Figure 5-5). In Lake Mathews water, the veligers had approximately the same mortality rate as the water flea and died with lower EarthTec QZ exposure relative to the rainbow trout and the fathead minnow. Veligers in Lake Piru survived at a higher rate relative to the water flea and rainbow trout (above 24 h\*mg/L exposure), but had higher mortality with lower exposure compared to the fathead minnow. This time-dose assessment allowed for a broad comparison of the impact of EarthTec QZ exposure on both the veligers and non-target indicators, given the

differences in experimental setup; the veliger exposure times were limited to 24 hours, while the non-target indicators were all tested using a 96-hour exposure time. Further testing of co-mortalities of veligers and the non-target indicators is recommended using a wider range of EarthTec QZ exposures with field-based test methods, such as a mesocosm (e.g., pilot-scale water enclosure system adjacent to treatment site), to better replicate expected full-scale conditions.

### 5.3 Raw Water Quality

Raw water quality was measured for each veliger collection and acute toxicity sampling event. Many of the water quality parameters were the same for Lake Mathews and Weymouth WTP, which was expected since Weymouth WTP influent water is the chlorinated water downstream of Lake Mathews (Table 5-2). Background copper levels were higher at Lake Piru compared to Lake Mathews and Weymouth WTP. Chlorine levels were also higher in Lake Piru water, but this could have been due to interferences in testing or residual levels from washing the test vials with tap water. Copper and chlorine levels did not impact veliger results but in some instances were high enough to impact the acute toxicity results. Dissolved oxygen, conductivity, and pH were at levels suitable for organism growth and survival. Oxidation reduction potential (ORP) was consistent for all samples.

The alkalinity of Lake Piru (mean=171 mg/L as CaCO<sub>3</sub>) was higher than Lake Mathews and Weymouth WTP (mean=126 mg/L as CaCO<sub>3</sub>), which indicated that Lake Piru water was able to buffer more of the effects of the addition of EarthTec QZ (a very acidic compound). Hardness measurements were also highest for Lake Piru (mean=315 mg/L as CaCO<sub>3</sub>). Tests conducted in June 2021 for Lake Mathews and Weymouth WTP had higher hardness measurements (mean=278 mg/L as CaCO<sub>3</sub>) than sampling 2 weeks later in 2021 (mean=182 mg/L as CaCO<sub>3</sub>). Water from the 2020 sampling events had the lowest hardness (mean=143 mg/L as CaCO<sub>3</sub>). Calcium competes with copper for binding sites in low hardness waters but is not a factor in waters that are considered hard like both Lake Piru and Lake Mathews waters (Parametrix and HydroQual 2006). DOC levels were different by location, with the highest levels measured at Lake Piru (Table 5-2). Chemical oxygen demand (COD) varied widely, and no trend was apparent.

Researchers have shown that along with calcium, other competing cations such as magnesium, sodium, and hydrogen, as well as complexing ligands (DOC, OH<sup>-</sup>, Cl<sup>-</sup> and CO<sub>3</sub><sup>2-</sup>) decrease the toxicity of copper as their concentrations increase in natural waters (Parametrix and HydroQual 2006). Alkalinity can affect copper by changing which complex is bioavailable (Parametrix and HydroQual 2006). When the water quality parameters were put into the veliger logistic regression model, alkalinity, DOC, and COD were important variables, but hardness was not a significant factor in the model. Water quality was an important factor in determining the toxicity of EarthTec QZ to veligers. Lake Piru water quality was different from Lake Mathews water, especially the alkalinity and DOC measurements.

#### Table 5-2. Raw water quality

Readings from each sample location at the time of veliger testing.

Parameter			Total Copper	Free Copper	Total Chlorine	Oxidative Reduction Potential	Dissolved Oxygen	Conductivity	Н	Alkalinity	Hardness	Dissolved Organic Carbon	Chemical Oxygen Demand
Location	Year Temperature Condition		mg/L	mg/L	mg/L	mV	mg/L	μS/ cm	рН unit		L as CO3	mg/L	mg/L
	Raw W	ater Quality											
Lake Piru	2019	15⁰C Tests	0.15	0.14	0.08	210.4	10.45	927	8.43	187	314	5.33	10.00
	2019	20°C Tests*	0.16	0.16	0.12	191.9	8.88	913	8.25	154	316	5.05	5.65
	Raw Water Quality												
l eke	2020	15°C Tests	0.02	0.02	0.02	212.5	7.57	946	8.18	115	138	3.01	4.67
Lake Mathews		19°C Tests	0.01	0.01	0.02	245	8.08	937	8.20	115	142	2.95	5.69
	2021	15°C Tests	0.00	0.00	0.01	185.6	8.46	950	8.24	138	281	2.98	4.65
		20°C Tests	0.00	0.00	0.00	208.2	8.34	957	8.29	135	178	2.91	3.30
	Raw W	ater Quality											
		15⁰C Tests	0.01	0.01	0.04	214	8.27	944	8.02	119	150	4.09	8.50
Weymouth	2020	20°C Tests	0.00	0.00	0.07	223.5	8.14	941	8.13	121	139	4.19	8.24
WTP		Additional Sampling	0.02	0.02	0.05	211	8.19	955	8.12	119	145	4.05	7.88
	2021	15⁰C Tests	0.02	0.03	0.10	195.6	8.69	969	8.18	137	275	3.01	4.46
	2021	20°C Tests	0.00	0.00	0.02	218.2	8.34	961	8.28	135	186	3.12	4.86

\*Some parameters may be different from normal as it was raining during the sampling and testing period.

\*\* Re-sample of Weymouth WTP influent for acute toxicity testing with 3 µL/L EarthTec QZ. This water was not used for veliger testing.

While working with the samples, we observed that the larger sized veligers were taking longer to succumb to the toxic effects of copper and many of these larger sized veligers were still alive during the final readings. Each sample collection was evaluated to determine the proportion of the four veliger size classes (i.e., D-shaped, small umbonal, large umbonal, and pediveliger) present, as indicated in Table 5-3. Samples taken during the same week from a given location were combined. The size distributions from all of the sample collections were then ranked by size class to compare the overall veliger sizes among the different sample collections. The ranking system assigned lower numerical values to a sample collection with higher proportions of larger sized veligers. The two larger size classes (i.e., pediveliger and large umbonal) were ranked from the location where they were most abundant to least (1 to 8). The opposite approach was used for the smaller two size classes (i.e., small umbonal and D-shaped), where the ranking values indicated least abundance to most (1 to 8). The scores for each sample collection were added and then ranked from A (lowest value) to H (highest value). This showed which samples had a relatively higher proportion of large veligers compared to those containing small veligers (Table 5-3).

		Size	Class		
Sample Site	<b>D-shaped</b> (50-150 μm)	Small umbonal (150-250 μm)	Large umbonal (200-350 µm)	<b>Pediveliger</b> (350-500 μm)	Rank (score wt)
2021 Lake Mathews (20°C)	32%	18%	38%	11%	A (8)
Lake Piru (15 & 20°C)	45%	15%	20%	20%	B (9)
2021 Lake Mathews (15°C)	52%	22%	23%	3%	C (16)
2021 Weymouth WTP (15°C)	74%	8%	17%	2%	D (17)
2020 Lake Mathews (20°C)	50%	30%	15%	5%	E (20)
2021 Weymouth WTP (20°C)	53%	25%	22%	1%	F (22)
2020 Weymouth WTP (15 & 20°C)	80%	15%	3%	2%	G (23)
2020 Lake Mathews (15°C)	75%	20%	4%	1%	H (26)

Table 5-3. Size class distribution of veligers used in testing Each sample site was ranked by density of large veligers to small veligers.

Veligers in Lake Mathews during the 2021 sampling event for the 20°C test conditions had the most abundant amount of the largest size classes and had a very similar veliger size class distribution to Lake Piru. The veliger mortality for this sampling event was lower than the other Lake Mathews events, and more consistent with the low mortality achieved in the Lake Piru testing (Figure 5-6). This trend was also observed with the

test sites containing mostly small veligers, where the smallest veligers utilized during testing were from the 2020 Lake Mathews sampling event for the 15°C test conditions and the mortality was similar to the Weymouth WTP results (Figure 5-6).

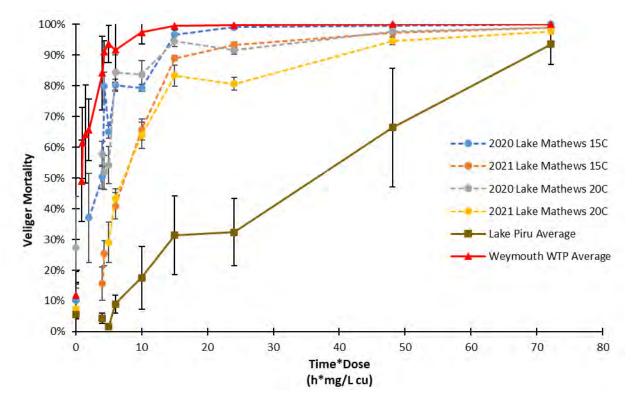


Figure 5-6. Veliger mortality with exposure to EarthTec QZ Standard deviation bars combine all temperatures and years tested for Lake Piru and Weymouth WTP. Lake Mathews veliger mortality with standard deviation bars was not combined by temperature or sampling year.

The simplest and best fitting model showed that mortality was a function of location, concentration, and exposure duration. The location variable could be replaced with the alkalinity and DOC. Additionally, adding in veliger size class helped explain some of the variation in the model, but increased the complexity of the model.

### 5.4 Study goals and objectives

The study goals and objectives were to evaluate the effectiveness of EarthTec QZ, an EPA–registered molluscicide for prevention and control of quagga and zebra mussels, in Southern California water.

EarthTec QZ was effective in reducing the number of live veligers in all systems treated. Veliger mortality increased with increased concentration of EarthTec QZ and with increased duration of exposure. The water that had the highest mortality was the chlorinated Lake Mathews water sampled at Weymouth WTP. The lowest mortality per concentration and duration was observed in veligers from Lake Piru. Alkalinity and

dissolved organic carbon were significant water quality factors in influencing the toxicity of EarthTec QZ in the hard waters of Southern California.

### 5.5 Major problems in achieving study goals and objectives

There were two major problems that were encountered while conducting this study. The first was the impact of Covid-19 on the sampling schedule and the second was obtaining enough veligers at Lake Mathews in 2020.

Covid-19 stay at home orders and associated restrictions delayed sampling events at Lake Mathews, Weymouth WTP, and OCWD's OC-28 turnout (original location) from May or June 2020 to September 2020. Testing was completed at the original study testing locations, with the exception of OC-28 turnout. The study was designed with the intention of correlating the dose-response efficacy of EarthTec QZ at Lake Mathews with that of two downstream locations. Water from Lake Mathews is chlorinated prior to entering pipelines supplying both OC-28 and Weymouth WTP. Considering the connection of these water supplies, the Study aimed to correlate testing from Lake Mathews with the two downstream locations – OC-28 turnout and Weymouth WTP influent. Testing these three locations in a series would have allowed for comparison of the effects of EarthTec QZ with and without chlorine exposure. However, due to prior budgeting, OCWD only had access to Lake Mathews water at the OC-28 turnout through June 2020, and not during the 2021 fiscal year (July 2020 – June 2021). Given the similarity in travel time from Lake Matthews to Weymouth WTP and Lake Mathews to OC-28, the Weymouth WTP results would be expected to be the same at OC-28.

Samples of quagga veligers were initially collected at Lake Mathews on September 3, 2020 for the 20°C dose-response testing with EarthTec QZ. However, veliger densities were too low to provide greater than 50 veligers per testing replicate and the control mortality was greater than 50% for all exposure durations. An additional sampling and subsequent testing event was conducted on September 18, 2020 at deeper depths which yielded a higher veliger density acceptable for dose-response testing. These results were originally labeled as 19°C to avoid confusion with the initial 20°C results that had high mortality in the control group. In the summary of the data, the initial 20°C results were removed from the analysis and discussion; the complete results are available in TM1 in Appendix A.

### 5.6 Application of study to other areas of the region

EarthTec QZ was effective in reducing the number of live veligers in all systems treated. This copper treatment was most effective after the veligers had been exposed to chlorine between Lake Mathews and Weymouth WTP. EarthTec QZ treatments were less effective on veligers collected in Lake Piru, which had higher alkalinity and DOC measurements, and a large variety of veliger size classes present.



These results can be applied to other waterbodies within Southern California that have high hardness values and similar alkalinity and DOC levels, but site-specific testing would be required to assess the appropriate dose and exposure time to achieve the desired mortality. Some deviations from the results are expected if applied in other waterbodies because copper toxicity is influenced by high alkalinity levels and dissolved organic carbon levels. These parameters also change with seasons, as we observed different values among different sampling events at the same location with seasonally variable mortality curves. Though we did see seasonal variation in mortality results, the variability was only about 15%.

This Study evaluated veliger toxicity at a bench-scale level that has its own limitations when comparing it to a field application. Veligers collected from each study location were filtered to remove large non-target organisms and represent a size range of 50-500 micrometers. Likewise, the sample waters used for the beaker tests were filtered to remove particles above 10 micrometers. If the organisms that were between 10 and 40 micrometers or larger than 500 micrometers were present, then the efficacy of the EarthTec QZ on the veligers may be lower because these organisms could uptake copper, making it less bioavailable. This would be monitored by measuring and comparing the residual copper at the end of the exposure duration, which if true would be less than found in these study results. As discussed in conjunction with the results from the control conditions, natural veliger mortality increased with residence time in the test beakers, which will obscure the results for test conditions after approximately 48 hours. Utilizing a mesocosm set up or a flow-through apparatus to test site-specific conditions (dose and exposure time) is recommended to optimize the potential use of EarthTec QZ for controlling veligers at each candidate location.

Copper is regulated by the State Water Resources Control Board Division of Drinking Water in California and has a secondary maximum containment level of 1.0 mg/L (State of California 2018). This will regulate the maximum dose of copper to be used in treatments of imported water supplies. If locations around Southern California were to use EarthTec QZ, they could expect similar results to this study (Table 5-4). For example, if EarthTec QZ was applied to the water at OC-28 at a dosage of 16.7 µL/L EarthTec QZ dosage (1.0 mg/L as Cu), then we would expect mortality results similar to what we observed in the Weymouth WTP testing. This would be applicable when OC-28 is receiving MWD's CRA water.

Location	Exposure Duration (hours)		
	2	5	24
Lake Piru	Not Assessed	1.7 (±0.6)%	32.4(±10.9)%
Lake Mathews	37.0(±14.5)%	49.4(±16.0)%	91.2(±6.8)%
Weymouth WTP	65.6(±10.0)%	93.6(±6.0)%	99.8(±0.5)%

Table 5-4. Average percent veliger mortality observed at each location Data presented for 16.7  $\mu$ L/L EarthTec QZ dosage (1.0 mg/L as Cu) with standard deviation.

## 6 Conclusion

EarthTec QZ is an effective tool to use in Southern California waters to achieve high mortality of quagga mussel veligers. EarthTec QZ effectiveness is driven by bioavailable copper ions in the water which is affected by hardness, alkalinity, and DOC. EarthTec QZ was more toxic to veligers in water that had previously been exposed to a chlorine treatment. EarthTec QZ is also toxic to non-target species, including water fleas and rainbow trout. This study showed that fathead minnows are impacted less by the toxicity of EarthTec QZ.

The design of this Study allowed for comparison of multiple variables expected to potentially influence the toxicity of EarthTec QZ. Temperature was not an explanatory factor in determining mortality, however, using a broader range of temperatures could be considered if a treatment were to be applied at temperatures outside of the range included in the study, such as at 25 to 30°C. COD did not correlate to mortality of veligers and was not found to be a parameter of interest. The size distribution of the veligers correlated with mortality differences for an individual sampling location (Lake Mathews). Small veligers succumbed quickly to the toxic effects of EarthTec QZ, but the larger veligers (pediveligers) were still alive at the end of both the treatment duration and the recovery period.

### 6.1 Lessons Learned

We found that it was important to add in a recovery period after the exposure duration to determine final mortality. During the Study, we observed veligers that were moving slowly and bloated, but were not stained green with the Fast Green dye used to determine veliger mortality. With the additional 24 hours of exposure to clean water, the veligers succumbed to the toxicity and were confirmed dead.

An example of how a recovery period would work in a field application would be as follows. OC-28 could be treated with EarthTec QZ at the inlet area for a 5-hour exposure duration, and then the treated water could be mixed with either reclaimed water or Santa Ana River water (which is veliger and copper free water), and the

expected mortality of veliger would be around 94% (Table 5-4) instead of 58% mortality without a recovery period. This post-treatment dilution is also expected to be beneficial for reducing the impact of EarthTec QZ on non-target aquatic species present in natural systems (e.g., Santa Ana River) and reducing the residual copper concentration.

One of the initial EarthTec QZ studies found that 100% veliger mortality occurred in 30 min at 3  $\mu$ L/L EarthTec QZ (Watters et al. 2013). This Study did not achieve these results in any of the waters tested. The water used in the Watters study was Colorado River water at Lake Mead fish hatchery. Lake Mathews receives the same water downstream of this location. Our results did not obtain 100% mortality with a dosage of 3  $\mu$ L/L EarthTec QZ even after a 24-hour exposure duration (Figure 6-1). Additionally, no tested concentration of EarthTec QZ achieved 100% morality with an exposure duration of 30 min (Figure 5-2).

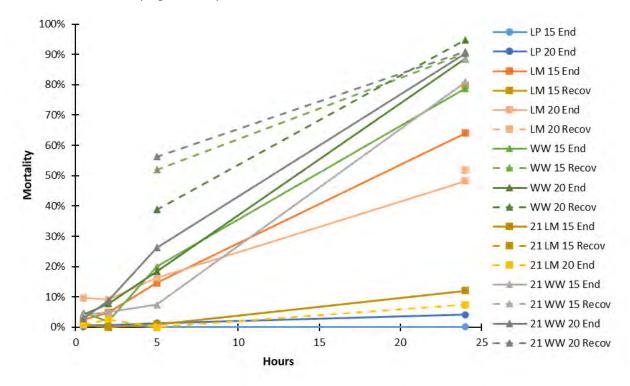


Figure 6-1. Mortality of quagga mussel veligers for 3  $\mu$ L/L EarthTec QZ. Data presented for mortality measured at the end (End) of each exposure time and after a 24-hour recovery (Recov) period with no additional exposure to EarthTec QZ.

### 6.2 Next Steps of the Study

The data from this Study can be used as a baseline to conduct full scale field treatments, but site-specific assessments would be required to assess the appropriate dose and exposure time to achieve the desired mortality for each particular site. Utilizing a mesocosm set-up or a flow-through apparatus to test site-specific conditions to determine dose and exposure time is recommended to optimize the potential use of EarthTec QZ for controlling veligers at each candidate location. Site-specific testing should also evaluate potential effects on non-target organisms related to full-scale treatment, in coordination with CDFW and other regulators. During field treatment, veliger mortality should be monitored along with relevant water quality parameters – hardness, alkalinity, dissolved organic carbon, pH, dissolved oxygen, temperature, and ions. Data from a field study will be useful for more broadly assessing full-scale implementation of a chemical control method for quagga, such as EarthTec QZ.

Since this Study did not include all the organisms present in the water from each test location, site-specific testing prior to large scale testing is recommended. In this study the organisms between 10 and 50 micrometers and those larger than 500 micrometers were excluded in the veliger testing. Additionally, the acute toxicity data did not show the full impact of an EarthTec QZ treatment because testing water was filtered and represented only organisms less than 10 micrometers, in addition to the indicator species. Moreover, the treatment duration was 96 hours at full copper dosage. As such the results may not be representative of full-scale field treatment for these locations. The organisms that were not present in our study could have the potential of reducing the bioavailability of copper and decreasing the effectiveness of EarthTec QZ; and to make it as effective as our Study results, longer exposure durations or higher concentrations at the point of dosing may be required.

Additional studies that evaluate the extent of copper decay with a wide range of organisms present and/or similar to prospective treatment locations is recommended to fully understand EarthTec QZ's effect in the environment. This data would then be used to determine what type of remediation could be needed after EarthTec QZ treatment in locations with short exposure durations. If there are organisms that reduce the bioavailability of copper in the environment, then a high dose, short duration use of EarthTec QZ could be considered and not be toxic to other more sensitive organisms. For example, dosing EarthTec QZ in an aqueduct or pipeline may be acceptable, as long as the residual copper and toxicity to sensitive aquatic species no longer remains once the water is discharged into a downstream lake or river.

In a site-specific study, the toxicity to non-target aquatic organisms of concern would need to be evaluated. Part of the evaluation should include consideration of the size class of non-target organisms, as the small size classes are used in acute toxicity testing and are the most susceptible to a toxicant. In Hammond and Ferris (2019) no non-target mortality was observed, and zooplankton densities returned to high densities after treatment.

Finally, the data showed that low doses of EarthTec QZ work as well as higher doses, but longer exposure times are needed to obtain the same mortality. The field results and current practices of using EarthTec QZ in the Midwest show that low doses of 0.5 mg/L as Cu are effective at reducing and removing quagga mussels in lotic systems, but the treatment duration is weeks to a month (Hammond and Ferris 2019). Further site-

specific evaluation of the use of lower EarthTec QZ is recommended, with correlation of water quality.

## Acknowledgements

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### References

- Hammond D, and G Ferris. 2019. Low doses of EarthTec QZ ionic copper used in effort to eradicate quagga mussels from an entire Pennsylvania lake. Management of Biological Invasions 10: 500-516.
- Nelson H, D Benoit, R Erickson, V Mattson, and J Lindberg. 1986. The Effects of Variable Hardness, pH, and Alkalinity, and Humics on the Chemical Speciation and Aquatic Toxicity of Copper. USEPA (Duluth, MN 55804).

Parametrix and HydroQual. 2006. Evaluation of the Reliability of Biotic Ligand Model Predictions for Copper Toxicity in Waters Characteristic of the Ardi West. Final Report for Arid West Water Quality Research Project prepared for Pima County Wastewater Management. Available: https://webcms.pima.gov/UserFiles/Servers/Server 6/File/Government/Wastewater

%20Reclamation/AAWQRP/BioticLigandModel.pdf

State of California. 2018. Maximum Contaminant Levels and Regulatory Dates for Drinking Water U.S. EPA VS California. Available: https://www.waterboards.ca.gov/drinking\_water/certlic/drinkingwater/documents/ccr/ mcls\_epa\_vs\_dwp.pdf.

- Stockton-Fiti KA and R Claudi. 2017. Use of a differential simple stain to confirm mortality of dreissenid mussel veligers in field and laboratory experiments. Management of Biological Invasions 8:325-333.
- Taylor PA. 1993. An Evaluation of the toxicity of various forms of chlorine to *Ceriodaphnia dubia.* Environmental Toxicology and Chemistry 12: 925-930.
- USEPA. 1993. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fourth Edition. EPA/600/4-90/027F, August 1993.
- USEPA. 2002. *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition. EPA-821-R-02-012, October 2002.
- USEPA. 2016. Water Quality Standards Academy: Biotic Ligand Model and Copper Criteria.
- Watters A, SL Gerstenberger, and WH Wong. 2013. Effectiveness of EarthTec® for killing invasive quagga mussels (*Dreissena rostriformis bugensis*) and preventing their colonization in the Western United States. Biofouling 29: 21-28.
- Welsh P, J Parrott, D G Dixon, P Hodson, D Spry, and G Mierle. 2011. Estimating acute copper toxicity to larval fathead minnow (*Pimephales promelas*) in soft water from measurements of dissolved organic carbon, calcium, and pH. Canadian Journal of Fisheries and Aquatic Sciences 53: 1263-1271.



## Appendix A. Technical Memorandum 1 Evaluation of EarthTec QZ Veliger Treatment



## **TECHNICAL MEMORANDUM #1**



Evaluation of EarthTec QZ Veliger Treatment

Fina Date: Draft Date:	December 20, 2021 September 29, 2021
Prepared for:	Metropolitan Water District of Southern California City of Santa Ana Orange County Water District
Copies to:	Water Replenishment District of Southern California United Water Conservation District Main San Gabriel Basin Watermaster Central Basin Municipal Water District California Department of Fish and Wildlife California Department of Water Resources
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Subject:	Technical Memorandum 1

### **1** Introduction

#### 1.1 Background

Since their discovery in the Colorado River system in January 2007, Quagga mussels (*Dreissena bugensis*) have rapidly spread through the Metropolitan Water District of Southern California's (MWD's) Colorado River Aqueduct (CRA) and have been detected at many sites in California. The presence of this invasive species presents a barrier to the use of imported water and storm water for groundwater replenishment. Considering these challenges, the City of Santa Ana proposed a study entitled "Restoration of Local Recharge Sources from Invasive Dreissenid Mussels" to MWD's Future Supply Actions Funding Program. The Study was conducted by Trussell Technologies (Trussell), KASF Consulting, and Orange County Water District (OCWD), with support from project partners including the Water Replenishment District of Southern California (WRD), the United Water Conservation District (UWCD), the Main San Gabriel Basin Watermaster,

and the Central Basin Municipal Water District (CBMWD). Although not directly contributing financially to the study, the California Department of Fish and Wildlife (CDFW) and California Department of Water Resources are supporting the Study by providing technical review and assistance.

#### 1.2 Study Description

The purpose of the Study was to evaluate a potential treatment method, other than desiccation, for use in eradicating quagga mussel infestations as well as preventing the spread of this invasive species.

Trussell led the Study in partnership with KASF Consulting, a firm specializing in quagga mussel sampling, identification, and testing. The Study evaluated the effectiveness of EarthTec  $QZ^{TM1}$  for control of quagga mussel veligers (the mussel's final larval stage). A fourth location, OCWD's OC-28 turnout at Anaheim Lake, was originally planned but later eliminated based on scheduling issues and identification of a surrogate location. The Study included testing with samples collected from multiple locations, to allow the project team to evaluate the impact of site-specific water quality on the performance of EarthTec QZ.

The following objectives were evaluated at each testing location:

- 1. Quagga veliger dose-response testing with EarthTec QZ
- 2. Toxicity assessment of EarthTec QZ with non-target species

The purpose of this technical memorandum <sup>™</sup> is to describe the results of **Objective** #1.

# 2 Schedule Summary

The status of veliger dose-response tests completed at each testing location is summarized in Table 2.1.

<sup>&</sup>lt;sup>1</sup> EarthTec QZ® is registered with the United States Environmental Protection Agency (USEPA) as a molluscicide for the control of quagga and zebra mussels. It is also registered with the California Department of Pesticide Regulation as a molluscicide for use in lakes, streams, rivers, waterways, canals, ponds, reservoirs, irrigation systems, and catch basins.

Location	Study Status	Testing Date				
Lake Piru	Completed	December 2 – 6, 2019				
Lake Mathews	Completed	September 9 – 11, 2020				
Lake Mathews	Completed	September 18 – 20, 2020				
Weymouth WTP Influent	Completed	September 14 – 18, 2020				
OC-28 Turnout	N/A <sup>2</sup>					
Weymouth WTP Influent	Completed	June 28 – 30, 2021				
2021	Completed	July 12 – 14, 2021				
Lake Mathews 2021	Completed	June 30 – July 2, 2021				
	Completed	July 14 – 16, 2021				

Table 2.1.	Study	status	at each	sampling	location
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Testing was completed for each of the study testing locations (Table 2.1), with the exception of the OC-28 turnout. The study was designed with the intention of correlating the dose-response efficacy of EarthTec QZ at Lake Mathews with that of two downstream locations. Water delivered from Lake Mathews is chlorinated prior to entering transmission pipelines supplying both OC-28 and Weymouth WTP. Considering the connection of these water supplies, the Study aimed to correlate testing from Lake Mathews with the two downstream locations – OC-28 turnout and Weymouth WTP influent. Testing these three locations in a series would allow for comparison of the effects of EarthTec QZ with and without chlorine exposure. However, due to prior budgeting, OCWD only had access to Lake Mathews water at the OC-28 turnout through June 2020, and not during the 2021 fiscal year (July 2020 – June 2021). Covid-19 restrictions precluded the project team from sampling at Lake Mathews until September 2020. For these reasons, it was not possible to complete sampling from the OC-28 turnout in conjunction with the sampling and testing at Lake Mathews and Weymouth WTP influent.

The project team met with MWD staff in August 2020 to discuss alternative sampling locations for the OC-28 turnout. Although already included as a sampling location for the Study, Weymouth WTP was identified as the most appropriate surrogate monitoring location for the OC-28 turnout, as both sites can receive water from Lake Mathews that is chlorinated and transmitted within a pipeline for a similar travel time and therefore, similar exposure time to chlorine. For this reason, sampling at OC-28 is no longer being considered for this Project. The project team proceeded with testing at Lake Mathews and Weymouth WTP during September 2020 and completed follow up testing at both of these locations in 2021, as well.

# 3 Study Results

Objective #1 of the Study, to conduct quagga veliger dose-response tests with EarthTec QZ, was completed at three locations: (1) Lake Piru, (2) Lake Mathews and (3) MWD's

<sup>&</sup>lt;sup>2</sup> Sampling at OC-28 is no longer applicable given the similarity of this location with that of Weymouth WTP, as is later discussed.



Weymouth WTP influent. The Project Team developed a Test Plan for the study, providing details for the expected methods, materials, and test conditions related to collecting quagga mussel veligers and establishing a dose-response relationship to EarthTec QZ (Trussell 2019b).

The results from the completed three testing locations are presented in the following subsections. As discussed in **Section 2**, it was not possible to complete testing with samples collected from the OC-28 turnout due to restrictions from COVID-19, as well as water purchasing agreements between OCWD and MWD. The project team met with MWD staff in August 2020 to discuss alternative sampling locations for the OC-28 turnout. Although already included as a sampling location for the Study, Weymouth WTP was identified as the most appropriate surrogate monitoring location for the OC-28 turnout, as both sites can receive water from Lake Mathews that is chlorinated and transmitted within a pipeline for a similar travel time and therefore, similar contact time with chlorine. Thus, sampling at OC-28 was eliminated as a sampling location for the Study. The project team proceeded with testing at Lake Mathews and Weymouth WTP during September 2020 and completed follow up testing at both of these locations in 2021, as well.

Trussell worked with KASF Consulting to complete and submit an application for a Specific Use Scientific Collecting Permit to CDFW (Trussell 2019a). The permit was approved on November 6, 2019.

Live veligers were collected from each location, and subsets of the collected veligers were tested at two different temperatures (15°C and 20°C). Each temperature condition included veliger exposure to five concentrations of EarthTec QZ (ET) doses (0, 3.0, 16.7, 33.4, 50.1  $\mu$ L/L). Copper is the active ingredient in EarthTec QZ molluscicide, thus the equivalent copper doses are also provided (0, 0.18, 1.0, 2.0, and 3.0 mg/L as Cu). Veliger mortality was evaluated at the end of each exposure time. Directly following this count at the end of the exposure time, the veligers were placed in a beaker and exposed to raw sample water (without the addition of EarthTec QZ) for a 24-hour recovery period. A final mortality assessment was made at the end of the recovery time to allow for analysis of delayed mortality.

The raw water quality of the sample water for each round of testing was measured during each round of testing, and can be found in **Appendix A**.

#### 3.1 Lake Piru

The first round of dose-response quagga veliger testing was completed at UWCD's Lake Piru. This reservoir, located in Ventura County, CA, impounds storm flows from the Piru Creek watershed and supplemental imported State Project Water supplied by the Department of Water Resources (DWR) via Pyramid Lake. It is used both for recreation and storage of water used to recharge downstream groundwater basins between Lake Piru and the coastal Oxnard Plain. Quagga mussel infestation of Lake Piru was first discovered in late 2014.





Veligers and water samples were collected on December 2<sup>nd</sup> and 4<sup>th</sup>, 2019 for doseresponse testing from December 2<sup>nd</sup> through the 6<sup>th</sup>, 2019. KASF Consulting led the quagga veliger collection and testing efforts, while Trussell supported veliger collection, dose-response testing, and provided water quality assessment. UWCD staff supported veliger collection efforts with plankton tow nets from a research-use boat. Veligers were collected on the first and third day of testing; both days resulted in a sufficient count of quagga mussel veligers for testing.

The veliger mortality results for Lake Piru are summarized in **Table 3.1** and plotted for each temperature condition in **Appendix B**.

**Table 3.1.** Average mortality with standard deviation (n=3) of veligers at Lake Piru as a function of EarthTec QZ dose, temperature, and exposure time

	]	0.5 hr.	2 hr.	5 hr.	24 hr.
			Control		•
15º C	End*	0.8±0.5%	0.2±0.3%	0.3±0.3%	0.2±0.4%
15° C	Recovery**	locovery	3.0±2.7%	0.7±0.6%	0.6±0.7%
20° C	End	0.0±0.0%	0.5±0.6%	1.2±0.2%	2.9±2.8%
20° C	Recovery	NA	2.2±0.4%	1.5±1.3%	33.4±13.2%
		3 µL/L :	as EarthTec (0.18 n	ng/L as Cu)	
15° C	End	0.7±0.2%	0.7±0.7%	0.0±0.0%	0.1±0.2%
20° C	End	0.2±0.3%	0.7±0.4%	1.4±1.2%	4.1±3.2%
		16.7 μL/	L as EarthTec (1.0	mg/L as Cu)	
15º C	End	1.0±0.9%	1.3±0.7%	2.1±2.1%	42.4±3.0%
15° C	Recovery	NA	NA	1.7±0.7%	41. 9±1.3%
20° C	End 6.0±5.9%		2.1±1.3%	7.9±6.3%	23.5±12.3%
20° C	Recovery	NA	NA	NA	22.9±9.2%
		33.4 μL/	L as EarthTec (2.0	mg/L as Cu)	
15º C	End	2.1±1.8%	4.7±0.3%	19.3±2.8%	74.2±4.4%
15° C	Recovery	NA	4.3±2.0%	11.2±2.1%	79.9±5.8%
20° C	End	2.6±0.8%	8.6±2.1%	28.0±4.3%	51.0±17.0%
20° C	Recovery	NA	NA	23.8±13.7%	53.0±23.3%
		50.1 μL/	L as EarthTec (3.0	mg/L as Cu)	
15º C	End	1.8±1.1%	5.1±0.2%	37.4±10.0%	99.0±0.8%
15° C	Recovery	NA	7.5±3.6%	19.9±5.4%	NA
20° C	End	NA	NA	NA	97.7±1.8%
20° C	Recovery	3.6±0.9%	15.9±4.7%	41.8±4.1%	85.0±4.3%

\* End is the end of the exposure period

\*\* Recovery is at the end of the 24-hour recovery period following the exposure period.

NA=Not Assessed

As shown in **Table 3.1**, veliger mortality occurred at 16.7(1.0), 33.4(2.0), and 50.1(3.0)  $\mu$ L/L as EarthTec QZ (as Cu in mg/L) at both temperatures. Mortality of the veligers at 16.7  $\mu$ L/L EarthTec QZ was similar to the control. At 5 hours of exposure, the veligers exposed to the two highest concentrations (33.4 and 50.1  $\mu$ L/L EarthTec QZ) began to demonstrate mortality. It took 24 hours for the veligers exposed to 50.1  $\mu$ L/L EarthTec QZ to reach mortality of 85% or greater. Higher veliger mortality was observed at the lower temperature of 15°C, compared with the 20°C test conditions; however, using linear regression modeling temperature was not a significant variable in predicting mortality.

The recovery procedure did not show a significant difference statistically or observationally in mortality results compared with the mortality measured at the end of the exposure period. The main exception to this trend was observed in the 20°C control after the recovery period, with mortality greater than 33% compared to approximately 3% mortality measured at the end of the 24-hour exposure. Natural mortality was



observed when veligers were held in static conditions; mortality was increased with time and was amplified by higher temperatures.

Water quality parameters that were measured throughout testing included temperature, dissolved oxygen, pH, specific conductance, free copper, and total copper. The average temperatures of the 15°C and 20°C test conditions were 15.1°C and 19.7°C, respectively. Varying the dose of EarthTec QZ did not produce notable changes in either the dissolved oxygen or the specific conductance in any of the test conditions. A decrease in pH was observed with increasing EarthTec QZ concentrations, however the pH for each individual test condition remained mostly consistent over time. The full range of tested conditions resulted in pH values that were consistent with those under which veligers can thrive. Free and total copper readings were very similar for each tested condition. Over time the copper concentrations decreased slightly but was not significantly different for a given dose of EarthTec QZ. After 24 hours of exposure, the measured copper concentration was similar to the original treatment concentration. Copper concentrations in the recovery were near zero. A table of detailed water quality measurements from Round 1 Lake Piru testing are included in **Appendix C**.

#### 3.2 Lake Mathews 2020

The second round of dose-response veliger testing was completed at Lake Mathews, a reservoir located in Riverside County, CA that is owned and operated by MWD. Lake Mathews is primarily used to store CRA water. Water from Lake Mathews is delivered into raw water pipelines that are dosed with chlorine for quagga control.

Samples of quagga veligers were initially collected at Lake Mathews on September 3<sup>rd</sup>, 2020 for the 20°C dose-response testing with EarthTec QZ. However, veliger densities were too low to provide greater than 50 veligers per testing replicate and the control mortality was greater than 50% for all exposure durations. The low veliger counts can be attributed to an insufficient depth at which the veligers were collected. During additional sampling at Lake Mathews, the towing depth was increased from 50 feet to 100 feet from the top of the intake tower. This increase in collection depth yielded a higher veliger density acceptable for dose-response testing.

Additional veligers were collected on September 18<sup>th</sup>, 2020 to repeat the testing of the 20°C conditions (September 18-20); these results are recorded in Table 3 as 19°C to avoid confusion with the initial 20°C results that had high mortality in the control group. Testing at 15°C was completed September 9<sup>th</sup> through 11<sup>th</sup>, 2020 using veligers and water samples collected from Lake Mathews on September 9<sup>th</sup>. KASF Consulting led the quagga veliger collection and testing efforts while Trussell and OCWD supported veliger collection, dose-response testing, and water facility and towing/collection locations.

The veliger mortality results for the 2020 Lake Mathews are summarized in **Table 3.2** and graphed by temperature condition in **Appendix D**.

**Table 3.2.** Average mortality and standard deviation (n=3) of veligers from Lake Mathews in 2020 as a function of EarthTec QZ dose, temperature, and exposure time (results labeled as 20°C are not considered representative due to low veliger counts in the sample collection and high mortality of the control; these test conditions were repeated and labeled as 19°C)

		0.5 hr.	2 hr.	5 hr.	24 hr.
			Control		
15°C 19°C 20°C 15°C 19°C 20°C 15°C 19°C 20°C 15°C 19°C 20°C 15°C 19°C 15°C 19°C 20°C	End*	3.4±0.8%	5.7±1.7%	4.1±1.6%	3.8±2.3%
15 C	Recovery**	NA	7.5±2.9%	7.8±2.2%	15.5±5.0%
10°C	End	5.5±0.7%	5.2±3.1%	8.2±1.3%	19.6±9.0%
20°C 15°C 19°C 20°C 15°C	Recovery	NA	12.9±2.2%	18.6±3.0%	50.3±1.3%
2000	End	50.7±9.6%	63.1±4.0%	60.9±3.7%	60.5±8.6%
20°C	Recovery	NA	66.4±2.6%	87.1±3.8%	72.9±4.2%
		3 µL/L as Eart	hTec (0.18 mg/L as	s Cu)	
4500	End	2.4±1.1%	4.9±0.7%	14.7±2.5%	64.1±7.7%
15°C	Recovery	NA	NA	NA	79.8±4.6%
40%0	End	9.7±1.2%	9.1±2.9%	16.3±0.6%	48.3±6.7%
19°C	Recovery	NA	NA	NA	51.8±5.6%
2000	End	65.0±9.6%	64.6±10.3%	67.4±5.4%	68.0±8.4%
20°C	Recovery	NA	NA	NA	NA
		16.7 µL/L as Ea	rthTec (1.0 mg/L a	is Cu)	
15°C	End	6.8±3.2%	32.0±9.9%	37.7±9.4%	95.6±1.7%
15°C	Recovery	NA	37.0±14.5%	65.1±2.0%	99.1±0.7%
40%0	End	8.5±3.3%	16.9±4.2%	23.8±6.8%	90.2±3.4%
19°C	Recovery	NA	NA	54.2±6.0%	91.6±1.3%
2000	End	53.7±15.0%	64.2±8.8%	52.3±7.0%	97.8±1.8%
20°C	Recovery	NA	NA	NA	98.2±1.6%
		33.4 µL/L as Ea	rthTec (2.0 mg/L a	is Cu)	
4500	End	7.2±1.4%	55.7±15.8%	60.1±7.8%	99.0±0.8%
15°C	RecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecoveryEndRecovery	NA	50.4±3.9%	79.3±1.2%	99.5±0.4%
40%0	End	11.5±4.9%	22.7±3.4%	40.5±0.6%	97.9±1.3%
19.0	Recovery	NA	57.8±4.1%	83.6±4.6%	97.8±1.0%
2000	End	69.7±6.0%	73.2±4.2%	94.2±2.3%	100±0.0%
20°C	Recovery	NA	NA	100±0.0%	NA
		50.1 µL/L as Ea	rthTec (3.0 mg/L a	is Cu)	
4500	End	7.9±2.7%	60.5±6.1%	66.6±8.2%	100.0±0.0%
15-0	Recovery	NA	80.2±2.0%	96.7±2.1%	NA
4000	End	18.2±1.5%	25.3±3.6%	43.9±2.0%	98.4±0.4%
19°C	Recovery	NA	84.4±5.7%	94.5±1.7%	98.9±0.8%
2005	End	66.4±3.7%	89.6±7.5%	77.5±29.6%	100±0.0%
20°C	Recovery	NA	98.5±1.2%	98.2±2.5%	NA

\* End is the end of the exposure period.

\*\* Recovery is at the end of the 24-hour recovery period following the exposure period.

NA=Not Assessed



In the Lake Mathews samples, significant quagga veliger mortality was observed initially with the 16.7(1.0), 33.4(2.0), and 50.1(3.0)  $\mu$ L/L as EarthTec QZ (mg/L as Cu) test conditions at both temperatures after 24 hours of exposure. Mortality of the 3  $\mu$ L/L EarthTec QZ was greater than the control at 15 and 19°C, and mortality at 3  $\mu$ L/L EarthTec QZ after 24 h was around 50%. At 5 hours of exposure, the veligers exposed to the two highest concentrations (33.4 and 50.1  $\mu$ L/L EarthTec QZ) began to demonstrate mortality greater than 50% mortality. It took 24 hours for the veligers exposed to 16.7, 33.4 and 50.1 mg/L  $\mu$ L/L EarthTec QZ to reach mortality of 85% or greater. Higher veliger mortality was observed at the lower temperature of 15°C, compared with the 19°C test conditions. Temperature was not a significant variable in the linear regression model.

Only the end mortality results greater than 20% were checked for additional recovery mortality after 24 hours. The recovery procedure did show a significant increase in mortality results both observationally and was statistically significant. Increased mortality in the recovery was due to veligers showing signs of stress at the initial reading but were not quite dead enough to be stained by the fast green and counted as dead. With the additional recovery time, the stressed veligers were dead and stained. The recovery mortality was high with greater than 90% mortality being achieved in the three highest concentrations. Interestingly, the 2 h 50.1  $\mu$ L/L EarthTec QZ reached high mortality (greater than 80%). At the 24-hour exposure in the 19°C study, the control mortality was over 50%. Natural mortality was observed when veligers were held in static conditions; mortality increased with time and was amplified by higher temperatures. Laboratory conditions in the OCWD laboratory were hotter than at the Lake Piru laboratory, which could have contributed to additional stress on the veligers. Steps were minimized to limit the time veligers were out of the water bath.

Water quality parameters that were measured throughout testing included temperature, dissolved oxygen, pH, specific conductance, free and total copper, and chlorine. The average temperatures recorded for the 15°C and 19°C test conditions were 14.8°C and 21.3°C, respectively. Varying the dose of EarthTec QZ did not produce notable changes in either the dissolved oxygen or the specific conductance in any of the test conditions. The pH decreased with increased concentration and each concentrations pH was significantly different from each other during testing. The pH for each individual test condition remained mostly consistent over time. The full range of tested conditions resulted in pH values that are consistent with those under which veligers can thrive. Free and total copper readings were very similar for each tested condition. Over time the copper concentrations decreased slightly for a given dose of EarthTec QZ, but after 24 hours of exposure, the measured copper concentration was not significantly different from the original treatment concentration. Copper concentrations in the recovery were near zero. The measured chlorine concentrations were negligible. A table of detailed water quality measurements from the 2020 Lake Mathews testing is included in Appendix E.



#### 3.3 Weymouth Water Treatment Plant Influent 2020

The Weymouth WTP receives untreated water from two sources: Colorado River water from Lake Mathews via the Upper Feeder and State Project Water (SWP) from the East Branch of the SWP via the Rialto Pipeline or from the Upper Feeder via the Etiwanda Pipeline from the Rialto Pipeline. The WRD historically had access to this same source water through the Upper Feeder pipeline at CenB-28 for use in groundwater recharge via spreading. Detections of quagga in the nearby San Gabriel River in October 2017 were linked to deliveries of imported water. Since these detections, imported water has not been approved for use in groundwater recharge, due to the potential for quagga mussel infestations.

For the purpose of this study, the influent water sampling location at Weymouth WTP provides an access point for understanding the condition of the guagga veligers present in the pipeline downstream of Lake Mathews, following exposure to chlorine, and the cumulative impacts of exposure to both chlorine and EarthTec QZ. This location is of interest to the study when MWD is supplying only imported water from CRA via Lake Mathews. Water from Lake Mathews is dosed with chlorine as it enters the downstream water supply pipelines, as a control measure for guagga. The pipeline travel time from Lake Mathews to the Weymouth WTP is approximately 8 hours via the Upper Feeder. Another branch of pipeline downstream of the chlorine dosing station supplies raw water from Lake Mathews to the OC-28 turnout and MWD's Diemer WTP. The travel time from Lake Mathews to the Diemer WTP is approximately 11 hours, with the OC-28 turnout located upstream, but nearby the Diemer WTP. The approximate pipeline travel times were provided per personal communication with project partner Paul Rochelle of MWD. As such, the study aimed to complete parallel dose-response EarthTec QZ testing with guagga veligers collected from both Lake Mathews (no chlorine exposure) and Weymouth WTP (exposed to chlorine through pipeline) as a surrogate location for expected veliger populations at WRD's CenB-28 (Upper Feeder) or OCWD's OC-28 turnout. The Upper Feeder pipeline supply in late 2019 was from SWP, but changed to CRA via Lake Mathews in 2020.

The third round of dose-response veliger testing was completed from September 14<sup>th</sup> through 18<sup>th</sup>, 2020 using veligers and raw water collected from the influent water to MWD's Weymouth WTP. Collection of veligers and water samples were taken September 14<sup>th</sup> and 16<sup>th</sup>, 2020; both days resulted in a sufficient count of quagga mussel veligers for testing. KASF Consulting led the quagga veliger collection and testing efforts while Trussell and OCWD supported veliger collection, dose-response testing, and water quality assessment. MWD staff supported veliger collection efforts with access to the facility and towing/collection locations.

The veliger mortality results for the 2020 Weymouth WTP influent are summarized in **Table 3.3** and presented graphically by temperature condition in **Appendix F.** 

<b>Table 3.3.</b> Average mortality with standard deviation (n=3) of veligers from Weymouth
Water Treatment Plant in 2020 as a function of EarthTec QZ dose, temperature, and
exposure time

		0.5 hr.	2 hr.	5 hr.	24 hr.						
15°C	End*	2.2±1.6%	1.2±1.7%	6.1±5.1%	2.7±2.0%						
15 C	Recovery**	13.7±9.7%	18.6±4.0%	16.2±13.0%	14.3±2.0%						
20°C	End	3.4±2.4%	1.9±1.4%	4.3±1.7%	0.8±1.2%						
20 C	Recovery	3.1±1.3%	13.2±2.4%	11.8±6.9%	0.9±1.2%						
3 μL/L as EarthTec (0.18 mg/L as Cu)											
15°C	End	4.7±3.5%	2.0±0.5%	20.0±3.6%	78.8±9.6%						
15 C	Recovery	NA	NA	52±14.7%	90.4±4.7%						
20°C	End	4.3±2.4%	7.8±2.4%	18.4±1.9%	88.7±1.3%						
20 C	Recovery	NA	NA	38.8±8.0%	94.8±1.4%						
	16.7	΄μL/L as EarthΤe	ec (1.0 mg/L as 0	Cu)							
15°C	End	3.1±2.2%	27.4±10.9%	39.7±3.2%	100±0.0%						
15 0	Recovery	NA	62.0±12.6%	87.5±9.1%	NA						
20°C	End	4.1±2.9%	22.5±2.8%	36.1±4.4%	100±0.0%						
20 C	Recovery	NA	56.1±3.0%	95±1.8%	NA						
	33.4	μL/L as EarthTe	ec (2.0 mg/L as 0	Cu)							
15°C	End	27.9±9.4%	27.9±0.7%	68.6±10.2%	100±0.0%						
15 0	Recovery	53.5±9.2%	77.1±8.1%	93.1±5.2%	NA						
20°C	End	20.1±7.7%	44.7±7.4%	57.6±10.1%	100±0.0%						
20 C	Recovery	61.1±11.1%	71.3±3.1%	97.6±1.7%	NA						
	50.1	µL/L as EarthTe	c (3.0 mg/L as 0	Cu)							
15°C	End	15.4±8.4%	38.1±9.5%	59.7±4.5%	100.0±0.0%						
13 0	Recovery	47.7±5.2%	80.8±12.1%	98.3±2.4%	NA						
20°C	End	18.3±6.8%	34.7±8.7%	75.9±0.6%	99.7±0.5%						
20 0	Recovery	60.7±3.7%	96.1±1.7%	99.8±0.3%	99.9±0.1%						

\* End is the end of the exposure period.

\*\* Recovery is at the end of the 24-hour recovery period following the exposure period. NA=Not Assessed

In the Weymouth WTP influent samples, significant veliger mortality was observed at 3 (0.18), 16.7(1.0), 33.4(2.0), and 50.1(3.0)  $\mu$ L/L as EarthTec QZ (mg/L as Cu) at both temperatures, following 24 hours of exposure time. Mortality of the 3  $\mu$ L/L EarthTec QZ was much higher than control at 5 and 24 hours of exposure. At 5 hours of exposure, the veligers exposed to all concentrations tested (3, 16.7, 33.4 and 50.1  $\mu$ L/L EarthTec QZ ) began to demonstrate mortality greater than the control mortality. It took 24 hours for the veligers exposed to 16.7, 33.4 and 50.1  $\mu$ L/L EarthTec QZ to reach mortality of 100%. Higher veliger mortality was observed at the lower temperature of 15°C, compared with the 20°C test conditions; however, temperature was not a significant variable in the probit regression model to predict mortality.



End mortality results greater than 15% were checked for additional recovery mortality. The recovery procedure did show a significant increase in mortality results, both observationally and statistically.

Increased mortality in the recovery was due to veligers that showed signs of stress at the initial reading but were not quite dead enough to be stained by the fast green and counted as dead. With the additional recovery time, the stressed veligers were dead and stained. With this set of test subjects, the control mortality was less than 20% for all exposure durations and temperatures. The recovery mortality was generally higher than the initial end mortality. After the recovery period in the 5-hour treatments greater than 90% mortality was achieved in the three highest doses (16.7, 33.4, and 50.1  $\mu$ L/L EarthTec QZ). The 2-hour treatments reached greater than 70% mortality in the two highest concentrations (33.4 and 50.1  $\mu$ L/L EarthTec QZ).

Water quality parameters that were measured throughout testing included temperature, dissolved oxygen, pH, specific conductance, free and total copper, and chlorine. The average temperatures measured for the 15°C and 20°C test conditions were 15.3°C and 20.3°C, respectively. Varying the dose of EarthTec QZ did not produce notable changes in either the dissolved oxygen or the specific conductance in any of the test conditions. A statistically significant decrease in pH was observed with increasing EarthTec QZ concentrations, however the pH for each individual test condition remained mostly consistent over time. The full range of tested conditions resulted in pH values that were consistent with those under which veligers can thrive. Consistent with the findings from Lake Piru and Lake Mathews, free and total copper readings were very similar for each tested condition. As with the other test locations, the copper concentrations decreased slightly over time for a given dose of EarthTec QZ, but after 24 hours of exposure, the measured copper concentration was not significantly different from the original treatment concentration. Copper concentrations in the recovery were near zero. The measured chlorine concentrations were negligible. A table of detailed water quality measurements from the 2020 Weymouth WTP testing is included in Appendix G.

#### 3.4 Lake Mathews 2021

For the fourth round of dose-response veliger testing was completed at Lake Mathews, a reservoir located in Riverside County, CA that is owned and operated by MWD. Samples of quagga veligers were collected at Lake Mathews on June 30, 2021 for the 15°C dose-response testing with EarthTec QZ with testing occurring June 30 to July 2. The 20°C dose-response testing with EarthTec QZ occurred July 14 to 16 with veligers and raw water collection occurring on the morning of July 14. Both sampling events resulted in a sufficient count of quagga mussel veligers for testing. KASF Consulting led the quagga veliger collection and testing efforts while Trussell and OCWD supported veliger collection, dose-response testing, and water quality assessment. MWD staff supported veliger collection efforts with access to the facility and towing/collection locations.

The veliger mortality results for the 2021 Lake Mathews testing are summarized in **Table 3.4** and graphed by temperature condition in **Appendix H**.

		0.5 hr.	2 hr.	5 hr.	24 hr.
			Control		
15°C	End*	0.0±0.0%	0.5±0.7%	0.0±0.0%	0.7±1.0%
15 C	Recovery**	NA	4.7±4.1%	12.3±10.9%	1.2±1.2%
20°C	End	1.8±0.9%	0.0±0.0%	0.0±0.0%	1.0±0.8%
20 C	Recovery	NA	2.3±1.4%	2.2±0.3%	18.1±5.3%
		3 μL/L as Earth	nTec (0.18 mg/L as	s Cu)	
15°C	End	0.8±0.6%	0.0±0.0%	0.9±1.0%	12.1±3.3%
15 C	Recovery	NA	NA	NA	25.5±4.1%
20°C	End	0.8±0.6%	2.6±0.9%	0.0±0.0%	7.4±0.9%
20 C	Recovery	NA	NA	NA	NA
		16.7 µL/L as Ea	rthTec (1.0 mg/L a	is Cu)	
15°C	End	0.8±0.2%	2.4±1.7%	8.7±3.0%	85.6±1.0%
15 C	Recovery	NA	NA	NA	93.3±0.8%
20°C	End	1.2±0.6%	0.3±0.4%	19.5±8.3%	68.5±2.1%
20 C	Recovery	NA	NA	29.1±6.6%	80.7±2.1%
		33.4 µL/L as Ea	rthTec (2.0 mg/L a	is Cu)	
15°C	End	1.3±1.0%	3.3±2.4%	31.5±8.9%	96.7±1.0%
15 C	Recovery	NA	15.6±5.5%	65.8±3.5%	97.2±1.4%
20°C	End	5.3±2.0%	11.2±6.2%	48.5±3.6%	87.3±8.6%
20 C	Recovery	NA	NA	64.0±4.3%	94.7±1.2%
		50.1 µL/L as Ea	rthTec (3.0 mg/L a	is Cu)	
15°C	End	1.9±0.7%	1.8±0.6%	40.0±9.2%	99.5±0.7%
15 C	Recovery	NA	40.9±4.3%	89.0±0.8%	98.9±0.8%
20°C	End	7.3±1.0%	20.7±5.6%	48.0±2.0%	94.4±0.8%
20 6	Recovery	NA	43.4±3.1%	83.3±3.5%	97.8±0.8%

**Table 3.4.** Average mortality and standard deviation (n=3) of veligers from Lake Mathews in 2021 as a function of EarthTec QZ dose, temperature, and exposure time

\* End is the end of the exposure period.

\*\* Recovery is at the end of the 24-hour recovery period following the exposure period. NA=Not Assessed

In the Lake Mathews samples, significant quagga veliger mortality was observed with the 16.7(1.0), 33.4(2.0), and 50.1(3.0)  $\mu$ L/L as EarthTec QZ (mg/L as Cu) test conditions at both temperatures after 24 hours of exposure. Mortality of the 3  $\mu$ L/L EarthTec QZ was greater than the control at 15 and 20°C, but was not greater than 20%. At 5 hours of exposure, the veligers exposed to the two highest concentrations (33.4 and 50.1  $\mu$ L/L EarthTec QZ) began to demonstrate mortality greater than 30%, but 50% mortality was not achieved. It took 24 hours for the veligers exposed to 16.7, 33.4 and 50.1 mg/L  $\mu$ L/L EarthTec QZ to reach mortality of 85% or greater, except in the 24 h 16.7  $\mu$ L/L EarthTec QZ tests. Higher veliger mortality was observed at the lower temperature of 15°C, compared with the 19°C test conditions. Temperature was not a significant variable in the probit regression model.



Only the end mortality results greater than 12% were checked for additional recovery mortality after 24 hours. Additionally, there were two testing concentrations at 2 hours (33.4 and 50.1  $\mu$ L/L EarthTec QZ) that had low initial mortality that were checked for additional mortality to ensure that the results were less than 50%. These two concentrations at 15°C resulted in increased mortality but was less than 50%. The recovery procedure did show a significant increase in mortality results both observationally and was statistically significant. Increased mortality in the recovery was due to veligers showing signs of stress at the initial reading but were not quite dead enough to be stained by the fast green and counted as dead. With the additional recovery time, the stressed veligers were dead and stained. The recovery mortality was high with greater than 80% mortality being achieved in the three highest concentrations. The 5 h 50.1  $\mu$ L/L EarthTec QZ reached high mortality (greater than 80%).

Water quality parameters that were measured throughout testing included temperature, dissolved oxygen, pH, specific conductance, free and total copper, and chlorine. The average temperatures recorded for the 15°C and 20°C test conditions were 15.0°C and 20.9°C, respectively. Varying the dose of EarthTec QZ did not produce notable changes in either the dissolved oxygen or the specific conductance in any of the test conditions. The pH decreased with increased concentration and each concentrations pH was significantly different from each other during testing. The pH for each individual test condition remained mostly consistent over time. The full range of tested conditions resulted in pH values that were consistent with those under which veligers can thrive. Free and total copper readings were very similar for each tested condition. Over time the copper concentrations decreased slightly for a given dose of EarthTec QZ, but after 24 hours of exposure, the measured copper concentration was not significantly different from the original treatment concentration. Copper concentrations in the recovery were near zero. The measured chlorine concentrations were negligible. A table of detailed water quality measurements from the 2021 Lake Mathews testing is included in Appendix I.

#### 3.5 Weymouth Water Treatment Plant Influent 2021

The fifth round of dose-response veliger testing was completed on June 28<sup>th</sup> through 30<sup>th</sup>, 2021 and July 12<sup>th</sup> through 14<sup>th</sup>, 2021 using veligers and raw water collected from the influent water to MWD's Weymouth WTP. Collection of veligers and water samples were taken June 30<sup>th</sup> and July 12<sup>th</sup>, 2021; both days resulted in a sufficient count of quagga mussel veligers for testing. KASF Consulting led the quagga veliger collection and testing efforts while Trussell and OCWD supported veliger collection, dose-response testing, and water quality assessment. MWD staff supported veliger collection efforts with access to the facility and towing/collection locations.

The veliger mortality results for the Weymouth WTP influent are summarized in **Table 3.5** and presented graphically by temperature condition in **Appendix J.** 

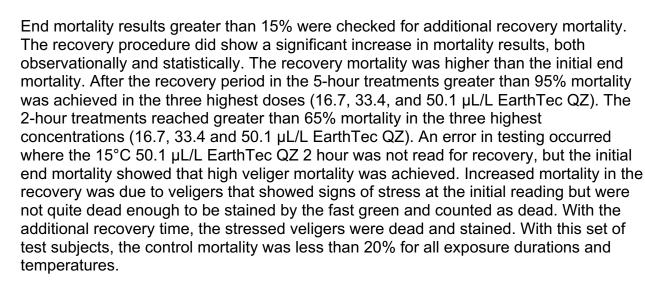
Table 3.5. Average mortality with standard deviation (n=3) of veligers from Weymouth
Water Treatment Plant in 2021 as a function of EarthTec QZ dose, temperature, and
exposure time

		0.5 hr.	2 hr.	5 hr.	24 hr.						
		Cont	trol								
15°C	End*	1.8±0.8%	3.4±1.2%	4.3±0.4%	5.2±5.8%						
15 C	Recovery**	NA	6.7±1.8%	13.4±2.3%	11.3±7.8%						
20°C	End	2.5±0.3%	5.0±1.7%	4.2±2.6%	5.6±2.3%						
20 C	Recovery	18.9±2.2%	13.5±4.0%	17.0±4.3%	5.5±1.5%						
3 μL/L as EarthTec (0.18 mg/L as Cu)											
15°C	End	4.0±1.8%	5.0±1.3%	7.4±2.5%	81.0±7.0%						
15 0	Recovery	NA	NA	NA	88.4±1.4%						
20°C	End	2.9±0.9%	8.8±0.9%	26.2±4.8%	90.4±3.8%						
20 C	Recovery	NA	NA	56.3±8.9%	91.0±1.5%						
	16.7	μL/L as EarthTe	c (1.0 mg/L as 0	Cu)							
15°C	End	4.7±0.3%	32.7±10.1%	77.4±10.5%	98.8±0.9%						
15 0	Recovery	NA	68.6±4.0%	96.7±1.0%	99.2±0.6%						
20°C	End	11.1±1.9%	43.2±3.5%	79.4±2.5%	99.8±0.3%						
20 0	Recovery	NA	75.7±1.7%	95.4±1.8%	100±0.0%						
	33.4	μL/L as EarthTe	c (2.0 mg/L as 0	Cu)							
15°C	End	11.5±4.5%	66.1±9.4%	96.9±2.6%	100±0.0%						
15 0	Recovery	NA	90.0±7.2%	100±0.0%	NA						
20°C	End	17.7±1.4%	53.2±12.1%	94.3±2.1%	99.7±0.4%						
20 0	Recovery	69.7±8.0%	98.2±0.7%	99.0±0.8%	100±0.0%						
	50.1	µL/L as EarthTe	c (3.0 mg/L as 0	Cu)							
15°C	End	12.3±5.6%	94.2±1.8%	98.4±2.2%	100.0±0.0%						
15 0	Recovery	NA	NA	100±0.0%	NA						
20°C	End	36.0±14.1%	57.2±9.0%	97.7±1.0%	100±0.0%						
20 0	Recovery	84.6±4.0%	98.2±0.3%	100±0.0%	NA						

\* End is the end of the exposure period.

\*\* Recovery is at the end of the 24-hour recovery period following the exposure period. NA=Not Assessed

In the 2021 Weymouth WTP influent samples, significant veliger mortality was observed at 3 (0.18), 16.7(1.0), 33.4(2.0), and 50.1(3.0)  $\mu$ L/L as EarthTec QZ (mg/L as Cu) at both temperatures, following 24 hours of exposure time. Mortality of the 3  $\mu$ L/L EarthTec QZ was much higher than control at 5 (20 °C) and 24 hours of exposure. At 5 hours of exposure, the veligers exposed to all concentrations tested (3, 16.7, 33.4 and 50.1  $\mu$ L/L EarthTec QZ ) began to demonstrate mortality greater than the control mortality. It took 24 hours for the veligers exposed to 50.1  $\mu$ L/L EarthTec QZ to reach mortality of 100%. Higher veliger mortality was observed at the lower temperature of 15°C, compared with the 20°C test conditions; however, temperature was not a significant variable in the probit regression model to predict mortality.



Water quality parameters that were measured throughout testing included temperature, dissolved oxygen, pH, specific conductance, free and total copper, and chlorine. The average temperatures measured for the 15°C and 20°C test conditions were 14.2°C and 20.9°C, respectively. Varying the dose of EarthTec QZ did not produce notable changes in either the dissolved oxygen or the specific conductance in any of the test conditions. A statistically significant decrease in pH was observed with increasing EarthTec QZ concentrations, however the pH for each individual test condition remained mostly consistent over time. The full range of tested conditions resulted in pH values that were consistent with those under which veligers can thrive. Consistent with the findings from Lake Piru and Lake Mathews, free and total copper readings were very similar for each tested condition. As with the other test locations, the copper concentrations decreased slightly over time for a given dose of EarthTec QZ, but after 24 hours of exposure, the measured copper concentration was not significantly different from the original treatment concentration. Copper concentrations in the recovery were near zero. The measured chlorine concentrations were negligible. A table of detailed water quality measurements from Weymouth WTP testing is included in Appendix K.

# 4 Analysis

The following is a high-level analysis of the results shown in **Section 3**. Further discussion, correlations, statistical analysis, integrated analyses and recommendations will be provided in the Final Report.

To begin comparing dose-response results at the three sites, veliger mortality of all tested locations were grouped by EarthTec QZ concentration in **Appendix L**. As previously mentioned, a more comprehensive analysis of these results will be included in the Final Report.

Mortality of veligers was achieved using EarthTec QZ at the three sample locations over the three years. Weymouth WTP veligers in both 2020 and 2021 had the highest mortality (>75% mortality) using the lowest dose of EarthTec QZ (3 µL/L EarthTec QZ)



after 24 hours exposure time. The higher concentrations tested on Weymouth WTP veligers resulted in 100% mortality at both temperatures. Mortality of veligers from the 2020 Lake Mathews testing was greater than 90% at 16.7, 33.4, and 50.1  $\mu$ L/L EarthTec QZ for both temperatures tested at 24 hours of exposure time, but mortality in 2021 was lower for 16.7  $\mu$ L/L EarthTec QZ achieving 86 and 69% mortality for the 15 and 20°C tests. Veligers from Lake Piru had the lowest mortality after 24 hours of exposure, but >85% mortality was achieved at the highest concentration tested (50.1  $\mu$ L/L EarthTec QZ). In all test locations, the 15°C tests had higher mortality than the 20°C tests.

This study design used the fast green stain method to quickly analyze the health status of the veligers. In the Lake Piru samples, the end mortality was similar to the recovery mortality. The stain easily identified the veligers that were dead and additional mortality was not observed. In both the Lake Piru and Weymouth WTP samples, the recovery mortality was much higher than the end mortality, indicating that there was additional mortality after being evaluated with the fast green stain. Mortality in the 2- and 5-hour exposure times in the Weymouth WTP and Lake Mathews water increased at least 30% with the additional recovery time. Control mortality for the same exposure time increased about 10%. The fast green stain was working well, but stressed individuals did not stain. Their tissue did look abnormal and swollen, but there was still movement in some individuals with this condition. With the additional time of recovery, the fast green stain is used and veligers are observed with abnormal and swollen tissue, the use of a recovery period is recommended.

The water quality parameters measured during testing did not show any variances around the potential differences in mortalities seen. The temperature, dissolved oxygen, pH, and conductivity were within ranges that veligers survive and flourish. Chlorine concentrations were low, showing that the test results were not confounded by the presence of chlorine. The free and total copper concentrations were consistently similar, indicating that the free copper ion (i.e., Cu<sup>2+</sup>) was dominant, rather than copper in the particulate or complexed form. In the recovery step, the copper concentrations were minimal in all testing water, suggesting that any copper absorption by the veligers with exposure to EarthTec QZ was not released once the veligers were returned to source water without EarthTec QZ.

Differences in source water quality were observed (**Appendix A**), which likely factored into the efficacy of EarthTec QZ on the veligers. Lake Piru is a reservoir that is filled mainly with local runoff with some SWP, whereas Lake Mathews is supplied by the CRA system. The Weymouth WTP influent at the time of the sampling was supplied from Lake Mathews, but is chlorinated as it enters the pipeline. The differences in water quality include the following:

 Alkalinity and hardness were significantly higher at Lake Piru compared with the other locations; average values of 171 and 315 mg/L as CaCO<sub>3</sub>, respectively, were measured at Lake Piru. The alkalinity and hardness of the 2020 Lake Mathews testing waters were the same as Weymouth WTP



influent samples (average values of 118 and 142 mg/L as CaCO<sub>3</sub>, respectively. The 2021 alkalinity for Lake Mathews and Weymouth WTP (average 136 mg/L as CaCO<sub>3</sub>) were similar to each other and higher than the 2020 levels. Hardness for 2021 did vary significantly between the two sampling events, but Lake Mathews and Weymouth WTP values were similar. During the first week of testing at 15°C the hardness mean value was 275 mg/L as CaCO<sub>3</sub> and the second week of testing at 20 °C the hardness mean value was 182 mg/L as CaCO<sub>3</sub>.

- Water temperatures at Lake Piru (average 13.4°C) were significantly lower compared to those measured from samples collected from Lake Mathews (average 23°C) or Weymouth WTP influent (average 26.5°C). These temperature differences account for seasonal changes in the surface water. Lake Piru testing was completed in December 2019, whereas the testing associated with the Lake Mathews and Weymouth WTP influent samples were completed in September 2020 and July 2021. The higher water temperatures in September 2020 and July 2021 at Lake Mathews and post-pipeline at the downstream Weymouth WTP influent increases veliger metabolism, which could contribute to the sensitivity to EarthTec QZ.
- Lake Piru had a slightly higher average pH (8.34) compared to that of the 2020 Lake Mathews and Weymouth WTP influent (8.19 and 8.08, respectively). The 2021 pH of Lake Mathews and Weymouth WTP influent (8.27 and 8.23, respectively) were higher than 2020, but still lower than Lake Piru.
- The turbidity values at Lake Piru (average 7.94 NTU) were also elevated, compared to the 2020 and 2021 Lake Mathews and Weymouth WTP influent (0.74 and 0.67 NTU, respectively).

The size distribution of the veligers collected from Lake Piru had a large number of each size class present (**Table 4.1**). The veligers from the 2020 Lake Mathews and Weymouth WTP were mostly comprised of the smaller size class of D-shaped veligers. In the 2021 Lake Mathews samples the veligers were larger with less D-shaped veligers present. The 2021 Weymouth WTP had many small veligers present and only a few larger veligers, but the distribution of larger veligers increased in the 20°C tests. The veligers that were observed to survive EarthTec QZ addition tended to be pediveliger to large umbonal in size in all treatment waters. Therefore, the toxicity of EarthTec QZ for larger sized veligers may be lower in these two locations. Collection of veligers was completed within 2 days for the Lake Piru and 2020 Weymouth WTP testing and resulted in the same distribution of size classes. The 2020 and 2021 Lake Mathews and 2021 Weymouth WTP collections were taken 2 weeks apart and the distribution of size class was different with the later sampling event (20°C) having larger veligers, as reflected in **Table 4.1**.

		Size	Class	
Sample Site	D-shaped (50-150 µm)	Small umbonal (150-250 μm)	Large umbonal (200-350 µm)	Pediveliger (350-500 µm)
Lake Piru (15 & 20°C)	45%	15%	20%	20%
2020 Lake Mathews (15°C)	75%	20%	4%	1%
2020 Lake Mathews (19°C)	50%	30%	15%	5%
2020 Weymouth WTP (15 & 20°C)	80%	15%	3%	2%
2021 Lake Mathews (15°C)	52%	22%	23%	3%
2021 Lake Mathews (20°C)	32%	18%	38%	11%
2021 Weymouth WTP (15°C)	74%	8%	17%	2%
2021 Weymouth WTP (20°C)	53%	25%	22%	1%

Table 4.1. Size class distribution of veligers used in testing at each sample site

## **5** References

- Trussell Technologies (2019a). "Scientific Collection Permit, Specific Use Application." Application for *California Department of Fish and Wildlife*. November 6.
- Trussell Technologies (2019b). "Test Plan Evaluation of EarthTec QZ® for Use in the Restoration of Local Recharge Sources from Invasive Dreissenid Mussels." Report for *Orange County Water District*. November 15.

# **Appendix List**

Appendix A: Raw Water Quality of Lake Piru, Lake Mathews and Weymouth WTP Influent

Appendix B: Lake Piru Veliger Dose-Response Figures

Appendix C: Lake Piru Dose-Response Veliger Testing – Water Quality Data

Appendix D: 2020 Lake Mathews Veliger Dose-Response Figures

Appendix E: 2020 Lake Mathews Dose-Response Veliger Testing – Water Quality Data



Appendix F: 2020 Weymouth Water Treatment Plant Influent Veliger Dose-Response Figures

Appendix G: 2020 Weymouth WTP Dose-Response Veliger Testing – Water Quality Data

Appendix H: 2021 Lake Mathews Veliger Dose-Response Figures

Appendix I: 2021 Lake Mathews Dose-Response Veliger Testing – Water Quality Data

Appendix J: 2021 Weymouth Water Treatment Plant Influent Veliger Dose-Response Figures

Appendix K: 2021 Weymouth WTP Dose-Response Veliger Testing – Water Quality Data

Appendix L: Veliger Mortality at All Sites Grouped by EarthTec QZ Concentration

## Appendix A

#### Raw Water Quality of Lake Piru, Lake Mathews and Weymouth WTP Influent

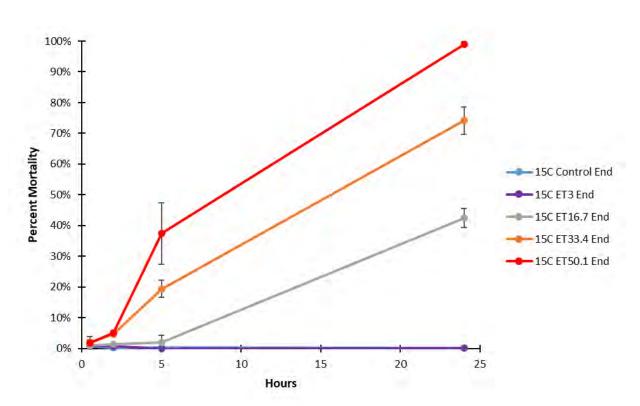
Table A1. Individual raw water quality measurements for Lake Piru, Lake Mathews, and Weymouth WTP

		Parameter	Total Copper	Free Copper	Total Chlorine	Oxidation Reduction Potential	Dissolved Oxygen	Conductivity	Hq	Temperature	Alkalinity	Hardness	Turbidity	Dissolved Organic Carbon	Chemical Oxygen Demand
Location			mg/L	mg/L	mg/L	mV	mg/L	μS/ cm	pH unit	ပိ	mg/ CaC	L as CO3	NTU	mg/L	mg/L
	Raw V	Vater Quality													
Lake Piru	2019	15°C Tests	0.15	0.14	0.08	210.4	10.45	927	8.43	12.0	187	314	9.29	5.33	10.00
	2019	20°C Tests	0.16	0.16	0.12	191.9	8.88	913	8.25	14.8	154	316	6.59	5.05	5.65
	Raw V	Vater Quality													
		15°C Tests	0.02	0.02	0.02	212.5	7.57	946	8.18	25.1	115	138	0.61	3.01	4.67
1 -1 84-41	2020	19°C Tests	0.01	0.01	0.02	245	8.08	937	8.20	18.9	115	142	0.89	2.95	5.69
Lake Mathews		20°C Tests *	0.02	0.02	0.10	244.3	7.86	948	8.21	25.8	116	144	0.92	2.91	7.83
	2021	15°C Tests	0.00	0.00	0.01	185.6	8.46	950	8.24	24.6	138	281	0.56	2.98	4.65
	2021	20°C Tests	0.00	0.00	0.00	208.2	8.34	957	8.29	23.5	135	178	0.92	2.91	3.30
	Raw V	Vater Quality													
		15°C Tests	0.01	0.01	0.04	214	8.27	944	8.02	25.6	119	150	0.76	4.09	8.50
Weymouth	2020	20°C Tests	0.00	0.00	0.07	223.5	8.14	941	8.13	27.1	121	139	0.69	4.19	8.24
ŴTP		Additional Sampling **	0.02	0.02	0.05	211	8.19	955	8.12	26.8	119	145	0.64	4.05	7.88
	2021	15°C Tests	0.02	0.03	0.10	195.6	8.69	969	8.18	21.9	137	275	0.61	3.01	4.46
	2021	20°C Tests	0.00	0.00	0.02	218.2	8.34	961	8.28	23.9	135	186	0.61	3.12	4.86

\* During Round #2 testing, the Lake Mathews 20°C sample water was recollected due to insufficient veliger counts in the original collection. The Lake Mathews 19°C sample water represents the recollected sample water used for successful veliger testing.

\*\* Re-sample of Weymouth Water Treatment Plant influent during Round #2 of testing for additional acute toxicity testing. This water was NOT used for veliger testing.

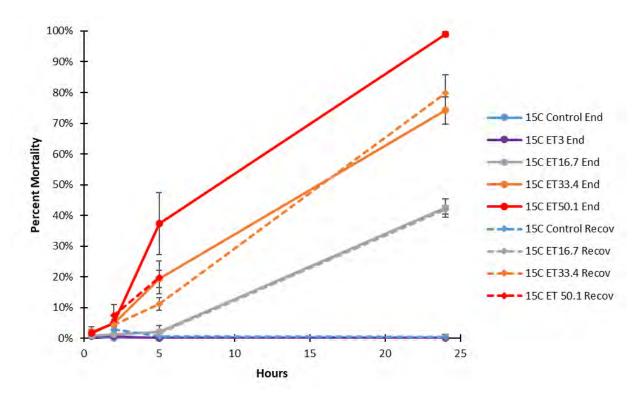




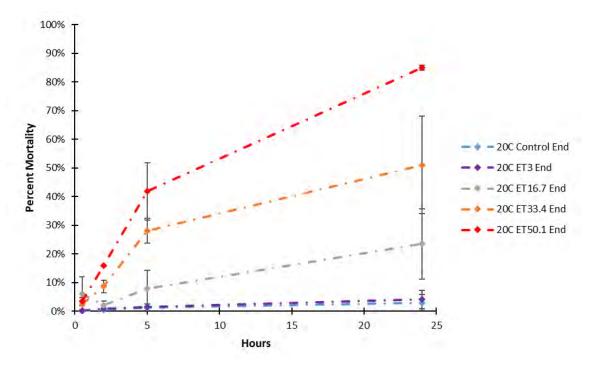
### **Appendix B** Lake Piru Veliger Dose Response Figures

**Figure B1.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 15°C for Lake Piru trials



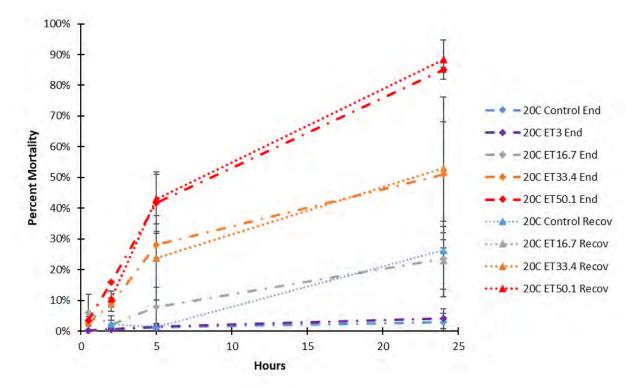


**Figure B2.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 15°C for Lake Piru trials



**Figure B3.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 20°C for Lake Piru trials





**Figure B4.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 20°C for Lake Piru trials



## Appendix C Lake Piru Dose-Response Veliger Testing – Water Quality Data

**Table C1.** Average with standard deviation of water quality data for each Lake Piru dose-response test condition

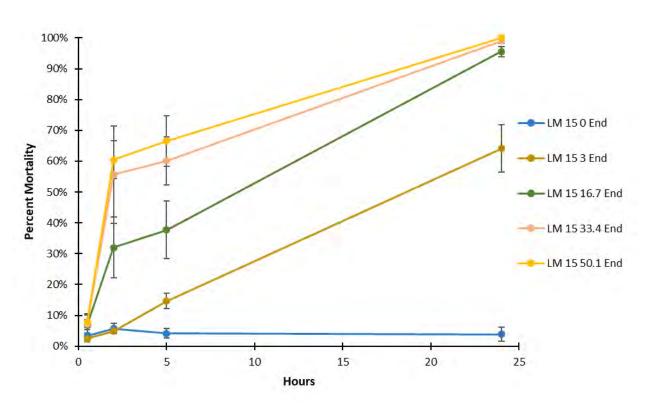
			15°C Test Conditions						20°C Test Conditions						
	Earth Tec QΖ (μL/L)	0 h	0.5 h	2 h	5 h	24 h	Reco very	0 h	0.5 h	2 h	5 h	24 h	Reco very		
	0.0	14.3	14.9	15.2	15.3	15.1	14.8	17.2	20.7	20.1	20.4	20.3	20.0		
	3.0	±0.5 14.5	±0.0 14.9	±0.0 15.4	±0.0 15.4	±0.0 15.1	±0.3 14.8	±1.4 16.7	±0.1 21.1	±0.0 20.0	±0.0 20.3	±0.0 20.3	±0.3 NM		
Taman		±0.4 14.5	±0.0 16.1	±0.2 15.7	±0.0 15.5	±0.0 15.0	±0.2	±1.4	±0.0 20.4	±0.0 20.6	±0.0	±0.0 20.2			
Temp. (°C)	16.7	±0.6	±0.0	±0.0	±0.0	±0.0	14.8 ±0.4	17.4 ±1.4	20.4 ±0.0	20.0 ±0.0	19.8 ±0.0	±0.2	20.1 ±0.0		
( 0)		14.9	15.9	15.5	15.5	15.0	14.8	17.5	20.6	20.6	19.9	20.2	19.9		
	33.4	±0.6	±0.0	±0.0	±0.0	±0.0	±0.2	±1.4	±0.0	±0.0	±0.0	±0.0	±0.3		
	50.1	14.6	15.9	15.5	15.6	15.2	15.1	17.1	20.7	20.3	20.1	20.0	20.2		
	50.1	±0.6	±0.0	±0.0	±0.0	±0.0	±0.1	±1.5	±0.0	±0.0	±0.0	±0.0	±0.3		
	0.0	9.07	8.96	8.80	8.56	9.21	9.07	9.40	9.13	9.16	8.20	5.65	7.11		
	0.0	±0.03	±0.03	±0.04	±0.04	±0.11	±0.25	±0.13	±0.05	±0.52	±0.19	±0.45	±0.44		
	3.0	9.05	8.97	8.84	8.55	9.19	9.14	9.60	9.16	9.09	8.28	5.15	NM		
DO		±0.05 8.96	±0.01 8.75	±0.03 8.82	±0.06 8.58	±0.05 9.26	±0.13 9.24	±0.12 9.47	±0.09 8.25	±0.04 9.07	±0.18 8.37	±0.31 6.78	7.06		
(mg/L)	16.7	±0.08	±0.03	6.62 ±0.02	±0.01	9.20 ±0.04	9.24 ±0.08	9.47 ±0.16	±0.06	9.07 ±0.06	±0.26	±0.34	±0.36		
(iiig/L)		<u>10.00</u> 8.98	<u>10.05</u> 8.77	8.78	8.60	<u>10.04</u> 9.26	<u>10.00</u> 9.33	9.54	<u>10.00</u> 9.12	8.88	8.21	<u>10.34</u> 7.61	<u>10.30</u> 7.23		
	33.4	±0.12	±0.01	±0.02	±0.02	±0.05	±0.07	±0.12	±0.02	±0.09	±0.13	±0.46	±0.66		
	50.4	8.69	8.75	8.85	8.62	9.71	9.40	9.53	8.17	8.71	8.26	8.09	7.47		
	50.1	±0.09	±0.02	±0.10	±0.06	±0.00	±0.10	±0.15	±0.07	±0.19	±0.17	±0.02	±0.35		
	0.0	8.50	8.47	8.45	8.49	8.47	8.46	8.31	8.22	8.21	8.15	8.16	8.35		
	0.0	±0.10	±0.06	±0.03	±0.02	±0.02	±0.05	±0.03	±0.02	±0.03	±0.03	±0.04	±0.07		
	3.0	8.53	8.47	8.45	8.46	8.5	8.52	8.33	8.22	8.24	8.02	8.12	NM		
	5.0	±0.05	±0.04	±0.05	±0.03	±0.01	±0.02	±0.01	±0.01	±0.00	±0.15	±0.02			
рН	16.7	8.46	8.40	8.36	8.32	8.46	8.51	8.19	8.09	8.12	8.06	8.22	8.44		
•		±0.09	±0.05	±0.04	±0.07	±0.00	±0.03	±0.03	±0.05	±0.02	±0.00	±0.02	±0.04		
	33.4	8.26 ±0.03	8.35 ±0.02	8.21 ±0.03	8.31 ±0.00	8.40 ±0.01	8.53 ±0.02	8.09 ±0.04	8.02 ±0.01	8.03 ±0.01	7.98 ±0.01	8.24 ±0.04	8.44 ±0.07		
		<u>+0.03</u> 8.20	8.25	<u>+0.03</u> 8.16	8.24	8.36	8.53	7.99	7.95	7.94	7.92	±0.04 8.23	<u>+0.07</u> 8.41		
	50.1	±0.40	±0.01	±0.01	±0.01	±0.01	±0.02	±0.03	±0.01	±0.01	±0.01	±0.01	±0.09		
		950	938	936	940	949	946	930	938	944	947	966	965		
	0.0	±23	±1	±9	±1	±1	±2	±5	±2	±1	±0	±2	±6		
	3.0	936	938	940	940	948	945	940	944	944	947	966	NM		
Specific	3.0	±1	±1	±1	±1	±1	±2	±2	±1	±1	±1	±1			
Conduct	16.7	939	942	944	942	949	944	943	946	947	948	965	964		
ance	10.7	±3	±1	±3	±1	±1	±3	±2	±0	±1	±1	±1	±2		
(µS/cm)	33.4	941	943	944	943	950	944	943	948	949	951	964	962		
		±1	±0	±2 946	±1 945	±1	±3 947	±2 943	±2	±1	±1	±2	±3		
	50.1	951 ±6	944 ±1	946 ±2	945 ±0	951 ±0	947 ±1	943 ±4	950 ±0	950 ±1	953 ±0	958 ±1	958 ±3		
		0.19	0.21	0.17	0.13	0.13	0.15	0.18	0.23	0.12	0.13	0.18			
	0.0	±0.04	±0.03	±0.01	±0.03	±0.01	±0.04	±0.05	±0.02	±0.01	±0.02	±0.04	NM		
	• •	0.32	0.29	0.27	0.32	0.25	0.19	0.31	0.29	0.28	0.28	0.33			
Eree	3.0	±0.04	±0.00	±0.03	±0.06	±0.01	±0.04	±0.04	±0.03	±0.01	±0.00	±0.02	NM		
Free Copper	16.7	1.05	1.02	0.89	0.95	1.00	0.21	1.10	1.05	1.06	1.04	1.08	NM		
(mg/L)	10.7	±0.03	±0.01	±0.04	±0.02	±0.09	±0.04	±0.04	±0.01	±0.05	±0.01	±0.01	INIVI		
(mg/⊏)	33.4	1.96	1.93	1.9	1.86	2.13	0.22	2.05	1.98	1.95	1.93	1.91	NM		
	00.7	±0.02	±0.03	±0.02	±0.02	±0.20	±0.03	±0.05	±0.01	±0.02	±0.01	±0.02	1 4101		
	50.1	2.93	2.84	2.77	2.75	2.93	0.24	2.97	2.84	2.84	2.77	2.80	NM		
		±0.09	±0.02	±0.03	±0.04	±0.10	±0.04	±0.09	±0.04	±0.04	±0.01	±0.08			

			15°C Test Conditions							20°C Test Conditions						
	Earth Tec QZ (µL/L)	0 h	0.5 h	2 h	5 h	24 h	Reco very	0 h	0.5 h	2 h	5 h	24 h	Reco very			
	0.0	0.19	0.14	0.18	0.13	0.10	0.14	0.13	0.13	0.12	0.12	0.12	NM			
		±0.00	±0.02	±0.02	±0.02	±0.02	±0.05	±0.02	±0.00	±0.01	±0.01	±0.02				
	3.0	0.29	0.28	0.24	0.29	0.23	0.16	0.32	0.29	0.27	0.30	0.37	NM			
Total		±0.02	±0.00	±0.01	±0.03	±0.00	±0.07	±0.02	±0.02	±0.01	±0.01	±0.02	INIVI			
	16.7	1.04	1.00	0.98	0.98	1.03	0.17	1.10	1.04	1.07	1.02	1.09	NM			
Copper	10.7	±0.02	±0.02	±0.02	±0.01	±0.07	±0.08	±0.06	±0.03	±0.06	±0.02	±0.02	INIVI			
(mg/L)	33.4	1.96	1.93	1.91	1.88	2.14	0.20	2.05	1.96	1.97	1.93	1.93	NM			
	33.4	±0.01	±0.05	±0.02	±0.03	±0.18	±0.04	±0.04	±0.01	±0.04	±0.01	±0.02	INIVI			
	50.4	2.91	2.85	2.81	2.78	2.97	0.23	2.96	2.85	2.85	2.80	2.79	NIN/			
	50.1	±0.07	±0.03	±0.03	±0.05	±0.11	±0.05	±0.09	±0.02	±0.05	±0.00	±0.08	NM			

NM: Not Measured

Recovery: Follow up measurement at the end of the 24 h recovery period following the exposure period.

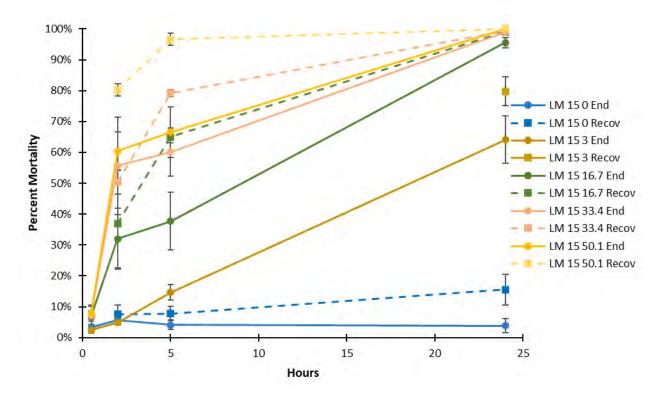




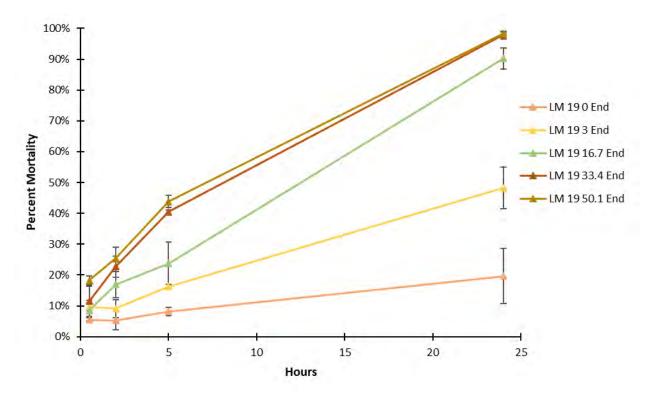
### **Appendix D** 2020 Lake Mathews Veliger Dose-Response Figures

**Figure D1.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 15°C for 2020 Lake Mathews (LM) trials

# TECHNICAL MEMORANDUM 1

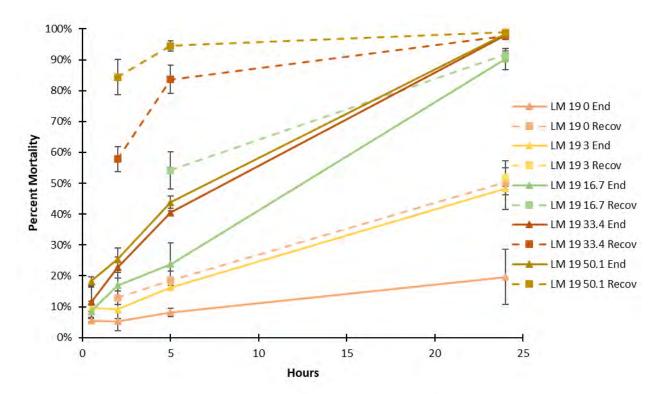






**Figure D3.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 19°C for 2020 Lake Mathews (LM) trials

# TECHNICAL MEMORANDUM 1



**Figure D4.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 19°C for 2020 Lake Mathews (LM) trials



### Appendix E 2020 Lake Mathews Dose-Response Veliger Testing – Water Quality Data

 
 Table E1. Average water quality data for each 2020 Lake Mathews dose-response test
 condition

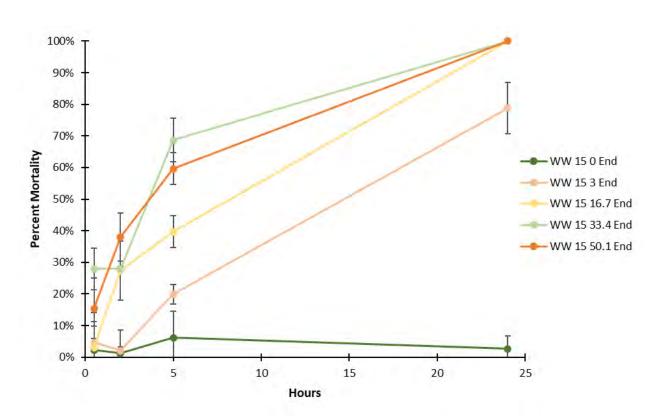
oonanion			15	°C Test (	Conditio	ns		19°C Test Conditions						
	Earth Tec QZ						Reco						Reco	
	(µL/L)	0 h	0.5 h	2 h	5 h	24 h	very	0 h	0.5 h	2 h	5 h	24 h	very	
		17.3	14.9	14.2	14.2	15.1	14.5	21.2	22.5	21.0	21.2	21.2	21.0	
	0.0	±0.1	±0.1	±0.0	±0.1	±0.0	±0.2	±0.6	±0.1	±0.0	±0.1	±0.8	±0.1	
		15.0	14.8	14.2	14.2	15.1	14.5	21.5	20.9	20.9	21.2	21.3	21.3	
-	3.0	±0.7	±0.0	±0.0	±0.1	±0.0	±0.1	±0.6	±0.1	±0.0	±0.1	±0.0	±0.0	
Temp.		16.9	14.5	13.9	14.4	15.1	14.4	21.7	20.6	20.7	21.2	21.3	21.3	
(°C)	16.7	±1.2	±0.1	±0.1	±0.0	±0.0	±0.3	±0.5	±0.1	±0.0	±0.0	±0.1	±0.1	
	22.4	15.7	13.6	13.5	15.1	15.1	14.4	22.3	20.8	21.0	21.5	21.3	21.3	
	33.4	±2.0 15.6	±0.3 13.2	±0.1 13.6	±0.0	±0.0 15.0	±0.3 14.5	±0.5 22.5	±0.1 20.6	±0.0 21.0	±0.0 21.6	±0.0 21.3	±0.1 21.2	
	50.1	±2.9	±0.1	±0.0	15.1 ±0.0	±0.0	14.5 ±0.4	22.5 ±0.5	20.8 ±0.0	21.0 ±0.0	21.6 ±0.0	21.3 ±0.1	±0.1	
	50.1	<u>±2.9</u> 7.63	8.10	<u>±0.0</u> 7.96	<u>±0.0</u> 7.94	±0.0 8.68	8.84	±0.5 8.01	<u>±0.0</u> 8.11	<u>±0.0</u> 8.09	<u>±0.0</u> 7.93	<u>±0.1</u> 7.58	<u>±0.1</u> 8.01	
	0.0	±0.16	±0.21	+0.04	+0.06	±0.10	6.64 ±0.28	±0.07	±0.05	±0.05	±0.01	±0.07	±0.15	
	0.0	<u>+0.10</u> 8.31	8.71	<u>+0.04</u> 8.59	<u>+0.00</u> 8.48	8.99	9.11	8.07	<u>+0.03</u> 8.12	<u>+0.03</u> 8.02	8.05	7.61	<u>+0.15</u> 8.09	
	3.0	±0.11	±0.03	±0.06	±0.05	±0.04	±0.07	±0.04	±0.02	±0.02	±0.03	±0.09	±0.03	
DO	5.0	8.33	<u>10.05</u> 9.02	<u>10.00</u> 8.43	<u>10.05</u> 8.40	<u>10.04</u> 8.98	<u>10.07</u> 8.90	<u>10.04</u> 8.14	<u>10.02</u> 8.13	<u>10.02</u> 8.01	<u>10.05</u> 8.06	<u>10.05</u> 8.11	<u>10.04</u> 8.13	
(mg/L)	16.7	±0.27	±0.04	±0.12	±0.03	±0.03	±0.23	±0.05	±0.02	±0.01	±0.02	±0.06	±0.09	
(		8.45	<u>+0.0</u> + 9.24	8.41	<u>+0.00</u> 8.35	<u>10.00</u> 8.92	8.81	<u>-0.00</u> 8.10	8.17	7.96	7.98	8.33	8.22	
	33.4	±0.38	±0.03	±0.12	±0.06	±0.07	±0.12	±0.07	±0.06	±0.02	±0.01	±0.09	±0.10	
		8.61	9.72	8.44	8.45	9.12	8.73	8.09	8.12	7.99	8.00	8.26	8.49	
	50.1	±0.53	±0.02	±0.09	±0.07	±0.06	±0.13	±0.07	±0.04	±0.01	±0.04	±0.04	±0.14	
		8.31	8.35	8.34	8.36	8.26	8.26	8.08	8.13	8.13	8.14	8.15	8.24	
	0.0	±0.02	±0.00	±0.01	±0.00	±0.01	±0.03	±0.03	±0.00	±0.00	±0.01	±0.03	±0.03	
		8.29	8.32	8.32	8.32	8.22	8.27	8.09	8.14	8.11	8.12	8.08	8.25	
	3.0	±0.01	±0.01	±0.01	±0.01	±0.00	±0.00	±0.01	±0.00	±0.01	±0.01	±0.01	±0.01	
рН		8.20	8.27	8.27	8.23	8.18	8.26	8.06	8.11	8.06	8.09	8.12	8.25	
рп	16.7	±0.03	±0.02	±0.02	±0.02	±0.02	±0.04	±0.02	±0.01	±0.01	±0.02	±0.01	±0.01	
		8.15	8.19	8.21	8.19	8.12	8.25	7.93	8.05	7.92	7.93	8.09	8.27	
	33.4	±0.08	±0.04	±0.06	±0.04	±0.03	±0.05	±0.06	±0.03	±0.03	±0.03	±0.03	±0.01	
		8.00	8.08	8.08	8.09	8.08	8.25	8.03	7.90	7.75	7.84	8.00	8.30	
	50.1	±0.08	±0.03	±0.02	±0.05	±0.03	±0.05	±0.06	±0.04	±0.03	±0.04	±0.03	±0.02	
		939	938	937	936	940	939	947	947	948	948	954	954	
	0.0	±1	±2	±1	±1	±0	±4	±3	±1	±1	±1	±1	±1	
o		941	938	938	940	943	941	945	946	946	947	955	946	
Specific	3.0	±0	±0	±2	±0	±1	±0	±2	±0	±0	±0	±1	±0	
Conduct	46.7	942	940	939	941	943	941	951	948	949	949	954	954	
ance (µS/cm)	16.7	±3 945	±1 942	±0 944	±0 946	±0 947	±1 941	±1 955	±0 954	±0 952	±0 954	±1 958	±2 952	
(µS/cm)	33.4	±6	942 ±0	944 ±0	940 ±0	±0	±1	±3	934 ±2	±0	934 ±0	±0	952 ±1	
	55.4	<u>946</u>	<u>10</u> 945	<u>9</u> 43	<u>946</u>	<u>948</u>	<u>-</u> 1 942	<u>9</u> 57	955	<u>9</u> 55	<u>10</u> 957	<u>10</u> 957	953	
	50.1	±4	±0	±0	±0	±1	±1	±1	±1	±0	±0	±0	±2	
		0.09	0.10	0.08	0.04	0.05	0.05	0.09	0.11	0.10	0.05	0.07	0.04	
	0.0	±0.03	±0.02	±0.04	±0.00	±0.01	±0.02	±0.00	±0.00	±0.02	±0.02	±0.01	±0.03	
		0.43	0.41	0.41	0.37	0.36	0.07	0.36	0.35	0.34	0.32	0.32	0.05	
Ene -	3.0	±0.00	±0.00	±0.01	±0.04	±0.2	±0.02	±0.02	±0.01	±0.02	±0.01	±0.02	±0.00	
Free		1.25	1.21	1.20	1.18	1.16	0.09	1.03	1.04	1.00	0.95	0.95	0.10	
Copper	16.7	±0.02	±0.01	±0.02	±0.05	±0.00	±0.03	±0.01	±0.01	±0.03	±0.01	±0.01	±0.01	
(mg/L)		2.00	2.02	1.96	1.94	1.86	0.11	1.96	1.94	1.90	1.87	1.64	0.18	
	33.4	±0.04	±0.02	±0.02	±0.02	±0.01	±0.05	±0.03	±0.01	±0.01	±0.02	±0.05	±0.04	
		2.93	2.98	2.90	2.78	2.56	0.13	2.95	2.91	2.83	2.84	2.27	0.36	
	50.1	±0.08	±0.04	±0.05	±0.02	±0.02	±0.04	±0.01	±0.05	±0.01	±0.03	±0.04	±0.13	

			15	°C Test (	19°C Test Conditions								
	Earth Tec QZ (µL/L)	0 h	0.5 h	2 h	5 h	24 h	Reco very	0 h	0.5 h	2 h	5 h	24 h	Reco very
		0.09	0.06	0.07	0.04	0.06	0.05	0.09	0.10	0.09	0.07	0.08	0.04
	0.0	±0.02	±0.01	±0.02	±0.02	±0.01	±0.01	±0.01	±0.00	±0.02	±0.05	±0.01	±0.02
		0.42	0.39	0.40	0.37	0.37	0.07	0.36	0.36	0.33	0.34	0.36	0.05
Total	3.0	±0.02	±0.00	±0.01	±0.03	±0.03	±0.02	±0.01	±0.01	±0.04	±0.03	±0.01	±0.00
Copper		1.25	1.21	1.18	1.19	1.20	0.09	1.04	1.01	0.99	0.94	0.98	0.10
(mg/L)	16.7	±0.03	±0.02	±0.02	±0.06	±0.01	±0.03	±0.02	±0.03	±0.04	±0.01	±0.02	±0.02
(ing/L)		2.00	2.01	1.95	1.91	1.86	0.12	1.94	1.93	1.90	1.88	1.64	0.18
	33.4	±0.05	±0.01	±0.01	±0.02	±0.02	±0.06	±0.03	±0.02	±0.00	±0.00	±0.04	±0.04
		2.94	2.95	2.87	2.77	2.56	0.14	2.95	2.90	2.84	2.85	2.29	0.36
	50.1	±0.06	±0.04	±0.05	±0.02	±0.03	±0.05	±0.01	±0.02	±0.02	±0.02	±0.05	±0.15
		0.04	0.04	0.03	0.06	0.04		0.07	0.06	0.06	0.05	0.05	
	0.0	±0.01	±0.01	±0.01	±0.00	±0.01	NM	±0.00	±0.01	±0.01	±0.02	±0.01	NM
		0.05	0.07	0.03	0.04	0.04		0.06	0.06	0.06	0.07	0.04	
Total	3.0	±0.01	±0.01	±0.00	±0.01	±0.01	NM	±0.01	±0.00	±0.02	±0.01	±0.00	NM
Chlorine	<u> </u>	0.06	0.05	0.05	0.06	0.04		0.08	0.08	0.06	0.06	0.05	
(mg/L)	16.7	±0.00	±0.02	±0.00	±0.01	±0.01	NM	±0.01	±0.01	±0.02	±0.00	±0.00	NM
(9, -)		0.07	0.09	0.07	0.08	0.05		0.07	0.10	0.07	0.10	0.06	
	33.4	±0.02	±0.01	±0.00	±0.02	±0.01	NM	±0.02	±0.01	±0.01	±0.00	±0.00	NM
		0.08	0.11	0.08	0.10	0.09		0.08	0.11	0.09	0.11	0.08	
	50.1	±0.02	±0.01	±0.01	±0.01	±0.00	NM	±0.01	±0.01	±0.02	±0.02	±0.01	NM

NM: Not Measured

Recovery: Follow up measurement at the end of the 24 h recovery period following the exposure period.

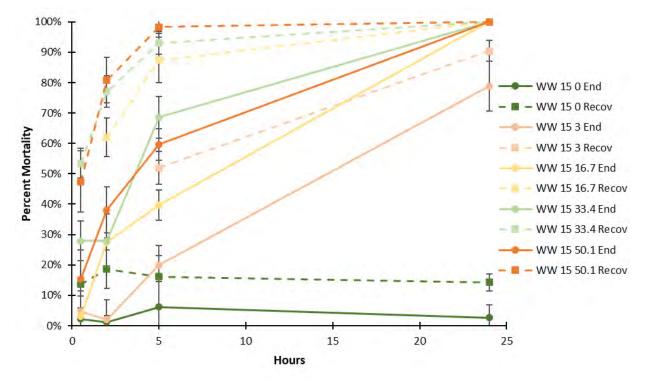




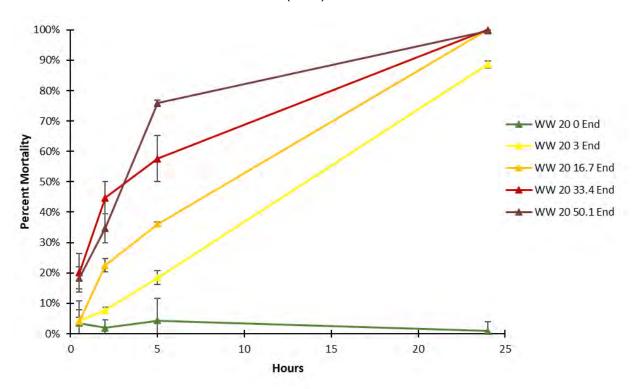


**Figure F1.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 15°C for the 2020 Weymouth Water Treatment Plant (WW) trials

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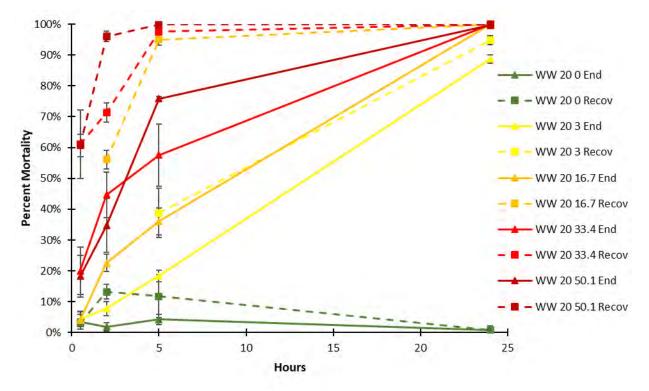


**Figure F2.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 15°C for the 2020 Weymouth Water Treatment Plant (WW) trials



**Figure F3.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 20°C for the 2020 Weymouth Water Treatment Plant (WW) trials





**Figure F4.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 20°C for the 2020 Weymouth Water Treatment Plant (WW) trials



## Appendix G 2020 Weymouth WTP Dose-Response Veliger Testing – Water Quality Data

**Table G1.** Average water quality data for each dose-response test condition usingWeymouth WTP influent in 2020

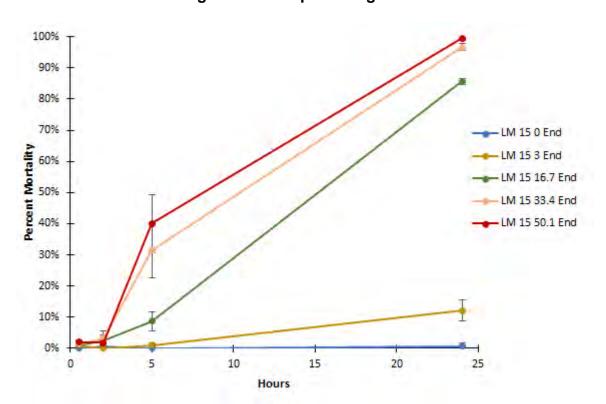
veymout		15°C Test Conditions							20°C Test Conditions						
	Earth Tec QZ						Reco						Reco		
	(µL/L)	0 h	0.5 h	2 h	5 h	24 h	very	0 h	0.5 h	2 h	5 h	24 h	very		
	0.0	16.6	15.2	14.8	14.5	15.4	15.4	22.0	20.1	19.7	20.9	19.7	20.0		
	010	±0.5	±0.5	±0.5	±0.0	±0.1	±0.3	±0.5	±0.1	±0.1	±0.0	±0.1	±0.3		
	3.0	16.6	14.8	14.4	14.4	15.2	15.5	22.0	19.9	19.6	21.1	19.7	20.0		
Temp.		±0.8 16.9	±0.1 14.6	±0.1 14.5	±0.0 14.2	±0.0 14.9	±0.3	±0.4 22.2	±0.0 19.7	±0.1 19.6	±0.3 20.8	±0.0 19.7	±0.3 19.9		
(°C)	16.7	±0.8	±0.0	$\pm 0.0$	±0.1	±0.1	15.4 ±0.3	±0.4	±0.1	±0.0	20.8 ±0.0	±0.1	±0.1		
(0)		<u>16.9</u>	<u>1</u> 0.0 15.8	<u>1</u> 0.0 15.0	<u>1</u> 0.1 15.1	<u>1</u> 0.1	<u>1</u> 0.3 15.2	22.3	<u>19.</u> 9	<u>10.0</u> 19.9	<u>10.0</u> 19.9		20.0		
	33.4	±1.7	±0.1	±0.1	±0.0	±0.0	±0.3	±0.6	±0.1	±0.1	±0.0	NM	±0.2		
		16.8	15.7	15.2	15.2	14.4	15.2	22.4	19.8	20.0	19.6	20.3	20.0		
	50.1	±1.7	±0.0	±0.0	±0.1	±0.1	±0.2	±0.4	±0.0	±0.0	±0.0	±0.1	±0.2		
	• •	8.73	9.22	8.73	8.88	9.35	9.24	8.19	8.37	8.37	8.33	8.63	8.61		
	0.0	±0.20	±0.03	±0.06	±0.02	±0.10	±0.06	±0.04	±0.07	±0.05	±0.02	±0.04	±0.12		
	2.0	8.73	9.18	8.76	8.76	9.42	9.13	8.21	8.33	8.32	8.40	8.73	8.68		
	3.0	±0.17	±0.10	±0.04	±0.17	±0.03	±0.06	±0.08	±0.03	±0.02	±0.05	±0.01	±0.09		
DO	16.7	8.72	9.13	8.78	8.97	9.55	9.23	8.22	8.28	8.36	8.39	8.74	8.53		
(mg/L)	10.7	±0.17	±0.10	±0.14	±0.09	±0.03	±0.09	±0.04	±0.06	±0.03	±0.06	±0.03	±0.08		
	33.4	8.86	8.88	8.85	9.02	9.55	9.25	8.25	8.22	8.37	8.34	NM	8.56		
	33.4	±0.06	±0.05	±0.01	±0.02	±0.08	±0.08	±0.09	±0.07	±0.02	±0.02		±0.11		
	50.1	8.77	8.80	8.89	8.87	9.64	9.12	8.27	8.28	8.34	8.37	8.77	8.64		
	0.0	±0.05	±0.01	±0.12	±0.05	±0.05	<u>±0.10</u>	±0.12	±0.07	±0.08	±0.02	±0.02	<u>±0.14</u>		
		8.29	8.31	8.33	8.31	8.31	8.32	8.21	8.28	8.30	8.30	8.27	8.23		
рН		±0.05	±0.00	±0.00	±0.00	±0.00	±0.01	±0.06	±0.00	±0.00	±0.01	±0.00	±0.10		
	3.0 16.7 33.4	8.28	8.30	8.31	8.30	8.30	8.32	8.22	8.26	8.28	8.28	8.26	8.31		
		±0.02 8.18	±0.00 8.23	±0.00 8.24	±0.01 8.23	±0.00 8.23	±0.01 8.33	±0.02 8.18	±0.00 8.26	±0.01 8.19	±0.01 8.21	±0.00 8.22	±0.01 8.27		
		±0.01	6.23 ±0.02	6.24 ±0.02	6.23 ±0.03	6.23 ±0.00	6.33 ±0.01	±0.05	6.20 ±0.08	±0.02	6.21 ±0.02	6.22 ±0.02	6.27 ±0.04		
		8.08	<u>10.02</u> 8.10	<u>10.02</u> 8.13	<u>10.05</u> 8.09	<u>10.00</u> 8.13	8.33	<u>10.05</u> 8.10	<u>10.00</u> 8.18	<u>10.02</u> 8.16	<u>10.02</u> 8.04		<u>10.04</u> 8.23		
		±0.05	±0.02	±0.03	±0.03	±0.03	±0.01	±0.04	±0.06	±0.05	±0.03	NM	±0.08		
	50.1	7.92	8.01	7.97	7.95	8.05	8.34	8.01	8.05	8.02	7.96	8.11	8.26		
		±0.06	±0.05	±0.09	±0.05	±0.03	±0.01	±0.07	±0.04	±0.04	±0.04	±0.04	±0.06		
		937	931	936	936	940	941	937	937	934	937	941	942		
	0.0	±3	±1	±1	±1	±1	±2	±2	±2	±1	±0	±1	±1		
	<b>3.0</b> 938 ±1	937	936	936	939	941	935	936	935	937	941	944			
Specific		±0	±0	±0	±0	±0	±1	±0	±1	±0	±0	±1			
Conduct	16.7	940	938	938	937	939	940	937	937	937	938	942	942		
ance	10.7	±0	±1	±0	±1	±0	±0	±1	±0	±0	±0	±0	±1		
(µS/cm)	33.4	943	944	940	940	942	940	945	939	939	941	NM	942		
		±2	±1	±1	±0	±0	±1	±4	±0	±0	±0		±0		
	50.1	944	945	943	943	942	941	944	944	943	944	945	942		
		<u>±1</u>	±0	±0	±1	±0	±1	±3	±0	±0	±0	±0	<u>±2</u>		
	0.0	0.02 ±0.01	0.05	0.03 ±0.00	0.03	0.03 ±0.00	0.02	0.02 ±0.02	0.04 ±0.01	0.03 ±0.00	0.03	0.03	0.01 ±0.01		
			±0.01 0.29		±0.01		±0.01				±0.02	±0.01			
	3.0	0.28 ±0.00	0.29 ±0.01	0.28 ±0.01	0.28 ±0.00	0.26 ±0.00	0.02 ±0.01	0.29 ±0.01	0.30 ±0.02	0.27 ±0.00	0.20 ±0.00	0.32 ±0.12	0.03 ±0.09		
Free		±0.00 0.95	±0.01 0.95	±0.01 0.94	±0.00 0.92	±0.00 0.91	±0.01 0.03	1.08	±0.02 1.08	±0.00 1.06	±0.00 1.03	±0.12 0.98	±0.09 0.02		
Copper	16.7	±0.02	±0.01	±0.02	±0.02	$\pm 0.00$	±0.05	±0.01	±0.02	±0.02	±0.01	±0.01	±0.02		
(mg/L)		1.99	1.92	1.95	1.92	<u>1.87</u>	0.04	1.93	1.91	1.95	1.90		0.04		
	33.4	±0.04	±0.01	±0.02	±0.00	±0.01	±0.04	±0.01	±0.02	±0.02	±0.01	NM	±0.04		
		2.86	2.81	2.85	2.78	2.57	0.05	2.89	2.84	2.86	2.79	2.41	0.10		
	50.1	±0.03	±0.03	±0.04	±0.05	±0.03	±0.02	±0.02	±0.00	±0.04	±0.02	±0.04	±0.07		

			15	°C Test	Conditio	ons	20°C Test Conditions						
	Earth Tec QZ (µL/L)	0 h	0.5 h	2 h	5 h	24 h	Reco very	0 h	0.5 h	2 h	5 h	24 h	Reco very
	0.0	0.02 ±0.01	0.05 ±0.01	0.03 ±0.01	0.03 ±0.01	0.03 ±0.01	0.02 ±0.01	0.03 ±0.02	0.04 ±0.02	0.02 ±0.00	0.04 ±0.01	0.02 ±0.00	0.01 ±0.01
	3.0	0.27 ±0.01	0.29 ±0.01	0.28 ±0.00	0.28 ±0.00	0.26 ±0.01	0.02 ±0.01	0.29 ±0.00	0.28 ±0.01	0.27 ±0.01	0.28 ±0.00	0.28 ±0.05	0.03 ±0.01
Total Copper (mg/L)	16.7	0.95 ±0.01	0.95 ±0.01	0.94 ±0.01	0.93 ±0.01	0.92 ±0.01	0.03 ±0.01	1.08 ±0.01	1.07 ±0.01	1.06 ±0.01	1.03 ±0.02	0.98 ±0.01	0.02 ±0.00
	33.4	1.98 ±0.04	1.91 ±0.02	1.93 ±0.02	1.91 ±0.01	1.88 ±0.03	0.04 ±0.02	1.93 ±0.00	1.90 ±0.02	1.95 ±0.02	1.90 ±0.02	NM	0.04 ±0.01
	50.1	2.83 ±0.02	2.80 ±0.03	2.83 ±0.04	2.78 ±0.03	2.57 ±0.03	0.06 ±0.02	2.88 ±0.02	2.82 ±0.01	2.83 ±0.02	2.76 ±0.03	2.42 ±0.03	0.10 ±0.07
	0.0	0.06 ±0.02	0.06 ±0.00	0.06 ±0.00	0.06 ±0.00	0.03 ±0.00	NM	0.08 ±0.01	0.08 ±0.01	0.06 ±0.01	0.05 ±0.00	0.05 ±0.00	NM
Total	3.0	0.05 ±0.01	0.06 ±0.00	0.05 ±0.00	0.06 ±0.00	0.03 ±0.00	NM	0.05 ±0.00	0.06 ±0.00	0.05 ±0.00	0.05 ±0.00	0.04 ±0.01	NM
Chlorine	16.7	0.05 ±0.00	0.06 ±0.01	0.05 ±0.01	0.06 ±0.01	0.04 ±0.01	NM	0.05 ±0.01	0.07 ±0.01	0.05 ±0.01	0.05 ±0.00	0.08 ±0.02	NM
(mg/L)	33.4	0.07 ±0.01	0.07 ±0.00	0.08 ±0.01	0.06 ±0.01	0.04 ±0.00	NM	0.09 ±0.02	0.06 ±0.01	0.05 ±0.00	0.05 ±0.00	NM	NM
	50.1	0.06 ±0.01	0.07 ±0.01	0.09 ±0.01	0.08 ±0.00	0.05 ±0.01	NM	0.10 ±0.02	0.07 ±0.01	0.08 ±0.02	0.08 ±0.02	0.07 ±0.03	NM

NM: Not Measured

Recovery: Follow up measurement at the end of the 24 h recovery period following the exposure period.

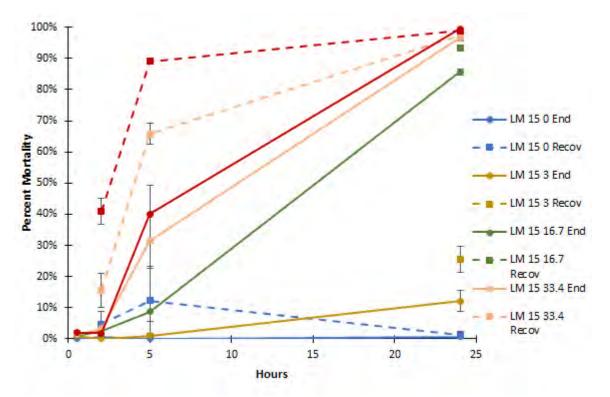




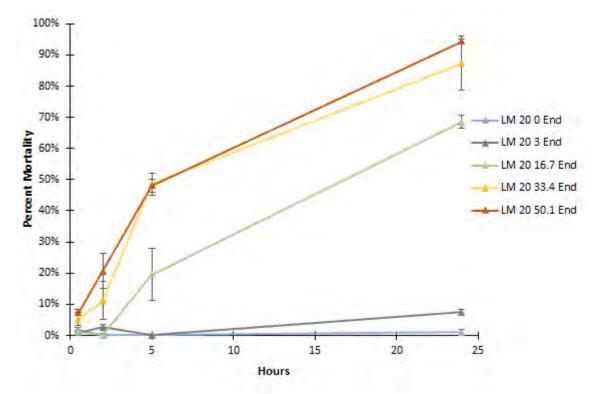
## **Appendix H** 2021 Lake Mathews Veliger Dose-Response Figures

**Figure H1.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 15°C for 2021 Lake Mathews (LM) trials

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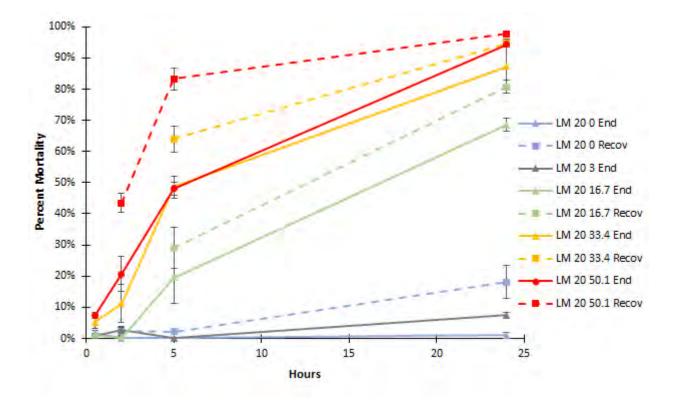






**Figure H3.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 20°C for 2021 Lake Mathews (LM) trials





**Figure H4.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 20°C for 2021 Lake Mathews (LM) trials



#### Appendix I 2021 Lake Mathews Dose-Response Veliger Testing – Water Quality Data

 
 Table I1. Average water quality data for each 2021 Lake Mathews dose-response test
 condition

			15	°C Test (	Conditio	ns		20°C Test Conditions							
	Earth Tec QZ						Reco						Reco		
	(µL/L)	0 h	0.5 h	2 h	5 h	24 h	very	0 h	0.5 h	2 h	5 h	24 h	very		
		14.5	14.9	15.5	14.8	14.9	15.3	22.1	20.0	20.1	21.1	21.1	21.1		
	0.0	±0.0	±0.5	±0.1	±0.1	±0.0	±0.2	±0.6	±0.1	±0.1	±0.0	±0.0	±0.3		
		14.2	14.8	15.5	14.8	14.9	15.3	23.2	20.0	20.0	21.1	21.1	NM		
Tamm	3.0	±0.1	±0.0	±0.0	±0.0	±0.0	±0.1	±0.9	±0.1	±0.1	±0.1	±0.0			
Temp.	16.7	14.5 ±0.1	14.4 ±0.0	14.6 ±0.0	14.4 ±0.1	14.5 ±0.0	15.2 ±0.1	23.3 ±0.4	19.9 ±0.1	20.1 ±0.1	21.1 ±0.0	20.1 ±0.1	21.0 ±0.1		
(°C)	10.7	±0.1 14.3	±0.0 14.1	±0.0 14.5	±0.1 14.4	±0.0 14.5	±0.1 15.0	±0.4 21.8	±0.1 20.9	±0.1 20.0	±0.0 20.3	±0.1 20.1	±0.1 20.1		
	33.4	$\pm 0.2$	±0.1	±0.2	$\pm 0.1$	$\pm 0.0$	±0.0	±0.2	±0.0	±0.1	±0.0	±0.1	±0.1		
	00.4	14.0	14.4	15.2	15.6	15.6	15.3	21.7	20.9	20.0	20.2	20.0	20.8		
	50.1	±0.5	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.0	±0.1	±0.0	±0.0	±0.3		
		9.59	9.86	9.43	9.36	9.22	8.83	8.04	8.17	8.05	8.01	7.47	7.81		
	0.0	±0.20	±0.11	±0.07	±0.08	±0.05	±0.10	±0.21	±0.04	±0.02	±0.02	±0.09	±0.12		
		9.82	10.02	9.83	9.71	9359	8.92	8.00	8.19	7.97	8.00	7.85			
	3.0	±0.07	±0.01	±0.01	±0.03	±0.02	±0.05	±0.16	±0.04	±0.03	±0.05	±0.04	NM		
DO		9.64	9.79	9.53	9.49	9.40	9.06	7.99	8.18	8.04	8.06	7.95	8.07		
(mg/L)	16.7	±0.12	±0.06	±0.06	±0.03	±0.03	±0.03	±0.13	±0.11	±0.07	±0.16	±0.01	±0.17		
		9.87	10.05	9.68	9.54	9.52	9.01	8.16	8.28	8.04	8.02	8.10	8.30		
	33.4	±0.19	±0.06	±0.06	±0.03	±0.03	±0.03	±0.14	±0.08	±0.05	±0.06	±0.08	±0.11		
		9.97	10.19	9.70	9.78	9.93	9.23	8.16	8.33	7.99	8.01	7.95	8.24		
	50.1	±0.17	±0.01	±0.05	±0.02	±0.02	±0.07	±0.07	±0.04	±0.05	±0.03	±0.01	±0.24		
		8.49	8.23	8.36	8.29	8.35	8.38	8.30	8.35	8.33	8.32	8.31	8.31		
	0.0	±0.07	±0.18	±0.00	±0.01	±0.01	±0.03	±0.02	±0.03	±0.03	±0.01	±0.05	±0.03		
		8.38	8.34	8.34	8.29	8.24	8.39	8.27	8.32	8.29	8.31	8.26	NM		
	3.0	±0.05	±0.00	±0.00	±0.00	±0.01	±0.00	±0.01	±0.00	±0.01	±0.02	±0.00			
рН	16 7	8.30	8.27	8.27	8.23	8.26	8.41	8.20	8.17	8.20	8.27	8.23	8.32		
	16.7	±0.04 8.18	±0.02 8.13	±0.03 8.18	±0.02 8.16	±0.01 8.19	±0.00 8.40	±0.04 8.15	±0.04 8.23	±0.02 8.13	±0.05 8.17	±0.01 8.22	±0.04 8.34		
	33.4	±0.04	±0.01	±0.05	±0.05	±0.02	±0.02	±0.10	±0.04	±0.04	±0.05	±0.02	±0.01		
	55.4	<u>10.04</u> 8.04	8.03	<u>10.05</u> 8.04	<u>10.05</u> 8.05	8.13	<u>10.02</u> 8.42	8.01	<u>10.04</u> 8.12	<u>+0.04</u> 8.00	<u>10.03</u> 8.02	<u>10.02</u> 8.14	8.34		
	50.1	±0.05	±0.05	±0.05	±0.03	±0.02	±0.02	±0.05	±0.02	±0.05	±0.04	±0.03	±0.03		
	00.1	948	952	950	953	950	952	949	949	949	949	951	955		
	0.0	±1	±0	±0	±1	±0	±1	±4	±1	±1	±0	±0	±1		
		950	952	951	952	949	952	945	948	948	949	951			
Specific	3.0	±2	±0	±0	±1	±0	±0	±3	±0	±0	±1	±0	NM		
Conduct		954	954	953	956	949	952	947	951	951	952	953	951		
ance	16.7	±2	±0	±1	±1	±0	±0	±3	±0	±0	±0	±0	±1		
(µS/cm)		954	954	958	954	957	956	953	954	954	954	955	951		
	33.4	±3	±2	±2	±3	±0	±1	±2	±0	±0	±0	±1	±1		
		958	959	959	956	958	952	957	956	956	956	957	950		
	50.1	±1	±0	±2	±1	±0	±1	±1	±0	±1	±0	±0	±1		
	• •	0.01	0.01	0.01	0.03	0.01	0.01	0.05	0.05	0.03	0.03	0.06	0.02		
	0.0	±0.01	±0.01	±0.01	±0.00	±0.01	±0.01	±0.01	±0.01	±0.02	±0.03	±0.03	±0.02		
	2.0	0.20	0.20	0.19	0.23	0.24	0.00	0.23	0.24	0.17	0.19	0.21	NM		
Free	3.0	±0.00	±0.01	±0.00	±0.01	±0.03	±0.00	$\pm 0.05$	±0.02	±0.01	$\pm 0.00$	±0.01			
Copper	16.7	0.00	0.94	0.94	0.95	0.94	0.00	1.12	1.04	1.12	0.94	0.98	0.05		
(mg/L)	10.7	±0.02 1.93	±0.01 1.88	±0.00 1.89	±0.01 1.83	±0.03 1.73	±0.00 0.05	±0.15 2.02	±0.02 1.93	±0.16 1.93	±0.01 1.88	±0.01 1.81	±0.01 0.14		
	33.4	1.93 ±0.05	±0.02	±0.02	±0.01	1.73 ±0.02	0.05 ±0.03	2.02 ±0.01	±0.01	1.93 ±0.02	1.88 ±0.01	±0.02	0.14 ±0.03		
	55.4	±0.05 2.94	±0.02 2.85	±0.02 2.87	±0.01 2.68	±0.02 2.49	±0.03 0.12	±0.01 2.95	2.82	±0.02 2.77	±0.01 2.66	±0.02 2.34	±0.03 0.18		
	50.1	2.94 ±0.01	±0.03	±0.01	±0.02	±0.03	$\pm 0.12$	±0.02	±0.02	±0.02	±0.02	±0.02	±0.07		
	55.1	10.01	±0.00	±0.01	±0.02	±0.00	±0.01	±0.02	±0.02	±0.02	±0.02	±0.02	±0.07		

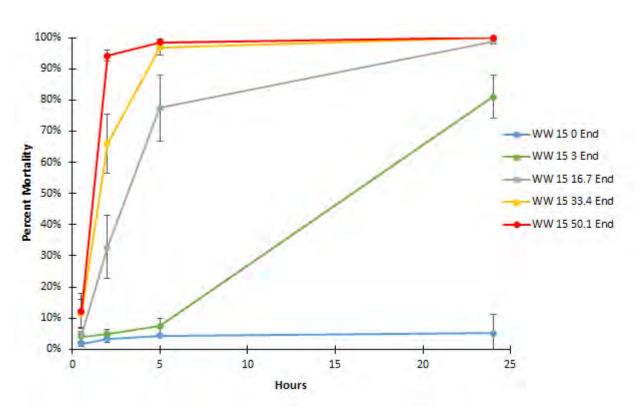
			15	°C Test (	Conditio	ns			20	°C Test (	Conditio	ns	
	Earth Tec QZ (µL/L)	0 h	0.5 h	2 h	5 h	24 h	Reco very	0 h	0.5 h	2 h	5 h	24 h	Reco very
	<b>N</b> <i>i</i>	0.02	0.00	0.01	0.02	0.00	0.01	0.03	0.05	0.04	0.03	0.04	0.03
	0.0	±0.01	±0.00	±0.01	±0.01	±0.00	±0.01	±0.01	±0.01	±0.02	±0.02	±0.01	±0.03
Total	3.0	0.20 ±0.00	0.20 ±0.01	0.18 ±0.00	0.23 ±0.03	0.22 ±0.01	0.00 ±0.00	0.23 ±0.05	0.24 ±0.02	0.17 ±0.00	0.19 ±0.01	0.19 ±0.01	NM
		0.96	0.94	0.95	0.93	0.92	0.01	1.11	1.03	1.12	0.94	0.98	0.05
Copper	16.7	±0.01	±0.01	±0.01	±0.00	±0.01	±0.01	±0.15	±0.02	±0.16	±0.01	±0.03	±0.01
(mg/L)		1.93	1.88	1.89	1.83	1.75	0.06	2.02	1.94	1.93	1.88	1.84	0.14
	33.4	±0.02	±0.03	±0.03	±0.01	±0.03	±0.03	±0.01	±0.00	±0.01	±0.00	±0.02	±0.03
		2.92	2.84	2.85	2.68	2.79	0.12	2.96	2.83	2.75	2.65	2.35	0.19
	50.1	±0.01	±0.02	±0.02	±0.03	±0.04	±0.07	±0.01	±0.02	±0.02	±0.02	±0.03	±0.07
	0.0	0.03 ±0.01	0.03 ±0.00	0.00 ±0.00	0.00 ±0.00	0.00 ±0.00	NM	0.04 ±0.01	0.04 ±0.00	0.03 ±0.00	0.01 ±0.00	0.03 ±0.01	NM
	3.0	0.03 ±0.00	0.02 ±0.01	0.01 ±0.00	0.03 ±0.00	0.02 ±0.00	NM	0.05 ±0.03	0.03 ±0.01	0.04 ±0.02	0.01 ±0.01	0.04 ±0.01	NM
Total Chlorine		0.04	0.02	0.03	0.03	0.02	NM	0.06	0.05	0.04	0.01	0.05	NM
(mg/L)	16.7	±0.01	±0.00	±0.01	±0.01	±0.00		±0.01	±0.01	±0.01	±0.01	±0.01	
(iiig/ட)		0.04	0.01	0.04	0.04	0.07	NM	0.06	0.07	0.06	0.05	0.07	NM
	33.4	±0.01	±0.01	±0.01	±0.01	±0.01	INIVI	±0.02	±0.02	±0.03	±0.01	±0.01	INIVI
		0.05	0.06	0.05	0.05	0.06	NM	0.08	0.09	0.05	0.08	0.07	NM
	50.1	±0.01	±0.02	±0.00	±0.01	±0.01		±0.00	±0.01	±0.01	±0.01	±0.03	

NM: Not Measured

Recovery: Follow up measurement at the end of the 24 h recovery period following the exposure period.

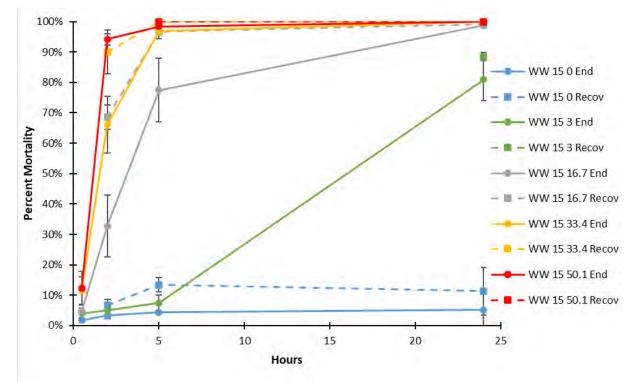


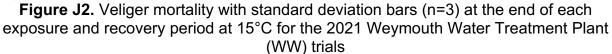


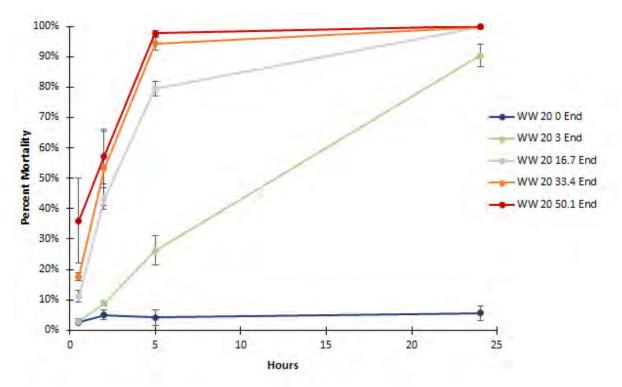


**Figure J1.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 15°C for the 2021 Weymouth Water Treatment Plant (WW) trials

## TECHNICAL MEMORANDUM 1

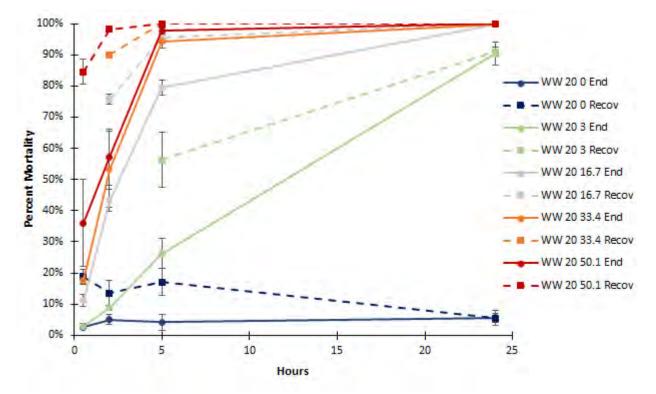






**Figure J3.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure period at 20°C for the 2021 Weymouth Water Treatment Plant (WW) trials

## TECHNICAL MEMORANDUM 1



**Figure J4.** Veliger mortality with standard deviation bars (n=3) at the end of each exposure and recovery period at 20°C for the 2021 Weymouth Water Treatment Plant (WW) trials

## Appendix K

### 2021 Weymouth WTP Dose-Response Veliger Testing – Water Quality Data

 Table G1. Average water quality data for each dose-response test condition using

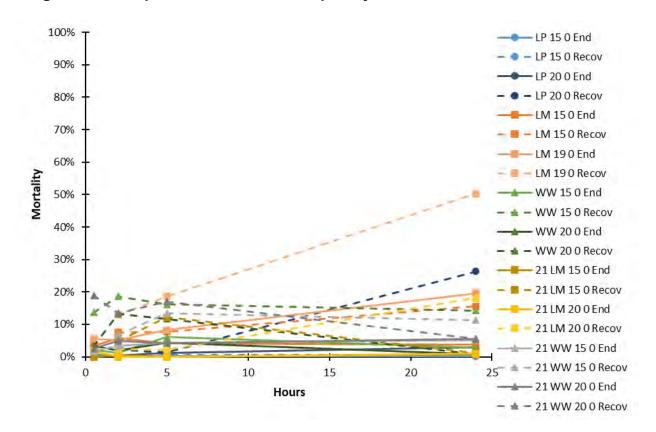
 Weymouth WTP influent in 2021

Free (μg/L)         0.h         0.5 h         2 h         5 h         24 h         Very         0.h         0.5 h         2 h         5 h         24 h           0.0         11.8         14.0         14.0         14.1         14.9         15.7         14.7         20.1         20.5         20.0         20.0         20.0         20.0         10.1         10.0         10.0         10.1         11.1         10.0         10.0         10.0         10.1         11.1         10.0         10.0         10.1         11.1         10.0         10.0         10.1         10.1         10.1         10.1         10.1         10.0         10.1         10.0 <td< th=""><th>mouin</th><th></th><th>15</th><th>°C Test</th><th>Conditio</th><th>ons</th><th></th><th colspan="6">20°C Test Conditions</th></td<>	mouin		15	°C Test	Conditio	ons		20°C Test Conditions					
0.0         11.8         14.4         14.9         10.7         10.7         10.8         10.8         10.7         11.7													Reco
Tempera         a.0         ±0.7         ±0.1         ±0.1         ±0.1         ±0.2         ±1.3         ±0.0         ±0.0         ±0.1         ±0.1           Tempera         16.7         ±0.5         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         <		(µL/L)					-						very
Tempera         3.0         10.1         ±0.1         ±0.1         ±0.1         ±0.2         ±1.3         ±0.2         ±1.3         ±0.2         ±0.6         ±0.1		0.0											20.7
1.0         ±0.5         ±0.0         ±0.1         ±0.0         ±0.1         ±0.1         ±0.0         ±0.1           Tempera         16.7         ±0.4         ±0.1         ±0.1         ±0.1         ±0.1         ±1.1         ±0.0         ±0.1         ±1.1         ±0.0         ±0.1         ±0.1         ±1.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.1         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.0		0.0											±0.5
Tempera ture (°C)         10.0 <td></td> <th>3.0</th> <td></td> <td>20.7</td>		3.0											20.7
ture (°C)         16.7         ±0.4         ±0.1         ±0.1         ±0.1         ±0.1         ±1.1         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.0         ±0.1         ±0.1         ±0.0         ±0.1         ±0.0         ±0.1         ±0.1         ±0.0         ±0.1         ±0.0         ±0.0         ±0.1         ±0.0		0.0											±0.6
Hure (C)         ±0.4         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.0         ±0.1         ±0.0		16.7											20.7
53.4         ±1.0         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.1         ±0.0         ±0.1         ±0.0         ±0.0         ±0.3         ±0.7         ±0.0         ±0.1         ±0.0 <th< td=""><td>∋ (°C)</td><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>±0.4</td></th<>	∋ (°C)												±0.4
Fire         first		33.4											20.3
BO         ±0.5         ±0.1         ±0.1         ±0.0         ±0.0         ±0.1         ±0.0         ±													±0.4
Ho         HO<		50.1											20.7
DO (mg/L)         ±0.00 ±0.02         ±0.02 ±0.01         ±0.01 ±0.02         ±0.01 ±0.02         ±0.01 ±0.02         ±0.01 ±0.07         ±0.02 ±0.04         ±0.03 ±0.07         ±0.06 ±0.07         ±0.07 ±0.07         ±0.07         ±0.07 ±0.07         ±0.07													±0.2
BO         10.02         10.02         10.01         10.12         10.12         10.10         10.11         10.12         10.10         10.11         10.12         10.10         10.10         10.03         10.04         9.20         8.34         8.38         8.39         8.64           10.7         10.62         11.47         10.07         t0.16         t0.20         t0.05         t0.02         t0.04         t0.07         t0.16         t0.02         t0.05         t0.02         t0.04         t0.07         t0.16         t0.05         t0.04         t0.01         t0.02         t0.03         t0.02         t0.03         t0.02         t0.03         t0.02         t0.03         t0.02         t0.03         t0.02         t0.01         t0.02         t0.01         t0.02         t0.01         t0.02         t0.01         t0.02         t0.01         t0.02         t0.03         t0.03         t0.03         t0.03         t0.03		0.0											8.66
DO (mg/L)         10.1         ±0.17         ±0.07         ±0.16         ±0.20         ±0.05         ±0.02         ±0.04         ±0.07         ±0.01           16.7         ±0.24         ±0.04         ±0.07         ±0.14         ±0.11         ±0.08         ±0.03         ±0.01         ±0.03         ±0.02         ±0.04         ±0.06         ±0.03         ±0.02         ±0.04         ±0.01         ±													±0.0
DO (mg/L)         16.7         11.47         11.56         11.20         10.58         9.33         8.27         8.46         8.38         8.35         8.69           33.4         10.20         10.01         11.80         11.67         10.47         10.01         10.02         10.03         10.02         10.01         10.01         10.01         10.02         10.03         10.02         10.01         10.01         10.02         10.02         10.01         10.01         10.01         10.01         10.01         10.01         10.01         10.02         10.02         10.02         10.02         10.02<		3.0											8.65
(mg/L)         10.7         ±0.24         ±0.04         ±0.07         ±0.14         ±0.11         ±0.08         ±0.03         ±0.10         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.07         ±0.41         ±0.08         ±0.05         ±0.04         ±0.01         ±0.00         ±0.01         ±0.01         ±0.00         ±0.01         ±0.05         ±0.04         ±0.01         ±0.00         ±0.01         ±0.00         ±0.01         ±0.06         ±0.03         ±0.02         ±0.04         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.01         ±0.02         ±0.02         ±0.03         ±0.02         ±0.05         ±0.02         ±0.01 <t< td=""><td>0</td><th></th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>±0.1</td></t<>	0												±0.1
33.4         11.82         11.61         11.80         11.67         10.49         8.85         8.27         8.38         8.33         8.35         8.69           50.1         ±0.20         ±0.23         ±0.08         ±0.15         ±0.02         ±0.08         ±0.15         ±0.03         ±0.04         ±0.01         ±0.00         ±0.04         ±0.00         ±0.01         ±0.00         ±0.02         ±0.03         ±0.29         ±0.03         ±0.04         ±0.03         ±0.02         ±0.03         ±0.04         ±0.03         ±0.02         ±0.03         ±0.04         ±0.01         ±0.02         ±0.03         ±0.04         ±0.01         ±0.02         ±0.03         ±0.02         ±0.03         ±0.02         ±0.03         ±0.02         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.01         ±0.03         ±0.02         ±0.02         ±0.03         ±0.02		16.7											8.6
Free (µS/cm)         0.0         ±0.20         ±0.23         ±0.08         ±0.08         ±0.05         ±0.05         ±0.04         ±0.10         ±0.00         ±0.04           50.1         11.11         11.49         11.37         11.27         10.52         9.10         8.29         8.36         8.35         8.42         8.66           0.0         8.33         8.30         8.30         8.28         8.37         8.39         8.32         8.36         8.38         8.37         8.42           3.0         ±0.06         ±0.00         ±0.01         ±0.01         ±0.02         ±0.05         ±0.02         ±0.01	ig/L)												±0.1
50.1         11.11         11.49         11.37         11.27         10.52         9.10         8.29         8.36         8.35         8.42         8.66           ±0.15         ±0.20         ±0.14         ±0.06         ±0.03         ±0.02         ±0.03         ±0.04         ±0.03         ±0.02         ±0.03         ±0.04         ±0.03         ±0.02         ±0.03         ±0.04         ±0.02         ±0.02         ±0.03         ±0.04         ±0.02         ±0.03         ±0.04         ±0.01 <td></td> <th>33.4</th> <td></td> <td>8.6</td>		33.4											8.6
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$ \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		50.1											8.59
$ \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$													<u>±0.0</u> 8.40
PH         3.0         8.28         8.28         8.30         8.28         8.37         8.39         8.32         8.33         8.36         8.36         8.38           pH         16.7         ±0.04         ±0.01         ±0.03         ±0.03         ±0.02         ±0.04         ±0.03         ±0.02         ±0.04         ±0.02         ±0.04         ±0.02         ±0.03         ±0.03         ±0.02         ±0.04         ±0.02         ±0.04         ±0.02         ±0.03         ±0.03         ±0.01         ±0.04         ±0.02         ±0.02         ±0.03         ±0.03         ±0.01         ±0.07         ±0.04         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02         ±0.02 <th< td=""><td></td><th>0.0</th><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>		0.0											
PH         10.0         ±0.06         ±0.01         ±0.01         ±0.01         ±0.00         ±0.02         ±0.01         ±0.02         ±0.03         ±0.04         ±0.04         ±0.02         ±0.04         ±0.02         ±0.04         ±0.02         ±0													±0.0
pH         16.7         8.21         8.21         8.24         8.23         8.30         8.38         8.25         8.28         8.31         8.28         8.34           33.4         8.19         8.12         8.16         8.12         8.28         8.34         8.18         8.24         8.18         8.24         8.18         8.24         8.18         8.24         8.18         8.34           40.06         ±0.05         ±0.02         ±0.03         ±0.03         ±0.02         ±0.04		3.0											8.39
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33.4         8.19         8.12         8.16         8.12         8.28         8.34         8.18         8.24         8.18         8.18         8.18         8.34           50.1         ±0.06         ±0.05         ±0.02         ±0.03         ±0.03         ±0.02         ±0.04         ±0.04         ±0.04         ±0.04         ±0.04         ±0.04         ±0.02         ±0.04           50.1         ±0.08         ±0.05         ±0.05         ±0.05         ±0.03         ±0.01         ±0.07         ±0.06         ±0.02         ±0.01         ±0.11         ±0         ±1         ±0         ±1         ±1         ±1         ±1         <	ъΗ	16.7											±0.0
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Free Copper (mg/L) $\pm 0.01$ $\pm 0.01$ $\pm 0.00$ $\pm 0.01$ $\pm 0.02$ $\pm 0.01$ </td <td></td> <th></th> <td></td> <td>0.0</td>													0.0
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		3.0			NM								±0.0
$\begin{array}{c cccc} \textbf{Copper} & \textbf{16.7} & \pm 0.04 & \pm 0.02 & \pm 0.01 & \textbf{INM} & \pm 0.04 & \pm 0.01 & \pm 0.01 & \pm 0.01 & \pm 0.02 & \pm 0.02 & \pm 0.02 \\ \textbf{33.4} & 1.91 & 1.87 & 1.86 & 1.84 & 1.79 & 0.02 & 1.95 & 1.92 & 1.89 & 1.87 & 1.76 \\ \pm 0.02 & \pm 0.01 &$		40 -											0.00
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		16.7			NM								±0.0
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		50.1											±0.0
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		0.0			NM							±0.00	±0.0

			15	°C Test	Conditic	ons			20	°C Test	Conditic	ons	
	Earth Tec QZ (µL/L)	0 h	0.5 h	2 h	5 h	24 h	Reco very	0 h	0.5 h	2 h	5 h	24 h	Reco very
	3.0	0.17	0.16	0.16	NM	0.15	0.00	0.21	0.19	0.20	0.20	0.20	0.22
	0.0	±0.01	±0.01	±0.01		±0.00	±0.00	±0.00	±0.00	±0.00	±0.01	±0.00	±0.05
Total	16.7	0.93	0.93	0.92	NM	0.91	0.00	1.03	1.02	1.02	1.02	1.02	0.01
	10.7	±0.01	±0.01	±0.01	INIVI	±0.01	±0.00	±0.00	±0.01	±0.02	±0.02	±0.01	±0.01
Copper	22.4	1.89	1.86	1.85	1.85	1.79	0.02	1.94	1.90	1.89	1.87	1.76	0.04
(mg/L)	33.4	±0.01	±0.01	±0.00	±0.00	±0.00	±0.02	±0.01	±0.01	±0.01	±0.01	±0.00	±0.03
	50.4	2.90	2.84	2.83	2.75	2.55	0.05	2.88	2.84	2.83	2.75	2.59	0.04
	50.1	±0.02	±0.03	±0.02	±0.02	±0.01	±0.02	±0.03	±0.03	±0.02	±0.01	±0.02	±0.02
	0.0 0.11	0.11	0.11	0.10	NIM	0.07	NINA	0.08	0.09	0.06	0.06	0.06	N IN A
	0.0	±0.01	±0.00	±0.02	NM	±0.02	NM	±0.00	±0.01	±0.03	±0.01	±0.00	NM
		0.12	0.06	0.09		0.06		0.07	0.08	0.05	0.05	0.05	
	3.0	±0.01	±0.04	±0.01	NM	±0.02	NM	±0.00	±0.01	±0.03	±0.03	±0.01	NM
Total		0.11	0.10	0.09		0.06		0.07	0.09	0.07	0.05	0.04	
Chlorine	16.7	±0.02	±0.01	±0.01	NM	±0.00	NM	±0.00	±0.02	±0.01	±0.00	±0.01	NM
(mg/L)		0.09	0.07	0.09	0.09	0.08		0.06	0.07	0.08	0.07	0.05	
	33.4	±0.05	±0.02	±0.01	±0.00	±0.00	NM	±0.03	±0.00	±0.01	±0.01	±0.00	NM
		0.10	0.06	0.13	0.11 ±0.00	0.12		0.08	0.08	0.12	0.07	0.09	
	50.1	±0.01	±0.02	±0.00		±0.01	NM	±0.03	±0.01	±0.00	±0.01	±0.02	NM

NM: Not Measured

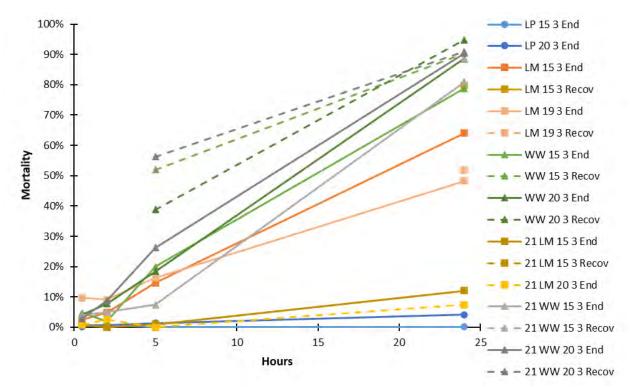
Recovery: Follow up measurement at the end of the 24 h recovery period following the exposure period.





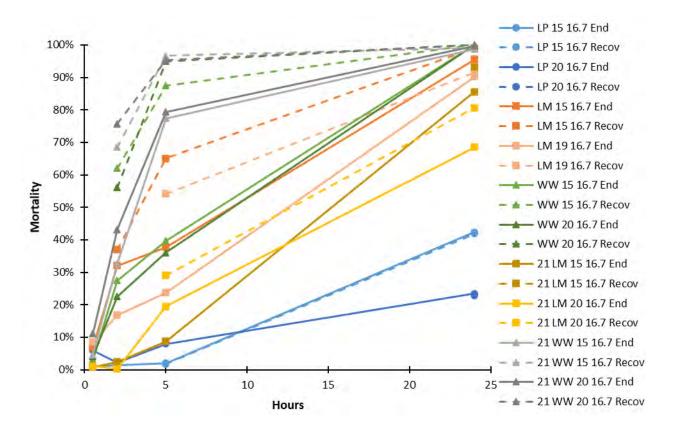
**Figure L1.** Veliger mortality of the control treatment at the end of each exposure and recovery period at 15 & 20°C for Lake Piru (LP), 2020 and 2021 Lake Mathews (LM), and 2020 and 2021 Weymouth WTP (WW) trials



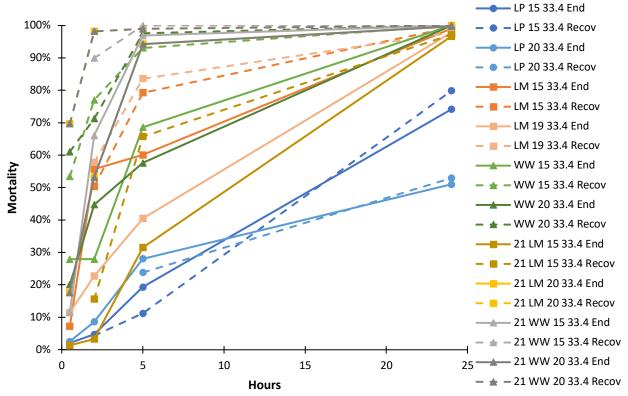


**Figure L2.** Veliger mortality of the EarthTec QZ 3 μl/L treatment at the end of each exposure and recovery period at 15 & 20°C for Lake Piru (LP), 2020 and 2021 Lake Mathews (LM), and 2020 and 2021 Weymouth WTP (WW) trials



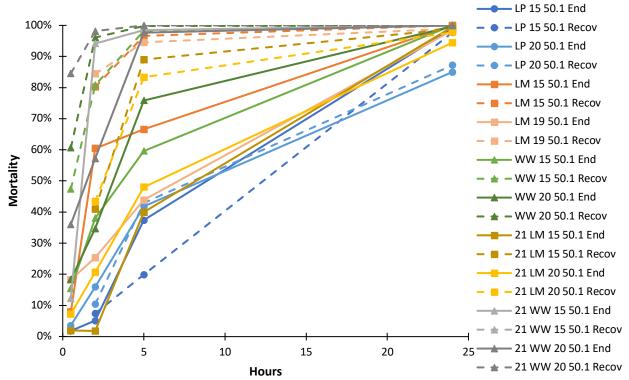


**Figure L3.** Veliger mortality of the EarthTec QZ 16.7 μl/L treatment at the end of each exposure and recovery period at 15 & 20°C for Lake Piru (LP), 2020 and 2021 Lake Mathews (LM), and 2020 and 2021 Weymouth WTP (WW) trials



**Figure L4.** Veliger mortality of the EarthTec QZ 33.4 µl/L treatment at the end of each exposure and recovery period at 15 & 20°C for Lake Piru (LP), 2020 and 2021 Lake Mathews (LM), and 2020 and 2021 Weymouth WTP (WW) trials





**Figure L5.** Veliger mortality of the EarthTec QZ 50.1 μl/L treatment at the end of each exposure and recovery period at 15 & 20°C for Lake Piru (LP), 2020 and 2021 Lake Mathews (LM), and 2020 and 2021 Weymouth WTP (WW) trials



## Appendix B. Technical Memorandum 2 Toxicity Assessment



## **TECHNICAL MEMORANDUM 2**



**Toxicity Assessment** 

Final Date: Draft Date:	December 20, 2021 September 29, 2021
Prepared for:	Metropolitan Water District of Southern California City of Santa Ana Orange County Water District
Copies to:	Water Replenishment District of Southern California United Water Conservation District Main San Gabriel Basin Watermaster Central Basin Municipal Water District California Department of Fish and Wildlife California Department of Water Resources
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Subject:	Technical Memorandum 2

## 1 Introduction

#### 1.1 Background

Since their discovery in Lake Mead within the Colorado River system in January 2007, Quagga mussels (*Dreissena bugensis*) have rapidly spread through the Metropolitan Water District of Southern California's (MWD's) Colorado River Aqueduct (CRA) and have been detected at many sites in California. The presence of this invasive species presents a barrier to the use of imported water and storm water for groundwater replenishment. Considering these challenges, the City of Santa Ana proposed a study entitled "Restoration of Local Recharge Sources from Invasive Dreissenid Mussels" (Study) to MWD's Future Supply Actions Funding Program. The Study was conducted by Trussell Technologies (Trussell), KASF Consulting, and Orange County Water District (OCWD), with support from project partners including the Water Replenishment District of Southern California (WRD), the United Water Conservation District (UWCD), the Main San Gabriel Basin Watermaster, and the Central Basin Municipal Water District. Although not directly contributing financially to the study, the California Department of Fish and Wildlife (CDFW) and California Department of Water Resources are supporting the Study by providing technical review and assistance.

#### 1.2 Study Description

The purpose of this Study is to evaluate a potential treatment method, other than desiccation, for use in addressing quagga mussel infestations and preventing the spread of this invasive species.

Trussell led the study in partnership with KASF Consulting, a firm specializing in quagga mussel sampling, identification, and testing. The Study evaluated the effectiveness of EarthTec QZ<sup>™1</sup> for control of quagga mussel veligers (the mussel's final larval stage). The testing locations included: (1) Lake Piru, (2) Lake Mathews, and (3) MWD's Weymouth Water Treatment Plant (WTP). A fourth location, OCWD's OC-28 turnout at Anaheim Lake, was originally planned but later eliminated based on scheduling issues and identification of a surrogate location. Lake Piru contains mostly imported water from the State Water Project (SWP), supplemented with local runoff. Lake Mathews is part of the CRA system. Water from Lake Mathews is chlorinated at the inlet to a pipeline that supplies Weymouth WTP; thus, these two locations represent the same water, with and without chlorine treatment. The Study included testing with samples collected from multiple locations, to allow the project team to evaluate the impact of site-specific water quality on the performance of EarthTec QZ.

The following objectives were evaluated at each testing location:

- 1. Veliger dose-response testing of EarthTec QZ
- 2. Toxicity assessment of non-target aquatic species

The purpose of this technical memorandum (TM) is to summarize the results of **Objective #2** for the study.

## 2 Schedule Summary

Veliger dose-response testing and associated toxicity assessments for non-target species were completed according to the schedule summarized in Table 2-1.

<sup>&</sup>lt;sup>1</sup> EarthTec QZ<sup>™</sup> is registered with the United States Environmental Protection Agency (USEPA) as a molluscicide for the control of quagga and zebra mussels. It is also registered with the California Department of Pesticide Regulation as a molluscicide for use in lakes, streams, rivers, waterways, canals, ponds, reservoirs, irrigation systems, and catch basins.

Location	Study Status	Testing Date
Lake Piru	Completed	December 2 – 6, 2019
Lake Mathews 2020	Completed	September 9 – 11, 2020
Lake Mainews 2020	Completed	September 18 – 20, 2020
Weymouth WTP Influent 2020	Completed	September 14 – 18, 2020
OC-28 Turnout	N/A <sup>2</sup>	
Weymouth WTP Influent 2021	Completed	June 28 – 30, 2021
	Completed	July 12 – 14, 2021
Lake Mathews 2021	Completed	June 30 – July 2, 2021
	Completed	July 14 – 16, 2021

Table 2-1. S	Study sta	tus at each	sampling	location
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#### 2.1 Exemption of OC-28 Turnout

Testing was completed for each of the study testing locations (Table 2-1), with the exception of the OC-28 turnout. The study was designed with the intention of correlating the dose-response efficacy of EarthTec QZ at Lake Mathews with that of two downstream locations. Water delivered from Lake Mathews is chlorinated prior to entering transmission pipelines supplying both OC-28 and Weymouth WTP. Considering the connection of these water supplies, the Study aimed to correlate testing from Lake Mathews with the two downstream locations – OC-28 turnout and Weymouth WTP influent. Testing these three locations in a series would allow for comparison of the effects of EarthTec QZ with and without chlorine exposure. However, due to prior budgeting, OCWD only had access to Lake Mathews water at the OC-28 turnout through June 2020, and not during the 2021 fiscal year (July 2020 – June 2021). Covid-19 restrictions precluded the project team from sampling at Lake Mathews until September 2020. For these reasons, it was not possible to complete sampling from the OC-28 turnout in conjunction with the sampling and testing at Lake Mathews and Weymouth WTP influent.

The project team met with MWD staff in August 2020 to discuss alternative sampling locations for the OC-28 turnout. Although already included as a sampling location for the Study, Weymouth WTP was identified as the most appropriate surrogate monitoring location for the OC-28 turnout, as both sites can receive CRA water from Lake Mathews that is chlorinated and transmitted within a pipeline for a similar travel time and therefore, similar contact time with chlorine. Thus, sampling at OC-28 was eliminated as a sampling location for the Study. The project team proceeded with testing at Lake Mathews and Weymouth WTP during September 2020 and completed follow up testing at both of these locations in 2021.

<sup>&</sup>lt;sup>2</sup> Sampling at OC-28 is no longer applicable given the similarity with that of Weymouth WTP, as is later discussed.



#### 2.2 Repetition of Lake Mathews and Weymouth WTP

The project team found value in repeating paired veliger and toxicity testing at Lake Mathews and Weymouth WTP (2020 and 2021). Advantages of repeating this testing included:

- Repeating toxicity testing for Weymouth WTP influent water samples after inconsistent acute toxicity test results from the 2020 Weymouth WTP samples (discussed in Section 3);
- 2. Assessing the same acute toxicity doses on all three non-target species with both Lake Mathews and Weymouth WTP sample water;
- 3. Capturing seasonal variability by testing water samples from these locations collected during different months in the year;
- 4. Potentially capturing a larger veliger size-distribution and assessing the effects of EarthTec QZ on larger quagga mussel veligers; and
- 5. Comparing the effect that EarthTec QZ has on veligers with no significant exposure to chlorine (Lake Mathews) to those which have been exposed to chlorine (Weymouth WTP influent).

The project team proceeded with testing at Weymouth WTP and Lake Mathews in June & July 2021.

### 3 Study Results

Objective #2 of the Study was to assess acute toxicity of EarthTec QZ for non-target aquatic species at the four Study locations. Testing was completed as defined in the 'Test Plan for Toxicity Assessment of Non-Target Aquatic Species,' provided in the Semi-Annual Progress Report 2019 No. 1.

Trussell collected large volume samples from each test location and delivered these to Aquatic Bioassay and Consulting Laboratories (ABC Labs) in Ventura, CA to conduct acute toxicity testing on three non-targeted indicator species: fathead minnow (*Pimephales promelas*), water flea (*Ceriodaphnia dubia*), and rainbow trout (*Oncorhynchus mykiss*). This testing was completed in parallel with the dose-response veliger testing. Each round of toxicity testing utilized the same site-specific water and EarthTec QZ stock that was used during the veliger dose-response testing (findings from Objective #1 are reported in TM 1). ABC Labs evaluated 96-hour acute toxicity for either two or three doses of EarthTec QZ per water sample. The EarthTec QZ doses were determined by Trussell and KASF Consulting based on the most effective dose identified from preliminary veliger dose-response data from each test location.

The results from the acute toxicity testing for non-target indicators are discussed in the following subsections by sampling event: Lake Piru, Lake Mathews 2020, Weymouth WTP influent 2020, Lake Mathews 2021, and Weymouth WTP influent 2021. Additional plots of the results are provided in Appendix A and the individual test reports for the acute toxicity testing from each location are provided in Appendices B-G.



#### 3.1 Lake Piru

In December 2019, toxicity testing was conducted with Lake Piru water. The preliminary data from the Lake Piru 15°C veliger dose-response tests suggested that veligers were only experiencing significant mortality (>50%) at the two highest doses of EarthTec QZ: 33.4 and 50.1  $\mu$ L/L. Trussell and KASF Consulting selected the EarthTec QZ dose with the highest veliger mortality (50.1  $\mu$ L/L or 3.0 mg/L as Cu), and the lowest dose that resulted in mortality greater than control mortality (16.7  $\mu$ L/L or 1.0 mg/L as Cu) as the targets for acute toxicity testing on the three indicator species. The results are shown in Table 3-1 and presented graphically in Appendix A. The full toxicity test reports for Lake Piru are included as Appendix B.

	Fath	nead Min	now	V	Vater Fle	а	Rainbow Trout			
EarthTec	0	16.7	50.1	0	16.7	50.1	0	16.7	50.1	
QZ Dose	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	
Average 96-hour Survival Rate	100%	57.5%	0%	100%	0%	0%	100%	0%	0%	
TU(a) *	-	0.96	>1.00	-	>1.00	>1.00	-	>1.00	>1.00	

Table 3-1. 96-hour acute toxicity results of non-target indicator species in Lake Piru sample water

\*The acute toxicity unit [TU(a)] is calculated as: log (% mortality)/1.7

As shown in Table 3-1, the average survival rate for the fathead minnow was 57.5% after 96 hours of exposure to 16.7  $\mu$ L/L EarthTec QZ. This same dose and exposure time resulted in 0% survival for water fleas and rainbow trout. None of the tested species showed survival after 96 hours of exposure to 50.1  $\mu$ L/L EarthTec QZ. Acute toxicity results are typically presented relative to the effective concentration (EC) required to reach a biological endpoint (mortality, in this case). One toxic unit (TU) is defined for the standard acute toxicity analysis as EC50, or the effective concentration at which 50% of the test species reaches mortality by the end of the 96-hour exposure time. Both of the EarthTec QZ doses evaluated with the Lake Piru water samples (16.7 and 50.1  $\mu$ L/L) yielded acute toxicity values of greater than 1.0 TU(a).

The Test Plan included provisions for evaluating chronic toxicity for the non-target aquatic indicator species pending Round 1 acute toxicity testing results. Because Round 1 acute toxicity testing results indicated very limited survival rates (i.e., high levels of mortality) and chronic toxicity testing would entail longer exposure times, it is expected that chronic toxicity testing would not provide additional value to the study. For these reasons, toxicity testing focused on acute toxicity response for the non-target aquatic indicator species with subsequent rounds of testing at Lake Mathews and Weymouth WTP influent.

#### 3.2 Lake Mathews 2020

In September 2020, toxicity testing was conducted with Lake Mathews water. The preliminary data from the Lake Mathews 20°C veliger dose-response testing suggested that veligers were more susceptible to lower EarthTec QZ doses when compared to Lake Piru. Veliger mortality was higher than 90% at 16.7  $\mu$ L/L EarthTec QZ (1.0 mg/L as Cu) after 24 hours of exposure. Based on these veliger mortality results, Trussell and KASF Consulting selected 8.35  $\mu$ L/L (50% of 16.7  $\mu$ L/L or 0.5 mg/L as Cu) and 16.7  $\mu$ L/L EarthTec QZ as the target test doses for acute toxicity assessment. The results are summarized in Table 3-2 and graphed in Appendix A. The full toxicity test reports for the Lake Mathews 2020 samples are included as Appendix C.

	Fath	nead Min	now	V	Vater Fle	а	Rainbow Trout			
EarthTec	0	8.35 16.7		0	0 8.35 16.7		0	8.35	16.7	
QZ Dose	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	
Average 96-hour Survival Rate	100%	97.5%	92.5%	100%	0%	0%	100%	0%	0%	
TU(a)	-	0.23	0.51	-	>1.00	>1.00	-	>1.00	>1.00	

Table 3-2. 96-hour acute toxicity results of non-target indicator species in Lake Mathews 2020 water

As shown in Table 3-2 the average survival rate for fathead minnow was 97.5% (0.23 TU(a)) and 92.5% (0.51 TU(a)) after 96 hours of exposure to 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ, respectively. However, 96-hour exposure to both tested doses resulted in 0% survival for water fleas and rainbow trout, which translates to acute toxicity values of greater than 1.0 TU(a) for both EarthTec QZ doses.

#### 3.3 Weymouth Water Treatment Plant Influent 2020

In September 2020, toxicity testing was conducted with Weymouth WTP influent. Preliminary data from the 20°C veliger dose-response testing in Weymouth WTP influent indicated similar or higher efficacy of EarthTec QZ as was observed with Lake Mathews water. After 24 hours of exposure to 16.7  $\mu$ L/L EarthTec QZ (1.0 mg/L as Cu), veliger mortality was 93%. ABC Labs completed the acute toxicity assessment with the Weymouth WTP influent using the same doses as those tested with Lake Mathews water: 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ.

The final veliger mortality results from the Weymouth WTP influent indicated significantly higher mortality (78-89% at 24 hours exposure) at the lowest EarthTec QZ dose of 3.0  $\mu$ L/L (0.18 mg/L as Cu) when compared with the same dose at Lake Mathews (48-65% at 24 hours exposure). Therefore, Trussell and KASF Consulting requested that ABC Labs analyze acute toxicity for the Weymouth WTP influent with an additional dose of 3.0  $\mu$ L/L EarthTec QZ. This additional test condition required re-



sampling Weymouth WTP influent water, which took place two weeks after the original testing. The results from both rounds of acute toxicity testing with Weymouth WTP influent are summarized in Table 3-3 and graphed in Appendix A. The full toxicity test reports for the original Weymouth WTP influent 2020 samples are included as Appendix D. The full toxicity test reports for the Weymouth WTP 2020 re-sample are included as Appendix E.

	F	athead	Minnov	N		Wate	r Flea		Rainbow Trout				
EarthTec	0	3	8.35	16.7	0	3	8.35	16.7	0	3	8.35	16.7	
QZ Dose	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	
Average 96-hour Survival Rate	97.5%	100%	100%	100%	100%	0%	100%	100%	100%	65%	0%	0%	
TU(a)	0.23	-	-	-	-	>1.00	-	-	-	0.91	>1.00	>1.00	

Table 3-3. 96-hour acute toxicity results of non-target indicator species in Weymouth
WTP 2020 sample water

As shown in Table 3-3, the fathead minnow survival rate was 100% after 96 hours of exposure to all three tested doses. An average of 65% of the rainbow trout survived after 96 hours of exposure to 3.0  $\mu$ L/L EarthTec QZ, which translates to an acute toxicity value of 0.91 TU(a). The same exposure to the two higher doses of 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ both resulted in 0% survival and acute toxicity values greater than 1.0 TU(a).

Water fleas survived at a rate of 100% at the two higher doses of 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ. However, 0% of water fleas survived the lower dose of 3  $\mu$ L/L EarthTec QZ, which translates to an acute toxicity value of 1.0 TU(a).

It is unclear why no water fleas survived at the lowest EarthTec QZ dose, whereas 100% survival was observed with the two higher doses. As previously mentioned, the addition of the third and lower dose condition (3.0  $\mu$ L/L EarthTec QZ) required a separate sampling event two weeks after the initial Weymouth WTP influent sample was collected for the higher two doses (8.35  $\mu$ L/L and 16  $\mu$ L/L EarthTec QZ). The results indicate limited change in the water quality of the two Weymouth WTP samples. A slightly higher chlorine residual (0.05 mg/L) was measured in the second sample, used for the 3.0  $\mu$ L/L EarthTec QZ condition, compared to the original water sample (0.02 mg/L). ABC Labs used the same batch of diluted EarthTec QZ for dosing the tested conditions for both rounds of toxicity testing. ABC Labs conducted a quality control audit of the results and found no obvious explanation for the inconsistent results.

As previously discussed in Section 2, these inconsistent results were one of the motivations to repeat testing at both Lake Mathews and Weymouth WTP.



#### 3.4 Weymouth Water Treatment Plant Influent 2021

In July 2021, a repeat round of toxicity testing was conducted with Weymouth WTP water. As discussed in the previous section, the acute toxicity tests with the Weymouth WTP 2020 sample water resulted in inconsistent water flea survival data. To provide more clarity on the effects that EarthTec QZ has on the water flea, the same three doses that were used in the 2020 Weymouth WTP toxicity tests were selected for the follow up testing in 2021: 3, 8.35 & 16.7  $\mu$ L/L as EarthTec QZ, or 0.18, 0.5 and 1.0 mg/L as Cu, respectively. The results are presented in Table 3-4 and graphed in Appendix A. The full toxicity test reports for Lake Mathews 2021 are included as Appendix F.

	F	athead	Minnov	N		Wate	r Flea		Rainbow Trout				
EarthTec	0	3	8.35	16.7	0	3	8.35	16.7	0	3	8.35	16.7	
QZ Dose	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	
Average 96-hour Survival Rate	100%	100%	97.5%	97.5%	100%	0%	0%	0%	100%	100%	0%	0%	
TU(a)	-	-	0.23	0.23	-	>1.00	>1.00	>1.00	-	-	>1.00	>1.00	

Table 3-4. 96-hour acute toxicity results of non-target indicator species in Weymouth WTP 2021 sample water

As shown in Table 3-4, the average survival rate for fathead minnow and rainbow trout was 100% after 96 hours of exposure to the lowest tested dose 3  $\mu$ L/L EarthTec QZ. However, the average survival rate for water flea was 0% after 96 hours of exposure to this same lowest dose. Furthermore, the average survival rate for fathead minnow was 97.5% (0.23 TU(a)) after 96 hours of exposure to both 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ to 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ resulted in 0% survival for water fleas and rainbow trout, which translates to acute toxicity values of greater than 1.0 TU(a) for both EarthTec QZ doses.

#### 3.5 Lake Mathews 2021

In July 2021, a repeat round of toxicity testing was conducted with Lake Mathews sample water. As discussed in the previous section, the original acute toxicity tests with Weymouth WTP sample water resulted in inconsistent water flea survival data. To obtain consistent data with the Weymouth WTP, the same three doses that were used for the repeated Weymouth WTP toxicity testing (3, 8.35 & 16.7  $\mu$ L/L as EarthTec QZ, or 0.18, 0.5 and 1.0 mg/L as Cu, respectively) were selected for this location as well. The results are presented in Table 3-5 and graphed in Appendix A. The full toxicity test reports for Lake Mathews are included as Appendix G.

*Table 3-5. 96-hour acute toxicity results of non-target indicator species in Lake Mathews 2021 sample water* 

	Fathead Minnow					Wate	r Flea		Rainbow Trout					
EarthTec QZ Dose	0	3	8.35	16.7	0	3	8.35	16.7	0	3	8.35	16.7		
	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L	μL/L		
Average 96-hour Survival Rate	100%	100%	100%	97.5%	100%	15%	0%	0%	100%	100%	0%	0%		
TU(a)	-	-	-	0.23	-	>1.00	>1.00	>1.00	-	-	>1.00	>1.00		

As shown in Table 3-5, the average survival rate for fathead minnow and rainbow trout was 100% after 96 hours of exposure to the lowest tested dose 3  $\mu$ L/L EarthTec QZ. However, the average survival rate for water flea was only 15% (>1.0 TU(a)) after 96 hours of exposure to this same lowest dose. The average fathead minnow survival rates after 96 hours of exposure to 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ were also high at 100% and 97.5% (0.23 TU(a)), respectively. However, the same exposure to 8.35  $\mu$ L/L and 16.7  $\mu$ L/L EarthTec QZ resulted in 0% survival for water fleas and rainbow trout, or acute toxicity values of greater than 1.0 TU(a).

## 4 Analysis

This section includes a high-level analysis of the results presented in Section 3. Further discussion, correlations, statistical analysis, integrated analyses and recommendations will be provided in the Final Report.

#### 4.1 Experimental Setup

The toxicity assessment for non-target organisms was based on the standard acute toxicity test method, which exposes each of the three indicator species to the selected EarthTec QZ dose for 96 hours. This is 72 hours longer than the longest exposure time for the veliger dose-response tests at 24 hours (an additional 24-hour recovery period was assessed after exposure to fresh sample water without EarthTec QZ). Therefore, it should be noted that the non-target indicator species experienced significantly longer exposure times to EarthTec QZ compared to the veligers in the corresponding dose-response tests. The final report compares the acute toxicity results with the veliger mortality on the basis of total exposure to EarthTec QZ, using a time-dose variable (the product of the copper concentration and exposure time of each sample).

Another notable difference in the veliger dose-response testing conditions compared with the acute toxicity test procedure is the ambient temperature. The veliger dose-response testing included two temperature conditions, 15 °C and 20°C. ABC Labs followed the standard method for acute toxicity testing and maintained a temperature of approximately 24°C for the fathead minnow and water flea, and a temperature of



approximately 13°C for rainbow trout. These temperature conditions were selected as they provide constant and acceptable temperature conditions for the non-target indicator species, so that the control may yield high survival and varying temperature does not add an additional factor that could cause non-chemical related mortality.

#### 4.2 Water Quality Comparison

The water quality associated with acute toxicity testing is shown in Table 4-1. Raw water quality values include the sample water that the project team collected and analyzed during veliger testing, along with the water quality analysis provided by ABC Labs for the same sample water.<sup>3</sup> The results in Table 4-1 indicated as being analyzed by ABC Labs include both raw water quality and measurements from the sample containing EarthTec QZ. While copper was not reported by ABC Labs, it was measured to confirm accurate dosing of EarthTec QZ during testing. The full laboratory reports provided by ABC Labs for each of the tests are included in **Appendices B through G**.

The water quality for Lake Mathews and Weymouth WTP was mostly consistent, since these two locations represent the same CRA water, with the addition of chlorine in the pipeline upstream of Weymouth WTP. Lake Piru represents mostly imported water from the SWP and had higher DOC, hardness, and alkalinity, but lower conductivity compared with Lake Mathews and Weymouth WTP. Similar pH values were measured from all three locations.

<sup>&</sup>lt;sup>3</sup> ABC Labs used both the sample raw water and their own lab-made water for the control conditions during acute toxicity testing. The control conditions with the sample water served as a quality control method to rule out mortality to the indicator species caused by the water sample, and not the EarthTec QZ. All the control conditions with sample water yielded 100% survival, confirming that none of the mortality was attributed to the sample source. The survival results reported in **Section 3** for 0  $\mu$ L/L EarthTec QZ reflect the test results run with the lab-made control water. The water quality titled 'ABC Labs: Raw Water' in **Table 4-1** reflects the sample water quality measured by ABC Labs.

				Dissolved Oxygen	ctivity	_	ature	nity	less	opper	opper	al rine	٩	iical jen and	lved nic on
				Disc	Conductivity	Hd	Temperature	Alkalinity	Hardness	Total Copper	Free Copper	Total Chlorine	ORP	Chemical Oxygen Demand	Dissolved Organic Carbon
Location	Year	Analysis	Test Condition	mg/L	μS/ cm	pH unit	°C	mg/ CaC		mg/L	mg/L	mg/L	mV	mg/L	mg/L
Lake	Raw Water Quality			-				-		-					
	2019	Field	20°C Tests	8.88	913	8.25	14.8	154	316	0.16	0.16	0.12	192	5.65	5.05
		ABC Labs	Raw Water	7.50	776	7.70	24.0	98	315	-	-	-	-	-	-
			16.7 µL/L EarthTec (1.0 mg/L as Cu)	8.37	947	8.83	24.1	-	-	-	-	-	-	-	-
Piru			50.1 μL/L EarthTec (3.0 mg/L as Cu)	8.25	990	8.10	24.1	160	161	-	-	-	-	-	-
	Statistica	al Analysis	-	-											
	All Sample Collections		Mean	8.19	845	7.98	19.4	126	316	0.16	0.16	0.12	192	5.65	5.05
			Standard Deviation	0.98	97	0.39	6.5	40	0.71	-	-	-	-	-	-
	Raw Water Quality				-			-	-		-	-			_
		Field	15°C Tests	7.57	946	8.18	25.1	115	138	0.02	0.02	0.02	213	4.67	3.01
	2020	ABC Labs	Raw Water	7.90	788	8.30	23.9	113	288	-	-	-	-	-	-
	2020		8.35 µL/L EarthTec (0.5 mg/L as Cu)	7.60	1129	7.90	24.1	100	350	-	-	-	-	-	-
			16.7 µL/L EarthTec (1.0 mg/L as Cu)	7.46	1097	7.87	24.1	-	-	-	-	-	-	-	-
		Field	15°C Tests	8.46	950	8.24	24.6	138	281	0.00	0.00	0.01	186	4.65	2.98
		ABC Labs	Raw Water	7.83	1044	7.53	24.1	120	250	-	-	-	-	-	-
Lake	2021		3 µL/L EarthTec (0.15 mg/L as Cu)	8.00	1013	7.53	24.1	-	-	-	-	-	-	-	-
Mathews			8.35 µL/L EarthTec (0.5 mg/L as Cu)	7.87	1013	7.53	24.1	-	-	-	-	-	-	-	-
			16.7 µL/L EarthTec (1.0 mg/L as Cu)	7.87	1023	7.53	24.1	125	330	-	-	-	-	-	-
	Statistical Analysis			1101	1020	1100		120		L	<u> </u>	<u> </u>		<u> </u>	
			Mean	7.74	867	8.24	24.5	114	213	0.02	0.02	0.02	213	4.67	3.01
	2020 Raw Samples		Standard Deviation	0.23	112	0.08	0.8	1	106	-	-	-	-	-	-
			Mean	8.15	997.0	7.89	24.34	129	266	0.00	0.00	0.01	186	4.65	2.98
	2021 R	aw Samples	Standard Deviation	0.44	66.47	0.50	0.37	13	200	-	-	-	-	-	-
	Raw Wat	er Qualty		0.11	00.11	0.00	0.01	10						-	
		Field	15°C Tests	8.27	944	8.02	25.6	119	150	0.01	0.01	0.04	214	8.50	4.09
		ABC Labs	Raw Water	8.10	1056	8.00	24.1	110	362	-	-	-	-	-	
			8.35 µL/L EarthTec (0.5 mg/L as Cu)	7.67	1107	7.90	24.1	108	315	-		_	-	-	-
	2020		$16.7 \mu\text{L/L}$ EarthTec (1.0 mg/L as Cu)	7.50	1107	7.87	24.1	-	515		-	-	-	-	-
	2020	Field	Additional Sampling *	8.19	955	8.12	24.2	- 119	145	0.02	0.02	0.05	211	7.88	4.05
		ABC Labs Field	Raw Water	8.30	1022	8.10	20.8	103	311	-	0.02	0.05	-	-	4.05
			3 µL/L EarthTec (0.15 mg/L as Cu)	7.40	1022	7.70	24.0	103	238	-	-	-	-	-	-
Weymouth WTP			3 μL/L Eartified (0.13 flig/L as Cd) 15℃ Tests	8.69	969	8.18	24.0	137	230	- 0.02	0.03	0.10	- 196	- 4.46	- 3.01
	2021	ABC Labs	Raw Water	7.90	1009	7.67	21.9	123	295	-	0.03	-	-	4.40	-
			3 µL/L EarthTec (0.15 mg/L as Cu)	7.90	1009	7.70	24.1								
				7.93	1011	7.63	24.1	-	-	-	-	-	-	-	-
			8.35 µL/L EarthTec (0.5 mg/L as Cu)							-	-	-	-	-	-
	Statistic		16.7 μL/L EarthTec (1.0 mg/L as Cu)	7.87	1012	7.63	24.1	129	330	-	L -	-	-	-	-
	Statistical Analysis		Ma	0.40	1000	0.01	24.0	445	250	0.01	0.01	0.04	014	0.50	4.00
	2020 R	aw Samples	Mean	8.19	1000	8.01	24.9	115	256	0.01	0.01	0.04	214	8.50	4.09
		· · ·	Standard Deviation	0.12	79	0.01	1.1	6	150	-	-	-	-	-	-
		aw Samples	Mean	8.25	989	8.11	25.4	111	228	0.02	0.02	0.05	211	7.88	4.05
	(Additional Sampling) 2021 Raw Samples		Standard Deviation	0.08	47	0.01	2.0	11	117	-	-	-	-	-	-
			Mean	8.30 0.56	989 28	7.92	<u>23.0</u> 1.6	130 10	285 14	0.02	0.03	0.10	196	4.46	3.01
			Standard Deviation												

Table 4-1. Water Quality of Acute Toxicity Test Samples with and without EarthTec QZ

\* Re-sample of Weymouth WTP influent for acute toxicity testing with 3 µL/L EarthTec QZ. This water was not used for veliger testing.



#### 4.3 General Trends

The toxicity response of non-target organisms to EarthTec QZ were tested on three species – fathead minnow, water flea, and rainbow trout. The mortality response of the tested non-target organisms is summarized in Figure 4-1.

Both water flea and rainbow trout were highly sensitive to EarthTez QZ and exhibited acute mortality response at the lower concentrations tested in this Study. Water flea and rainbow trout acute mortality was observed to be 100% at a dose greater than or equal to 8.35  $\mu$ L/L EarthTec QZ which corresponds to 0.5 mg/L as copper.

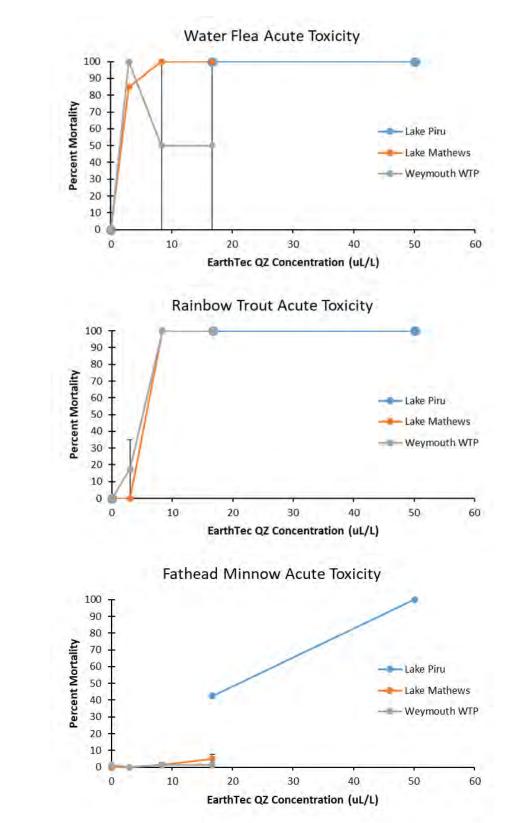
Meanwhile, fathead minnow showed a mixed response to EarthTec QZ. Lake Mathews and Weymouth WTP water test conditions showed little to no mortality of fathead minnows for all EarthTec QZ doses tested up to 16.7  $\mu$ L/L which corresponds to 1 mg/L as copper. However, the Lake Piru water test conditions had 42.5% mortality at 16.7  $\mu$ L/L. The difference in mortality observed for fathead minnows is thought to be the result of differences in water quality between the test locations. The discussion on water quality and mortality can be found in Section 4.4.



Α.

Β.

C.



*Figure 4-1 Average acute toxicity with standard deviations bars* (*A*) *Water Flea;* (*B*) *Rainbow Trout; and* (*C*) *Fathead Minnow for each location with EarthTec QZ* 



#### 4.4 Water Quality Impact on EarthTec QZ Performance

Water quality affects the toxicity of EarthTec QZ. The following information is listed on the EarthTec QZ label:

"Certain water conditions including low pH ( $\leq$ 6.5), low dissolved organic carbon (DOC) levels (3.0 mg/L or lower) and "soft" waters (i.e., alkalinity less than 50 mg/L) increases the potential acute toxicity to non-target aquatic organisms. The application rates on this label are appropriate for water with alkalinity greater than 50 mg/L. Do not use these application rates for water with less than 50 ppm alkalinity (e.g., soft or acid waters) because trout and other species of fish may be killed under such conditions."

The raw water quality for each test condition is summarized in Table 4-1 and discussed briefly in Section 4.2. While the alkalinity, pH, and DOC are within the conditions specified by the EarthTec QZ label, it is expected that water quality still plays a role in the toxicity response. The influence of water quality on toxicity response can be explained using the biotic ligand model as described in Section 4.4.1.

#### 4.4.1 Copper Bioavailability and Oxidants on Mortality

Copper toxicity in fish is a function of bioavailable copper as well as competitive ions in the water. Typically, the biotic ligand model is used to predict copper toxicity by accounting for bioavailability of copper and ion competition through modeling using a multitude of water quality parameters. The water quality parameters used by the model are pH, DOC, alkalinity, ions, and temperature (USEPA 2016). These water quality parameters affect the chemical composition of copper in the water and determine the bioavailability. For example, alkalinity, pH, hardness, and anions affect the saturation indices for copper and the percentage of total copper existing in dissolved form. It has been demonstrated that copper toxicity decreases when pH and hardness increase (Welsh et al. 1995). Additionally, DOC can also form organic complexes with copper that decrease the fraction of bioavailable copper existing in the dissolved fraction. Meanwhile, other cations, especially sodium, can compete with free copper ions for binding sites in the gills of fish (Nelson et al., 1986; Welsh et al. 1995; Parametrix and HydroQual 2006; USEPA 2016 ). Therefore, different waters can exhibit a wide range of mortality response at the same given dose of EarthTec QZ due to site-specific water quality differences that affect copper toxicity.

The water quality of the three test locations varied for the influential parameters related to the biotic ligand model, which likely explained why there was no clear trend in the toxicity of EarthTec QZ to the three non-target species based on location. Lake Piru had higher DOC, hardness, and alkalinity compared with Lake Mathews and Weymouth WTP; these parameters were more correlated with lowering copper toxicity. Similar pH values were measured from all three locations. The full suite of water quality for predicting toxicity with the biotic ligand model was not measured for these tests. In prior studies conducted by KASF Consulting, sodium levels in Lake Piru in 2019 were



lower (65 mg/L) than those measured in Colorado River water (100 mg/L) in 2015. While sodium measurements were not included in this study, the higher sodium concentration for Lake Mathews and Weymouth WTP should have provided more protection from the copper toxicity for fish species. In general, water quality clearly affects copper toxicity and could be the reason for the difference in Lake Piru fathead minnow mortality.

In addition to bioavailability of copper, other toxic constituents in water are expected to increase overall mortality. While not apparent in the non-target organisms in this Study, total chlorine residual is another environmental stressor and is thought to compound copper toxicity. An increase in toxicity response is seen in veligers as seen from the results of Objective 1 of this Study.



### References

Nelson, Henry, Duane Benoit, Russ Erickson, Vince Mattson, and Jim Lindberg. 1986. *The Effects of Variable Hardness, pH, and Alkalinity, and Humics on the Chemical Speciation and Aquatic Toxicity of Copper.* USEPA (Duluth, MN 55804).

Parametrix and HydroQual. 2006. Evaluation of the Reliability of Biotic Ligand Model Predictions for Copper Toxicity in Waters Characteristic of the Ardi West. Final Report for Arid West Water Quality Research Project prepared for Pima County Wastewater Management. Available:

https://webcms.pima.gov/UserFiles/Servers/Server\_6/File/Government/Wastewater%20 Reclamation/AAWQRP/BioticLigandModel.pdf

USEPA. 2016. Water Quality Standards Academy: Biotic Ligand Model and Copper Criteria.

Welsh, Paul, Joanne Parrott, D. G. Dixon, Peter Hodson, Doug Spry, and G. Mierle. 2011. "Estimating acute copper toxicity to larval fathead minnow (Pimephales promelas) in soft water from measurements of dissolved organic carbon, calcium, and pH." *Canadian Journal of Fisheries and Aquatic Sciences* 53: 1263-1271.



## **Appendix List**

APPENDIX A – PLOTS OF ACUTE TOXICITY RESULTS FROM LAKE PIRU, LAKE MATHEWS 2020, WEYMOUTH WTP 2021, AND LAKE MATHEWS 2021

- APPENDIX B LAKE PIRU TOXICITY TEST REPORT
- APPENDIX C LAKE MATHEWS 2020 TOXICITY TEST REPORT
- APPENDIX D WEYMOUTH WTP INFLUENT 2020 TOXICITY TEST REPORT
- APPENDIX E WEYMOUTH WTP INFLUENT 2020 (RE-SAMPLE) TOXICITY TEST REPORT
- APPENDIX F WEYMOUTH WTP INFLUENT 2021 TOXICITY TEST REPORT
- APPENDIX G LAKE MATHEWS 2021 TOXICITY TEST REPORT



## Appendix A –

Plots of Acute Toxicity Results from Lake Piru, Lake Mathews 2020, Weymouth WTP 2020, Weymouth WTP 2021, and Lake Mathews 2021

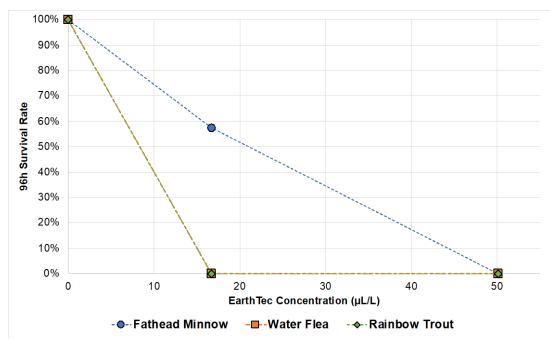
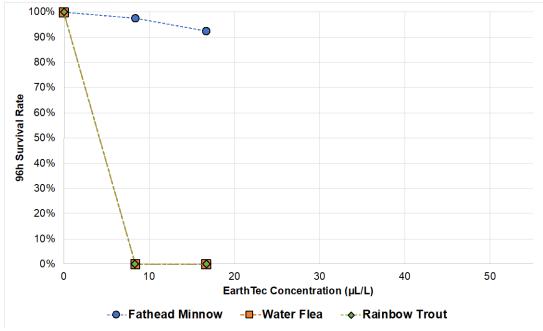
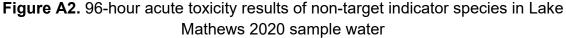


Figure A1. 96-hour acute toxicity results of non-target indicator species in Lake Piru sample water





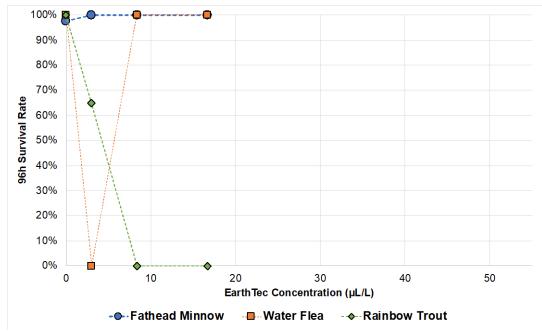


Figure A3. 96-hour acute toxicity results of non-target indicator species in Weymouth WTP influent 2020 sample water

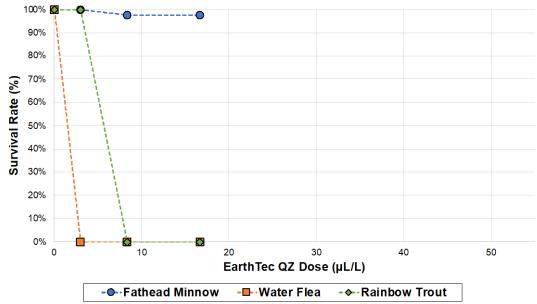


Figure A4. 96-hour acute toxicity results of non-target indicator species in Weymouth WTP influent 2021 sample water

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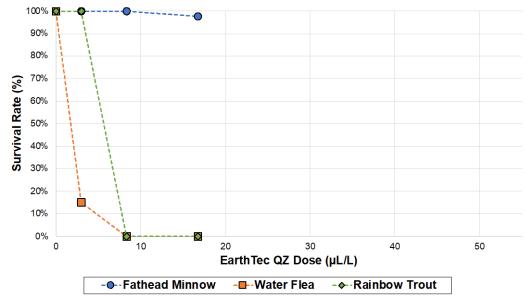


Figure A5. 96-hour acute toxicity results of non-target indicator species in Lake Mathews 2021 sample water



### **Appendix B –** Lake Piru Toxicity Test Report

Trussell Technologies, Inc. | KASF Consulting



December 23, 2019

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Piru Raw
DATE RECEIVED:	6 Dec – 19
ABC LAB NO.:	EUR1219.056

# ACUTE FATHEAD MINNOW SURVIVAL BIOASSAY

% Survival = 0 % Survival in 50.1 mg/l Sample \*TU(a) = >1.00 @ 16.7 mg/l \*TU(a) = >1.00 @ 50.1 mg/l \* TU(a) Is calculated by: log (% Mortality)/1.7

Yours very truly, Scott Johnson Laboratory Director

# **CETIS Summary Report**

 Report Date:
 19 Dec-19 15:27 (p 1 of 1)

 Test Code/ID:
 TRU1219.056afml / 00-7302-2552

Aquatic Bioassay & Consulting Labs, Inc.

Fathead Minnow 96-h Acute Survival Test

Batch ID:	07-7352-6059	Test Type:	Survival (96h)	Analyst:		
Start Date:	06 Dec-19 16:05	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Laboratory Water	
Ending Date:	10 Dec-19 14:10	Species:	Pimephales promelas	Brine:	Not Applicable	
Test Length:	94h	Taxon:	Actinopterygii	Source:	Aquatic Biosystems, CO	Age:
Sample ID:	20-2611-5180	Code:	TRU1219.056afml	Project:		
Sample Date:	04 Dec-19 09:00	Material:	Sample Water	Source:	Bioassay Report	
Receipt Date:	: 06 Dec-19 13:00	CAS (PC):		Station:	Lake Piru Raw	
Sample Age:	55h (6.5 °C)	Client:	Trussell Technologies			

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method		P-Value	Compar	ison Result			S
11-9941-2527	96h Survival Rate	Steel Many-One Rank Sum Test		0.0105	16.7mg/	L failed 96h su	urvival rate		1
Point Estimat	e Summary								
Analysis ID	Endpoint	Point Estimate Method	$\checkmark$	Level	mg/L	95% LCL	95% UCL	τυ	s
05-9379-4708	96h Survival Rate	Linear Interpolation (ICPIN)		EC5	1.965	1.048	4.165		1
				EC10	3.929	2.096	8.33		
				EC15	5.894	3.144	12.5		
				EC20	7.859	4.191	16.66		
				EC25	9.824	5.239	20.83		
		1.00		EC40	15.72	8.383	27.98		
				EC50	21.06	9.633	31.9		

Test Acceptat	bility						
Analysis ID	Endpoint	Attribute	Test Stat	Lower	Upper	Overlap	Decision
05-9379-4708	96h Survival Rate	Control Resp	1	0.9	>>	Yes	Passes Criteria
11-9941-2527	96h Survival Rate	Control Resp	1	0.9	>>	Yes	Passes Criteria

96h Survival Rate Summary

Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1:0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
16.7		4	0.5750	0.2470	0.9030	0.4000	0.8000	0.1031	0.2062	35.85%	42.50%
50.1		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%

96h Survival Rate Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
16.7		0.8000	0.7000	0.4000	0.4000
50.1		0.0000	0.0000	0.0000	0.0000

96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
Conc-mg/L	Code	reb I	rep z	reb 2	кер 4
0	N	10/10	10/10	10/10	10/10
16.7		8/10	7/10	4/10	4/10
50.1		0/10	0/10	0/10	0/10

Analyst:\_\_\_\_\_ QA:\_\_\_\_

Analysis ID: 11-9941-2527

Fathead Minnow 96-h Acute Survival Test

 Report Date:
 19 Dec-19 15:26 (p 1 of 2)

 Test Code/ID:
 TRU1219.056afml / 00-7302-2552

 Test Code/ID:
 TRU1219.056atml / 00-7302-2552

 Il Test
 Aquatic Bioassay & Consulting Labs, Inc.

 Endpoint:
 96h Survival Rate
 CETIS Version:
 CETISv1.9.5

 Analysis:
 Nonparametric-Control vs Treatments
 Status Level:
 1

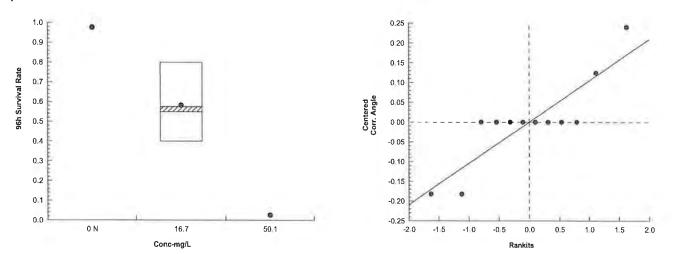
 Test Type:
 Survival (96h)
 Analyst:

	1-9941-2527 9 Dec-19 12:4		ndpoint: nalysis:	Nonparametric		reatments		S Version	ETISV1	.9.5	
Batch ID: 0	7-7352-6059	Te	est Type:	Survival (96h)			Anal	yst:			
Start Date: 0	6 Dec-19 16:0	5 <b>P</b> i	rotocol:	EPA/821/R-02-	012 (2002)		Dilue		boratory Wat	er	
Ending Date: 1	0 Dec-19 14:10	0 <b>S</b>	pecies:	Pimephales pro	omelas		Brin	e: No	t Applicable		
Test Length: 94	4h	Τa	axon:	Actinopterygii			Sou	r <b>ce:</b> Aq	uatic Biosyst	ems, CO	Age:
	0-2611-5180		ode:	TRU1219.056a	ıfml		Proje	ect:			
Sample Date: 04			aterial:	Sample Water			Sou	rce: Bio	bassay Repo	t	
Receipt Date: 0		0 <b>C</b>	AS (PC):				Stati	on: La	ke Piru Raw		
Sample Age: 5	5h (6.5 °C)	С	lient:	Trussell Techn	ologies						
Data Transform		Alt Hyp	<b>)</b>					son Result		_	PMSD
Angular (Correct	ed)	С > Т					16.7mg/L	failed 96h	survival rate		12.96%
Steel Many-One	Rank Sum To	est									
Control vs		11	Test S			P-Type	P-Value	Decisio			
Negative Control	16.7*		10	12	0 6	CDF	0.0105	Significa	nt Effect		
Test Acceptabil	ity Criteria	TAC	Limits								
Attribute	Test Stat	Lower	Uppe	r Overlap	Decision						
Control Resp	1	0.9	>>	Yes	Passes C	riteria					
ANOVA Table											
Source	Sum Squ	ares	Mean	Square	DF	F Stat	P-Value	Decisio	n(α:5%)		
Between	0.594225		0.594	225	1	25.55	0.0023	Significa	nt Effect		
Error	0.139539		0.023	2565	6	2.1					
Total	0.733764				7						
ANOVA Assum	ptions Tests										
Attribute	Test				Test Stat	Critical	P-Value	Decisio	n(a:1%)		
Variance	Levene E				59.23	13.75	2.5E-04		Variances		
	Mod Leve	-	-		39.49	13.75	7.6E-04	•	Variances		
Distribution	Anderson	-		ity Test	0.5621	3.878	0.1497		Distribution		
	Kolmogor				0.25	0.3313	0.1599		Distribution		
	Shapiro-V	Vilk W No	rmality Te	st	0.8906	0.6451	0.2370	Normal	Distribution		
96h Survival Ra	te Summary										
Conc-mg/L	Code	Count	Mean				Min	Max	Std Err	CV%	%Effect
0	N	4	1.000		1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
16.7		4	0.575		0.9030	0.5500	0.4000	0.8000	0.1031	35.85%	42.50%
50.1		4	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
Angular (Correc			_								
Conc-mg/L	Code	Count	Mean				Min	Max	Std Err	CV%	%Effect
0	N	4	1.412		1.412	1.412	1.412	1.412	0	0.00%	0.00%
16.7		4	0.866		1.21	0.8379	0.6847	1.107	0.1078	24.88%	38.60%
50.1		4	0.158	8 0.1588	0.1588	0.1588	0.1588	0.1588	0	0.00%	88.76%
96h Survival Ra											
Conc-mg/L	Code	Rep 1	Rep 2		Rep 4						
0	N	1.0000	1.000	1.0000	1.0000						
16.7 50.1		0.8000 0.0000	0.700 0.000		0.4000 0.0000						

Analyst: \_\_\_\_\_ QA:\_\_\_\_

CETIS Ana	alytical Repo	rt				Report Date: Test Code/ID:	19 Dec-19 15:26 (p 2 of 2) TRU1219.056afml / 00-7302-2552
Fathead Min	now 96-h Acute S	urvival T	est			Aquatic B	lioassay & Consulting Labs, Inc.
Analysis ID: Analyzed:	11-9941-2527 19 Dec-19 12:47			5h Survival R onparametric	ate c-Control vs Treatments	CETIS Version: Status Level:	CETISv1.9.5 1
Angular (Cor	rected) Transform	ned Deta	il				
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4		
0	N	1.412	1.412	1.412	1.412		
16.7		1.107	0.9912	0.6847	0.6847		
50.1		0.1588	0.1588	0.1588	0.1588		
96h Survival	Rate Binomials						
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4		
0	N	10/10	10/10	10/10	10/10		
16.7		8/10	7/10	4/10	4/10		
50.1		0/10	0/10	0/10	0/10		

# Graphics



QA:\_ P Analyst: 1

Report Date: Test Code/ID:

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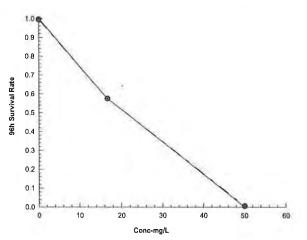
Fathoad												
alliedu	Minne	ow 96-h Acute S	urvival Tes	st					Aquatic E	Bioassay &	Consulting	Labs, Inc
Analysis Analyzec		05-9379-4708 19 Dec-19 12:48		point: lysis:	96h Survival Ra Linear Interpola				S Version: is Level:	CETISv1 1	.9.5	
Batch ID	):	07-7352-6059	Test	Type:	Survival (96h)			Anal	vst:			
Start Dat	te:	06 Dec-19 16:05		ocol:	EPA/821/R-02-	012 (2002)		Dilue	·	oratory Wat	er	
Ending [	Date:	10 Dec-19 14:10	Spe	cies:	Pimephales pro	melas		Brine	e: Not	Applicable		
Test Len	ngth:	94h	Taxo	on:	Actinopterygii			Sour	ce: Aqu	uatic Biosyst	ems, CO	Age:
Sample I	ID:	20-2611-5180	Cod	e:	TRU1219.056a	fml		Proje	ect:			
Sample I	Date:	04 Dec-19 09:00	Mate	erial:	Sample Water			Sour	ce: Bio	assay Repoi	rt	
Receipt	Date:	06 Dec-19 13:00	CAS	(PC):				Stati	on: Lak	e Piru Raw		
Sample /	Age:	55h (6.5 °C)	Clie	nt:	Trussell Techno	ologies						
Linear Ir	nterpo	lation Options										
X Transf	form	Y Transform	See	d	Resamples	Exp 95% CL					-	
Linear		Linear	0		280	Yes	Two-F	Point Interp	olation			
Test Acc	ceptab	oility Criteria	TAC L	imits								
Attribute	e	Test Stat	Lower	Uppe	r Overlap	Decision						
Control F		1	0.9	>>								
	voop		0.9	>>	Yes	Passes Criter	ria					
_			0.9		res	Passes Criter	ria	-				
Point Es	stimate	es	_		res	Passes Criter	ria					
Point Es Level	stimate mg/L	es 95% LCL	95% UCL		fes	Passes Criter	ria					
Point Es Level EC5	mg/L	<b>95% LCL</b>	<b>95% UCL</b> 4.165		Tes	Passes Criter	ria					
Point Es Level EC5 EC10	stimate mg/L 1.965 3.929	<b>95% LCL</b> 1.048 2.096	<b>95% UCL</b> 4.165 8.33		Tes	Passes Criter	ria					
Point Es Level EC5 EC10 EC15	mg/L 1.965 3.929 5.894	<b>95% LCL</b> 1.048 2.096 3.144	<b>95% UCL</b> 4.165 8.33 12.5		Tes	Passes Criter	ria					
Point Es Level EC5 EC10 EC15 EC20	stimate mg/L 1.965 3.929	<b>95% LCL</b> 1.048 2.096 3.144 4.191	<b>95% UCL</b> 4.165 8.33 12.5 16.66		Tes	Passes Criter	ria					
Point Es Level EC5 EC10 EC15 EC20 EC25	stimate mg/L 1.965 3.929 5.894 7.859	<b>95% LCL</b> 1.048 2.096 3.144 4.191 5.239	<b>95% UCL</b> 4.165 8.33 12.5			Passes Criter	ria					
Point Es EC5 EC10 EC15 EC20 EC25 EC25 EC40	stimate mg/L 1.965 3.929 5.894 7.859 9.824	<b>95% LCL</b> 1.048 2.096 3.144 4.191 5.239 8.383	<b>95% UCL</b> 4.165 8.33 12.5 16.66 20.83		Tes	Passes Criter	ria					
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06	<b>95% LCL</b> 1.048 2.096 3.144 4.191 5.239 8.383	<b>95% UCL</b> 4.165 8.33 12.5 16.66 20.83 27.98			Passes Criter		e(A/B)			Isotor	nic Variate
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surv	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	<b>95% LCL</b> 1.048 2.096 3.144 4.191 5.239 8.383 9.633	<b>95% UCL</b> 4.165 8.33 12.5 16.66 20.83 27.98	Mean		Calculate		e(A/B) CV%	%Effect	A/B	Isotor Mean	
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	<b>95% LCL</b> 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary	<b>95% UCL</b> 4.165 8.33 12.5 16.66 20.83 27.98 31.9		Min	Calculate Max S	ed Variat		%Effect 0.0%	A/B 40/40		
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surv Conc-mg 0	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	es 95% LCL 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary Code	95% UCL 4.165 8.33 12.5 16.66 20.83 27.98 31.9 Count	Mean	Min 0 1.0000	Calculate Max S 1.0000 0.	ed Variat td Dev	CV%			Mean	%Effec
Point Es Level EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surr Conc-ma 0 16.7	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	es 95% LCL 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary Code	95% UCL 4.165 8.33 12.5 16.66 20.83 27.98 31.9 Count 4	<u>Mean</u> 1.000	Min 0 1.0000 0 0.4000	Calculate           Max         S           1.0000         0.           0.8000         0.	ed Variat td Dev .0000	<b>CV%</b> 0.00%	0.0%	40/40	Mean 1	%Effect 0.0%
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surr Conc-mg 0 16.7 50.1	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f g/L	es 95% LCL 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary Code	<b>95% UCL</b> 4.165 8.33 12.5 16.66 20.83 27.98 31.9 <b>Count</b> 4 4	<b>Mean</b> 1.000 0.575	Min 0 1.0000 0 0.4000	Calculate           Max         S           1.0000         0.           0.8000         0.	ed Variat td Dev .0000 .2062	<b>CV%</b> 0.00%	0.0% 42.5%	40/40 23/40	<b>Mean</b> 1 0.575	%Effec 0.0% 42.5%
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surv 50.1 96h Surv	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	es 95% LCL 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary Code N	<b>95% UCL</b> 4.165 8.33 12.5 16.66 20.83 27.98 31.9 <b>Count</b> 4 4	<b>Mean</b> 1.000 0.575	Min 0 1.0000 0 0.4000 0 0.0000	Calculate           Max         S           1.0000         0.           0.8000         0.	ed Variat td Dev .0000 .2062	<b>CV%</b> 0.00%	0.0% 42.5%	40/40 23/40	<b>Mean</b> 1 0.575	%Effec 0.0% 42.5%
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surv Conc-mg 0 16.7 50.1	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	es 95% LCL 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary Code N Rate Detail	95% UCL 4.165 8.33 12.5 16.66 20.83 27.98 31.9 Count 4 4 4	<b>Mean</b> 1.000 0.575 0.000	Min 0 1.0000 0 0.4000 0 0.0000 2 Rep 3	Calculate           Max         S           1.0000         0.           0.8000         0.           0.0000         0.	ed Variat td Dev .0000 .2062	<b>CV%</b> 0.00%	0.0% 42.5%	40/40 23/40	<b>Mean</b> 1 0.575	%Effec 0.0% 42.5%
Point Es EC5 EC10 EC15 EC20 EC25 EC40 EC50 96h Surv 50.1 96h Surv Conc-mg	stimate mg/L 1.965 3.929 5.894 7.859 9.824 15.72 21.06 vival f	es 95% LCL 1.048 2.096 3.144 4.191 5.239 8.383 9.633 Rate Summary Code N Rate Detail Code	95% UCL 4.165 8.33 12.5 16.66 20.83 27.98 31.9 Count 4 4 4 4 4 8 Rep 1	Mean 1.000 0.575 0.000 Rep 2	Min 0 1.0000 0 0.4000 0 0.0000 2 Rep 3 0 1.0000	Calculate           Max         S           1.0000         0.           0.8000         0.           0.0000         0.           Rep 4	ed Variat td Dev .0000 .2062	<b>CV%</b> 0.00%	0.0% 42.5%	40/40 23/40	<b>Mean</b> 1 0.575	%Effec 0.0% 42.5%

## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	10/10	10/10	10/10	10/10
16.7		8/10	7/10	4/10	4/10
50.1		0/10	0/10	0/10	0/10

Analyst:\_\_\_\_\_QA:\_\_\_\_

CETIS Ana	alytical Report			Report Date: Test Code/ID:	19 Dec-19 15:26 (p 2 of 2) TRU1219.056afml / 00-7302-2552
Fathead Mini	now 96-h Acute Surv	rival Test		Aquatic B	ioassay & Consulting Labs, Inc.
Analysis ID:	05-9379-4708	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.5
Analyzed:	19 Dec-19 12:48	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1



Analyst: QA

Report Date: 19 Dec-19 15:26 (p 1 of 3)

Test Code/ID: TRU1219.056afml / 00-7302-2552

Fathead Minn	ow 96-h Acute S	Survival	Test					Aquatio	: Bioassay &	Consulting	J Labs, Inc.
Batch ID: Start Date: Ending Date: Test Length:	07-7352-6059 06 Dec-19 16:05 10 Dec-19 14:10 94h	5	Test Type: Protocol: Species: Taxon:	Survival (96h) EPA/821/R-02- Pimephales pro Actinopterygii			Di Br	ine: N	aboratory Wa lot Applicable .quatic Biosys		Age:
•	20-2611-5180 04 Dec-19 09:00 06 Dec-19 13:00 55h (6.5 °C)	)	Code: Material: CAS (PC): Client:	TRU1219.056a Sample Water Trussell Techn			Sc		ioassay Repo ake Piru Raw	ort	
Alkalinity (Ca	CO3)-mg/L					~ ~					
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	60	60	60	60	60	0	0	0.0%	0
50.1		3	160	160	160	160	160	0	0	0.0%	0
Overall		6	110	52.52	167.5	60	160	22.36	54.77	49.79%	0 (0%)
Conductivity-	µmhos										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	336.3	296.1	376.6	326	355	9.351	16.2	4.82%	0
16.7		3	946.7	920.8	972.5	935	955	6.009	10.41	1.1%	0
50.1		2	990	939.2	1041	986	994	4	5.657	0.57%	0
Overall		8	728.6	456.5	1001	326	994	115.1	325.5	44.67%	0 (0%)
Dissolved Ox	ygen-mg/L										. ,
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Count
0	N	3	7.9	7.896	7.904	7.9	7.9	0	0	0.0%	0
16.7		3	8.367	5.878	10.85	7.4	9.4	0.5783	1.002	11.97%	0
50.1		2	8.25	-6.362	22.86	7.1	9.4	1.15	1.626	19.71%	0
Overall		8	8.162	7.456	8.869	7.1	9.4	0.2988	0.845	10.35%	0 (0%)
Hardness (Ca	aCO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	94	94	94	94	94	0	0	0.0%	0
50.1		3	161	161	161	161	161	0 0	ů –	0.0%	0
Overall		6	127.5	88.99	166	94	161	14.98	36.7	28.78%	0 (0%)
pH-Units			_								- ()
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	
0	N	3	Mean 7.667		7.954	Min 7.6	<b>Max</b> 7.8	Std Err		CV%	QA Count 0
0 16.7	IN IN	з З	7.833	7.38	7.954 7.977	7.6 7.8	7.8 7.9	0.06667		1.51% 0.74%	
50.1		2	8.1	6.829	9.371	8	8.2	0.03333	0.1414	0.74% 1.75%	0 0
Overall		8	7.838	7.671	8.004	7.6	8.2	0.07055		2.55%	0 (0%)
Temperature	-°C	-	,				012	0.07000		2.0070	0 (070)
		Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
	Code			00/0 202	00,3 00L		MUA				
Conc-mg/L	Code N			24	24	24	24	0	0	0.0%	0
Conc-mg/L	N N	3	24	24 23.92	24 24.21	24 24	24 24.1	0	0	0.0% 0.24%	0
Conc-mg/L				24 23.92 23.42	24 24.21 24.68	24 24 24	24 24.1 24.1	0 0.03323 0.0499	-	0.0% 0.24% 0.29%	0 0 0

Analyst: \_\_\_\_\_QA: \_\_\_\_\_

Report Date: Test Code/ID: TRU1219.056afml / 00-7302-2552

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Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCC Conc-mg/L	Code	Read	Time	Measure	04	Diff-%	Inst ID	Analyst	Notes
0	N	1	nine	60	<b>W</b> M	DIII-70	Institu	Analyst	Notes
50.1				160					
0	N	2		60					1
50.1				160					1
0	N	3		60					
50.1				160					
Conductivity-µr	nhos								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		326					
16.7				955					
50.1				994					
0	N	2		328					
16.7				950					
50.1				986					
0	N	3		355					
16.7				935					
Dissolved Oxyg	jen-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.9					
16.7				9.4					
50.1				9.4					
0	N	2		7.9					
16.7				7.4					
50.1				7.1					
0	N	3		7.9	-		-		
16.7				8.3					
Hardness (CaC	O3)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		94					
50.1				161					
0	N	2		94					
50.1				161					
0	N	3		94					
50.1				161					
pH-Units									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.6					
16.7				7.9					
				8.2					
	N	2		7.8					
0				7.8					
0 16.7									
0 16.7 50.1				8	_				
50.1 0 16.7 50.1 0 16.7	N	3		8 7.6 7.8					

QA:

Report Date: 19 Dec-19 15:27 (p 3 of 3) Test Code/ID: TRU1219.056afml / 00-7302-2552

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C	;							
Conc-mg/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst Notes	
0	N	1		24				
16.7				24.1				
50.1				24.1				
0	N	2		24				
16.7				24.1				
50.1				24				
0	N	3		24				
16.7				24				

CETIS™ v1.9.5.5





December 23, 2019

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Piru Raw
DATE RECEIVED:	6 Dec – 19
ABC LAB NO.:	EUR1219.056

# ACUTE CERIODAPHNIA SURVIVAL BIOASSAY

% Survival = 0 % Survival in 50.1mg/l Sample \*TU(a) = >1.00 @ 16.7 mg/l \*TU(a) = >1.00 @ 50.1 mg/l \* TU(a) Is calculated by: log (% Mortality)/1.7

Yours very truly, cott Johnson Laboratory Director

							Tes	t Code/ID	<b>.</b> 1100	1219.0			
Ceriodaphnia	96-h Acute Surv	ival Test						Aquat			onsulting		_
Batch ID:	18-1458-7538			Survival (96				lyst:					
Start Date:	06 Dec-19 16:05		otocol:		02-012 (2002)				Laborator		r		
	10 Dec-19 14:10	•	ecies:	Ceriodaphn			Brir		Not Applie				
Test Length:	9411	18	xon:	Branchiopo	Ja		Sol	irce:	Aquatic B	losyste	ms, CO	Age:	_
Sample ID:	09-3098-8150	Co	de:	TRU1219.0	56acer		Pro	ject:					
•	04 Dec-19 09:00		terial:	Sample Wa	ter		Soι	Irce:	Bioassay	Report			
	06 Dec-19 13:00	CA	S (PC):				Sta	tion:	Lake Piru	I Raw			
Sample Age:	55h (6.5 °C)	Cli	ent:	Trussell Te	chnologies								
Point Estimat	e Summary												
Analysis ID	Endpoint			Estimate M		1	Level	mg/L	95%	% LCL	95% UCL	ŤU	
18-7406-0446	96h Survival Rate	Э	Linea	r Interpolatio	n (ICPIN)		EC5	0.835			0.835		1
							EC10	1.67	1.6		1.67		
							EC15	2.505			2.505		
							EC20	3.34	3.34		3.34		
							EC25 EC40	4.175 6.68			4.175		
		_					EC50	8.35	6.68 8.38		6.68 8.35		
	bility Endpoint		Attrib	ute	Test Stat	TAC L Lower	EC50		8.3				-
Analysis ID		9		oute ol Resp	Test Stat		EC50 imits	8.35	8.3 ap Dec	5	8.35		
Analysis ID 18-7406-0446	Endpoint		Contr			Lower	EC50 imits Upper	8.35 Overla	8.3 ap Dec Pas	5 cision	8.35 iteria		
Analysis ID 18-7406-0446 21-2716-7875	Endpoint 96h Survival Rate		Contr	ol Resp	1	Lower 0.9	EC50 imits Upper >>	8.35 Overla Yes	8.3 ap Dec Pas	5 <b>cision</b> sses Cr	8.35 iteria		
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L	Endpoint 96h Survival Rat 96h Survival Rat Rate Summary Code	e Count	Contr Contr Mean	ol Resp ol Resp <b>95% L</b>	1 1 CL 95% UCL	Lower 0.9 0.9 Min	EC50 imits Upper >>	8.35 Overla Yes	8.33 ap Dec Pas Pas	5 <b>cision</b> sses Cr	8.35 iteria	%Eff	ect
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0	Endpoint 96h Survival Rat 96h Survival Rat Rate Summary	Count	Contr Contr Mean 1.000	ol Resp ol Resp <b>95% L</b> 0 1.000	1 1 CL 95% UCL 0 1.0000	Lower 0.9 0.9 Min 1.0000	EC50 imits Upper >> >>	8.35 Overla Yes Yes	ap Dec Pas Pas rr Std	5 cision sses Cr sses Cr sses Cr l Dev 000	8.35 iteria iteria	%Eff( 0.009	_
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7	Endpoint 96h Survival Rat 96h Survival Rat Rate Summary Code	Count 4 4	Contr Contr Mean 1.000 0.000	ol Resp ol Resp <b>95% L</b> 0 1.0000 0 0.0000	1 1 <b>CL 95% UCL</b> 0 1.0000 0 0.0000	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7	Endpoint 96h Survival Rat 96h Survival Rat Rate Summary Code	Count	Contr Contr Mean 1.000	ol Resp ol Resp <b>95% L</b> 0 1.0000 0 0.0000	1 1 <b>CL 95% UCL</b> 0 1.0000 0 0.0000	Lower 0.9 0.9 Min 1.0000	EC50 imits Upper >> >> Max 1.0000	8.35 Overla Yes Yes Std E 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr sses Cr l Dev 000	8.35 iteria iteria CV%	0.00%	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I	Endpoint 96h Survival Rat 96h Survival Rat Rate Summary Code N Rate Detail	Count 4 4 4	Contr Contr Mean 1.000 0.000 0.000	ol Resp ol Resp <b>95% L</b> 0 1.0000 0 0.0000	1 1 <b>CL 95% UCL</b> 0 1.0000 0 0.0000 0 0.0000	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 8 Rep 1	Contr Contr Mean 1.000 0.000 0.000 Rep 2	ol Resp ol Resp 95% L 0 1.0000 0 0.0000 0 0.0000 2 Rep 3	1 1 CL 95% UCL 0 1.0000 0 0.0000 0 0.0000 Rep 4	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0	Endpoint 96h Survival Rat 96h Survival Rat Rate Summary Code N Rate Detail	Count 4 4 4 4 8 8 8 9 1.0000	Contr Contr Mean 1.000 0.000 0.000 Rep 2 1.000	ol Resp ol Resp 95% L 0 1.0000 0 0.0000 0 0.0000 2 Rep 3 0 1.0000	1 1 2 2 3 3 4 3 5 4 3 5 4 5 4 5 4 5 4 5 5 7 5 7 5 7 5 7 5 7 5	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0 16.7	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 1.0000 0.0000	Contr Contr 1.000 0.000 0.000 Rep 2 1.000 0.000	ol Resp ol Resp 95% L 0 1.000 0 0.000 0 0.000 2 Rep 3 0 1.000 0 0.000	1 1 2 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0 16.7	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 8 8 8 9 1.0000	Contr Contr Mean 1.000 0.000 0.000 Rep 2 1.000	ol Resp ol Resp 95% L 0 1.000 0 0.000 0 0.000 2 Rep 3 0 1.000 0 0.000	1 1 2 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I 96h Survival I	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials	Count           4           4           4           1.0000           0.0000           0.0000	Contr Contr 1.000 0.000 0.000 <b>Rep 2</b> 1.000 0.000 0.000	ol Resp ol Resp 95% L 0 1.000 0 0.000 0 0.000 2 Rep 3 0 1.000 0 0.000 0 0.000	1 1 2 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count 4 4 4 4 1.0000 0.0000 0.0000 Rep 1	Contr Contr 1.000 0.000 0.000 Rep 2 1.000 0.000 0.000 Rep 2	ol Resp ol Resp 95% L 0 1.000 0 0.0000 2 Rep 3 0 1.0000 0 0.0000 0 0.0000 2 Rep 3	1 1 2 2 3 4 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
21-2716-7875 96h Survival I 0 16.7 50.1 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0 96h Survival I 0	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials	Count           4           4           4           1.0000           0.0000           0.0000           Rep 1           5/5	Contr Contr Mean 1.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000	ol Resp ol Resp 95% L 0 1.000 0 0.000 0 0.000 2 Rep 3 0 1.000 0 0.000 0 0.000 2 Rep 3 5/5	1 1 1 CL 95% UCL 1.0000 0.0000 0.0000 Rep 4 0.1.0000 0.00000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.0000 0.000000 0.00000 0.00000000	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%
Analysis ID 18-7406-0446 21-2716-7875 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L 0 16.7 50.1 96h Survival I Conc-mg/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count 4 4 4 4 1.0000 0.0000 0.0000 Rep 1	Contr Contr 1.000 0.000 0.000 Rep 2 1.000 0.000 0.000 Rep 2	ol Resp ol Resp 95% L 0 1.000 0 0.0000 2 Rep 3 0 1.0000 0 0.0000 0 0.0000 2 Rep 3	1 1 2 2 3 4 5 5 5 7 7 7 7 7 7 7 7 7 7 7 7 7	Lower 0.9 0.9 Min 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 0.0000	8.35 Overla Yes Yes Std E 0.0000 0.0000	8.3 ap Dec Pas Pas rr Std 0 0.00 0 0.00	5 cision sses Cr sses Cr <b>i Dev</b> 000 000	8.35 iteria iteria CV%	0.00% 100.0	% )0%

PASS Analyst:\_ QA: 1-

Report Date: 19 Dec-19 15:28 (p 1 of 2) Test Code/ID: TRU1219.056acer / 07-0764-7780

#### Ceriodaphnia 96-h Acute Survival Test Aquatic Bioassay & Consulting Labs, Inc. Analysis ID: 21-2716-7875 Endpoint: 96h Survival Rate **CETIS Version:** CETISv1.9.5 Analyzed: 19 Dec-19 15:28 Analysis: Nonparametric-Two Sample Status Level: 1 Batch ID: 18-1458-7538 Test Type: Survival (96h) Analyst: Start Date: 06 Dec-19 16:05 Protocol: EPA/821/R-02-012 (2002) **Diluent:** Laboratory Water Ending Date: 10 Dec-19 14:10 Species: Ceriodaphnia dubia Brine: Not Applicable Test Length: 94h Taxon: Branchiopoda Source: Aquatic Biosystems, CO Age: Sample ID: 09-3098-8150 Code: TRU1219.056acer Project: Sample Date: 04 Dec-19 09:00 Material: Sample Water Source: **Bioassay Report** Receipt Date: 06 Dec-19 13:00 CAS (PC): Station: Lake Piru Raw Sample Age: 55h (6.5 °C) Client: **Trussell Technologies Test Acceptability Criteria TAC Limits** Attribute Test Stat Lower Overlap Decision Upper Control Resp 1 0.9 >> Yes Passes Criteria 96h Survival Rate Summary Conc-mg/L Code CV% Count Mean 95% LCL 95% UCL Median Min Max Std Err %Effect Ν 4 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 0.0000 0.00% 0.00% 16.7 4 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 100.00% 50.1 4 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 100.00% Angular (Corrected) Transformed Summary Conc-mg/L Code Count Mean 95% LCL 95% UCL Median Min Std Err CV% %Effect Max Ν 4 1.345 1.345 1.346 1.345 1.345 1.345 0 0.00% 0.00% 16.7 4 0.2255 0.2255 0.2256 0.2255 0.2255 0.2255 0 0.00% 83.24% 50.1 4 0.2255 0.2255 0.2255 0.2256 0.2255 0.2255 0 0.00% 83.24%

96h Survival Rate Detail

0

0

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
16.7		0.0000	0.0000	0.0000	0.0000
50.1		0.0000	0.0000	0.0000	0.0000

## Angular (Corrected) Transformed Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.345	1.345	1.345	1.345
16.7		0.2255	0.2255	0.2255	0.2255
50.1		0.2255	0.2255	0.2255	0.2255

## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
)	N	5/5	5/5	5/5	5/5	
16.7		0/5	0/5	0/5	0/5	
50.1		0/5	0/5	0/5	0/5	

Analyst:\_\_\_\_\_ QA:\_\_\_

alytical Report					Report Date: Test Code/ID:	19 Dec-19 15:28 (p 2 TRU1219.056acer / 07-0764	
a 96-h Acute Surviva	l Test				Aquatic Bi	ioassay & Consulting Labs,	, Inc.
21-2716-7875 19 Dec-19 15:28	Endpoint: Analysis:	96h Survival Rate Nonparametric-Two	o Sample		CETIS Version: Status Level:	CETISv1.9.5 1	
• • • •	<b>0</b> 16.7	• 50.1	Centered Corr. Angle	1.0 0.8 0.5 0.3 0.0 -2.0 -1	5 -1.0 -0.5 0.0	05 1.0 1.5 2.0	
				2.0	Rankits		
	96-h Acute Surviva 21-2716-7875 19 Dec-19 15:28	96-h Acute Survival Test 21-2716-7875 Endpoint: 19 Dec-19 15:28 Analysis:	96-h Acute Survival Test 21-2716-7875 Endpoint: 96h Survival Rate 19 Dec-19 15:28 Analysis: Nonparametric-Tw	96-h Acute Survival Test 21-2716-7875 Endpoint: 96h Survival Rate 19 Dec-19 15:28 Analysis: Nonparametric-Two Sample	96-h Acute Survival Test           21-2716-7875         Endpoint:         96h Survival Rate           19 Dec-19 15:28         Analysis:         Nonparametric-Two Sample	Test Code/ID:           96-h Acute Survival Test         Aquatic B           21-2716-7875         Endpoint:         96h Survival Rate         CETIS Version:           19 Dec-19 15:28         Analysis:         Nonparametric-Two Sample         Status Level:	Test Code/ID:         TRU1219.056acer / 07-0764           a 96-h Acute Survival Test         Aquatic Bioassay & Consulting Labs           21-2716-7875         Endpoint:         96h Survival Rate         CETIS Version:         CETISV1.9.5           19 Dec-19 15:28         Analysis:         Nonparametric-Two Sample         Status Level:         1

Analyst: \_\_\_\_\_QA:\_\_\_\_

1

Report Date: 19 Dec-19 15:28 (p 1 of 2) Test Code/ID: TRU1219.056acer / 07-0764-7780

						rest coue/	п <b>D</b> , I	R01219.050ace170	//-0/04-//
Ceriodaphni	a 96-h Acute Surv	vival Test				Aqua	atic Bic	bassay & Consulting	g Labs, In
Analysis ID:	18-7406-0446	Endpoint:	96h Survival Ra	ate		CETIS Ver	sion:	CETISv1.9.5	
Analyzed:	19 Dec-19 15:28	Analysis:	Linear Interpola	ation (ICPIN)		Status Lev	el:	1	
Batch ID:	18-1458-7538	Test Type:	Survival (96h)			Analyst:			
Start Date:	06 Dec-19 16:05	<b>Protocol:</b>	EPA/821/R-02-	012 (2002)		Diluent:	Labor	atory Water	
Ending Date	: 10 Dec-19 14:10	) Species:	Ceriodaphnia d	lubia		Brine:	Not A	pplicable	
Test Length:	: 94h	Taxon:	Branchiopoda			Source:	Aquat	tic Biosystems, CO	Age:
Sample ID:	09-3098-8150	Code:	TRU1219.056a	icer		Project:			
Sample Date	e: 04 Dec-19 09:00	) Material:	Sample Water			Source:	Bioas	say Report	
Receipt Date	e: 06 Dec-19 13:00	CAS (PC):				Station:	Lake	Piru Raw	
Sample Age	: 55h (6.5 °C)	Client:	Trussell Techn	ologies					
Linear Interp	oolation Options								
X Transform	Y Transform	n Seed	Resamples	Exp 95% CL	Method				
Linear	Linear	0	280	Yes	Two-Point	Interpolation	)		
Test Accepta	ability Criteria	TAC Limits							
Attribute	Test Stat		r Overlap	Decision					
Control Resp	) 1	0.9 >>	Yes	Passes Criteria					
Point Estima	ates								
Level mg/	/L 95% LCL	95% UCL							
EC5 0.83	35 0.835	0.835							
EC10 1.67	7 1.67	1.67							
EC15 2.50	05 2.505	2.505							
EC20 3.34	4 3.34	3.34							

3.34 3.34 EC20 EC25 4.175 4.175 4.175 EC40 6.68 6.68 6.68 EC50 8.35 8.35 8.35

## 96h Survival Rate Summary

96h Survival Ra	ate Summary				Calc	ulated Varia	te(A/B)			Isoto	nic Variate
Conc-mg/L	Code	Count	Mean	Min	Max	Std Dev	CV%	%Effect	A/B	Mean	%Effect
0	N	4	1.0000	1.0000	1.0000	0.0000	0.00%	0.0%	20/20	1	0.0%
16.7		4	0.0000	0.0000	0.0000	0.0000		100.0%	0/20	0	100.0%
50.1		4	0.0000	0.0000	0.0000	0.0000		100.0%	0/20	0	100.0%

## 96h Survival Rate Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	Ν	1.0000	1.0000	1.0000	1.0000
16.7		0.0000	0.0000	0.0000	0.0000
50.1		0.0000	0.0000	0.0000	0.0000

## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	5/5	5/5	5/5	5/5
16.7		0/5	0/5	0/5	0/5
50.1		0/5	0/5	0/5	0/5

Analyst: \_\_\_\_\_ QA: \_\_\_\_

CETIS Ana	alytical Report		Report Date: Test Code/ID:	19 Dec-19 15:28 (p 2 of 2) TRU1219.056acer / 07-0764-7780		
Ceriodaphnia	a 96-h Acute Surviva	l Test	Aquatic Bioassay & Consulting Labs, Inc.			
Analysis ID:	18-7406-0446	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.5	
Analyzed:	19 Dec-19 15:28	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1	
Graphics						

#### 1.00 0.9 0.8 0.7 96h Survival Rate 06 0.5 0.4 0.3 0.2 0.1 0.0 E 50 4 1 10 20 30 40 60 Conc-mg/L

Analyst:\_\_\_\_\_ QA:\_\_\_\_

Report Date: 19 Dec-19 15:28 (p 1 of 3)

Test Code/ID: TRU1219.056acer / 07-0764-7780

Ceriodaphnia	96-h Acute Surv	vival Tes	it					Aquatic	Bioassay &	Consulting	Labs, Inc.
Batch ID: Start Date: Ending Date: Test Length:	18-1458-7538 06 Dec-19 16:05 10 Dec-19 14:10 94h	5 P ) S	est Type: rotocol: pecies: axon:		EPA/821/R-02-012 (2002) Ceriodaphnia dubia			ine: N	aboratory Wa ot Applicable quatic Biosys		Age:
-	09-3098-8150 04 Dec-19 09:00 06 Dec-19 13:00 55h (6.5 °C)	) N	ode: laterial: AS (PC): lient:	TRU1219.056a Sample Water Trussell Techn			So		ioassay Repo ake Piru Raw	rt	
Alkalinity (Ca	CO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Count
0	N	3	60	60	60	60	60	0	0	0.0%	0
50.1		2	160	160	160	160	160	0	0	0.0%	0
Overall		5	100	31.99	168	60	160	24.49	54.77	54.77%	0 (0%)
Conductivity-	µmhos										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	336.3	296.1	376.6	326	355	9.351	16.2	4.82%	0
16.7		3	946.7	920.8	972.5	935	955	6.009	10.41	1.1%	0
50.1		2	990	939.2	1041	986	994	4	5.657	0.57%	0
Overall		8	728.6	456.5	1001	326	994	115.1	325.5	44.67%	0 (0%)
Dissolved Ox	vaen-ma/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	7.9	7.896	7.904	7.9	7.9	0	0	0.0%	0
16.7		3	8.367	5.878	10.85	7.4	9.4	0.5783	1.002	11.97%	0
50.1		2	8.25	-6.362	22.86	7.1	9.4	1.15	1.626	19.71%	0
Overall		8	8.162	7.456	8.869	7.1	9.4	0.2988	0.845	10.35%	0 (0%)
Hardness (Ca	aCO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	94	94	94	94	94	0	0	0.0%	0
50.1		2	161	161	161	161	161	0	0	0.0%	0
Overall		5	120.8	75.23	166.4	94	161	16.41	36.7	30.38%	0 (0%)
pH-Units											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Count
0	N	3	7.667	7.38	7.954	7.6	7.8	0.06667		1.51%	0
16.7		3	7.833	7.69	7.977	7.8	7.9	0.03333		0.74%	0
50.1		2	8.1	6.829	9.371	8	8.2	0.1	0.1414	1.75%	0
Overall		8	7.838	7.671	8.004	7.6	8.2	0.07055		2.55%	0 (0%)
Temperature	-°C										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Count
	N	3	24	24	24	24	24	0	0	0.0%	0
0	IN										
0 16.7	IN	3	24.07	23.92	24.21	24	24.1	0.03323	0.05755	0.24%	0
	N		24.07 24.05	23.92 23.42	24.21 24.68	24 24	24.1 24.1	0.03323 0.0499	0.05755 0.07056	0.24% 0.29%	0

Analyst: \_\_\_\_\_QA:\_\_\_

Report Date: Test Code/ID: TRU1219.056acer / 07-0764-7780

19 Dec-19 15:28 (p 2 of 3)

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCO			-							
Conc-mg/L 0	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes	_
50.1	N	1		60 160						
0	Ν	2		60 160						
50.1				160						-
0	N	3		60						
Conductivity-µr	nhos									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes	
0	N	1		326						-
16.7				955						
50.1				994						
0	N	2	_	328	-					_
16.7		_		950						
50.1				986						
0	N	3		355						
16.7		U		935						
							_	_		-
Dissolved Oxyg										
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes	
0	N	1		7.9						
16.7				9.4						
50.1				9.4						
0	Ν	2		7.9						
16.7				7.4						
50.1				7.1						
0	N	3		7.9						
16.7				8.3						
Hardness (CaC	03)-ma/L									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes	
0	N	1		94		5	moting	/ indigot	Noted	
50.1				161						
0	N	2		94	-					
50.1		2		161						
0	N	3	_	94						
	11	5		94						
pH-Units										
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes	
0	N	1		7.6						
16.7				7.9						
50.1				8.2						
0	N	2		7.8						
16.7				7.8						
50.1				8						
0	N	3		7.6						
16.7				7.8						

Report Date: Test Code/ID: TRU1219.056acer / 07-0764-7780

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C	;								
Conc-mg/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes	
0	N	1		24					
16.7				24.1					
50.1				24.1					
0	N	2		24					
16.7				24.1					
50.1				24					
0	N	3		24					
16.7				24					



December 19, 2019

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

1

CLIENT:	Trussell Technologies
SAMPLE I.D.:	Lake Piru Raw (16.7mg/l)
DATE RECEIVED:	12/06/19
ABC LAB. NO.:	TRU1219.056

### NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 0% Survival in 16.7mg/l Sample

TUa = >1.00 @ 16.7mg/l

very truly, Johnson tory Director

## AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

## NPDES Percent Survival Bioassay for Effluents and Stormwater

	SAMPLE INFORMATION
CLIENT:	Trussell Technologies Date: 12/06/19
SAMPLE I.D.:	Lake Piru Raw (16.7mg/l) LAB # TRU1219.056

## WATER QUALITY

DILUTION WAT Reconst. Fresh	AERATION Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 90 mg/l End: 100 mg/l	Beg: 60 mg/l End: 63 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 300 mg/l End: 310 mg/l	Beg: 150 mg/l End: 154 mg/l

## ORGANISM INFORMATION

Oncorhynchus mykiss	DATE REC'D;	11/24/19
Rainbow Trout		
Thomas Fish Co.		
California Overnight	NO. FISH / TANK	10
	Thomas Fish Co.	Rainbow Trout Thomas Fish Co.

## TEST DATA

and the second	Ι	NITIAL		24	HOU	RS		48	HOU	RS		72	HOU	RS		96	HOU	RS		
DATE: TIME:	12/06/19 1450 1100			1100				2/08/1 1530	9		1	12/09/19 1200	9			2/10/1 1450	9			
CONC.	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish		Temp dg.C	pН	#Fish
0 (Con.)	9.8	11.8	7.9	10	6.9	11.0	7.9	10	7.0	12.1	7.1	10	7.0	12.0	7.1	10	11.0	11.0	8.0	10
0 (Con.) 16.7mg/l	10.0	11.8 13.9	8.0	10	7.0	$11.0 \\ 11.0$	8.0 7.8	10	7.0	12.0	7.1	10	7.1	12.0	7.0	10	10.9	11.0	8.1	10
16.7mg/l	9.3	13.9	7.5	10	10.9	11.0	7.8	0				0				0				0

FINAL DATA							
TOTAL	FISH SURVIVAL						
0 (Con.)	10						
0 (Con.)	10						
16.7mg/l 16.7mg/l	0						
16.7mg/l	0						

 FINAL RESULTS

 PERCENT SURVIVAL =
 0% Survival in 16.7mg/l Sample

 TUa =
 >1.00 @ 16.7mg/l

Joe Freas, Senior/Toxicologist

Date 12



December 19, 2019

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

CLIENT:	Trussell Technologies
SAMPLE I.D.:	Lake Piru Raw (50.1mg/l)
DATE RECEIVED:	12/06/19
ABC LAB. NO.:	TRU1219.056

### NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 0% Survival in 50.1/mg/l Sample

TUa = >1.00 @ 50.1mg/1

very truly, Johnson atory Director

#### AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

# NPDES Percent Survival Bioassay for Effluents and Stormwater

	SAMPLE INFORMATI	ON
CLIENT:	Trussell Technologies	Date: 12/06/19
SAMPLE I.D.:	Lake Piru Raw (50.1mg/l)	LAB + TRU1219.056

WATER QU	ALITY
DILUTION WATI Reconst. Fresh	AERATION Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 90 mg/l End: 100 mg/l	Beg: 60 mg/l End: 63 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 320 mg/l End: 325 mg/l	Beg: 161 mg/l End: 162 mg/l

#### **ORGANISM INFORMATION** SPECIES: Oncorhynchus mykiss DATE REC'D: 11/24/19 COMMON NAME: Rainbow Trout SOURCE: Thomas Fish Cc CARRIER: California Over Thomas Fish Co.

NO. FISH / TANK

10

California Overnight

										TES	ST DA	TA								
	1	NITIAI		24	HOU	RS		48	HOU	RS		72	HOU	RS		96	HOU	RS		
DATE:		12/06/19	9		1	2/07/1	9			2/08/1	9			2/09/19	9		1	2/10/1	9	
TIME:		1450	_			1100	_		-	1530	_			1200				1450	_	
	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp	pH	#Fish
CONC.	Oxy.	dg.Č			Oxy.	dg.Č		A	Oxy.	dg.Ċ		1.1	Oxy.	dg.Ĉ	- 1	1	Oxy.	dg.Ċ		1.1
0 (Con.)	9.8	11.8	7.9	10	6.9	11.0	7.9	10	7.0	12.1	7.1	10	7.0	12.0	7.1	10	11.0	11.0	8.0	10
0 (Con.)	10.0	11.8	8.0	10	7.0	11.0	8.0	10	7.0	12.0	7.1	10	7.1	12.0	7.0	10	10.9	11.0	8.1	10
50.1mg/1	9.2	13.9	7.3	10	10.7	11.0	7.7	0				0				0				0
50.1mg/l	8.9	13.9	7.0	10	10.6	11.0	7.7	0				0				0				0

j	FINAL I	DATA
	TOTAL	FISH SURVIVAL
	0 (Con.)	10
l	0 (Con.)	10
l	50.1mg/1	0
1	50.1mg/l	0

FINAL RESULTS 0% Survival in 50.1/mg/l Sample >1.00 @ 50.1mg/l PERCENT SURVIVAL = TUa =

-7. Joe Freas, Senfor Toxicologist

Date

# CHAIN OF CUSTODY RECORD

Client:					Project Name/Number:		1		_		-		Analy	sis				
					Liana Olivas							1000						
Truss	ell	Tec	hr	nologies	(1,26) 375 - 8150		1. 3	2	4						•			
Address	and a		Δ.	J	(626) 375 - 8150 Project Mgr. David Ho	kanson	xici ty	120	fit.									
234	p. eui	re	/ <del>+</del> v	e	P.O. #		2.5	5.2	5-2									1
	wa, c	A	9	11/01			X	XZ	ο r	-								
Phone N	umber:				Sampled By (sigpature)		Fr	エル	P P					1.1				
(626)	375	-8	150	Ø	fill-		10	<u>ع</u> ج	i te									
Date	Time	Comp.	Grab	Matrix	Sample ID	Volume/ Number	Aud	AC	Aut								Comments	
12/4/19	9:00		J	Liquid	Lake Piru Raw	28 2	2	2	2								Two Barth Tec Dases each	50-1 mg
				· -				1		-			4					(50:1 mg
			4					- 4										
							1								-			
					120-													
						0										_		284
					l'emp. deg. C =	450	1	-	- i	T AT	150	ENT.						
					1000						2 - 10 14 1							
	-				Chloring (													
					Chlorine (mg/L) =	20.1		= (	I/Su	I) Ə1	,1011					1		1
					1 31		1				10		•					
					NH3 (mg/L) =	109			~	320	*	0 T						
						1	1			+					1			
				_			1		1									ľ
				. /	1													1
Relinquis	ed By: (sig	nature	)	1.1		: Time:	1	nquise	d By:(s	ignature	) .						Date: Time:	1
Received	By:(signat	ure)	0	A	Liavo Ulivas Date	/19 13:00 : Time:	Rec	eived E	3 <b>y:</b> (sign	ature)							Date: Time:	
	ŕ	m	eD		12-6-10	3 134	Tem	p. upon	samp	le rece	ipt:		°C					

Aquatic Bioassay and Consulting Laboratories 29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930



Appendix C – Lake Mathews 2020 Toxicity Test Report



October 22, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Mathews Raw with EarthTec
DATE RECEIVED:	10 Sept – 20
ABC LAB NO.:	TRU0920.134

# ACUTE FATHEAD MINNOW SURVIVAL BIOASSAY

% Survival

ral = 92.5 % Survival in 16.7 mg/l Sample

EC50 = >16.7 mg/l

ery truly, cott Johnson Laboratory Director

# **CETIS Summary Report**

 Report Date:
 21 Oct-20 15:15 (p 1 of 1)

 Test Code/ID:
 TRU0920.134afml / 20-4338-7613

								Test	Code/II	D:	TRU0920.1	34afml / 20-	-4338-761
Fathead Minn	ow 96-h Acute S	urvival Test							Aquat	ic Bi	oassay & C	onsulting	Labs, Inc.
Batch ID:	03-3365-6779	Test T	ype:	Survival (96h)				Anal	lyst:				
Start Date:	22 Sep-20 13:25	Protoc	col:	EPA/821/R-02-0	012 (2002)			Dilu	ent:	Labo	oratory Wate	r	
_	26 Sep-20 13:30	Specie	es:	Pimephales pro	melas			Brin	e:	Not /	Applicable		
Test Length:	4d 0h	Taxon	:	Actinopterygii				Sou	rce:	Aqua	atic Biosyste	ems, CO	Age:
Sample ID:	05-3885-0428	Code:		TRU0920.134a1	fml			Proj	ect:				
Sample Date:	10 Sep-20 09:50	) Materi	al:	Sample Water				Sou	rce:	Bioa	ssay Report		
Receipt Date:	10 Sep-20 09:50	CAS (I	PC):					Stat	ion:	Lake	Mathews R	law with Ear	rth Tec
Sample Age:	12d 4h (9.3 °C)	Client		Trussell Techno	ologies								
Multiple Com	parison Summa	ry											
Analysis ID	Endpoint	(	Compa	arison Method		$\checkmark$	N	OEL	LOEL		TOEL	PMSD	
07-4137-4317	96h Survival Rat	ie S	Steel N	/any-One Rank	Sum Test		16	6.7	>16.7			9.21%	
Point Estimat	e Summary												
Analysis ID	Endpoint	F	Point I	Estimate Metho	bd	~	Ĺ	evel	mg/L		95% LCL	95% UCL	
09-5562-0350	96h Survival Rat	te I	inear	Interpolation (IC	CPIN)		E	C10	>16.7			***	
							Е	C15	>16.7				
							Ε	C20	>16.7				
							Е	C25	>16.7				
							Е	C40	>16.7				
			-				Е	C50	>16.7				
Test Accepta	bility					TAC I	.imi	ts					
Analysis ID	Endpoint		Attribu	ute	Test Stat	Lower	U	pper	Over	lap	Decision		
07-4137-4317	96h Survival Rat	te (	Contro	l Resp	1	0.9	>:	>	Yes		Passes Cr	iteria	
09-5562-0350	96h Survival Rat	te i	Contro	l Resp	1	0.9	>	>	Yes		Passes Cr	iteria	
96h Survival	Rate Summary												
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	M	lax	Std E	rr	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1	.0000	0.000	0	0.0000		0.00%
8.35		4	0.9750	0.8954	1.0550	0.9000	1	.0000	0.025	0	0.0500	5.13%	2.50%
16.7		4 1	0.9250	0.7727	1.0770	0.8000	1	.0000	0.047	9	0.0957	10.35%	7.50%
96h Survival	Rate Detail							MD	5: B7E	7C8/	5E8F52720	CD2997374	2D21B3F
Conc-mg/L	Code		Rep 2		Rep 4								
0	N	1.0000	1.0000	0 1.0000	1.0000								
8.35		1.0000	1.0000	) 1.0000	0.9000								
16.7		0.8000	0.9000	1.0000	1.0000								
96h Survival	Rate Binomials												
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4								
0	N	10/10	10/10	10/10	10/10								
8.35		10/10	10/10	10/10	9/10								

Analyst: Analyst: Analyst: Analyst:

16.7

8/10

9/10

10/10

10/10

Fathead Minnov	v 96-h Acute S	urvival Te	st							Aquatic I	Bioassay & C	onsulting	Labs, Inc.
Analysis ID: 07	7-4137-4317	End	point:	96h Survival Ra	te				CET	S Version	CETISv1.	9.7	
Analyzed: 2	1 Oct-20 15:14		-	Nonparametric-0					Statu	us Level:	1		
Edit Date: 21	1 Oct-20 15:13	MD	5 Hash:	B7E7C8A5E8F5	5272CD29	97	3742D21B	3F9	Edite	or ID:	000-189-1	26-0	
Batch ID: 03	3-3365-6779	Tes	t Type:	Survival (96h)					Anal	yst:			
Start Date: 22	2 Sep-20 13:25		-	EPA/821/R-02-0	012 (2002)				Dilue	ent: Lat	oratory Wate	er	
Ending Date: 20	6 Sep-20 13:30	) Spe	cies:	Pimephales pro	melas				Brin	e: No	t Applicable		
Test Length: 4	d Oh	Тах		Actinopterygii					Sou	rce: Aq	uatic Biosyste	ems, CO	Age:
Sample ID: 0	5-3885-0428	Cod	<u>ه</u> .	TRU0920.134af	fml	-			Proj	ect:	_		
Sample Date: 10				Sample Water					Sou		assay Report	ł	
Receipt Date: 10			6 (PC):						Stati		ke Mathews F		arth Tec
Sample Age: 1				Trussell Techno	ologies								
Data Transform		Alt Hyp				-	NOEL	LO	FI	TOEL	TU	MSDu	PMSD
Angular (Correct		C > T				-	16.7	>16				0.09209	9.21%
Steel Many-One	Rank Sum Te	st				-							
Control v			Toet 9	Stat Critical	Ties D	F	P-Type	p_\/	alue	Decision	)(d:5%)		
Negative Control		j, <b>L</b>	16	11	1 6	_	CDF		206		nificant Effect		
-ogaine control	16.7		14	11	1 6		CDF		042	•	nificant Effect		
Toot Accordet!													
Test Acceptabil	•	TAC L			Dest								
Attribute	Test Stat		Upper		Decisio	_	lie die			_			
Control Resp	1	0.9	>>	Yes	Passes	Uri	iteria			_			
ANOVA Table													
Source	Sum Squ	ares	Mean	Square	DF		F Stat	P-V	/alue	Decisio	n(α:5%)		
Between	0.028198		0.0140	099	2		1.498	0.2	744	Non-Sig	nificant Effect		
Error	0.0847049	9	0.0094	4117	9								
Total	0.112903				11								
ANOVA Assum	ptions Tests												
Attribute	Test				Test Sta	t	Critical	P-V	/alue	Decisio	n(α:1%)		
Variance	Bartlett Ec	quality of Va	ariance T	est		-				Indeterm			
		quality of V			8.187		8.022	0.0	094	Unequal	Variances		
	Mod Leve	ne Equality	of Varia	nce Test	3.623		8.022	0.0	701	Equal V	ariances		
Distribution	Anderson	-Darling A2	Test		0.6319		3.878	0.1	002	Normal	Distribution		
		o Skewnes			1.332		2.576	0.1	827	Normal	Distribution		
	-	ov-Smirnov			0.25		0.2801		369	Normal	Distribution		
	Shapiro-V	Vilk W Norr	nality Te	st	0.906		0.8025	0.1	897	Normal	Distribution		
96h Survival Ra	ate Summary												
Conc-mg/L	Code	Count	Mean	95% LCL	95% UC	L	Median	Mi	n	Max	Std Err	CV%	%Effect
0	N	4	1.000	0 1.0000	1.0000		1.0000	1.0	000	1.0000	0.0000	0.00%	0.00%
8.35		4	0.975	0 0.8954	1.0000		1.0000	0.9	000	1.0000	0.0250	5.13%	2.50%
16.7		4	0.925	0 0.7727	1.0000		0.9500	0.8	000	1.0000	0.0479	10.35%	7.50%
Angular (Corre	cted) Transfor	med Sumr	nary										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UC	L	Median	Mi	n	Max	Std Err	CV%	%Effect
0	N	4	1.412		1.4120	-	1.4120	_	120	1.4120	0.0000	0.00%	0.00%
8.35		4	1.371		1.5010		1.4120		2490	1.4120	0.0407	5.94%	2.89%
16.7		4	1.295		1.5290		1.3310		070	1.4120	0.0735	11.35%	8.28%
96h Survival R	ate Detail					-							
Conc-mg/L	Code	Rep 1	Rep 2	2 Rep 3	Rep 4								
0	N	1.0000	1.000		1.0000	-			_			_	-
8.35		1.0000	1.000		0.9000								
0.00		0.0000	0.000		1.0000								

0.8000

0.9000

1.0000

16.7

1.0000

P

CETIS	Analytical	Report
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## Fathead Minnow 96-h Acute Survival Test

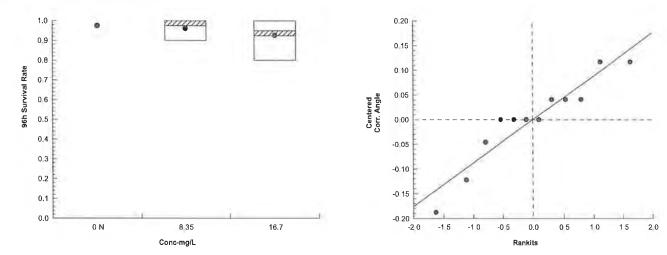
Fathead Minn	now 96-h Acute Surv	vival Test		Aquatic Bi	oassay & Consulting Labs, Inc.
Analysis ID;	07-4137-4317	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7
Analyzed:	21 Oct-20 15:14	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1
Edit Date:	21 Oct-20 15:13	MD5 Hash:	B7E7C8A5E8F5272CD29973742D21B3F9	Editor ID:	000-189-126-0

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	N	1.4120	1.4120	1.4120	1.4120	
8.35		1.4120	1.4120	1.4120	1.2490	
16.7		1.1070	1.2490	1.4120	1.4120	

# 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	N	10/10	10/10	10/10	10/10	
8.35		10/10	10/10	10/10	9/10	
16.7		8/10	9/10	10/10	10/10	

## Graphics



Analyst: QA:

Fathead Minn	ow 96-h Acute Sur	vival Test				Aqua	tic Bi	oassay & Consulting	J Labs, Ir
Analysis ID:	09-5562-0350	Endpoint:	96h Survival R	6h Survival Rate				CETISv1.9.7	
Analyzed:	21 Oct-20 15:14	Analysis:	Linear Interpol	ation (ICPIN)		Status Leve	el:	1	
Edit Date:	21 Oct-20 15:13	MD5 Hash:	B7E7C8A5E8F	B7E7C8A5E8F5272CD29973742D21B3F9				000-189-126-0	
Batch ID:	03-3365-6779	Test Type:	Survival (96h)		Analyst:				
Start Date:	22 Sep-20 13:25	Protocol:	EPA/821/R-02	-012 (2002)		Diluent:	Labo	ratory Water	
Ending Date:	26 Sep-20 13:30	Species:	Pimephales pr	Pimephales promelas				Applicable	
Test Length:	4d Oh	Taxon:	Actinopterygii			Source:	Aqua	atic Biosystems, CO	Age:
Sample ID:	05-3885-0428	Code:	TRU0920.134	afml		Project:			
Sample Date:	10 Sep-20 09:50	Material:	Sample Water			Source:	Bioa	ssay Report	
Receipt Date:	10 Sep-20 09:50	CAS (PC):				Station:	Lake	Mathews Raw with E	arth Tec
Sample Age:	12d 4h (9.3 °C)	Client:	Trussell Techr	nologies					
Linear Interpo	olation Options								
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method				
Linear	Linear	0	280	Yes	Two-Point	t Interpolation			
Test Accepta	bility Criteria	TAC Limits							

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria
		0.0		100	

Ро	int	Est	ima	tes
----	-----	-----	-----	-----

Level	mg/L	95% LCL	95% UCL	
EC10	>16.7			
EC15	>16.7			
EC20	>16.7			
EC25	>16.7			
EC40	>16.7	-		
EC50	>16.7			

96h Survival Ra	ate Summary		Calculated Variate(A/B)								Isotonic Variate	
Conc-mg/L	Code	Count	Mean	Median	Min	Мах	CV%	%Effect	A/B	Mean	%Effect	
0	N	4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	40/40	1.0000	0.00%	
8.35		4	0.9750	1.0000	0.9000	1.0000	5.13%	2.50%	39/40	0.9750	2.50%	
16.7		4	0.9250	0.9500	0.8000	1.0000	10.35%	7.50%	37/40	0.9250	7.50%	

## 96h Survival Rate Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	1.0000	0.9000
16.7		0.8000	0.9000	1.0000	1.0000

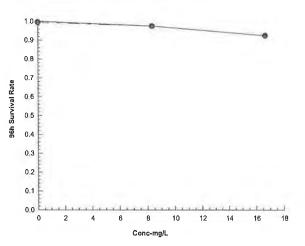
## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	10/10	10/10	10/10	10/10
8.35		10/10	10/10	10/10	9/10
16.7		8/10	9/10	10/10	10/10

P QA: Analyst: ve

CETIS Ana	alytical Report			Report Date: Test Code/ID:	21 Oct-20 15:15 (p 2 of 2) TRU0920.134afml / 20-4338-7613
Fathead Min	now 96-h Acute Surv	vival Test		Aquatic B	ioassay & Consulting Labs, Inc.
Analysis ID:	09-5562-0350	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7
Analyzed:	21 Oct-20 15:14	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1
Edit Date:	21 Oct-20 15:13	MD5 Hash:	B7E7C8A5E8F5272CD29973742D21B3F9	Editor ID:	000-189-126-0

# Graphics



Analyst: OA

 Report Date:
 21 Oct-20 15:15 (p 1 of 3)

 Test Code/ID:
 TRU0920.134afml / 20-4338-7613

Fathead Minnow 96-h Acute Survival Test

Batch ID:	03-3365-6779			Survival (96h)			An	alyst:				
Start Date:	22 Sep-20 13:25		rotocol:	EPA/821/R-02-	-012 (2002)		Di	Diluent: Laboratory Water				
Ending Date:	26 Sep-20 13:30	) <b>s</b>	pecies:	Pimephales pro	omelas		Br	Brine: Not Applicable				
Test Length:	4d 0h	Т	axon:	Actinopterygii	-		Sc	Source: Aquatic Biosystems, C			Age:	
Sample ID:	05-3885-0428	C	ode:	TRU0920.134a	afml		Pr	oject:				
Sample Date:	10 Sep-20 09:50	0 N	laterial:	Sample Water	ample Water			ource: Bio	bassay Repo	rt		
Receipt Date:	10 Sep-20 09:50	0 <b>C</b>	AS (PC):				St	ation: La	ke Mathews	Raw with E	arth Tec	
Sample Age:	12d 4h (9.3 °C)	C	lient:	Trussell Techn	ologies							
Alkalinity (Ca	CO3)-mg/L											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Coun	
0	N	3	60	60	60	60	60	0	0	0.00%	0	
8.35		3	100	100	100	100	100	0	0	0.00%	0	
Overall		6	80	57.01	103	60	100	8.944	21.91	27.39%	0 (0%)	
Conductivity-	-µmhos											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun	
0	N	3	337.7	332.5	342.8	336	340	0.6939	2.082	0.62%	0	
8.35		3	1129	1067	1191	1102	1151	8.293	24.88	2.20%	0	
16.7		3	1097	1090	1103	1094	1099	0.8389	2.517	0.23%	0	
Overall		9	854.4	556.2	1153	336	1151	129.3	388	45.41%	0 (0%)	
Dissolved Ox	(ygen-mg/L											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun	
0	N	3	7.4	6.655	8.145	7.1	7.7	0.1	0.3	4.05%	0	
8.35		3	7.6	6.11	9.09	7	8.2	0.2	0.6	7.89%	0	
16.7		3	7.467	6.463	8.471	7	7.7	0.1347	0.4041	5.41%	0	
Overall		9	7.489	7.18	7.797	7	8.2	0.1338	0.4014	5.36%	0 (0%)	
Hardness (Ca	aCO3)-mg/L											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun	
0	N	3	85	85	85	85	85	0	0	0.00%	0	
8.35		3	350	350	350	350	350	0	0	0.00%	0	
Overall		6	217.5	65.18	369.8	85	350	59.26	145.1	66.73%	0 (0%)	
pH-Units												
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cour	
0	N	3	8	7.57	8.43	7.9	8.2	0.05773	0.1732	2.17%	0	
8.35		3	7.9	7.652	8.148	7.8	8	0.03333	0.1	1.27%	0	
16.7		3	7.867	7.723	8.01	7.8	7.9	0.01924	0.05772	0.73%	0	
Overall		9	7.922	7.83	8.015	7.8	8.2	0.04006	0.1202	1.52%	0 (0%)	
Temperature	°C											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cour	
0	N	3	24	24	24	24	24	0	0	0.00%	0	
8.35		3	24.1	23.67	24.53	24	24.3	0.05775	0.1732	0.72%	0	
0.00												
16.7		3	24.13		24.71	24	24.4	0.07698	0.2309	0.96%	0	

QA: Analyst:\_\_\_\_\_

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCC	03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
8.35				100					
0	N	2		60					
8.35				100					
0	N	3		60					
8.35				100					
Conductivity-µn	nhos								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		337					
8.35				1102					
16.7				1094					
0	N	2		336	_				
8.35				1134					
16.7				1097					
0	N	3		340					
8.35		-		1151					
16.7				1099					
Dissolved Oxyg	ien-ma/l								
Conc-mg/L	Code	Read	Time	Measure	٥A	Diff-%	Inst ID	Analyst	Notes
0	N	1	THIL	7.7	NOT N	DIII-70	motib	Analyst	Notes
8.35				8.2					
16.7				7.7					
0	N	2		7.4					
8.35		-		7.6					
16.7				7.7					
0	N	3	_	7.1					
8.35		•		7					
16.7				7					
Hardness (CaC	O3)-ma/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		85				,	
8.35				350					
0	N	2		85					
8.35				350					
0	N	3		85					
8.35				350					
pH-Units									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2					
8.35				7.8					
16.7				7.8					
0	N	2	-	7.9					
8.35				8					
16.7				7.9					
0	N	3		7.9					
8.35				7.9					
16.7				7.9					

QA:

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C								
Conc-mg/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		24				
8.35				24				
16.7				24				
0	N	2		24				
8.35				24.3				
16.7				24.4				
0	N	3		24				
8.35				24				
16.7				24				

QA: Analyst:



October 22, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Mathews Raw with EarthTec
DATE RECEIVED:	10 Sept – 20
ABC LAB NO.:	TRU0920.134

# ACUTE CERIODAPHNIA SURVIVAL BIOASSAY

% Survival = 0 % Survival in 8.35mg/l & 16.7mg/l Sample

EC50 = 4.175 mg/l

Yours very truly, hnson Laboratory Director

O and a stand start	00 h Anute 0	al Test											Laba turi
Ceriodaphnia	96-h Acute Survi	val Test	~						Aqua	tic Bi	oassay & C	onsulting	Labs, Inc.
Batch ID:	16-7661-4185		t Type:		· · /			An	alyst:				
Start Date:	22 Sep-20 13:25		tocol:			)12 (2002)			luent:		ratory Wate	r	
	26 Sep-20 13:30	•	cies:		laphnia du	ubia			ine:		pplicable	~~	
Test Length:	4d Un	Тах	on:	Branch	niopoda			So	ource:	Aqua	tic Biosyste	ms, CO	Age:
Sample ID:	12-0106-0394	Coc	le:	TRU09	920.134a	cer		Pr	oject:				
•	10 Sep-20 09:50	Mat	erial:	Sampl	e Water			So	ource:		ssay Report		
-	10 Sep-20 09:50	CAS	6 (PC):					St	ation:	Lake	Mathews R	aw with Ea	rth Tec
Sample Age:	12d 4h (9.3 °C)	Clie	ent:	Trusse	eil Techno	logies							
Point Estimat	e Summary												
Analysis ID	Endpoint		Point	Estima	ate Metho	bd	$\checkmark$	Level	mg/L		95% LCL	95% UCL	
14-9409-9402	96h Survival Rate		Linea	r Interpo	olation (IC	PIN)		EC10	0.835	5	0.835	0.835	
								EC15	1.253	3	1.253	1.253	
								EC20	1.67		1.67	1.67	
								EC25	2.088	3	2.088	2.088	
								EC40	3.34		3.34	3.34	
								EC50	4.17	0	4.175	4.175	_
Test Acceptal	bility						TAC L	imits					
Analysis ID	Endpoint		Attrik			Test Stat		Upper	Over	lap	Decision		
	96h Survival Rate			ol Resp		1	0.9	>>	Yes		Passes Cr		
17-2439-4970	96h Survival Rate	)	Contr	ol Resp	)	1	0.9	>>	Yes		Passes Cr	iteria	
96h Survival	Rate Summary												
Conc-mg/L	Code	Count	Mear		95% LCL	95% UCL	Min	Max	Std		Std Dev	CV%	%Effect
0	N	4	1.000		0000.1	1.0000	1.0000	1.0000			0.0000		0.00%
8.35		4	0.000		0.0000	0.0000	0.0000	0.0000			0.0000		100.00%
16.7		4	0.000	0 0	0.0000	0.0000	0.0000	0.0000	0.00	00	0.0000	1	100.00%
96h Survival	Rate Detail							N	AD5: 792	42C0	938E02BA8	B3CB4769	263E98D9
Conc-mg/L	Code	Rep 1	Rep		Rep 3	Rep 4							
0	Ν	1.0000	1.000		1.0000	1.0000							
8.35		0.0000	0.000	00 0	0.0000	0.0000							
16.7		0.0000	0.000	00 0	0.0000	0.0000							
96h Survival	Rate Binomials												
Conc-mg/L	Code	Rep 1	Rep	2 F	Rep 3	Rep 4		_					
0	N	5/5	5/5	5	5/5	5/5							
8.35		0/5	0/5	ſ	0/5	0/5							
0.55		0/0	0/5		510	0/5							

PASS QA: Analyst:\_

 Report Date:
 21 Oct-20 15:24 (p 1 of 2)

 Test Code/ID:
 TRU0920.134acer / 06-8706-0944

Ceriodaphnia	96-h Acute Surv	ival Test								Aquatic	Bioassay & (	Consulting	Labs, Inc
Analysis ID: Analyzed: Edit Date:	17-2439-4970 21 Oct-20 15:23 21 Oct-20 15:21	Endpoint: Analysis: MD5 Hash:		96h Survival Rate Parametric-Two Sample : 79242C0938E02BA8B3CB4769263E98D9				5		S Version s Level: r ID:	1	CETISv1.9.7 1 000-189-126-0	
Batch ID:	16-7661-4185	Tes	t Type	Sur	vival (96h)				Analy	vst:			
Start Date:	22 Sep-20 13:25		tocol:		/821/R-02-0	12 (2002)			Dilue		boratory Wat	er	
	26 Sep-20 13:30		cies:		iodaphnia du	• •			Brine		t Applicable	01	
Test Length:		•	ion:		nchiopoda	loid			Sourc		uatic Biosyst	ems CO	Age:
									-				riger
Sample ID:	12-0106-0394	Co			J0920.134a	cer			Proje		_		
•	10 Sep-20 09:50		terial:	San	nple Water				Sour		oassay Repo		
-	10 Sep-20 09:50		S (PC):					5	Static	on: La	ke Mathews I	Raw with E	arth liec
Sample Age:	12d 4h (9.3 °C)	Clie	ent:	Tru	ssell Techno	ologies	_						
Test Acceptal	bility Criteria	TAC I	imits										
Attribute	Test Stat		Uppe	r	Overlap	Decision							
Control Resp	1	0.9	>>		Yes	Passes Cr	iteria						
ANOVA Assu	mptions Tests												
Attribute	Test					Test Stat	Critical	P-Va	lue	Decisio	n(a:1%)		
Distribution	Shapiro-Wilk W Normality Te			st		, cot otut				Indetern			
96h Survival	Rate Summary		-										
		Count	Мали			95% UCL	Madian	Min		Max	Std Err	CV%	%Effect
Conc-mg/L	Code N	Count 4	Mear 1.000		95% LCL 1.0000	1.0000	Median 1.0000	Min 1.000	0	Max 1.0000	0.0000	0.00%	0.00%
0 8.35	IN	4 4	0.000		0.0000	0.0000	0.0000	0.000		0.0000	0.0000	0.00%	100.00%
16.7		4	0.000		0.0000	0.0000	0.0000	0.000		0.0000	0.0000		100.00%
		_			0.0000	0.0000	0.0000	0.000		0.0000	0.0000		100.007
•	rected) Transfori				0.5% 1.01	0.50/ 11.01						01/0/	0/ 555
Conc-mg/L	Code	Count	Mear	_	95% LCL	95% UCL		Min		Max	Std Err	CV%	%Effect
0	N	4	1.345		1.3450	1.3460	1.3450	1.345		1.3450 0.2255	0.0000 0.0000	0.00% 0.00%	0.00% 83.24%
8.35 16.7		4 4	0.225		0.2255 0.2255	0.2256 0.2256	0.2255 0.2255	0.225		0.2255	0.0000	0.00%	83.24% 83.24%
		4	0.223	50	0.2200	0.2200	0.2200	0.223		0.2200	0.0000	0.0076	00.2470
96h Survival	Rate Detail												
Conc-mg/L	Code	Rep 1	Rep	_	Rep 3	Rep 4			_			_	
0	N	1.0000	1.000		1.0000	1.0000							
8.35		0.0000	0.000		0.0000	0.0000							
16.7		0.0000	0.00	00	0.0000	0.0000		_					
Angular (Cor	rected) Transfor	med Deta	il										
Conc-mg/L	Code	Rep 1	Rep	2	Rep 3	Rep 4							
0	N	1.3450	1.34	50	1.3450	1.3450							
8.35		0.2255	0.22	55	0.2255	0.2255							
16.7		0.2255	0.22	55	0.2255	0.2255							
96h Survival	Rate Binomials												
Conc-mg/L	Code	Rep 1	Rep	2	Rep 3	Rep 4							
Sone-mg/L	Code	Rep I	Kep 5/5	~	Trep 5	rep 4							

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	5/5	5/5	5/5	5/5
8.35		0/5	0/5	0/5	0/5
16.7		0/5	0/5	0/5	0/5

Analyst:\_\_\_\_\_QA:\_\_\_\_

Ceriodaphnia	a 96-h Acute Surviva	l Test	Aquatic Bioassay & Consulting Labs, Inc			
Analysis ID: Analyzed: Edit Date:	17-2439-4970 21 Oct-20 15:23 21 Oct-20 15:21	Analysis:	96h Survival Rate Parametric-Two Samp 79242C0938E02BA8E		CETIS Version: Status Level: Editor ID:	CETISv1.9.7 1 000-189-126-0
Graphics						
1.0 0.9 0.8 0.7 0.6 40 0.5 0.5 0.4 0.3 0.2 0.1	••		Reject Null -	1.0 Centrered 0.0 5 0.3 - 0.3		
0.0	0 N	8.35	16.7	0.0 -2.0 -1.5	-1.0 -0.5 0.0	0.5 1.0 1.5 2.0
		onc-mg/L			Rankits	

Report Date:

21 Oct-20 15:24 (p 2 of 2)

Test Code/ID: TRU0920.134acer / 06-8706-0944

Analyst:\_\_\_\_\_QA:\_\_\_

**CETIS Analytical Report** 

Report Date: 21 Oct-20 15:24 (p 1 of 2) TRU0920.134acer / 06-8706-0944 Test Code/ID:

a 96-h Acute Surv	ival Test					Aqua	tic Bi	oassay & Consulting	g Labs, Ir
14-9409-9402 21 Oct-20 15:23 21 Oct-20 15:21	Analysis	s: Line	ear Interpola	tion (ICPIN)	63E98D9			CETISv1.9.7 1 000-189-126-0	
16-7661-4185	Test Typ	be: Surv	vival (96h)			Analyst:			
22 Sep-20 13:25	Protoco	I: EPA	V821/R-02-	012 (2002)		Diluent:	Labo	oratory Water	
: 26 Sep-20 13:30	Species	: Ceri	iodaphnia d	ubia		Brine:	Not A	Applicable	
4d Oh	Taxon:	Brai	nchiopoda			Source:	Aqua	atic Biosystems, CO	Age:
12-0106-0394	Code:	TRU	J0920.134a	cer		Project:			
: 10 Sep-20 09:50	Material	I: San	nple Water			Source:	Bioa	ssay Report	
: 10 Sep-20 09:50	CAS (PC	C):				Station:	Lake	e Mathews Raw with E	arth Tec
12d 4h (9.3 °C)	Client:	Trus	ssell Techno	ologies					
olation Options									
Y Transform	Seed	Res	amples	Exp 95% CL	Method				
Linear	0	280		Yes	Two-Point	Interpolation			
ability Criteria	TAC Limit	s							
Test Stat	Lower Up	oper	Overlap	Decision					
1	0.9 >>	,	Yes	Passes Criteria					
	010								
ates									
	95% UCL								
ates	_								
ates /L 95% LCL	95% UCL								
ates <b>12</b> 95% LCL 35 0.835	<b>95% UCL</b> 0.835								
95% LCL           0.835           0.3           1.253	<b>95% UCL</b> 0.835 1.253								
	14-9409-9402 21 Oct-20 15:23 21 Oct-20 15:21 16-7661-4185 22 Sep-20 13:25 : 26 Sep-20 13:30 4d 0h 12-0106-0394 : 10 Sep-20 09:50 12 4h (9.3 °C) colation Options Y Transform Linear ability Criteria Test Stat	14-9409-9402       Endpoir         21 Oct-20 15:23       Analysis         21 Oct-20 15:21       MD5 Ha         16-7661-4185       Test Typ         22 Sep-20 13:25       Protocol         26 Sep-20 13:30       Species         4d 0h       Taxon:         12-0106-0394       Code:         : 10 Sep-20 09:50       Material         :: 10 Sep-20 09:50       CAS (PO         : 12d 4h (9.3 °C)       Client:         colation Options       Y Transform         Y Transform       Seed         Linear       0         ability Criteria       TAC Limit         Test Stat       Lower       Up	14-9409-9402       Endpoint:       96h         21 Oct-20 15:23       Analysis:       Line         21 Oct-20 15:21       MD5 Hash:       792         16-7661-4185       Test Type:       Sur         22 Sep-20 13:25       Protocol:       EPA         26 Sep-20 13:30       Species:       Cer         4d 0h       Taxon:       Brain         12-0106-0394       Code:       TRU         : 10 Sep-20 09:50       Material:       San         : 10 Sep-20 09:50       CAS (PC):       Tru:         : 10 Sep-20 09:50       CAS (PC):       Tru:         : 10 Sep-20 09:50       CAS (PC):       Tru:         : 10 Sep-20 09:50       CAS (PC):       San         : 10 Sep-20 09:50       CAS (PC):       Tru:         : 10 Sep-20 09:50       CAS (PC):       San         : 10 Sep-20 Options       Tru:       San         : San       San       <	14-9409-9402Endpoint:96h Survival Ra21 Oct-20 15:23Analysis:Linear Interpola21 Oct-20 15:21MD5 Hash:79242C0938E016-7661-4185Test Type:Survival (96h)22 Sep-20 13:25Protocol:EPA/821/R-02-626 Sep-20 13:30Species:Ceriodaphnia di4d 0hTaxon:Branchiopoda12-0106-0394Code:TRU0920.134a: 10 Sep-20 09:50Material:Sample Water:: 10 Sep-20 09:50CAS (PC):Trussell Techno:: 10 Sep-20 09:50Client:Trussell Techno:: 10 Sep-20 09:50CAS (PC):Linear:: 10 Sep-20 09:50CAS (PC):Trussell Techno:: 10 Sep-20 09:50SeedResamples:: 10 Sep-20 09:50CAS (PC):Trussell Techno:: 10 Sep-20 09:50SeedResamples:: 10 Sep-20 09:50SeedResamples:: 10 Sep-20 09:50SeedResamples:: 10 Sep-20 09:50SeedResamples:: 10 Sep-20 09:50SeedSeed	14-9409-9402       Endpoint:       96h Survival Rate         21 Oct-20 15:23       Analysis:       Linear Interpolation (ICPIN)         21 Oct-20 15:21       MD5 Hash:       79242C0938E02BA8B3CB47692         16-7661-4185       Test Type:       Survival (96h)         22 Sep-20 13:25       Protocol:       EPA/821/R-02-012 (2002)         26 Sep-20 13:30       Species:       Ceriodaphnia dubia         4d 0h       Taxon:       Branchiopoda         12-0106-0394       Code:       TRU0920.134acer         : 10 Sep-20 09:50       Material:       Sample Water         : 10 Sep-20 09:50       CAS (PC):       Trussell Technologies         : 10 Sep-20 09:50       Seed       Resamples       Exp 95% CL         : Linear       <	14-9409-9402Endpoint:96h Survival Rate21 Oct-20 15:23Analysis:Linear Interpolation (ICPIN)21 Oct-20 15:21MD5 Hash:79242C0938E02BA8B3CB4769263E98D916-7661-4185Test Type:Survival (96h)22 Sep-20 13:25Protocol:EPA/821/R-02-012 (2002)26 Sep-20 13:30Species:Ceriodaphnia dubia4d 0hTaxon:Branchiopoda12-0106-0394Code:TRU0920.134acer: 10 Sep-20 09:50Material:Sample Water:: 10 Sep-20 09:50CAS (PC):Trussell Technologies: 12d 4h (9.3 °C)Client:Trussell Technologiesv TransformSeedResamplesExp 95% CLMethodLinear0280Y TransformSeedResamplesExp 95% CLMethodLinear0280Y Test StatLowerUpperOverlapDecision	14-9409-9402 21 Oct-20 15:23 21 Oct-20 15:21Endpoint: 96h Survival RateCETIS Vers Status Level16-7661-4185 22 Sep-20 13:25Test Type: Protocol:Survival (96h)Analyst: Diluent:16-7661-4185 22 Sep-20 13:25Test Type: Protocol:Survival (96h)Analyst: Diluent:26 Sep-20 13:30 4d 0hSpecies: Taxon:Ceriodaphnia dubiaBrine: Source:12-0106-0394 10 Sep-20 09:50Code: CAS (PC): Client:TRU0920.134acerProject: Source:12 d 4h (9.3 °C)Client: Client:Trussell TechnologiesStation: Two-Point Interpolation12 d 4h (9.3 °C)Seed Client:Resamples Trussell TechnologiesExp 95% CL Two-Point Interpolation12 bility Criteria ability Criteria Test Stat Test Stat LowerDecisionMethod	14-9409-9402 21 Oct-20 15:23 21 Oct-20 15:21Endpoint: 96h Survival Rate Linear Interpolation (ICPIN) MD5 Hash: 79242C0938E02BA8B3CB4769263E98D9CETIS Version: Status Level: Editor ID:16-7661-4185 22 Sep-20 13:25Test Type: Protocol: EPA/821/R-02-012 (2002)Analyst: Diluent: Diluent: Labo Brine: Not A Source: Aqua12-0106-0394 21 O sep-20 09:50Code: Material: Material: Sample WaterProject: Source: Bioa10 Sep-20 09:50 12 d 4h (9.3 °C)Code: Client: Client:Trussell TechnologiesV Transform bility Criteria TAC Limits Test Stat LowerQao VerlapYes Two-Point Interpolation	14-9409-9402       Endpoint:       96h Survival Rate       CETIS Version:       Cetod:       Cetod:       Teditor ID:       000-189-126-0         16-7661-4185       Test Type:       Survival (96h)       Analyst:       Diluent:       Laboratory Water       Editor ID:       000-189-126-0         22 Sep-20 13:25       Protocol:       EPA/821/R-02-012 (2002)       Diluent:       Laboratory Water       Source:       Aquatic Biosystems, CO         12-0106-0394       Code:       TRU0920.134acer       Project:       Source:       Bioassay Report       Source:       Station:       Lake Mathews Raw with E         12d 4h (9.3 °C)       Client:       Trus

EC40 3.34 3.34 EC50 4.175 4.175 4.175

## 96h Survival Rate Summary

96h Survival Ra	Calculated Variate(A/B)							Isotonic Variate			
Conc-mg/L	Code	Count	Mean	Median	Min	Max	CV%	%Effect	A/B	Mean	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	20/20	1.0000	0.00%
8.35		4	0.0000	0.0000	0.0000	0.0000		100.00%	0/20	0.0000	100.00%
16.7		4	0.0000	0.0000	0.0000	0.0000		100.00%	0/20	0.0000	100.00%

## 96h Survival Rate Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
8.35		0.0000	0.0000	0.0000	0.0000
16.7		0.0000	0.0000	0.0000	0.0000

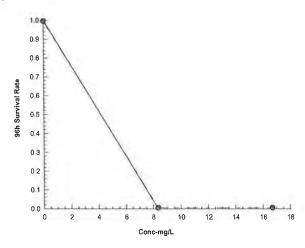
## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	5/5	5/5	5/5	5/5
8.35		0/5	0/5	0/5	0/5
16.7		0/5	0/5	0/5	0/5

Analyst: \_\_\_\_\_QA:\_\_\_\_

CETIS Ana	alytical Report		Report Date: Test Code/ID:	21 Oct-20 15:24 (p 2 of 2) TRU0920.134acer / 06-8706-0944	
Ceriodaphnia	a 96-h Acute Surviva	Il Test		Aquatic B	lioassay & Consulting Labs, Inc.
Analysis ID:	14-9409-9402	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7
Analyzed:	21 Oct-20 15:23	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1
Edit Date:	21 Oct-20 15:21	MD5 Hash:	79242C0938E02BA8B3CB4769263E98D9	Editor ID:	000-189-126-0

Graphics



Analyst:\_

Report Date: 21 Oct-20 15:24 (p 1 of 3)

Test Code/ID: TRU0920.134acer / 06-8706-0944

Ceriodaphnia	96-h Acute Sur	vival Te	st					Aquatic E	Bioassay &	Consulting	Labs, Inc.
Batch ID: Start Date: Ending Date: Test Length:	16-7661-4185 22 Sep-20 13:29 26 Sep-20 13:30 4d 0h	5 I 0 :	Test Type: Protocol: Species: Taxon:		PA/821/R-02-012 (2002) Ceriodaphnia dubia			alyst: luent: Lat ine: Not burce: Aqu	er tems, CO	Age:	
Sample ID:	12-0106-0394		Code:	TRU0920.134acer Project:							
Sample Date:	: 10 Sep-20 09:50	0	Material:	Sample Water					assay Repo	rt	
Receipt Date:	: 10 Sep-20 09:50	0	CAS (PC):				St	ation: Lak	ke Mathews	Raw with E	arth Tec
Sample Age:	12d 4h (9.3 °C)		Client:	Trussell Techn	ologies						
Alkalinity (Ca	CO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	60	60	60	60	60	0	0	0.00%	0
8.35		3	100	100	100	100	100	0	0	0.00%	0
Overall		6	80	57.01	103	60	100	8.944	21.91	27.39%	0 (0%)
Conductivity	-µmhos										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Coun
0	N	3	337.7	332.5	342.8	336	340	0.6939	2.082	0.62%	0
8.35		3	1129	1067	1191	1102	1151	8.293	24.88	2.20%	0
16.7		3	1097	1090	1103	1094	1099	0.8389	2.517	0.23%	0
Overall		9	854.4	556.2	11,53	336	1151	129.3	388	45.41%	0 (0%)
Dissolved O	xygen-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	7.4	6.655	8.145	7.1	7.7	0.1	0.3	4.05%	0
8.35		3	7.6	6.11	9.09	7	8.2	0.2	0.6	7.89%	0
16.7		3	7.467	6.463	8.471	7	7.7	0.1347	0.4041	5.41%	0
Overall		9	7.489	7.18	7.797	7	8.2	0.1338	0.4014	5.36%	0 (0%)
Hardness (C	aCO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	85	85	85	85	85	0	0	0.00%	0
8.35		3	350	350	350	350	350	0	0	0.00%	0
Overall		6	217.5	65.18	369.8	85	350	59.26	145.1	66.73%	0 (0%)
pH-Units											
Conc-mg/L	Code	Count	t Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Coun
0	Ν	3	8	7.57	8.43	7.9	8.2	0.05773	0.1732	2.17%	0
8.35		3	7.9	7.652	8.148	7.8	8	0.03333	0.1	1.27%	0
16.7		3	7.867		8.01	7.8	7.9	0.01924	0.05772	0.73%	0
Overall		9	7.922	2 7.83	8.015	7.8	8.2	0.04006	0.1202	1.52%	0 (0%)
Temperature	e-°C										
Conc-mg/L	Code	Coun					Мах	Std Err	Std Dev	CV%	QA Cour
0	N	3	24	24	24	24	24	0	0	0.00%	0
8.35		3	24.1	23.67	24.53	24	24.3	0.05775	0.1732	0.72%	0
16.7		3	24.13	3 23.56	24.71	24	24.4	0.07698	0.2309	0.96%	0
Overall		9	24.08	3 23.96	24.2	24	24.4	0.05212	0.1563	0.65%	0 (0%)

QA:\_\_\_ Analyst:

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCC	03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
8.35				100	_				
0	Ν	2		60					
8.35				100					
0	Ν	3		60					
8.35		_	_	100		_		_	
Conductivity-µr	mhos								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		337					
8.35				1102					
16.7				1094					
0	Ν	2		336					
8.35				1134					
16.7				1097					
0	Ν	3		340					
8.35				1151					
16.7				1099		_			
Dissolved Oxy	gen-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	Ν	1		7.7					
8.35				8.2					
16.7				7.7					
0	Ν	2		7.4					
8.35 16.7				7.6 7.7					
						_			
0 8.35	Ν	3		7.1 7					
16.7				7					
					-				
Hardness (CaC					~ •	D:55.0/			N - 4
Conc-mg/L 0	Code N	Read	Time	Measure 85	QA	Diff-%	Inst ID	Analyst	Notes
8.35	IN			350					
0	N	2		85	_				
8.35	IN	2		85 350					
0	N	2		85					
0 8.35	IN	3		85 350					
						-			
pH-Units									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	t Notes
0	N	1		8.2					
8.35				7.8					
16.7				7.8					
0	Ν	2		7.9					
8.35				8					
16.7				7.9					
0	Ν	3		7.9					
8.35				7.9					
16.7				7.9					

Analyst: \_\_\_\_\_QA:\_\_\_

 Report Date:
 21 Oct-20 15:24 (p 3 of 3)

 Test Code/ID:
 TRU0920.134acer / 06-8706-0944

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C				
Conc-mg/L	Code	Read	Time	Measure QA Diff-% Inst ID Analyst Notes
0	N	1		24
8.35				24
16.7				24
0	N	2		24
8.35				24.3
16.7				24.4
0	N	3		24
8.35				24
16.7				24

Analyst: \_\_\_\_\_ QA: \_\_\_\_\_



October 21, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

CLIENT:	Trussell Technologies	
SAMPLE I.D.:	Lake Mathews Raw Earthtec 8.35mg/l	
DATE RECEIVED:	09/10/20	
ABC LAB. NO.:	TRU0920.134	

NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 0% Survival in 8.35/mg/l Sample

TUa = >1.00 @ 8.35mg/l

truly, ohnson ory Director

#### AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

## NPDES Percent Survival Bioassay for Effluents and Stormwater

SAMPLE INFORMATION

and the second se	
CLIENT:	Trussell Technologies Date: 09/10/20
SAMPLE I.D.:	Lake Mathews Raw Eartht LAB # TRU0920.134

## WATER QUALITY

TTTT DIE 20						
DILUTION WAT Reconst. Fresh	AERATION Single Bubble Air CONTROL ALKALINITY					
CONTROL HARDNESS						
Beg: 94 mg/l End: 101 mg/l	Beg: 63 mg/l End: 68 mg/l					
SAMPLE HARDNESS	SAMPLE ALKALINITY					
Beg: 330 mg/l End: 330 mg/l	Beg: 117 mg/l End: 122 mg/l					

#### ORGANISM INFORMATION

Î	SPECIES:	Oncorhynchus mykiss	DATE REC'D:	09/15/20
1	COMMON NAME:	Rainbow Trout		
	SOURCE:	Thomas Fish Co.		
	CARRIER:	California Overnight	NO. FISH / TANK	10

										TES	ST DA	ATA								
	I	NITIAL	,	24	HOU	RS		48	HOUI	RS		72	HOU	RS		- 96	HOU	RS		
DATE: TIME:		09/22/20 1500	y			09/23/20 1450	)			09/24/20 1550	)		(	)9/25/2 1500	0		(	1550 19/26/2	0	
CONC.	Dis. Oxy.		pН	#Fish		Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp.	pН	#Fish		Temp. dg.C	pН	#Fish		Temp. dg.C	pН	#Fish
0 (Con.)	10.0	13.3	7.4	10	Oxy. 10.6	13.8	6.9	10	10.5	dg.C 13.8	6.9	10	10.5	13.8	6.8	10	10.3	13.8	6.9	10
0 (Con.)	10.1	13.3	7.4	10	10.9	13.8	6.9	10	10.4	13.8	6.9	10	10.6	13.8	6.9	10	10.4	13.8	6.9	10
50.1mg/l	10.6	13.6	7.5	10	10.6	13.8	7.3	0				0				0				0
50.1mg/1	10.7	13.6	7.4	10	10.5	13.8	7.2	0				0				0	Sec			0

FINAL I	DATA
TOTAL	FISH SURVIVAL
0 (Con.)	10
0 (Con.)	10
50.1mg/l	0
50.1mg/1	0

 FINAL RESULTS

 PERCENT SURVIVAL =
 0% Survival in 8.35/mg/l Sample

 TUa =
 >1.00 (a) 8.35mg/l

Joe Freas, Sonior oxicologist

Date 10/22/20



October 21, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

CLIENT:Trussell TechnologiesSAMPLE I.D.:Lake Mathews Raw Earthtec 16.7mg/lDATE RECEIVED:09/10/20ABC LAB. NO.:TRU0920.134

NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 0% Survival in 16.7/mg/l Sample

TUa = >1.00 @ 16.7mg/l

truly, ohnson ory Director

#### AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

## NPDES Percent Survival Bioassay for Effluents and Stormwater

	SAMPLE INFORMATION	
CLIENT:	Trussell Technologies Date: 09/10/20	
SAMPLE I.D.:	Lake Mathews Raw Eartht LAB # TRU0920.134	

#### WATER QUALITY

DILUTION WAT Reconst. Fresh	AERATION Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 94 mg/l End: 101 mg/l	Beg: 63 mg/l End: 68 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 350 mg/l End: 360 mg/l	Beg: 100 mg/l End: 117 mg/l

# ORGANISM INFORMATIONSPECIES:Oncorhynchus mykissDATE REC'D:09/15/20COMMON NAME:Rainbow TroutSOURCE:Thomas Fish Co.CARRIER:California OvernightNO. FISH / TANK10

										TES	ST DA	TA								
	]	NITIAL	,	24	HOUI	RS		48	HOUI	RS		72	HOU	RS		96	HOU	RS		
DATE: TIME:		09/22/20 1500	)		(	)9/23/20 1450	)			09/24/20 1550	)		(	)9/25/20 1500	0		(	)9/26/2 1550	0	
CONC.	Dis. Oxy.	Temp. dg.C	pH	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish
0 (Con.) 0 (Con.)	10.0	13.3	7.4 7.4	10 10	10.6 10.9	13.8 13.8	6.9 6.9	10 10	10.5	13.8 13.8	6.9 6.9	10 10	10.5 10.6	13.8 13.8	6.8 6.9	10 10	10.3 10.4	13.8 13.8	6.9 6.9	10 10
50.1mg/1 50.1mg/1	10.1	13.5	7.4	10 10 10	10.6	13.8 13.8	7.3 7.3		10.1	15.0	0.7		10.0	15.0	0.7		10.1	1010	0.7	

	FINAL I	DATA
1	TOTAL	FISH SURVIVAL
	0 (Con.)	10
	0 (Con.)	10
	50.1mg/1	0
l	50.1mg/1	0

 FINAL RESULTS

 PERCENT SURVIVAL =
 0% Survival in 16.7/mg/l Sample

 TUa =
 >1.00 (a) 16.7mg/l

Joe Freas, Septor Toxicologist

Date 10/1/10

2				Analysis	
Client:	Project Name/Number:			Analysis	_
Trussell Technologies		0			
Address 132 N. Lake Ave.	Project Mgr. David Hokanson		ty ty ty		
CA .	P.O. #		xici Min sici- sici		
	Sampled By (signature)		Tox Tox IKis Tox Japl		
	Jocolo nerro	1	e ny ioc		
Date Time b a Matrix	Sample ID	Volume/	Acut Fathi Acute O Acute Cer		Comments
	1		2 2 2		m
4/jo/204:50a / Liquid	Lake Mathe	70 L	٢		doses each
	Easth Tee (Rissile)				
Relinquised By:(signature) vocale new		Date: Time:	Relinquised By:(signature)	iture)	Date: Time:
Received By:(signature)	New mon	Date: Time: $\eta_{l,o}/l \circ \eta_{l} < 0$	Received By:(signature)	8)	Date: Time:
Upon sample reciept record the following results:	CI (mg/L):				

Aquatic Bioassay and Consulting Laboratories 29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930



Appendix D – Weymouth WTP Influent 2020 Toxicity Test Report



October 22, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Weymouth Raw with EarthTec
DATE RECEIVED:	17 Sept – 20
ABC LAB NO.:	TRU0920.262

# ACUTE FATHEAD MINNOW SURVIVAL BIOASSAY

% Survival = 100 % Survival in 16.7 mg/l Sample

EC50 =>16.7 mg/l

Yours truly, Scott Johnson 2 Laboratory Director

# **CETIS Summary Report**

Report Date: Test Code/ID: TRU0920.262afml / 19-6450-8286

21 Oct-20 15:33 (p 1 of 1)

							_					
Fathead Minn	now 96-h Acute Su	rvival Tes	t						Aquatic	Bioassay & C	onsulting l	_abs, Inc.
Batch ID:	13-6522-3425	Test	Type:	Survival (96h)				Anal	yst:			
Start Date:	22 Sep-20 13:22	Prot	ocol:	EPA/821/R-02-0	012 (2002)			Dilue	ent: La	boratory Wate	er	
Ending Date:	26 Sep-20 13:35	Spec	cies:	Pimephales pro	melas			Brin	e: N	ot Applicable		
Test Length:	4d Oh	Тахо	on:	Actinopterygii				Sou	rce: A	quatic Biosyste	ems, CO	Age:
Sample ID:	02-8796-6967	Code	e:	TRU0920.262a	fml			Proj	ect:			
Sample Date:	: 17 Sep-20 09:44	Mate	erial:	Sample Water				Sou	rce: Bi	oassay Report	t	
Receipt Date:	: 17 Sep-20 09:44	CAS	(PC):					Stati	ion: La	ake Weymouth	Raw with E	arth Tec
Sample Age:	5d 4h (20.8 °C)	Clier	nt:	Trussell Techno	ologies							
Multiple Com	parison Summary	/										
Analysis ID	Endpoint		Comp	arison Method			$\checkmark$	NOEL	LOEL	TOEL	PMSD	
09-5347-6586	96h Survival Rate		Steel	Many-One Rank	Sum Test			16.7	>16.7	<del></del>	4.84%	
Point Estimat	te Summary											
Analysis ID	Endpoint		Point	Estimate Metho	od		$\checkmark$	Level	mg/L	95% LCL	95% UCL	
09-1766-0348	96h Survival Rate	;	Linea	Interpolation (IC	CPIN)			EC10	>16.7		-	
								EC15	>16.7			
								EC20	>16.7			
								EC25	>16.7			
								EC40	>16.7			
								EC50	>16.7	<u>مالت</u>		
Test Accepta	bility					TAC	: Li	imits				
	En du stat		A 4411					Upper	Overla			
Analysis ID	Endpoint		Attrib	ute	Test Stat	Lower		-  -  - + -	Ovena	p Decision		
	96h Survival Rate	)		ol Resp	0.975	Lower 0.9	-	>>	Yes	Passes C	riteria	
09-1766-0348	· · · · · · · · · · · · · · · · · · ·		Contr									
09-1766-0348 09-5347-6586	96h Survival Rate		Contr	ol Resp	0.975	0.9		>>	Yes	Passes C		
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L	96h Survival Rate 96h Survival Rate Rate Summary Code		Contr	ol Resp ol Resp	0.975 0.975	0.9		>>	Yes	Passes C Passes C Std Dev	riteria CV%	%Effect
09-1766-0348 09-5347-6586 96h Survival	96h Survival Rate 96h Survival Rate Rate Summary	•	Contro Contro Mean 0.975	ol Resp ol Resp <b>95% LCL</b> 0 0.8954	0.975 0.975	0.9 0.9 Min 0.9000		>> >> Max 1.0000	Yes Yes Std En 0.0250	Passes C Passes C	riteria	%Effect 0.00%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L	96h Survival Rate 96h Survival Rate Rate Summary Code	Count	Contro Contro Mean	ol Resp ol Resp <b>95% LCL</b> 0 0.8954	0.975 0.975 <b>95% UCL</b>	0.9 0.9 Min		>> >> Max	Yes Yes Std Err	Passes C Passes C Std Dev	riteria CV%	
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0	96h Survival Rate 96h Survival Rate Rate Summary Code	Count 4	Contro Contro Mean 0.975	ol Resp ol Resp <b>95% LCL</b> 0 0.8954 0 1.0000	0.975 0.975 <b>95% UCL</b> 1.0550	0.9 0.9 Min 0.9000		>> >> Max 1.0000	Yes Yes Std En 0.0250	Passes C Passes C Std Dev 0.0500	riteria <b>CV%</b> 5.13%	
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35	96h Survival Rate 96h Survival Rate Rate Summary Code N	Count 4 4	Contro Contro Mean 0.975 1.000	ol Resp ol Resp <b>95% LCL</b> 0 0.8954 0 1.0000	0.975 0.975 <b>95% UCL</b> 1.0550 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C • Std Dev 0.0500 0.0000	cv% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7	96h Survival Rate 96h Survival Rate Rate Summary Code N	Count 4 4	Contro Contro Mean 0.975 1.000	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000	0.975 0.975 <b>95% UCL</b> 1.0550 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	cv% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival	96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail	<b>Count</b> 4 4 4	Contri Contri Mean 0.975 1.000 1.000	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 2 Rep 3	0.975 0.975 <b>95% UCL</b> 1.0550 1.0000 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	cv% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L	96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 Rep 1	Contri Contri Mean 0.975 1.000 1.000 Rep 2	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 2 Rep 3 0 1.0000	0.975 0.975 95% UCL 1.0550 1.0000 1.0000 Rep 4	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	cv% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L 0	96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 0.9000	Contri Contri 0.975 1.000 1.000 <b>Rep 2</b> 1.000	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 2 Rep 3 0 1.0000 0 1.0000	0.975 0.975 95% UCL 1.0550 1.0000 1.0000 Rep 4 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	cv% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L 0 8.35 16.7	96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 0.9000 1.0000	Contri Contri 0.975 1.000 1.000 <b>Rep 2</b> 1.000 1.000	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 2 Rep 3 0 1.0000 0 1.0000	0.975 0.975 95% UCL 1.0550 1.0000 1.0000 Rep 4 1.0000 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	cv% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L 0 8.35 16.7	96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N	Count 4 4 4 4 4 0.9000 1.0000	Contri Contri 0.975 1.000 1.000 <b>Rep 2</b> 1.000 1.000	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 2 Rep 3 0 1.0000 0 1.0000 0 1.0000	0.975 0.975 95% UCL 1.0550 1.0000 1.0000 Rep 4 1.0000 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	riteria CV% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival	<ul> <li>96h Survival Rate</li> <li>96h Survival Rate</li> <li>Rate Summary</li> <li>Code</li> <li>N</li> </ul> Rate Detail <ul> <li>Code</li> <li>N</li> </ul> Rate Binomials	Count           4           4           4           0.9000           1.0000	Contri Contri 0.975 1.000 1.000 1.000 1.000 1.000	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 2 Rep 3 0 1.0000 0 1.0000 0 1.0000	0.975 0.975 <b>95% UCL</b> 1.0550 1.0000 1.0000 <b>Rep 4</b> 1.0000 1.0000	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	riteria CV% 5.13% 	0.00% -2.56% -2.56%
09-1766-0348 09-5347-6586 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L	<ul> <li>96h Survival Rate</li> <li>96h Survival Rate</li> <li>96h Survival Rate</li> <li>Rate Summary</li> <li>Code</li> <li>N</li> </ul> Rate Detail <ul> <li>Code</li> <li>N</li> </ul> Rate Binomials <ul> <li>Code</li> </ul>	Count           4           4           4           4           0.9000           1.0000           1.0000           Rep 1	Contri Contri 0.975 1.000 1.000 1.000 1.000 1.000 Rep 2	ol Resp ol Resp 95% LCL 0 0.8954 0 1.0000 0 1.0000 0 1.0000 0 1.0000 0 1.0000 0 1.0000 0 1.0000	0.975 0.975 95% UCL 1.0550 1.0000 1.0000 1.0000 1.0000 1.0000 Rep 4	0.9 0.9 Min 0.9000 1.0000		>> >> 1.0000 1.0000 1.0000	Yes Yes Std En 0.0250 0.0000 0.0000	Passes C Passes C Std Dev 0.0500 0.0000 0.0000	riteria CV% 5.13% 	0.00% -2.56% -2.56%

Analyst: Analyst:

Fathead Minn	low 9	6-h Acute S	urvival	Test							Aqua	tic Bioass	say & C	Consulting	Labs, Inc
Analysis ID:	09-5	347-6586	E	ndpoint:	96h	Survival Ra	te			CE	TIS Vers	ion: CE	TISv1.	.9.7	
nalyzed:		oct-20 15:32		nalysis:		parametric-					tus Lev				
dit Date:	21 C	oct-20 15:30	N	1D5 Hash:	4D4	EE5657710	4BA0C	E576	BEOE4B88	EAF Edi	tor ID:	000	0-189-1	126-0	
latch ID:	13-6	522-3425	Т	est Type:	Surv	/ival (96h)				An	alyst:				
Start Date:	22 S	ep-20 13:22	P	rotocol:	EPA	/821/R-02-0	012 (200	)2)		Dil	uent:	Laborator	y Wate	er	
Ending Date:	26 S	ep-20 13:35	S	pecies:	Pim	ephales pro	melas			Bri	ne:	Not Applie	cable		
Fest Length:	4d (	Dh	Т	axon:	Acti	nopterygii				So	urce:	Aquatic B	liosyste	ems, CO	Age:
Sample ID:	02-8	796-6967	C	ode:	TRU	J0920.262a	fml			Pro	ject:				
Sample Date:	17 S	ep-20 09:44	. N	laterial:	Sam	nple Water				So	urce:	Bioassay	Repor	t	
Receipt Date:	: 17 S	ep-20 09:44	· C	AS (PC):						Sta	tion:	Lake Wey	ymouth	n Raw with	Earth Tec
Sample Age:	5d 4	4h (20.8 °C)	C	lient:	Trus	sseli Techno	ologies								
Data Transfo	rm		Alt Hy	р					NOEL	LOEL	TOE	L TU		MSDu	PMSD
Angular (Corre	ected	)	C > T						16.7	>16.7				0.0472	4.84%
Steel Many-O	ne R	ank Sum Te	st												
Control	vs	Conc-mg		Test	Stat	Critical	Ties	DF	P-Type	P-Value	Deci	sion(α:5%	<b>)</b>		
Negative Cont	trol	8.35		20		11	1	6	CDF	0.8569		Significant			
-		16.7		20		11	1	6	CDF	0.8569		Significant			
Test Accepta	bilitv	Criteria	TAA												
Attribute		Test Stat		C Limits Uppe	r	Overlap	Decis	ion							
Control Resp		0.975	0.9	>>	-	Yes	Passe	_	iteria					_	
ANOVA Table	•														
Source		Sum Squa	2705	Mean	Sau	ara	DF		F Stat	P-Value	Dec	ision(α:5%	()		
Between		0.0044266		0.002			2		1	0.4053		Significant		+	
Error		0.0199195		0.002			9			0.4000	Non	olgrinioun		L	
Total		0.0243461					11		-						
ANOVA Assu	mpti	ons Tests													
Attribute		Test					Test S	Stat	Critical	P-Value	e Dec	ision(α:1%	6)		
Variance			uality of	Variance	Test				entiteat			terminate	•,		
			• •	Variance			9		8.022	0.0071	Une	qual Variar	nces		
				lity of Varia		Test	1		8.022	0.4053		, al Variance			
Distribution		Anderson-		-			2.222		3.878	<1.0E-0		-Normal Di		ion	
		D'Agostine	o Skewn	ess Test			3.23		2.576	0.0012	Non	-Normal Di	istributi	ion	
				nov D Test			0.416	7	0.2801	<1.0E-0	5 Non	-Normal Di	istributi	ion	
		Shapiro-W	ilk W N	ormality Te	est		0.633	4	0.8025	0.0002	Non	-Normal Di	istribut	ion	
96h Survival	Rate	Summary													
Conc-mg/L		Code	Count	Mear	n	95% LCL	95% l	JCL	Median	Min	Мах	Ste	d Err	CV%	%Effec
0		N	4	0.975	50	0.8954	1.000	0	1.0000	0.9000	1.00	0.0 0.0	)250	5.13%	0.00%
8.35			4	1.000	00	1.0000	1.000	0	1.0000	1.0000	1.00	0.0 0.0	0000	0.00%	-2.56%
16.7			4	1.000	00	1.0000	1.000	0	1.0000	1.0000	1.00	0.0 0.0	0000	0.00%	-2.56%
Angular (Cor	rrecte	d) Transfor	med Su	mmary											
Conc-mg/L		Code	Count		n	95% LCL	95% l	JCL	Median	Min	Max	s Ste	dErr	CV%	%Effec
0		N	4	1.37		1.2420	1.501	_	1.4120	1.2490	1.41		0407	5.94%	0.00%
8.35			4	1.412		1.4120	1.412		1.4120	1.4120	1.41		0000	0.00%	-2.97%
16.7			4	1.412		1.4120	1.412		1.4120	1.4120	1.41	20 0.0	0000	0.00%	-2.97%
96h Survival	Rate	Detail													
Conc-mg/L		Code	Rep 1	Rep	2	Rep 3	Rep 4	1							

Conc-mg/L	Code	Rep 1	кер 2	кер з	кер 4	
0	N	0.9000	1.0000	1.0000	1.0000	
8.35		1.0000	1.0000	1.0000	1.0000	
16.7		1.0000	1.0000	1.0000	1.0000	

## Fathead Minnow 96-h Acute Survival Test

Fathead Mini	now 96-h Acute Sur	vival Test	Aquatic Bioassay & Consulting Labs, Inc.			
Analysis ID:	09-5347-6586	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7	
Analyzed:	21 Oct-20 15:32	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1	
Edit Date:	21 Oct-20 15:30	MD5 Hash:	4D4EE565771C4BA0CE57BE0E4B88EAF	Editor ID:	000-189-126-0	

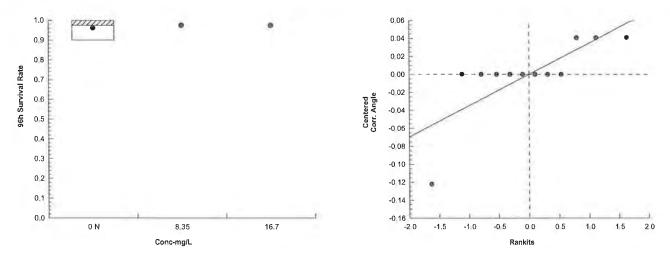
# Angular (Corrected) Transformed Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	N	1.2490	1.4120	1.4120	1.4120	
8.35		1.4120	1.4120	1.4120	1.4120	
16.7		1.4120	1.4120	1.4120	1.4120	

## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	9/10	10/10	10/10	10/10
8.35		10/10	10/10	10/10	10/10
16.7		10/10	10/10	10/10	10/10

## Graphics



QA: 10 Analyst:

Report Date: 21 Oct-20 15:33 (p 1 of 2) Test Code/ID: TRU0920.262afml / 19-6450-8286

Fathead Minr	now 96-h Acute S	urvival Test				Aqua	tic Bioassay & Consulting Labs,
Analysis ID:	09-1766-0348	•	96h Survival Ra			CETIS Vers	
Analyzed:	21 Oct-20 15:32	Analysis:	Linear Interpola	· · ·		Status Leve	
Edit Date:	21 Oct-20 15:30	MD5 Hash	: 4D4EE5657710	C4BA0CE57BE0E	4B88EAF	Editor ID:	000-189-126-0
Batch ID:	13-6522-3425	Test Type:	Survival (96h)			Analyst:	
Start Date:	22 Sep-20 13:22	Protocol:	EPA/821/R-02-	012 (2002)		Diluent:	Laboratory Water
Ending Date:	: 26 Sep-20 13:35	Species:	Pimephales pro	omelas		Brine:	Not Applicable
Test Length:	4d Oh	Taxon:	Actinopterygii			Source:	Aquatic Biosystems, CO Age:
Sample ID:	02-8796-6967	Code:	TRU0920.262a	ıfml		Project:	
Sample Date	: 17 Sep-20 09:44	Material:	Sample Water			Source:	Bioassay Report
Receipt Date	: 17 Sep-20 09:44	CAS (PC):				Station:	Lake Weymouth Raw with Earth T
Sample Age:	5d 4h (20.8 °C)	Client:	Trussell Techne	ologies			
Linear Interp	olation Options				_		
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method		
	Y Transform Linear	<b>Seed</b> 0	Resamples 280	Exp 95% CL Yes		Interpolation	
Linear		0				Interpolation	
Linear Test Accepta	Linear		280			Interpolation	
Linear Test Accepta	Linear ability Criteria Test Stat	0 TAC Limits	280	Yes	Two-Point	Interpolation	
Linear Test Accepta Attribute Control Resp	Linear ability Criteria Test Stat 0.975	0 TAC Limits Lower Uppe	280 er Overlap	Yes	Two-Point	Interpolation	
Linear Test Accepta Attribute Control Resp Point Estima	Linear ability Criteria Test Stat 0.975 ates	0 TAC Limits Lower Uppe	280 er Overlap	Yes	Two-Point	Interpolation	
Linear Test Accepta Attribute Control Resp Point Estima Level mg/	Linear ability Criteria Test Stat 0.975 ates /L 95% LCL	0 TAC Limits Lower Uppe 0.9 >>	280 er Overlap	Yes	Two-Point	Interpolation	
Linear Test Accepta Attribute Control Resp Point Estima Level mg/ EC10 >16.	Linear ability Criteria Test Stat 0.975 ates /L 95% LCL .7	0 TAC Limits Lower Uppe 0.9 >> 95% UCL	280 er Overlap	Yes	Two-Point	Interpolation	
Linear Test Accepta Attribute Control Resp Point Estima Level mg/ EC10 >16. EC15 >16.	Linear ability Criteria Test Stat 0.975 ates /L 95% LCL .7 .7	0 TAC Limits Lower Uppe 0.9 >> 95% UCL	280 er Overlap	Yes	Two-Point	Interpolation	
Linear Test Accepta Attribute Control Resp Point Estima Level mg/ EC10 >16. EC15 >16. EC20 >16.	Linear ability Criteria Test Stat 0.975 ates /L 95% LCL .7 .7 .7 .7	0 TAC Limits Lower Uppe 0.9 >> 95% UCL	280 er Overlap	Yes	Two-Point	Interpolation	
Attribute Control Resp Point Estima Level mg/ EC10 >16. EC15 >16. EC20 >16.	Linear ability Criteria Test Stat 0.975 ates 1 95% LCL .7 .7 .7 .7 .7	0 TAC Limits Lower Uppe 0.9 >> 95% UCL	280 er Overlap	Yes	Two-Point	Interpolation	

96h Survival Ra	ate Summary				Isotonic Variate						
Conc-mg/L	Code	Count	Mean	Median	Min	Max	CV%	%Effect	A/B	Mean	%Effect
0	N	4	0.9750	1.0000	0.9000	1.0000	5.13%	0.00%	39/40	0.9917	0.00%
8.35		4	1.0000	1.0000	1.0000	1.0000	0.00%	-2.56%	40/40	0.9917	0.00%
16.7		4	1.0000	1.0000	1.0000	1.0000	0.00%	-2.56%	40/40	0.9917	0.00%

## 96h Survival Rate Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	0.9000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	1.0000	1.0000
16.7		1.0000	1.0000	1.0000	1.0000

## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	9/10	10/10	10/10	10/10
8.35		10/10	10/10	10/10	10/10
16.7		10/10	10/10	10/10	10/10

AQA: Analyst:\_\_\_\_\_

		Aquatic Bi	oassay & Consulting Labs, Inc.
0348         Endpoint:           0 15:32         Analysis:           0 15:30         MD5 Hash:	96h Survival Rate Linear Interpolation (ICPIN) 4D4EE565771C4BA0CE57BE0E4B88EAF	CETIS Version: Status Level: Editor ID:	CETISv1.9.7 1 000-189-126-0
0	0		
4	8 8 10 12	6 9 10 12 14 16 18	6 8 10 12 14 16 18

# **CETIS Analytical Report**

 Report Date:
 21 Oct-20 15:33 (p 2 of 2)

 Test Code/ID:
 TRU0920.262afml / 19-6450-8286

000-189-126-0

Conc-mg/L

# **CETIS Measurement Report**

Report Date:

21 Oct-20 15:33 (p 1 of 3) Test Code/ID: TRU0920.262afml / 19-6450-8286

Fathead Minnow 96-h Acute Survival Test

Aquatic	Bioassay	&	Consulting	Labs,	Inc.

	iow so-ii Acute c										
Batch ID:	13-6522-3425		est Type:	Survival (96h)			An	alyst:			
Start Date:	22 Sep-20 13:22	2 F	Protocol:	EPA/821/R-02-	012 (2002)		Dil	uent: La	poratory Wat	er	
Ending Date:	26 Sep-20 13:35	5 5	Species:	Pimephales pro	omelas		Bri	ne: No	t Applicable		
Test Length:	4d Oh	٦	axon:	Actinopterygii			So	urce: Aq	uatic Biosyst	tems, CO	Age:
Sample ID:	02-8796-6967	C	Code:	TRU0920.262a	ıfml		Pre	oject:			
Sample Date:	17 Sep-20 09:44	1 P	/laterial:	Sample Water			So	urce: Bio	assay Repo	rt	
Receipt Date:	17 Sep-20 09:44	4 <b>C</b>	CAS (PC):				Sta	ation: La	ke Weymout	h Raw with	Earth Tec
Sample Age:	5d 4h (20.8 °C)	0	Client:	Trussell Techn	ologies						
Alkalinity (Ca	CO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	60	60	60	60	60	0	0	0.00%	0
8.35		3	108	108	108	108	108	0	0	0.00%	0
Overall		6	84	56.41	111.6	60	108	10.73	26.29	31.30%	0 (0%)
Conductivity-	-µmhos										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Coun
0	N	3	337.7	332.5	342.8	336	340	0.6939	2.082	0.62%	0
8.35		3	1107	1098	1117	1103	1110	1.262	3.786	0.34%	0
16.7		3	1101	1099	1103	1100	1102	0.3333	1	0.09%	0
Overali		9	848.7	554.1	1143	336	1110	127.8	383.3	45.16%	0 (0%)
Dissolved Ox	(ygen-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	7.4	6.655	8.145	7.1	7.7	0.1	0.3	4.05%	0
8.35		3	7.667	6.441	8.892	7.1	8	0.1644	0.4933	6.43%	0
16.7		3	7.5	6.639	8.361	7.1	7.7	0.1155	0.3464	4.62%	0
Overall		9	7.522	7.248	7.796	7.1	8	0.1188	0.3563	4.74%	0 (0%)
Hardness (Ca	aCO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	85	85	85	85	85	0	0	0.00%	0
8.35		3	315	315	315	315	315	0	0	0.00%	0
Overall		6	200	67.8	332.2	85	315	51.43	126	62.99%	0 (0%)
pH-Units											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Cour
0	N	3	8	7.57	8.43	7.9	8.2	0.05773	0.1732	2.17%	0
8.35		3	7.9	7.652	8.148	7.8	8	0.03333	0.1	1.27%	0
16.7		3	7.867	7.723	8.01	7.8	7.9	0.01924	0.05772	0.73%	0
Overall		9	7.922	7.83	8.015	7.8	8.2	0.04006	0.1202	1.52%	0 (0%)
Temperature	-°C										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cou
0	N	3	24	24	24	24	24	0	0	0.00%	0
0.05		3	24.13	23.56	24.71	24	24.4	0.07698	0.2309	0.96%	0
8.35											
8.35 16.7		3	24.17		24.88	24	24.5	0.09623	0.2887	1.19%	0

QA Analyst: U

 Report Date:
 21 Oct-20 15:33 (p 2 of 3)

 Test Code/ID:
 TRU0920.262afml / 19-6450-8286

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCC		<b>.</b> .				P. 144 - 1	=		
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
)	Ν	1		60					
8.35				108					
)	N	2		60					
8.35				108					
0	N	3		60					
8.35				108					
Conductivity-µr	nhos								
Conc-mg/L	Code	Read	Time	Measure	04	Diff-%	Inst ID	Analyst	Notos
0	N	1	Time	337	QA	D111-70	IIIST ID	Analyst	Notes
8.35	IN I			1103					
16.7				1102					
	N	0	_		_				
0	Ν	2		336					
8.35				1109					
16.7				1101					
0	Ν	3		340					
8.35				1110					
16.7				1100					
Dissolved Oxyg	gen-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.7		2411 /0		radiyot	
8.35				7.9					
16.7				7.7					
0	N	2		7.4	_				
8.35	IN	2		8					
16.7				7.7					
0	N	3	_	7.1					
8.35	IN	3		7.1					
16.7				7.1					
				1.1					
Hardness (CaC	O3)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		85					
8.35				315					
0	N	2		85					
8.35				315					
0	N	3		85					
8.35		v		315					
				2.0					
pH-Units									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	Ν	1		8.2					
8.35				7.8					
16.7				7.8					
0	N	2		7.9					
8.35				8					
16.7				7.9					
0	N	3		7.9				1000	
	-								
8.35				7.9					

000-189-126-0

Analyst:

Þ

da:

13-

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C									
Conc-mg/L	Code	Read	Time	Measure QA	Diff-%	inst ID	Analyst	Notes	
0	N	1		24	_				2
8.35				24					
16.7				24					
0	N	2		24					
8.35				24.4					
16.7				24.5					
0	N	3		24					
8.35				24					
16.7				24					

Analyst:\_\_\_\_\_QA:\_\_\_\_



October 22, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Weymouth Raw with EarthTec
DATE RECEIVED:	17 Sept – 20
ABC LAB NO.:	TRU0920.262

# ACUTE CERIODAPHNIA SURVIVAL BIOASSAY

% Survival =

= 100 % Survival in 16.7mg/l Sample

EC50 = >16.7 mg/l

v truly, You Scott Johnson Laboratory Director

	nmary Repo	rt						Test	Code/ID:	TRU0920.2		7 (p 1 of 1) 0627-1890
Ceriodaphnia	96-h Acute Surv	ival Test							Aquatic E	Bioassay & C	onsulting I	Labs, Inc.
Batch ID: Start Date:	17-4635-5680 22 Sep-20 13:22			Survival (96h) EPA/821/R-02-0	12 (2002)			Anal Dilue		oratory Wate	r	
	26 Sep-20 13:35			Ceriodaphnia du				Brin		Applicable	1	
Test Length:		Тахо		Branchiopoda				Sou		atic Biosyste	ms, CO	Age:
Sample ID:	16-1980-9739	Code	e:	TRU0920.262ad	cer			Proj	ect:	-		
Sample Date:	17 Sep-20 09:44	Mate	erial:	Sample Water				Sou	rce: Bio	assay Report		
Receipt Date:	17 Sep-20 09:44	CAS	(PC):					Stati	ion: La	e Weymouth	Raw with E	arth Tec
Sample Age:	5d 4h (20.8 °C)	Clier	nt:	Trussell Techno	logies							
Multiple Com	parison Summa	ry										
Analysis ID	Endpoint		Comp	arison Method			$\checkmark$	NOEL	LOEL	TOEL	PMSD	:
19-3074-8622	96h Survival Rat	е	Steel N	/any-One Rank	Sum Test			16.7	>16.7			
Point Estimat	te Summary											
Analysis ID	Endpoint		Point	Estimate Metho	od		$\checkmark$	Level	mg/L	95% LCL	95% UCL	5
18-6039-6023	96h Survival Rat	e	Linear	Interpolation (IC	PIN)			EC10	>16.7	***		
								EC15	>16.7	***		
								EC20	>16.7			
								EC25	>16.7		***	
								EC40	>16.7			
						_	_	EC50	>16.7			
Test Accepta	bility					TAC	Li	mits				
Analysis ID	Endpoint		Attrib		Test Stat	Lower		Upper	Overlap	Decision		
	96h Survival Rat			l Resp	1	0.9		>>	Yes	Passes Ci		
19-3074-8622	96h Survival Ra	te	Contro	ol Resp	1	0.9		>>	Yes	Passes Ci	riteria	_
96h Survival	Rate Summary											
	Code	Count	Mean	95% LCL	95% UCL			Max	Std Err	Std Dev	CV%	
Conc-mg/L	Code N	4	1.0000	1.0000	1.0000	1.0000		1.0000	0.0000	0.0000	***	0.00%
0 8.35		4 4	1.0000	) 1.0000 ) 1.0000	1.0000 1.0000	1.0000 1.0000		1.0000 1.0000	0.0000 0.0000	0.0000 0.0000		0.00%
0 8.35 16.7	N	4	1.0000	) 1.0000 ) 1.0000	1.0000	1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 96h Survival	N	4 4	1.0000	) 1.0000 ) 1.0000	1.0000 1.0000	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 96h Survival Conc-mg/L	N Rate Detail Code	4 4 4 Rep 1	1.0000 1.0000 1.0000 <b>Rep 2</b>	0 1.0000 0 1.0000 0 1.0000 Rep 3	1.0000 1.0000 1.0000 <b>Rep 4</b>	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 <b>96h Survival</b> Conc-mg/L 0	N Rate Detail	4 4 4 <b>Rep 1</b> 1.0000	1.0000 1.0000 1.0000 <b>Rep 2</b> 1.0000	0 1.0000 0 1.0000 0 1.0000 <b>Rep 3</b> 0 1.0000	1.0000 1.0000 1.0000 <b>Rep 4</b> 1.0000	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 96h Survival Conc-mg/L 0 8.35	N Rate Detail Code	4 4 4 Rep 1	1.0000 1.0000 1.0000 <b>Rep 2</b>	0 1.0000 0 1.0000 0 1.0000 <b>Rep 3</b> 0 1.0000	1.0000 1.0000 1.0000 <b>Rep 4</b>	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 96h Survival Conc-mg/L 0	N Rate Detail Code	4 4 4 <b>Rep 1</b> 1.0000	1.0000 1.0000 1.0000 <b>Rep 2</b> 1.0000	0       1.0000         0       1.0000         0       1.0000         Rep 3         0       1.0000         0       1.0000	1.0000 1.0000 1.0000 <b>Rep 4</b> 1.0000	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 <b>96h Survival</b> <b>Conc-mg/L</b> 0 8.35 16.7	N Rate Detail Code	4 4 4 <b>Rep 1</b> 1.0000 1.0000	1.0000 1.0000 1.0000 <b>Rep 2</b> 1.0000 1.0000	0       1.0000         0       1.0000         0       1.0000         Rep 3         0       1.0000         0       1.0000	1.0000 1.0000 1.0000 <b>Rep 4</b> 1.0000 1.0000	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L	N Rate Detail Code N Rate Binomials Code	4 4 4 <b>Rep 1</b> 1.0000 1.0000 1.0000 <b>Rep 1</b>	1.0000 1.0000 1.0000 <b>Rep 2</b> 1.0000 1.0000 <b>Rep 2</b>	0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000	1.0000 1.0000 <b>Rep 4</b> 1.0000 1.0000 1.0000 <b>Rep 4</b>	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 <b>96h Survival</b> <b>Conc-mg/L</b> 0 8.35 16.7 <b>96h Survival</b>	N Rate Detail Code N Rate Binomials	4 4 4 <b>Rep 1</b> 1.0000 1.0000 1.0000	1.0000 1.0000 1.0000 <b>Rep 2</b> 1.0000 1.0000	0 1.0000 1.0000 <b>Rep 3</b> 0 1.0000 0 1.0000 0 1.0000 0 1.0000 0 1.0000 0 5/5	1.0000 1.0000 1.0000 <b>Rep 4</b> 1.0000 1.0000 1.0000 <b>Rep 4</b> 5/5	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%
0 8.35 16.7 96h Survival Conc-mg/L 0 8.35 16.7 96h Survival Conc-mg/L	N Rate Detail Code N Rate Binomials Code	4 4 4 <b>Rep 1</b> 1.0000 1.0000 1.0000 <b>Rep 1</b>	1.0000 1.0000 1.0000 <b>Rep 2</b> 1.0000 1.0000 <b>Rep 2</b>	0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000         0       1.0000	1.0000 1.0000 <b>Rep 4</b> 1.0000 1.0000 1.0000 <b>Rep 4</b>	1.0000 1.0000		1.0000 1.0000 1.0000	0.0000 0.0000 0.0000	0.0000 0.0000 0.0000	 	0.00% 0.00% 0.00%

Analyst: \_\_\_\_\_QA:\_\_\_\_\_A

										Test Co	baenD:	TRU0920.2	ozacer / re	)-0027-108
Ceriodaphnia	96-h Acut	e Survival	Test							A	quatic	: Bioassay & C	Consulting	Labs, Inc
Analysis ID:	19-3074-8	622	Endpoint:	96h	Survival Ra	ite				CETIS	Versio	n: CETISv1	.9.7	
Analyzed:	21 Oct-20		Analysis:		parametric-					Status	Level:	1		
Edit Date:	21 Oct-20	15:36	MD5 Hash:	9E2	E5D7DCCA	34813F	07FF	E0218C5	D2D0	Editor	ID:	000-189-	126-0	
Batch ID:	17-4635-5	680	Test Type:	Sur	vival (96h)					Analys	t:			
Start Date:	22 Sep-20	) 13:22	Protocol:	EPA	4/821/R-02-0	012 (20	02)			Diluent	t: La	aboratory Wate	ər	
Ending Date:	26 Sep-20	) 13:35	Species:	Cer	iodaphnia d	ubia				Brine:	N	ot Applicable		
Test Length:	4d Oh		Taxon:	Bra	nchiopoda					Source	h: A	quatic Biosyste	ems, CO	Age:
Sample ID:	16-1980-9	739	Code:	TRI	J0920.262a	cer				Project	t:			
Sample Date:	17 Sep-20	09:44	Material:	San	nple Water					Source	е: В	ioassay Repor	t	
Receipt Date:	17 Sep-20	09:44	CAS (PC):							Station	n: L	ake Weymouth	n Raw with	Earth Teo
Sample Age:	5d 4h (20	).8 °C)	Client:	Tru	ssell Techno	ologies								
Data Transfoi	rm	Alt	Нур					NOEL	LOE	L 1	TOEL	τυ		
Angular (Corre	ected)	C >	·Τ					16.7	>16	.7 -	-			
Steel Many-O	ne Rank S	um Test												
Control	vs Co	nc-mg/L	Test	Stat	Critical	Ties	DF	P-Type	P-V	alue I	Decisio	on(α:5%)		
Negative Cont			18		11	1	6	CDF	0.66			gnificant Effect		
_	16.	.7	18		11	1	6	CDF	0.66	67 I	Non-Si	gnificant Effect		
Test Accepta	bility Crite	ria	TAC Limits											
Attribute	-	t Stat Lov		ər	Overlap	Decis	ion							
Control Resp	1	0.9			Yes	Passe		iteria						
ANOVA Table	}						-							
Source		n Squares	Mea	ι Sαι	Jare	DF		F Stat	P-V	alue	Decisi	on(α:5%)		
Between	0	noqualoo	0	, oqu	auro	2		1 Otur				minate		
Error	0		0			9								
Total	0					11		-						
ANOVA Assu	mptions T	ests												
Attribute	Tes					Test :	Stat	Critical	P-V	alue	Decisi	on(α:1%)		
Variance			y of Variance	Test								minate		
Distribution			V Normality Te									rminate		
96h Survival	Rate Sum	mary												
Conc-mg/L	Co		unt Mea	n	95% LCL	95%	JCL	Median	Mir	1	Max	Std Err	CV%	%Effec
0	N	4	1.00	_	1.0000	1.000	_	1.0000	1.0		1.0000		0.00%	0.00%
8.35		4	1.00		1.0000	1.000		1.0000	1.0		1.0000		0.00%	0.00%
16.7		4	1.00		1.0000	1.000		1.0000	1.0		1.0000		0.00%	0.00%
Angular (Cor	rected) Tra	ansformed	Summary											
Conc-mg/L	Co	de Co	unt Mea	n	95% LCL	95%	UCL	Median	Mir	1	Max	Std Err	CV%	%Effec
0	N	4	1.34	50	1.3450	1.346	0	1.3450	1.3	450	1.3450	0.0000	0.00%	0.00%
8.35		4	1.34		1.3450	1.346		1.3450	1.3		1.3450		0.00%	0.00%
16.7		4	1.34	50	1.3450	1.346		1.3450	1.3	450	1.3450	0.0000	0.00%	0.00%
96h Survival	Rate Deta	il												
Conc-mg/L	Co	de Re	p1 Rep	2	Rep 3	Rep 4	4							
				-										

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	Ν	1.0000	1.0000	1.0000	1.0000	
8.35		1.0000	1.0000	1.0000	1.0000	
16.7		1.0000	1.0000	1.0000	1.0000	

## Angular (Corrected) Transformed Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	N	1.3450	1.3450	1.3450	1.3450	
8.35		1.3450	1.3450	1.3450	1.3450	
16.7		1.3450	1.3450	1.3450	1.3450	

ETIS Ana	alytical Repo	ort						Report Date: Test Code/ID:	21 Oct-20 15:37 (p 2 of 2) TRU0920.262acer / 16-0627-1890
eriodaphnia	a 96-h Acute Surv	vival Te	est					Aquatic B	ioassay & Consulting Labs, Inc.
analysis ID: analyzed: dit Date:	19-3074-8622 21 Oct-20 15:36 21 Oct-20 15:36		•	96h Survival F Nonparametri 9E2E5D7DC0	c-Control v			CETIS Version: Status Level: Editor ID:	CETISv1.9.7 1 000-189-126-0
6h Survival	Rate Binomials								
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4				
)	N	5/5	5/5	5/5	5/5				
3.35		5/5	5/5	5/5	5/5				
6.7		5/5	5/5	5/5	5/5				
1.0 0.9 0.8 10 0.9 0.7 0.6 5 5 5 6 6 6 7 0.4 0.3 0.2 0.1	ø		e	•		Centered Corr. Angle	1.0 0.8 0.5 0.3		

P Analyst: QA:\_

21 Oct-20 15:37 (p 1 of 2) Report Date: Test Code/ID: TRU0920.262acer / 16-0627-1890

## Ceriodaphnia 96-h Acute Survival Test

Ceriodaphnia	96-h Acute Survival	Test		Aquat	ic Bio	assay & Consulting	Labs, Inc
Analysis ID: Analyzed:	18-6039-6023 21 Oct-20 15:36	Endpoint: Analysis:	96h Survival Rate Linear Interpolation (ICPIN)	CETIS Versi Status Leve		CETISv1.9.7 1	
Edit Date:	21 Oct-20 15:36	MD5 Hash:	9E2E5D7DCCA34813F07FFE0218C5D2D0	Editor ID:		000-189-126-0	
Batch ID:	17-4635-5680	Test Type:	Survival (96h)	Analyst:			
Start Date:	22 Sep-20 13:22	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Labor	atory Water	
Ending Date:	26 Sep-20 13:35	Species:	Ceriodaphnia dubia	Brine:	Not A	pplicable	
Test Length:	4d Oh	Taxon:	Branchiopoda	Source:	Aquat	tic Biosystems, CO	Age:
Sample ID:	16-1980-9739	Code:	TRU0920.262acer	Project:			
Sample Date:	17 Sep-20 09:44	Material:	Sample Water	Source:	Bioas	say Report	
Receipt Date:	17 Sep-20 09:44	CAS (PC):		Station:	Lake	Weymouth Raw with	Earth Tec
Sample Age:	5d 4h (20.8 °C)	Client:	Trussell Technologies				

## Linear Interpolation Options

Y Transform	See	ed Re	esamples	Exp 95% CL	Method
Linear	0	28	0	Yes	Two-Point Interpolation
lity Criteria	TAC L	_imits			
Test Stat	Lower	Upper	Overlap	Decision	
1	0.9	>>	Yes	Passes Criteria	
	Linear lity Criteria	Linear 0 lity Criteria TAC I Test Stat Lower	Linear 0 28 lity Criteria TAC Limits Test Stat Lower Upper	Linear 0 280 lity Criteria TAC Limits Test Stat Lower Upper Overlap	Linear 0 280 Yes lity Criteria TAC Limits Test Stat Lower Upper Overlap Decision

## **Point Estimates**

Level	mg/L	95% LCL	95% UCL
EC10	>16.7		
EC15	>16.7		
EC20	>16.7		
EC25	>16.7		
EC40	>16.7		
EC50	>16.7		
	EC10 EC15 EC20 EC25 EC40	EC10         >16.7           EC15         >16.7           EC20         >16.7           EC25         >16.7           EC40         >16.7	EC10       >16.7          EC15       >16.7          EC20       >16.7          EC25       >16.7          EC40       >16.7

#### 96h Survival Rate Summarv

96h Survival Ra	ate Summary				Calc	ulated Varia	ate(A/B)			Isoton	ic Variate
Conc-mg/L	Code	Count	Mean	Median	Min	Max	CV%	%Effect	A/B	Mean	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	20/20	1.0000	0.00%
8.35		4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	20/20	1.0000	0.00%
16.7		4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	20/20	1.0000	0.00%

## 96h Survival Rate Detail

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	1.0000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	1.0000	1.0000
16.7		1.0000	1.0000	1.0000	1.0000

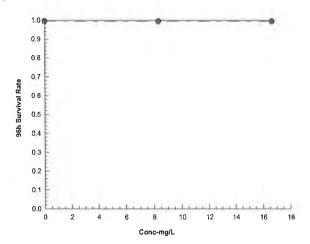
## 96h Survival Rate Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	N	5/5	5/5	5/5	5/5
8.35		5/5	5/5	5/5	5/5
16.7		5/5	5/5	5/5	5/5

Analyst: QA:

CETIS Ana	alytical Report			Report Date: Test Code/ID:	21 Oct-20 15:37 (p 2 of 2) TRU0920.262acer / 16-0627-1890
Ceriodaphnia	a 96-h Acute Surviva	al Test		Aquatic B	ioassay & Consulting Labs, Inc.
Analysis ID:	18-6039-6023	Endpoint:	96h Survival Rate	<b>CETIS Version:</b>	CETISv1.9.7
Analyzed:	21 Oct-20 15:36	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1
Edit Date:	21 Oct-20 15:36	MD5 Hash:	9E2E5D7DCCA34813F07FFE0218C5D2D0	Editor ID:	000-189-126-0

Graphics



Analyst:\_\_\_\_\_QA:\_\_\_\_

# **CETIS Measurement Report**

 Report Date:
 21 Oct-20 15:37 (p 1 of 3)

 Test Code/UP:
 TEL 10020 260accer ( 16 0607 1800

## Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

oonoaapiina	l oo ii Addte odi	titul ica						Aquatic	Jioassay u	oonsuiting	
Batch ID:	17-4635-5680	т	est Type:	Survival (96h)			An	alyst:			
Start Date:	22 Sep-20 13:2	2 P	rotocol:	EPA/821/R-02-	-012 (2002)		Di	uent: Lat	oratory Wat	ter	
Ending Date:	26 Sep-20 13:3	5 <b>S</b>	pecies:	Ceriodaphnia d	lubia		Br	ine: Not	Applicable		
Test Length:	4d Oh	т	axon:	Branchiopoda			Sc		uatic Biosyst	tems, CO	Age:
Sample ID:	16-1980-9739	c	ode:	TRU0920.262a	acer		Pr	oject:			
	: 17 Sep-20 09:4	4 N	laterial:	Sample Water				-	assay Repo	rt	
	: 17 Sep-20 09:4		AS (PC):						ke Weymout		Earth Tec
-	5d 4h (20.8 °C		lient:	Trussell Techn	ologies				.,		
Alkalinity (Ca	CO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	60	60	60	60	60	0	0	0.00%	0
8.35		3	108	108	108	108	108	0	0	0.00%	0
Overall		6	84	56.41	111.6	60	108	10.73	26.29	31.30%	0 (0%)
Conductivity	-µmhos										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Coun
0	N	3	337.7	332.5	342.8	336	340	0.6939	2.082	0.62%	0
8.35		3	1107	1098	1117	1103	1110	1.262	3.786	0.34%	0
16.7		3	1101	1099	1103	1100	1102	0.3333	1	0.09%	0
Overall		9	848.7	554.1	1143	336	1110	127.8	383.3	45.16%	0 (0%)
Dissolved O	kygen-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	7.4	6.655	8.145	7.1	7.7	0.1	0.3	4.05%	0
8.35		3	7.667	6.441	8.892	7.1	8	0.1644	0.4933	6.43%	0
16.7		3	7.5	6.639	8.361	7.1	7.7	0.1155	0.3464	4.62%	0
Overall		9	7.522	7.248	7.796	7.1	8	0.1188	0.3563	4.74%	0 (0%)
Hardness (Ca	aCO3)-mg/L										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cour
0	N	3	85	85	85	85	85	0	0	0.00%	0
8.35		3	315	315	315	315	315	0	0	0.00%	0
Overall		6	200	67.8	332.2	85	315	51.43	126	62.99%	0 (0%)
pH-Units											
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cour
0	N	3	8	7.57	8.43	7.9	8.2	0.05773	0.1732	2.17%	0
8.35		3	7.9	7.652	8.148	7.8	8	0.03333	0.1	1.27%	0
16.7		3	7.867	7.723	8.01	7.8	7.9	0.01924	0.05772	0.73%	0
Overall		9	7.922	7.83	8.015	7.8	8.2	0.04006	0.1202	1.52%	0 (0%)
Temperature	÷°C										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cou
0	N	3	24	24	24	24	24	0	0	0.00%	0
8.35		3	24.13	23.56	24.71	24	24.4	0.07698	0.2309	0.96%	0
16.7		3	24.17	23.45	24.88	24	24.5	0.09623	0.2887	1.19%	0
Overall		9	24.1	23.95	24.25	24	24.5	0.06667	0.2	0.83%	0 (0%)

Analyst:\_\_ QA

 Report Date:
 21 Oct-20 15:37 (p 2 of 3)

 Test Code/ID:
 TRU0920.262acer / 16-0627-1890

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCC	03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	Ν	1		60					
8.35				108					
0	N	2		60					
8.35				108					
0	N	3		60					
8.35				108					
Conductivity-µn	nhos								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		337					
8.35				1103					
16.7				1102					
0	N	2		336					
8.35				1109					
16.7				1101					
0	N	3		340					
8.35				1110					
16.7				1100					
Dissolved Oxyg	jen-mg/L				-				
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	inst iD	Analyst	Notes
0	N	1		7.7				, and the second s	
8.35				7.9					
16.7				7.7					
0	N	2		7.4					
8.35		-		8					
16.7				7.7					
0	N	3		7.1	_				
8.35	IN IN	0		7.1					
16.7				7.1					
Hardness (CaC	O3)-mg/l								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		85					
8.35				315					
0	N	2		85	_				
8.35				315					
0	N	3		85					
8.35		-		315					
pH-Units									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		8.2		=111 70			
8.35				7.8					
16.7				7.8					
0	N	2		7.9	_				
8.35	IN	2		8					
16.7				7.9					
	KI .	0							
0	Ν	3		7.9					
8.35				7.9					
16.7				7.9					

QA

 Report Date:
 21 Oct-20 15:37 (p 3 of 3)

 Test Code/ID:
 TRU0920.262acer / 16-0627-1890

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Temperature-°C	:			
Conc-mg/L	Code	Read	Time	Measure QA Diff-% Inst ID Analyst Notes
0	N	1		24
8.35				24
16.7				24
0	N	2		24
8.35				24.4
16.7				24.5
0	N	3		24
8.35				24
16.7				24

QA:



October 21, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

CLIENT:Trussell TechnologiesSAMPLE I.D.:Lake Weymouth Raw Earthtec 8.35mg/lDATE RECEIVED:09/10/20ABC LAB. NO.:TRU0920.262

NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 0% Survival in 8.35/mg/l Sample

TUa = >1.00 @ 8.35mg/l

Johnson ott aboratory Director

#### AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

## NPDES Percent Survival Bioassay for Effluents and Stormwater

SAMPLE INFORMATION

A CONTRACT OF A		-
CLIENT:	Trussell Technologies Date: 09/10/20	
SAMPLE I.D.:	Lake Weymouth Raw Eart LAB # TRU0920.262	

#### WATER QUALITY

DILUTION WATI Reconst. Fresh	AERATION Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 94 mg/l End: 101 mg/l	Beg: 63 mg/l End: 68 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 370 mg/l End: 380 mg/l	Beg: 116 mg/l End: 126 mg/l

#### ORGANISM INFORMATION

SPECIES:	Oncorhynchus mykiss	DATE REC'D:	09/15/20
COMMON NAMI	E: Rainbow Trout		
SOURCE:	Thomas Fish Co.		
CARRIER:	California Overnight	NO. FISH / TAN	K 10

## TEST DATA

	Ι	NITIAL		24	HOU	RS		48	HOUI	RS		72	HOU	RS		96	HOUI	RS		
DATE: TIME:			)	09/24/20 1550			)	09/25/20 1500				09/26/20 1550								
	Dis.	Temp.	pН	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pН	#Fish	Dis.	Temp.	pН	#Fish	Dis.	Temp.	pН	#Fish
CONC.	Oxy.	dg.Č			Oxy.	dg.Ĉ			Oxy.	dg.Ċ			Oxy.	dg.Ċ			Oxy.	dg.Ĉ		
0 (Con.)	10.0	13.3	7.4	10	10.6	13.8	6.9	10	10.5	13.8	6.9	10	10.5	13.8	6.8	10	10.3	13.8	6.9	10
0 (Con.)	10.1	13.3	7.4	10	10.9	13.8	6.9	10	10.4	13.8	6.9	10	10.6	13.8	6.9	10	10.4	13.8	6.9	10
50.1mg/l	10.2	13.5	7.4	10	10.6	13.8	7.4	0				0				0				0
50.1mg/1	10.1	13.5	7.4	10	10.5	13.9	7.5	0				0				0				0

FINAL DATA										
TOTAL	TOTAL FISH SURVIVAL									
0 (Con.)	10									
0 (Con.)	10									
50.1mg/l 50.1mg/l	0									
50.1mg/l	0									

 FINAL RESULTS

 PERCENT SURVIVAL =
 0% Survival in 8.35/mg/l Sample

 TUa =
 >1.00 (@ 8.35mg/l

Date 10/22/10

Joe Freas Senior Toxicologist

n



October 21, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

CLIENT:Trussell TechnologiesSAMPLE I.D.:Lake Weymouth Raw Earthtec 16.7mg/lDATE RECEIVED:09/10/20ABC LAB. NO.:TRU0920.262

NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 0% Survival in 16.7/mg/l Sample

TUa = >1.00 @ 16.7mg/l

ohnson ory Director Labora

#### AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

## NPDES Percent Survival Bioassay for Effluents and Stormwater

SAMPLE INFORMATION

		Contract of
CLIENT:	Trussell Technologies Date: 09/10/20	
SAMPLE I.D.	Lake Weymouth Raw Eart LAB # TRU0920.262	

#### WATER QUALITY

DILUTION WAT Reconst. Fresh	AERATION Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 94 mg/l End: 101 mg/l	Beg: 63 mg/l End: 68 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 315 mg/l End: 300 mg/l	Beg: 108 mg/l End: 115 mg/l

#### ORGANISM INFORMATION

SPECIES:	Oncorhynchus mykiss	DATE REC'D:	09/15/20
COMMON NAME:	Rainbow Trout		
SOURCE:	Thomas Fish Co.		
CARRIER:	California Overnight	NO. FISH / TANK	10

## TEST DATA

	I	NITIAL	,	24	HOUI	RS		48	HOU	RS		72	HOU	RS		96	HOU	RS		
DATE:		0972272(	)	1.1	(	09/23/20	)	- 11		09/24/20	)		(	)9/25/20	J		(	19/26/20	)	
TIME:	1.0	1500		and the second		1450		-		1550	-			1500	-			1550		
	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish	Dis.	Temp.	pH	#Fish
CONC.	Oxy.	dg.C			Oxy.	dg.Č			Oxy.	dg.Č			Oxy.	dg.Č			Oxy.	dg.C	- 1	
0 (Con.)	10.0	13.3	7.4	10	10.6	13.8	6.9	10	10.5	13.8	6.9	10	10.5	13.8	6.8	10	10.3	13.8	6.9	10
0 (Con.)	10.1	13.3	7.4	10	10.9	13.8	6.9	10	10.4	13.8	6.9	10	10.6	13.8	6.9	10	10.4	13.8	6.9	10
50.1mg/1	8.9	13.4	7.4	10	10.6	13.7	7.5	0				0				0				0
50.1mg/1	9.8	13.4	7.4	10	10.5	13.8	7.5	0				0				0				0

	FINAL I	DATA
1	TOTAL	FISH SURVIVAL
	0 (Con.)	10
	0 (Con.)	10
	50.1mg/l	0
J	50.1mg/l	0

 FINAL RESULTS

 PERCENT SURVIVAL =
 0% Survival in 16.7/mg/l Sample

 TUa =
 >1.00 (a) 16.7mg/l

Senior Toxicologist Joe Freas,

Date 10/12

Client:		Project Name/Number:		٦				Analysis	S	
Trussell Technologies		Liana Olivas			<u> </u>	-				
Address 121 N. Inke Ave		Project Mgr. David Hokanson		Y		-				
Pasadena, CA 91101	10	P.O. #		ki cit	city	a				
Phone Number:	ŀ	Sampled By (signature)		Tox	axia ST	phi			_	
(626) 375 - 8150		Jocol neur	1	2 0 0	yki	oda				
Date Time Comp. Grab	Matrix	Sample ID	Volume/ Number	Acute Fothe Acute O N Acute Ceri	0 N	Ceri			-	Comments
<	Liquid	Lake Neynauth Raw	28 L	2	2	2				2 EarthTec doses
					1					
					-					
Relinquised By:(signature)	1	Date: <b>q/17/20</b>	Time: q:44	Relinq	uised	Relinquised By:(signature)	9			Date: Time:
Received By:(signature)		Date: Time:	Time:	Receiv	red By	Received By:(signature)				Date: Time:
Upon sample reciept record the following results:	the followir	g results:	-							

Aquatic Bioassay and Consulting Laboratories 29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930



**Appendix E –** Weymouth WTP Influent 2020 (Re-sample) Toxicity Test Report



October 28, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Weymouth Resample with EarthTec
DATE RECEIVED:	$1 \operatorname{Oct} - 20$
ABC LAB NO.:	TRU1020.001

# ACUTE FATHEAD MINNOW SURVIVAL BIOASSAY

% Survival

al = 100 % Survival in 3.0 mg/l Sample

EC50 = >3.0 mg/l

Yours very truly, oott Johnson

Laboratory Director

# **CETIS Summary Report**

 Report Date:
 27 Oct-20 15:42 (p 1 of 1)

 Test Code/ID:
 TRU1020.001afml / 09-5343-0416

Aquatic Bioassay & Consulting Labs, Inc.

### Fathead Minnow 96-h Acute Survival Test

Batch ID:	03-5918-3368	Test Type:	Survival (96h)	Analyst:		
Start Date:	13 Oct-20 14:10	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Laboratory Water	
Ending Date:	17 Oct-20 12:55	Species:	Pimephales promelas	Brine:	Not Applicable	
Test Length:	95h	Taxon:	Actinopterygii	Source:	Aquatic Biosystems, CO	Age:
Sample ID:	18-2122-7453	Code:	TRU1020.001afml	Project:		
Sample Date:	30 Sep-20 15:00	Material:	Sample Water	Source:	Bioassay Report	
Receipt Date:	01 Oct-20 10:28	CAS (PC):		Station:	Weymouth Resample with	Earth Teo
Sample Age:	12d 23h (7.3 °C)	Client:	Trussell Technologies			

### Single Comparison Summary

Analysis ID	Endpoint		Compari	son Method			P-Value	Comparis	on Result		9
12-8029-7781	96h Survival R	ate	Wilcoxon Rank Sum Two-Sample Test			Test	1.0000	3mg/L passed 96h survival rate			1
Test Accepta	bility					TAC	Limits				
Analysis ID	Endpoint		Attribute		Test Stat	Lower	Upper	Overlap	Decision		
12-8029-7781	96h Survival R	ate	Control F	Resp	1	0.9	>>	Yes	Passes C	riteria	
96h Survival	Rate Summary										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	in the second se	0.00%
3		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	÷++:	0.00%
96h Survival	Rate Detail						MD	5: 7FE7613	65B732DC2	AD0861FE	AB25F3F5
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4						
0	N	1.0000	1.0000	1.0000	1.0000						
3		1.0000	1.0000	1.0000	1.0000						
96h Survival	Rate Binomial	s									
	Code	Rep 1	Rep 2	Rep 3	Rep 4						
Conc-mg/L											
Conc-mg/L 0	N	10/10	10/10	10/10	10/10						

Analyst: \_\_\_\_\_QA:\_\_\_\_ASS

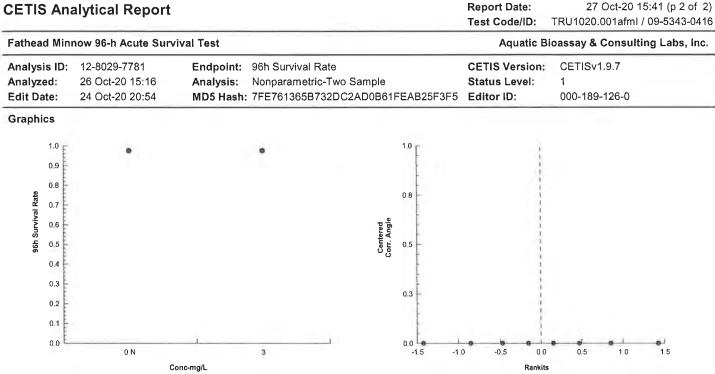
 Report Date:
 27 Oct-20 15:41 (p 1 of 2)

 Test Code/ID:
 TRU1020.001afml / 09-5343-0416

Fathead Minn	ow 96-h Acute S	urvival Te	st					Aquatio	Bioassay & (	Consulting	Labs, Inc	
Analysis ID:	12-8029-7781	End	point:	96h Survival Ra	te		CE	TIS Versio	n: CETISv1	.9.7		
Analyzed:	26 Oct-20 15:16		-	Nonparametric-				atus Level:	1			
Edit Date:	24 Oct-20 20:54	MD	5 Hash:	7FE761365B73	2DC2AD0B	61FEAB251	=3F5 Ed	litor ID:	000-189-	126-0		
Batch ID:	03-5918-3368	Tes	t Type:	Survival (96h)			An	alyst:				
Start Date:	13 Oct-20 14:10		tocol:	EPA/821/R-02-0	012 (2002)		Di	luent: La	: Laboratory Water			
Ending Date:	17 Oct-20 12:55	Spe	ecies:	Pimephales pro		Br	ine: N	ot Applicable				
Fest Length:	95h	Тах	ion:	Actinopterygii			Sc	ource: A	quatic Biosyst	ems, CO	Age:	
Sample ID:	18-2122-7453	Co	te:	TRU1020.001af	iml		Pr	oject:				
Sample Date:	30 Sep-20 15:00	) Mat	terial:	Sample Water			Sc	urce: B	ioassay Repor	t		
Receipt Date:	01 Oct-20 10:28	CA	S (PC):				St	ation: V	eymouth Res	ample with	Earth Tec	
Sample Age:	12d 23h (7.3 °C	Clie	ent:	Trussell Techno	logies							
Data Transfor	'n	Alt Hyp				Comparis	son Resu	lt				
Angular (Corre	ected)	C > T				3mg/L pa	ssed 96h	survival rate	endpoint			
Wilcoxon Rai	nk Sum Two-Sar	nple Test										
Control	vs Conc-mg		Test S	stat Critical	Ties DF	P-Type	P-Valu	e Decisio	on(α:5%)			
Negative Cont			18		1 6	Exact	1.0000		gnificant Effect	t		
Test Accepta	bility Criteria		_imits									
Attribute	Test Stat		Upper	- Overlap	Decision							
Control Resp	1	0.9	>>	Yes	Passes Cr	riteria						
ANOVA Table												
Source	Sum Squ	aros	Mean	Square	DF	F Stat	P-Valu	o Docisi	on(a:5%)			
Between	0	103	0	oquare	1	1 0141	I -Valu	Indeter				
Error	0		0		6							
Total	0				7	7						
ANOVA Assu	mptions Tests											
Attribute	Test				Test Stat	Critical	P-Valu	e Decisi	on(α:1%)			
Variance		Ratio F Tes			Test otat	ontical	-valu	Indeter	. ,			
Distribution		Vilk W Norr		st				Indeter				
96b Survival	Rate Summary	-										
	Code											
Conc-mg/L		Count		050/ 1.01	0.00/ 1101	Man dia a	8.61		Ctal East	01/0/	0/ 56000	
^		Count	Mean		95% UCL		Min	Max	Std Err	CV%	%Effect	
	N	4	1.000	0 1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%	
3	Ν	4 4	1.0000	0 1.0000				1.0000	0.0000			
3 Angular (Cor	N rected) Transfor	4 4 med Sumi	1.0000 1.0000 mary	0 1.0000 0 1.0000	1.0000 1.0000	1.0000 1.0000	1.0000 1.0000	1.0000 1.0000	0.0000 0.0000	0.00% 0.00%	0.00% 0.00%	
Conc-mg/L	N rected) Transfor Code	4 4 med Sumi Count	1.0000 1.0000 mary Mean	0 1.0000 0 1.0000 95% LCL	1.0000 1.0000 95% UCL	1.0000 1.0000 Median	1.0000 1.0000 Min	1.0000 1.0000 <b>Max</b>	0.0000 0.0000 Std Err	0.00% 0.00% CV%	0.00% 0.00% %Effec	
3 Angular (Cor Conc-mg/L 0	N rected) Transfor	4 4 rmed Sumi Count 4	1.0000 1.0000 mary <u>Mean</u> 1.4120	0 1.0000 0 1.0000 95% LCL 0 1.4120	1.0000 1.0000 95% UCL 1.4120	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3	N rected) Transfor Code N	4 4 med Sumi Count	1.0000 1.0000 mary Mean	0 1.0000 0 1.0000 95% LCL 0 1.4120	1.0000 1.0000 95% UCL	1.0000 1.0000 Median	1.0000 1.0000 Min	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV%	0.00% 0.00% %Effec	
3 Angular (Cor Conc-mg/L 0 3 96h Survival	N rected) Transfor Code N Rate Detail	4 4 rmed Sumi Count 4	1.0000 1.0000 mary <u>Mean</u> 1.4120	0 1.0000 0 1.0000 95% LCL 0 1.4120	1.0000 1.0000 95% UCL 1.4120	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L	N rected) Transfor Code N Rate Detail Code	4 med Sum Count 4 4 Rep 1	1.0000 1.0000 mary <u>Mean</u> 1.4120 1.4120 Rep 2	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3	1.0000 1.0000 95% UCL 1.4120 1.4120 Rep 4	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0	N rected) Transfor Code N Rate Detail	4 med Sum Count 4 4 <u>Rep 1</u> 1.0000	1.0000 1.0000 mary <u>Mean</u> 1.4120 1.4120 <u>Rep 2</u> 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000	1.0000 1.0000 <b>95% UCL</b> 1.4120 1.4120 <b>Rep 4</b> 1.0000	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0	N rected) Transfor Code N Rate Detail Code	4 med Sum Count 4 4 Rep 1	1.0000 1.0000 mary <u>Mean</u> 1.4120 1.4120 Rep 2	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000	1.0000 1.0000 95% UCL 1.4120 1.4120 Rep 4	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0 3	N rected) Transfor Code N Rate Detail Code	4 med Sum Count 4 4 <u>Rep 1</u> 1.0000 1.0000	1.0000 1.0000 mary <u>Mean</u> 1.4120 1.4120 <u>Rep 2</u> 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000	1.0000 1.0000 <b>95% UCL</b> 1.4120 1.4120 <b>Rep 4</b> 1.0000	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 3 96h Survival Conc-mg/L 0 3 Angular (Cor	N rected) Transfor Code N Rate Detail Code N	4 med Sum Count 4 4 <u>Rep 1</u> 1.0000 1.0000	1.0000 1.0000 mary <u>Mean</u> 1.4120 1.4120 <u>Rep 2</u> 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000 0 1.0000 2 Rep 3	1.0000 1.0000 <b>95% UCL</b> 1.4120 1.4120 <b>Rep 4</b> 1.0000	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0 3 Angular (Cor Conc-mg/L 0	N rected) Transfor Code N Rate Detail Code N rected) Transfor	4 med Summ Count 4 4 4 1.0000 1.0000 1.0000 mmed Detail Rep 1 1.4120	1.0000 1.0000 mary Mean 1.4120 1.4120 Rep 2 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000 0 1.0000 2 Rep 3 0 1.4120	1.0000 1.0000 95% UCL 1.4120 1.4120 1.4120 Rep 4 1.0000 1.0000 Rep 4 1.4120	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0 3 Angular (Cor Conc-mg/L 0	N rected) Transfor Code N Rate Detail Code N rected) Transfor Code	4 med Sumi Count 4 4 1.0000 1.0000 1.0000 rmed Detai Rep 1	1.0000 1.0000 mary <u>Mean</u> 1.4120 1.4120 <u>Rep 2</u> 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000 0 1.0000 2 Rep 3 0 1.4120	1.0000 1.0000 95% UCL 1.4120 1.4120 Rep 4 1.0000 1.0000 Rep 4	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0 3 Angular (Cor Conc-mg/L 0 3	N rected) Transfor Code N Rate Detail Code N rected) Transfor Code	4 4 7 7 7 7 7 7 7 7 7 7 7 7 7	1.0000 1.0000 mary Mean 1.4120 1.4120 Rep 2 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000 0 1.0000 2 Rep 3 0 1.4120	1.0000 1.0000 95% UCL 1.4120 1.4120 1.4120 Rep 4 1.0000 1.0000 Rep 4 1.4120	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0 3 Angular (Cor Conc-mg/L 0 3 96h Survival	N rected) Transfor Code N Rate Detail Code N rected) Transfor Code N	4 4 7 7 7 7 7 7 7 7 7 7 7 7 7	1.0000 1.0000 mary Mean 1.4120 1.4120 Rep 2 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000 0 1.0000 2 Rep 3 0 1.4120 0 1.4120	1.0000 1.0000 95% UCL 1.4120 1.4120 1.4120 Rep 4 1.0000 1.0000 Rep 4 1.4120	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	
3 Angular (Cor Conc-mg/L 0 3 96h Survival Conc-mg/L 0 3 Angular (Cor Conc-mg/L 0 3	N rected) Transfor Code N Rate Detail Code N rected) Transfor Code N Rate Binomials	4 4 7 7 7 7 7 7 7 7 7 7 7 7 7	1.0000 1.0000 mary Mean 1.4120 1.4120 1.4120 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	0 1.0000 0 1.0000 95% LCL 0 1.4120 0 1.4120 2 Rep 3 0 1.0000 2 Rep 3 0 1.4120 0 1.4120 0 1.4120 2 Rep 3	1.0000 1.0000 95% UCL 1.4120 1.4120 1.4120 1.0000 1.0000 Rep 4 1.4120 1.4120	1.0000 1.0000 Median 1.4120	1.0000 1.0000 Min 1.4120	1.0000 1.0000 <b>Max</b> 1.4120	0.0000 0.0000 Std Err 0.0000	0.00% 0.00% CV% 0.00%	0.00% 0.00% %Effec 0.00%	

Analyst:

QA:



QA: Analyst:

27 Oct-20 15:41 (p 2 of 2)

Report Date:

 Report Date:
 27 Oct-20 15:42 (p 1 of 2)

 Test Code/ID:
 TRU1020.001afml / 09-5343-0416

Fathead Minnow 96-h Acute Survival Test

	ow 96-n Acute	Surviva	li iest					Aqualic	Dioassay o	Consulting	Labs, Inc.
Start Date:	03-5918-3368 13 Oct-20 14:1		Protocol:	Survival (96h) EPA/821/R-02-	, ,		Di		aboratory Wat	ter	
Ending Date: Test Length:		5	Species: Taxon:		Pimephales promelas Actinopterygii				Not Applicable Aquatic Biosystems, CO		Age:
	18-2122-7453		Code:	TRU1020.001a	afml			oject:			
Sample Date:	30 Sep-20 15:0	00	Material:	Sample Water				-	ioassay Repo	rt	
Receipt Date:	01 Oct-20 10:2	28	CAS (PC):	·			St	ation: W	eymouth Res	sample with	Earth Tec
Sample Age:			Client:	Trussell Techn	ologies						
Alkalinity (Ca	CO3)-mg/L										
Conc-mg/L	Code	Count	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	60	60	60	60	60	0	0	0.00%	0
3		3	113	113	113	113	113	0	0	0.00%	0
Overall		6	86.5	56.04	117	60	113	11.85	29.03	33.56%	0 (0%)
Conductivity-	µmhos										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	352	321.8	382.2	338	360	4.055	12.17	3.46%	0
3		3	1025	1017	1032	1022	1028	1.018	3.055	0.30%	0
Overall		6	688.3	301.6	1075	338	1028	150.4	368.5	53.54%	0 (0%)
Dissolved Oxy	ygen-mg/L										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	7.633	7.49	7.777	7.6	7.7	0.01924	0.05773	0.76%	0
3		3	7.4	6.743	8.057	7.2	7.7	0.08819	0.2646	3.58%	0
Overall		6	7.517	7.292	7.741	7.2	7.7	0.08724	0.2137	2.84%	0 (0%)
Hardness (Ca	CO3)-mg/L										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	85	85	85	85	85	0	0	0.00%	0
3		3	238	238	238	238	238	0	0	0.00%	0
Overall		6	161.5	73.56	249.4	85	238	34.21	83.8	51.89%	0 (0%)
pH-Units											
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	3	7.7	7.699	7.701	7.7	7.7	0	0	0.00%	0
3		3	7.7	7.699	7.701	7.7	7.7	0	0	0.00%	0
Overall		6	7.7	7.7	7.7	7.7	7.7	0	0	0.00%	0 (0%)
Temperature-	۰°C										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cour
0	N	3	24	24	24	24	24	0	0	0.00%	0
3		3	24	24	24	24	24	0	0	0.00%	0
Overall		6	24	24	24	24	24	0	0	0.00%	0 (0%)

Analyst:\_\_\_\_\_QA:\_\_\_\_

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

									Aquatic Bioassay & Consulting Labs, Inc
Alkalinity (CaCo	03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	Ν	1		60					
3				113					
0	Ν	2		60					
3		-		113					
0 3	Ν	3		60 113					
				113					
Conductivity-µ	nhos								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		358					
3				1024				_	
0	N	2		360					
3				1028					
0	Ν	3		338					
3				1022					
Dissolved Oxy	gen-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.6					
3				7.7					
0	Ν	2		7.7					
3				7.3					
0	Ν	3		7.6					
3		_		7.2					
Hardness (CaC	03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		85					
3				238					
0	N	2		85					
3				238					
0	Ν	3		85					
3				238					
pH-Units									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.7					
3				7.7					
0	N	2		7.7					
3				7.7					
0	N	3		7.7		-			
3				7.7					
Temperature-°	c								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	শ		24					
3				24					
0	N	2		24					
3				24					
0	N	3		24					
3				24					

QA: Analyst: 0



October 28, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT: SAMPLE ID.: DATE RECEIVED: ABC LAB NO.: Trussell Technologies Weymouth Resample with EarthTec 1 Oct – 20 TRU1020.001

# ACUTE CERIODAPHNIA SURVIVAL BIOASSAY

% Survival = 0 % Survival in 3.0 mg/l Sample

EC50 = < 3.0 mg/l

You y truly. Scott Johnson Laboratory Director

# **CETIS Summary Report**

Report Date: Test Code/ID: TRU1020.001acer / 08-8822-4116

Aquatic Bioassay & Consulting Labs, Inc.

# 27 Oct-20 15:42 (p 1 of 1)

### Ceriodaphnia 96-h Acute Survival Test

Batch ID:	00-9934-3961	Test Type:	Survival (96h)	Analyst:		
Start Date:	13 Oct-20 14:10	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Laboratory Water	
Ending Date:	17 Oct-20 12:55	Species:	Ceriodaphnia dubia	Brine:	Not Applicable	
Test Length:	95h	Taxon:	Branchiopoda	Source:	Aquatic Biosystems, CO	Age:
Sample ID:	00-5310-5516	Code:	TRU1020.001acer	Project:		
Sample Date:	: 30 Sep-20 15:00	Material:	Sample Water	Source:	Bioassay Report	
Receipt Date:	: 01 Oct-20 10:28	CAS (PC):		Station:	Weymouth Resample with	Earth Teo
Sample Age:	12d 23h (7.3 °C)	Client:	Trussell Technologies			

### Single Comparison Summary

Analysis ID	Endpoint		Compari	son Method			P-Value	Comparis	son Result		9
10-1520-9557	96h Survival R	ate	Wilcoxon	Wilcoxon Rank Sum Two-Sample Test			0.0143	3mg/L fail	1		
Test Accepta	bility					TAC	Limits				
Analysis ID	Endpoint		Attribute		Test Stat	Lower	Upper	Overlap	Decision		
10-1520-9557	96h Survival R	ate	Control R	lesp	1	0.9	>>	Yes	Passes C	riteria	
96h Survival	Rate Summary										
Conc-mg/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000		0.00%
3		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
96h Survival	Rate Detail						MD	5: A855D6A	45B6135CE	1F9C8F16	971C8225F
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4						
0	N	1.0000	1.0000	1.0000	1.0000						
3		0.0000	0.0000	0.0000	0.0000						
96h Survival	Rate Binomials	3									
Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4						
0	N	5/5	5/5	5/5	5/5						
3		0/5	0/5	0/5	0/5						

Analyst:\_\_\_\_\_ QA:\_\_\_

 Report Date:
 27 Oct-20 15:42 (p 1 of 2)

 Test Code/ID:
 TRU1020.001acer / 08-8822-4116

Itatic Bioassay & Consulting Labs, Indirector         Image: CETISv1.9.7         vel: 1         000-189-126-0         Laboratory Water         Not Applicable         Aquatic Biosystems, CO         Age:         Bioassay Report
vel: 1 000-189-126-0 Laboratory Water Not Applicable Aquatic Biosystems, CO Age: Bioassay Report
000-189-126-0 Laboratory Water Not Applicable Aquatic Biosystems, CO Age: Bioassay Report
Laboratory Water Not Applicable Aquatic Biosystems, CO Age: Bioassay Report
Not Applicable Aquatic Biosystems, CO Age: Bioassay Report
Not Applicable Aquatic Biosystems, CO Age: Bioassay Report
Aquatic Biosystems, CO Age: Bioassay Report
Bioassay Report
Weymouth Resample with Earth Tec
ate endpoint
cision(α:5%)
nificant Effect
cision(α:5%)
leterminate
cision(a:1%)
leterminate
determinate
ax Std Err CV% %Effec
0000 0.0000 0.00% 0.00%
000 0.0000 100.00
ax Std Err CV% %Effec
3450 0.0000 0.00% 0.00% 2255 0.0000 0.00% 83.24%
2255 0.0000 0.00% 83.24%

QA: Analyst:\_\_

CETIS	Ana	lytical Report							port Date: st Code/ID:			5:42 (p 2 of 2 08-8822-411	
Ceriodap	phnia	96-h Acute Surviva	al Test					Aquatic Bioassay & Consulting Labs, Inc.					
Analysis Analyzed Edit Date	d:	10-1520-9557 24 Oct-20 21:00 24 Oct-20 20:59	Endpoint: Analysis: MD5 Hash:	96h Surviva Nonparama A855D6A5	etric-Two S	•	6971C82	St	ETIS Version: atus Level: litor ID:	CETISv1. 1 000-189-1			
Graphics	5												
	1.0 0.9	۰					1.0		1				
	0.8						0.8		1				
Su	0.6					Centered Corr. Angle							
	0.4					Corr	0.5						
	0.3 0.2						0.3						
	0.1	0 N	đ	3			0.0	-1.0	-0.5 0.0	• • • • • • • • • • • • • • • • • • •	e 1 1.0		
			Conc-mg/L	3			-1 5	-1 0	-0.5 0.0 Rankits		1.0	1.5	

alyst:\_\_\_\_\_QA:\_\_\_\_

# **CETIS Measurement Report**

 Report Date:
 27 Oct-20 15:42 (p 1 of 2)

 Test Code/ID:
 TRU1020.001acer / 08-8822-4116

Ceriodaphnia 96-h Acute Survival Test

Ceriodaphnia	96-h Acute Su	rvival Te	est			Aquati	c Bioassay &	Consulting	Labs, Inc.		
Batch ID: Start Date: Ending Date: Test Length:	00-9934-3961 13 Oct-20 14:1 17 Oct-20 12:5 95h	0	Test Type: Protocol: Species: Taxon:	Survival (96h) EPA/821/R-02- Ceriodaphnia d Branchiopoda	· · ·		Di Br	ine: N	aboratory Wat lot Applicable lquatic Biosyst		Age:
Sample ID:	00-5310-5516		Code:	TRU1020.001a	cer		Pr	oject:			
Sample Date:	30 Sep-20 15:0	00	Material:	Sample Water			Sc	ource: E	Bioassay Repo	rt	
Receipt Date:	01 Oct-20 10:2	8	CAS (PC):				St	ation: \	Veymouth Res	ample with	Earth Tec
Sample Age:	12d 23h (7.3 °	C)	Client:	Trussell Techn	ologies						
Alkalinity (Ca	CO3)-mg/L										
Conc-mg/L	Code	Count	t Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Count
0	N	3	60	60	60	60	60	0	0	0.00%	0
3		3	113	113	113	113	113	0	0	0.00%	0
Overall		6	86.5	56.04	117	60	113	11.85	29.03	33.56%	0 (0%)
Conductivity-	umhos										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Eri	Std Dev	CV%	QA Count
0	N	3	352	321.8	382.2	338	360	4.055	12.17	3.46%	0
3		3	1025	1017	1032	1022	1028	1.018	3.055	0.30%	0
Overall		6	688.3	301.6	1075	338	1028	150.4	368.5	53.54%	0 (0%)
Dissolved Ox	ygen-mg/L										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Count
0	N	3	7.633	7.49	7.777	7.6	7.7	0.0192	4 0.05773	0.76%	0
3		3	7.4	6.743	8.057	7.2	7.7	0.0881	9 0.2646	3.58%	0
Overall		6	7.517	7.292	7.741	7.2	7.7	0.0872	4 0.2137	2.84%	0 (0%)
Hardness (Ca	aCO3)-mg/L										
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Coun
0	N	3	85	85	85	85	85	0	0	0.00%	0
3		3	238	238	238	238	238	0	0	0.00%	0
Overall		6	161.5	73.56	249.4	85	238	34.21	83.8	51.89%	0 (0%)
pH-Units											
Conc-mg/L	Code	Coun	t Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Coun
0	N	3	7.7	7.699	7.701	7.7	7.7	0	0	0.00%	0
3		3	7.7	7.699	7.701	7.7	7.7	0	0	0.00%	0
Overall		6	7.7	7.7	7.7	7.7	7.7	0	0	0.00%	0 (0%)
Temperature	-°C										
Conc-mg/L	Code	Cour	it Mean	95% LCL	95% UCL	Min	Мах	Std Er	r Std Dev	CV%	QA Coun
0	N	3	24	24	24	24	24	0	0	0.00%	0
3		3	24	24	24	24	24	0	0	0.00%	0
Overall		6	24	24	24	24	24	0	0	0.00%	0 (0%)

Analyst:\_\_\_\_\_QA:\_\_\_

 Report Date:
 27 Oct-20 15:42 (p 2 of 2)

 Test Code/ID:
 TRU1020.001acer / 08-8822-4116

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCO	03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		60					
3				113					
0	N	2		60					
3				113					
0	N	3		60					
3				113					
Conductivity-µr	nhos								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		358					
3				1024					
0	N	2		360					
3				1028					
0	N	3		338					
3		-		1022					
Dissolved Oxyg	gen-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		7.6					
3		2		7.7					
0	N	2		7.7					
3		_		7.3					
0	N	3		7.6					
3		Ŭ		7.2					
Hardness (CaC	:03)-mg/L								
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	N	1		85					
3				238					
0	N	2		85					
3				238					
0	N	3		85					
3		-		238					
pH-Units				-					
	Cada	Pacel	Time	Maaa	0.4	D:66 0/	In st ID	Analyset	Notoc
Conc-mg/L 0	Code N	Read	Time	Measure 7.7	QA .	Diff-%	Inst ID	Analyst	NULES
3	IN	1		7.7					
	N!	0							
0	Ν	2		7.7					
3				7.7					
0	N	3		7.7					
3				7.7	_				
Temperature-°									
Conc-mg/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	Ν	1		24					
3				24					
0	N	2		24					
3				24					
0	N	3		24					
3				24					

< QA:\_\_\_\_ Analyst:



October 27, 2020

Mr. David Hokanson Trussell Technologies 232 N. Lake Ave Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed acute bioassay report. The test was conducted under the guidelines prescribed in "Methods for Measuring the Acute Toxicity of Effluents and Receiving water to Freshwater and Marine Organisms" (Fourth Edition) EPA/600/ 4-90/027F, August 1993. The results were as follows:

CLIENT:	Trussell Technologies
SAMPLE I.D.:	Weymouth Besample Earthtec 3.0mg/1
DATE RECEIVED:	09/10/20
ABC LAB. NO.:	TRU1020.001

### NPDES PERCENT SURVIVAL BIOASSAY RAINBOW TROUT

PERCENT SURVIVAL = 65% Survival in 3.0/mg/l Sample

TUa = 0.91 @ 3.0mg/l

ery truly, Johnson ory Director

### AQUATIC BIOASSAY AND CONSULTING LABORATORIES, INC. 29 North Olive Street Ventura, CA 93001 (805) 643-5621

### NPDES Percent Survival Bioassay for Effluents and Stormwater

	SAMPLE INFORMATION
CLIENT:	Trussell Technologies Date: 09/10/20
SAMPLE I.D.:	Weymouth Besample Eartl LAB # TRU1020.001

WATER QU	ALITY
DILUTION WATI Reconst. Fresh	AERATION Single Bubble Air
CONTROL HARDNESS	CONTROL ALKALINITY
Beg: 94 mg/l End: 100 mg/l	Beg: 63 mg/l End: 66 mg/l
SAMPLE HARDNESS	SAMPLE ALKALINITY
Beg: 238 mg/l End: 250 mg/l	Beg: 113 mg/l End: 116 mg/l

# ORGANISM INFORMATIONSPECIES:Oncorhynchus mykissDATE REC'D:10/08/20COMMON NAME:Rainbow Trout10/08/20SOURCE:Thomas Fish Co.10/08/20CARRIER:California OvernightNO. FISH / TANK10

										TES	ST DA	ТА								
	]	NITIAI		24	HOU	RS		48	HOU	RS		72	HOU	RS		96	HOU	RS		
DATE: TIME:		10/15/20 1400	0			10/16/20 1500	)			10/17/20 1450	0			1400	0			1400 1400	Ũ	
CONC.	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish	Dis. Oxy.	Temp. dg.C	pН	#Fish
0 (Con.)	9.9	13.8	6.8	10	10.1	13.9	6.5	10	9.9	13.8	6.5	10	9.9	13.7	6.5	10	9.9	13.6	6.7	10
0 (Con.)	9.8	13.8	6.8	10	9.9	13.8	6.7	10	9.8	13.8	6.6	10	9.9	13.6	6.7	10	9.9	13.7	6.8	10
50.1mg/l	9.8	13.6	7.0	10	10.1	13.7	6.7	10	10.0	13.8	6.4	6	10.0	13.6	6.2	6	9.9	13.7	6.7	6
50.1mg/1	9.6	13.6	7.0	10	9.9	13.7	6.6	10	10.1	13.8	6.5	7	10.0	13.6	6.4	7	10.0	13.7	6.5	7

l	FINAL I	ОАТА
1	TOTAL	FISH SURVIVAL
	0 (Con.)	10
J	0 (Con.)	10
	50.1mg/1	6
l	50.1mg/l	7

FINAL	RESULTS
PERCENT SURVIVAL =	65% Survival in 3.0/mg/l Sample
TUa =	0.91 (a) 3.0mg/l

Joe Freas, Senior Toxicologist

10/20/20 Date

		Amatunia	
Client:	Project Name/Number:	Analysis	
Transcell Ter handreser	63/6 375 8150		
0	5		
232 NLake Ave.	P.O. #	OXIC OXIC SS OXIC SS OXIC	
nber: 、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、	Sampled By (signature)	te T te T Myki e T erioc	
Date Time p. Co Grab Matrix	Sample ID Volume/	Acu Fat Acu Acu	Comments
1/30/20 15 00 V	Wern auth Resemble 30	1 1 1 East 3	ster and /cz
	4		3
			T
Relinquised By:(signature)	Date: Time:	Relinquised By:(signature)	Date: Time:
Received By: (signature)	Date: Time:	Received By:(signature)	Date: Time:
Upon sample reciept record the following results: Temp (°C) 7.3 NH <sub>3</sub> (mg/L) $\angle O.I$	. 00 ( Cl (mg		

Aquatic Bioassay and Consulting Laboratories 29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930

CHAIN OF CUSTODY RECORD

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Appendix F – Weymouth WTP Influent 2021 Toxicity Test Report



September 8, 2021

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Weymouth WTP Infl. with EarthTec QZ
DATE RECEIVED:	1 July – 21
ABC LAB NO .:	TRU0721.006

# RAINBOW TROUT SURVIVAL BIOASSAY

% Survival = CON = 100.00%3.0uL/L = 100.00% 8.35uL/L = 0.00% 16.7uL/L = 0.00%

EC50 = 5.675 ul/l

Yours very/truly, Scott Johnson Laboratory Director

29 north olive st. ventura, ca 93001 (805) 643 5621 aquabio.org

CE IIS SU	mmary Repo	ort					-	oort Date:		3 Sep-21 13:	
Fish 96-h Acı	ute Survival Test						Tes	t Code/ID	tic Bioassay &	0721.006 / 1	
Batch ID:	19-9127-3820		Test Type:	Survival (96h)			Δna		Joe Freas		<b>,</b> , , , , , , , , , , , , , , , , , ,
Start Date:	07 Jul-21 16:00		Protocol:	EPA/821/R-02	-012 (2002)			-	_aboratory Wate	ər	
	11 Jul-21 14:00		Species:	Oncorhynchus			Brir		Not Applicable		
Test Length:			Taxon:	Actinopterygii	mykiee				Aquatic Biosyste	ems, CO	Age:
Sample ID:	07-2433-7579	0	Code:	TRU0721_006		_	Pro	ject:			5
	01 Jul-21 11:30		Aterial:	Sample Water				•	Bioassay Repor	+	
-	01 Jul-21 11:30	Ċ	CAS (PC):	earripro trator					Veymouth WT		
Sample Age:			lient:	Trussell Techn	ologies		otu		veymouth vv H	undent	
Single Compa	arison Summary										
Analysis ID	Endpoint		Comp	arison Method			P-Value	Compa	arison Result		
01-7403-9603	96h Survival Rate	Э	Steel N	Many-One Rank	Sum Test		0.5000		bassed 96h sur	vival rate	
Point Estimat	e Summary										
Analysis ID	Endpoint		Point	Estimate Meth	od	~	Level	μL/L	95% LCL	95% UCL	
19-6588-7535	96h Survival Rate	9	Linear	Interpolation (IC	PIN)		EC10	3.535	3.535	3.535	
					, i i i i i i i i i i i i i i i i i i i		EC15	3.803	3.803	3.803	
							EC20	4.07	4.07	4.07	
							EC25	4.338	4.338	4.338	
							EC40	5.14	<b>F</b> 4 4	E 4 4	
							LOHU	5.14	5.14	5.14	
							EC50	5.675	5.14 5.675	5.675	
Test Acceptat	bility					TAC L	EC50				_
Test Acceptat Analysis ID	Endpoint		Attribu		Test Stat	Lower	EC50		5.675		
Analysis ID 01-7403-9603	Endpoint 96h Survival Rate		Contro	l Resp	1	Lower 0,9	EC50 .imits	5.675	5.675	5.675	
Analysis ID 01-7403-9603	Endpoint			l Resp		Lower	EC50 .imits Upper	5.675 Overla	5.675 Decision	5.675 riteria	
Analysis ID 01-7403-9603 19-6588-7535	Endpoint 96h Survival Rate		Contro	l Resp	1	Lower 0,9	EC50 imits Upper >>	5.675 Overla Yes	5.675 Decision Passes Cr	5.675 riteria	
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code	Count	Contro Contro Mean	I Resp I Resp <b>95% LCL</b>	1 1 95% UCL	Lower 0,9 0.9 Min	EC50 imits Upper >> >> Max	5.675 Overla Yes	5.675 <b>Decision</b> Passes Cr Passes Cr <b>Std Dev</b>	5.675 riteria	%Effect
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary	Count 4	Contro Contro Mean 1.0000	I Resp I Resp <b>95% LCL</b> 1.0000	1 1 95% UCL 1.0000	Lower 0,9 0.9 Min 1,0000	EC50 imits Upper >> Max 1.0000	5.675 Overlag Yes Yes Std Err 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000	5.675 riteria riteria	0.00%
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code	Count 4 4	Contro Contro Mean 1.0000 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000	1 1 95% UCL 1.0000 1.0000	Lower 0,9 0.9 Min 1.0000 1.0000	EC50 imits Upper >> Max 1.0000 1.0000	5.675 Overlag Yes Std Err 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000	5.675 riteria riteria	0.00% 0.00%
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 0 3 3.35	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code	Count 4 4 4	Contro Contro Mean 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000	5.675 Overlag Yes Std Err 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria	0.00% 0.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L D 3 3.35 16.7	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N	Count 4 4	Contro Contro Mean 1.0000 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000	Lower 0,9 0.9 Min 1.0000 1.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 <b>96h Survival F</b> Conc-µL/L 3 3.35 6.7 <b>16h Survival F</b>	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N	<b>Count</b> 4 4 4 4	Contro Contro Mean 1.0000 1.0000 0.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 <b>26h Survival F</b> <b>Conc-µL/L</b> 3.35 6.7 <b>26h Survival F</b> <b>Conc-µL/L</b>	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 8 Rep 1	Contro Contro Mean 1.0000 0.0000 0.0000 Rep 2	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b>	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 01-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 3 3.35 16.7 16h Survival F Conc-µL/L 0	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N	Count 4 4 4 4 4 8 8 8 9 1.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 Rep 2 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 <b>96h Survival F</b> <b>Conc-µL/L</b> 3 3.35 16.7 <b>96h Survival F</b> <b>Conc-µL/L</b>	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 4 8 Rep 1 1.0000 1.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 3 3.35 6.7 16h Survival F Conc-µL/L 3 3 3 3 3 3 3 3 3 3 3 3 3	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 4 1.0000 1.0000 1.0000 0.0000	Contro Contro Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 01-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 3 3.35 6.7 16h Survival F Conc-µL/L 3 3.35	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 4 8 Rep 1 1.0000 1.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 11-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 3 3.35 6.7 6h Survival F Conc-µL/L 3 6.7 6h Survival R	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials	Count 4 4 4 4 4 4 1.0000 1.0000 1.0000 0.0000	Contro Contro Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 11-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 3 6.7 6h Survival F Conc-µL/L 35 6.7 6h Survival R conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count           4           4           4           4           1.0000           1.0000           0.0000           0.0000           0.0000           0.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 Rep 2	I Resp I Resp <b>95% LCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000 0.0000	1 1 95% UCL 1.0000 0.0000 0.0000 0.0000 Rep 4 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 11-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 3 3.35 6.7 16h Survival F Conc-µL/L 4 35 6.7 6h Survival R conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials	Count           4           4           4           4           1.0000           1.0000           0.0000           0.0000           0.0000           0.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000	I Resp I Resp <b>95% LCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 96h Survival F Conc-µL/L 0 3.35 16.7 26h Survival F Conc-µL/L 0 3.35 6.7 16h Survival R Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count           4           4           4           4           4           1.0000           1.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 1.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 1.0000 1.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID D1-7403-9603 19-6588-7535 <b>96h Survival F</b> <b>Conc-µL/L</b> 3 3.35 16.7 <b>96h Survival F</b> <b>Conc-µL/L</b> 3 3.35 6.7 <b>16h Survival R</b> <b>Conc-µL/L</b>	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count           4           4           4           4           1.0000           1.0000           0.0000           0.0000           0.0000           0.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	Lower 0,9 0.9 Min 1_0000 1.0000 0_0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overla</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675	5.675 riteria riteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%

1 and Analyst:

		ort							eport Date		08 Sep-21 1 U0721.006	
Fish 96-h Acu	ute Survival Tes	t							Aqu	iatic Bioassay	& Consulti	ng Labs, l
Analysis ID:	01-7403-9603		Endpoint:	96h Survival F	Rate			CI	ETIS Vers	ion: CETIS	v1.9.7	
Analyzed:	08 Sep-21 13:1		Analysis:	Nonparametri					atus Leve			
Edit Date:	08 Sep-21 13:0			3A0D5E0FE4		BDE0	3F511260	D3FC EC	litor ID:	007-97	9-628-1	
Batch ID:	19-9127-3820			Survival (96h)					nalyst:	Joe Freas		
Start Date:	07 Jul-21 16:00 11 Jul-21 14:00		Protocol:	EPA/821/R-02		02)			luent:	Laboratory Wa		
Test Length:			Species: Taxon:	Oncorhynchus Actinopterygii	s mykiss				ine:	Not Applicable		
				Actinopterygi	_			50	ource:	Aquatic Biosys	stems, CO	Age:
Sample ID:	07-2433-7579		Code:	TRU0721.006				Pr	oject:			
-	01 Jul-21 11:30		Material:	Sample Water	•				ource:	Bioassay Repo		
Sample Age:	01 Jul-21 11:30		CAS (PC):	<b>.</b>				St	ation:	Weymouth W	TP Influent	
Sample Aye.	60 411		Client:	Trussell Tech	nologies			_				
Data Transfor		Alt Hy	p				Compari	son Resul	t			
Angular (Corre	cted)	C > T					3µL/L pas	sed 96h s	urvival rate	e endpoint		
Steel Many-O	ne Rank Sum Te	est										
Control	vs Conc-µL	./L	Test S	stat Critical	Ties	DF	Р-Туре	P-Value	Decis	sion(a:5%)		
Negative Control	ol 3		18	12	1	_	CDF	0.5000		Significant Effect	>t	
Test Acceptab	oility Criteria	T۸	C Limits									
Attribute	Test Stat		Upper	Overlap	Decisi	on						
Control Resp	1	0.9	>>	Yes	Passes		eria					
ANOVA Table												_
	0			_								
Source Between	Sum Squa	ares		Square	DF	F	F Stat	P-Value		sion(α:5%)		
Error	0		0		1 6				Indete	erminate		
Total	0		0		7	-						
ANOVA Assun	notions Tests							_				
Attribute	Test				Teet Ct		Sui4i I	DV-h				
Variance	Variance F	Patio E Te	et		Test St		sritical	P-Value		ion( $\alpha$ :1%)		
Distribution			mality Test							rminate rminate		
96h Survival R			,						macte		_	
		Count	Maar	05% 1.01	0.50/ 110							
Conc-µL/L	Code N	Count 4	Mean	95% LCL	95% UC		Median	Min	Max	Std Err	CV%	%Effect
3	IN	4 4	1.0000	1.0000 1.0000	1.0000 1.0000			1.0000 1.0000	1.0000		0.00%	0.00%
3.35		4	0.0000	0.0000	0.0000			0.0000	1.0000		0.00%	0.00% 100.00%
16.7		4	0.0000	0.0000	0.0000			0.0000	0.0000			100.00%
Angular (Corre	ected) Transform	ned Sum				-						
Conc-µL/L	Code	Count	Mean	95% LCL	95% UC	1 N	ledian	Min	Max	64d E	CV <sup>0/</sup>	0/ 555
)	N	4	1.4120	1 4120	1.4120		noulafi	1.4120	1.4120	<b>Std Err</b> 0.0000	CV%	%Effect 0.00%
3		4	1.4120	1 4120	1.4120			1.4120	1.4120		0.00%	0.00%
3.35		4	0.1588	0.1588	0.1588			0.1588	0.1588		0.00%	88,76%
6.7		4	0.1588	0.1588	0.1588			0.1588	0.1588		0.00%	88.76%
6h Survival R	ate Detail											
Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4							
	Ν	1.0000	1 0000	1.0000	1.0000							
}		1.0000	1.0000	1 0000	1,0000							
		0.0000	0.0000	0.0000	0.0000							
8.35 6.7		0.0000	0,0000	0.0000	0.0000							

alytical Rep	ort				Report Date: Test Code/ID:	08 Sep-21 13:31 (p 2 of 2) TRU0721.006 / 18-8018-4475
ite Survival Tes	t				Aquatic B	ioassay & Consulting Labs, Inc.
01-7403-9603	E	ndpoint: 9	6h Survival R	ate	<b>CETIS Version:</b>	CETISv1.9.7
08 Sep-21 13:1	8 <b>A</b>	nalysis: N	Ionparametric	-Control vs Treatments	Status Level:	1
08 Sep-21 13:0	7 M	D5 Hash: 3	A0D5E0FE40	DD419F8BDE03F5112603FC	Editor ID:	007-979-628-1
rected) Transfo	med Deta	il				
Code	Rep 1	Rep 2	Rep 3	Rep 4		
N	1.4120	1.4120	1.4120	1.4120		
	1.4120	1.4120	1.4120	1.4120		
	0.1588	0.1588	0.1588	0.1588		
	1te Survival Tes 01-7403-9603 08 Sep-21 13:1 08 Sep-21 13:0 rected) Transfor Code	08 Sep-21 13:18         Ai           08 Sep-21 13:07         M           rected) Transformed Detail         Code         Rep 1           N         1.4120         1.4120	Ite Survival Test           01-7403-9603         Endpoint: 9           08 Sep-21 13:18         Analysis: N           08 Sep-21 13:07         MD5 Hash: 3           rected) Transformed Detail         Code           Rep 1         Rep 2           N         1.4120           1.4120         1.4120	Ite Survival Test         Endpoint:         96h Survival R           01-7403-9603         Endpoint:         96h Survival R           08 Sep-21 13:18         Analysis:         Nonparametric           08 Sep-21 13:07         MD5 Hash:         3A0D5E0FE40           rected) Transformed Detail         Code         Rep 1         Rep 2         Rep 3           N         1.4120         1.4120         1.4120         1.4120	Inte Survival Test         Endpoint:         96h Survival Rate           01-7403-9603         Endpoint:         96h Survival Rate           08 Sep-21 13:18         Analysis:         Nonparametric-Control vs Treatments           08 Sep-21 13:07         MD5 Hash:         3A0D5E0FE40D419F8BDE03F5112603FC           rected) Transformed Detail         Code         Rep 1         Rep 2         Rep 3         Rep 4           N         1.4120         1.4120         1.4120         1.4120	Ary frout rtoport         Test Code/ID:           Inte Survival Test         Aquatic B           01-7403-9603         Endpoint:         96h Survival Rate         CETIS Version:           08 Sep-21 13:18         Analysis:         Nonparametric-Control vs Treatments         Status Level:           08 Sep-21 13:07         MD5 Hash:         3A0D5E0FE40D419F8BDE03F5112603FC         Editor ID:           rected) Transformed Detail           Code         Rep 1         Rep 2         Rep 3         Rep 4           N         1.4120         1.4120         1.4120         1.4120

0.1588

Analyst:\_\_\_\_\_ QA:\_\_\_\_

16.7

0.1588

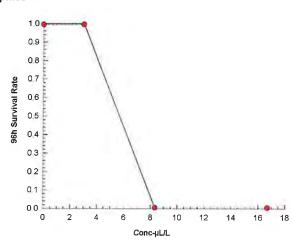
0.1588

0.1588

	S Ana	lytical Repo	ort						Report Da Test Code			8 Sep-21 13 J0721_006 /	
Fish 9	6-h Acu	te Survival Test							Aq	uatic	Bioassay	& Consultin	g Labs, Inc
Analy	sis ID:	19-6588-7535	Er	dpoint:	96h Survival R	ate			CETIS Ver	sion:	CETIS	1.9.7	
Analy	zed:	08 Sep-21 13:18	Ar	nalysis:	Linear Interpola	ation (ICPIN	)		Status Lev	/el:	1		
Edit D	ate:	08 Sep-21 13:07	M	D5 Hash:	3A0D5E0FE40	D419F8BD	E03F51126	03FC	Editor ID:		007-979	9-628-1	
Batch	ID:	19-9127-3820	Те	st Type:	Survival (96h)				Analyst:	Joe	Freas		
Start D	Date:	07 Jul-21 16:00	Pr	otocol:	EPA/821/R-02	-012 (2002)			Diluent:	Labo	oratory Wa	ter	
Ending	g Date:	11 Jul-21 14:00	Sp	ecies:	Oncorhynchus	mykiss			Brine:	Not	Applicable		
Test L	ength:	94h	Та	xon:	Actinopterygii				Source:	Aqu	atic Biosys	tems, CO	Age:
Sampl	e ID:	07-2433-7579	Co	de:	TRU0721_006				Project:	_			
		01 Jul-21 11:30	Mé	aterial:	Sample Water				Source:	Bioa	assay Repo	ort	
Receip	ot Date:	01 Jul-21 11:30	CA	AS (PC):					Station:			P Influent	
Sampl	e Age:	6d 4h	Cli	ent:	Trussell Techn	ologies					,		
Linear	Interpo	lation Options											
X Tran	sform	Y Transform	Se	ed	Resamples	Exp 95%	6 CL Met	thod					
Linear		Linear	0		280	Yes	Two	p-Point I	nterpolation				
Test A	cceptab	ility Criteria	TAC	Limits									
Attribu	ıte	Test Stat		Upper	Overlap	Decision	1						
Control	l Resp	1	0.9	>>	Yes	Passes (	Criteria						
	Ectimate	s											
Point E	_sumate												
Point E Level	_stimate μL/L	95% LCL	95% UCL										
		95% LCL	<b>95% UCL</b> 3,535										_
Level EC10 EC15	μL/L	<b>95% LCL</b> 3.535											
Level EC10 EC15 EC20	<b>μL/L</b> 3.535	<b>95% LCL</b> 3.535	3,535										
Level EC10 EC15 EC20 EC25	μL/L 3.535 3.803 4.07 4.338	<b>95% LCL</b> 3.535 3.803 4.07 4.338	3.535 3.803 4.07 4.338										
Level EC10 EC15 EC20 EC25 EC40	μL/L 3.535 3.803 4.07 4.338 5.14	<b>95% LCL</b> 3.535 3.803 4.07 4.338 5.14	3.535 3.803 4.07 4.338 5.14	-									
Level EC10 EC15 EC20 EC25 EC40	μL/L 3.535 3.803 4.07 4.338	<b>95% LCL</b> 3.535 3.803 4.07 4.338 5.14	3.535 3.803 4.07 4.338	-									
Level EC10 EC15 EC20 EC25 EC40 EC50	μL/L 3.535 3.803 4.07 4.338 5.14 5.675	<b>95% LCL</b> 3.535 3.803 4.07 4.338 5.14	3.535 3.803 4.07 4.338 5.14			Calc	ulated Varia	ate(A/B	)			Isoto	nic Variate
Level EC10 EC15 EC20 EC25 EC40 EC50	μL/L 3.535 3.803 4.07 4.338 5.14 5.675	<b>95% LCL</b> 3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14	Mean	Median	Calc Min	ulated Varia Max	ate(A/B CV%		fect	A/B	Isotor Mean	nic Variate %Effect
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-	μL/L 3.535 3.803 4.07 4.338 5.14 5.675	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 ate Summary	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4	<b>Mean</b> 1.0000	1.0000	Min 1.0000	Max 1.0000	<b>CV%</b>	%Efi % 0.00	%	A/B 40/40	-	
Level EC10 EC15 EC20 EC25 EC40 EC50 B6h Su Conc-1	μL/L 3.535 3.803 4.07 4.338 5.14 5.675	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4	<b>Mean</b> 1.0000 1.0000	1.0000 1.0000	Min 1.0000 1.0000	Max 1.0000 1.0000	CV%	% <b>E</b> fi % 0.00 % 0.00	% %	40/40 40/40	Mean 1.0000 1.0000	%Effect 0.00% 0.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 0 3 3.35	μL/L 3.535 3.803 4.07 4.338 5.14 5.675	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4	<b>Mean</b> 1.0000 1.0000 0.0000	1.0000 1.0000 0.0000	Min 1.0000 1.0000 0.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 D 3 3 3.35 16.7	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 srvival R JL/L	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4	<b>Mean</b> 1.0000 1.0000	1.0000 1.0000 0.0000	Min 1.0000 1.0000	Max 1.0000 1.0000	<b>CV%</b>	% <b>E</b> fi % 0.00 % 0.00	% % 00%	40/40 40/40	Mean 1.0000 1.0000	%Effect 0.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su 0 3 3.35 16.7 96h Su	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 wrvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4	Mean 1.0000 1.0000 0.0000 0.0000	1.0000 1.0000 0.0000 0.0000	Min 1.0000 1.0000 0.0000 0.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 96h Su Conc-1 2 96h Su	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 wrvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 8 Rep 1	Mean 1.0000 0.0000 0.0000 Rep 2	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b>	Min 1.0000 1.0000 0.0000 0.0000 Rep 4	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 0 3.35 16.7 96h Su Conc-1 0	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 wrvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4 <b>Rep 1</b> 1.0000	Mean 1.0000 0.0000 0.0000 Rep 2 1.0000	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 0 3 3.35 16.7 96h Su Conc-1 0 3 3	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 wrvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Atte Summary Code N ate Detail Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4 <b>Rep 1</b> 1.0000 1.0000	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000	Min 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 0 3 3.35 16.7 96h Su Conc-1 0 3 3.35	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 wrvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code N ate Detail Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4 4 4 4 1.0000 1.0000 0.0000	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000	Min 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 0 3 3.35 16.7 96h Su Conc-1 0 3 3.35 16.7	μL/L 3.535 3.803 4.07 4.338 5.14 5.675 srvival R iL/L	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code N ate Detail Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4 <b>Rep 1</b> 1.0000 1.0000	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000	Min 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 Of Su Conc-1 Of Su Conc-1 Of Su Conc-1 Of Su Conc-1 Of Su Conc-1 Of Su	<u>µL/L</u> 3.535 3.803 4.07 4.338 5.14 5.675 wivival R лL/L rvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code N ate Detail Code N ate Binomials	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 1.0000 1.0000 0.0000 0.0000	Mean 1.0000 0.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000 0.0000	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000 0.0000	Min 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000 0.0000	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 <b>26h Su</b> Conc-µ 3 3.35 I6.7 <b>26h Su</b> 3.35 6.7 <b>26h Su</b> Conc-µ	<u>µL/L</u> 3.535 3.803 4.07 4.338 5.14 5.675 wivival R лL/L rvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 Code N ate Detail Code N ate Detail Code	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 4 1.0000 1.0000 0.0000 0.0000 0.0000 <b>Rep 1</b>	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 2</b>	1.0000 1.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b>	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000 0.0000 Rep 4	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc-1</b> <b>3</b> 3.35 I6.7 <b>96h Su</b> <b>Conc-1</b> <b>3</b> 3.35 I6.7 <b>3</b> 3.35 I6.7	<u>µL/L</u> 3.535 3.803 4.07 4.338 5.14 5.675 wivival R лL/L rvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code N ate Binomials Code N	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 4 4 4 7 1.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 0.0000 0.0000 <b>Rep 2</b> 10/10	1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 10/10	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 0.0000 0.0000 0.0000 Rep 4 10/10	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
Level EC10 EC15 EC20 EC25 EC40 EC50 Of Su Conc-1 3 3.35 6.7 Of Su Conc-1 3 3.35 6.7 Of Su Conc-1 0 3 3.35 6.7	<u>µL/L</u> 3.535 3.803 4.07 4.338 5.14 5.675 wivival R лL/L rvival R	95% LCL 3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code N ate Binomials Code N	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 4 1.0000 1.0000 0.0000 0.0000 0.0000 <b>Rep 1</b>	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 2</b>	1.0000 1.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b>	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000 0.0000 Rep 4	Max 1.0000 1.0000 0.0000	CV%	%Efi % 0.00 % 0.00 100.	% % 00%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%

CETIS Ana	alytical Report		Report Date: Test Code/ID:	08 Sep-21 13:31 (p 2 of 2) TRU0721.006 / 18-8018-4475				
Fish 96-h Acu	ute Survival Test			Aquatic Bioassay & Consulting Labs, Inc.				
Analysis ID:	19-6588-7535	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7			
Analyzed:	08 Sep-21 13:18	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1			
Edit Date:	08 Sep-21 13:07	MD5 Hash:	3A0D5E0FE40D419F8BDE03F5112603FC	Editor ID:	007-979-628-1			

Graphics



Analyst:

CETIS Me	asurement	Repo	rt					Report Date Test Code/I			3:31 (p 1 of 18-8018-447
Fish 96-h Acu	ute Survival Test	t							atic Bioassay a		
Batch ID: Start Date: Ending Date: Test Length:	19-9127-3820 07 Jul-21 16:00 11 Jul-21 14:00 94h		Test Type: Protocol: Species: Taxon:	Survival (96h) EPA/821/R-02-012 (2002) Oncorhynchus mykiss Actinopterygii				Analyst:     Joe Freas       Diluent:     Laboratory Water       Brine:     Not Applicable       Source:     Aquatic Biosystems, CO			Age:
-	07-2433-7579 01 Jul-21 11:30 01 Jul-21 11:30 6d 4h		Code: Material: CAS (PC): Client:	TRU0721.006 Sample Water Trussell Techr				Project: Source: Station:	Bioassay Repo Weymouth WT		
Alkalinity (Ca	CO3)-mg/L									-	
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Coun
0	N	1	125			125	125		0		0
3		1	125		(+++)	125	125		0		0
8.35		1	125			125	125		0		0
16_7		1	125			125	125		0		0
Overall		4	125	125	125	125	125	0	0	0.00%	0 (0%)
Dissolved Oxy	ygen-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Cour
0	Ν	5	10.22	9.875	10.56	9.9	10.5	0.0555	0.2775	2.72%	0
3		5	10.2	10.08	10.32	10.1	10.3	0.02	0.1	0.98%	0
8.35		2	10.05	8.144	11.96	9.9	10.2	0.1061	0.2121	2.11%	0
16.7		2	10.05	8.144	11_96	9.9	10.2	0_1061	0.2121	2.11%	0
Overall		14	10.16	10.05	10.28	9.9	10.5	0.0530	5 0.1985	1.95%	0 (0%)
Hardness (Ca	CO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Coun
0	N	1	300			300	300		0		0
3		1	330		(me	330	330		0		0
16.7		1	323	· · · · ·	+++	323	323		0		0
Overall		3	317.7	278.7	356_7	300	330	9.062	15.7	4.94%	0 (0%)
oH-Units											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	Std Dev	CV%	QA Count
)	N	5	7.98	7.635	8.325	7.5	8.2	0.0555	0.2775	3,48%	0
3		5	7 96	7.562	8.358	7.4	8.2	0.0641		4.03%	0
3.35		2	7.7	3.888	11.51	7.4	8	0.2121	0.4243	5.51%	0
6.7		2	7.65	3.203	12.1	7.3	8	0.2475	0.495	6.47%	0
Overall		14	7.886	7.696	8.075	7.3	8,2	0.0876	2 0.3278	4.16%	0 (0%)
emperature-°	С										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Eri	Std Dev	CV%	QA Coun
)	N	5	12.06	10.02	14.1	10.2	14	0.3282	1.641	13.61%	0
}		5	13.08	12.5	13.66	12.8	13.9	0.0931	7 0.4658	3.56%	0
3.35		2	13.4	5.776	21.02	12.8	14	0.4243	0.8485	6.33%	0
6.7		2	13.4	5.776	21.02	12.8	14	0 4243	0.8485	6.33%	0
Overall		14	12.81	12.13	13.48	10.2	14	0.3114	1.165	9.10%	0 (0%)

Analyst:\_



July 21, 2021

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Weymouth WTP Infl. with EarthTec QZ
DATE RECEIVED:	1 July – 21
ABC LAB NO.:	TRU0721.006

# ACUTE FATHEAD MINNOW SURVIVAL BIOASSAY

% Survival = 97.50% Survival in 16.7 ul/l Sample

EC50 = >16.7 ul/l

Yours very truly,

A Scott Johnson Laboratory Director

# **CETIS Summary Report**

 Report Date:
 21 Jul-21 15:02 (p 1 of 1)

 Test Code/ID:
 TRU0721.006afml / 03-7525-8897

Fathead Minnow 96-h Acute Survival Test Aquatic Bioassay & Consulting Labs, Inc. Batch ID: 02-4273-4213 Test Type: Survival (96h) Analyst: Start Date: 07 Jul-21 14:50 EPA/821/R-02-012 (2002) Diluent: Receiving Water Protocol: Ending Date: 11 Jul-21 14:10 Pimephales promelas Brine: Not Applicable Species: Source: Aquatic Biosystems, CO Test Length: 95h Taxon: Actinopterygii Age: <24 TRU0721.006afml Sample ID: 20-8538-1072 Code: Project: Sample Date: 01 Jul-21 11:30 Material: Sample Water Source: **Bioassay Report** Receipt Date: 01 Jul-21 11:30 CAS (PC): Station: Weymouth WTP Infl. with Earth Tec Q Sample Age: 6d 3h (12 °C) Client: **Trussell Technologies Multiple Comparison Summary** Analysis ID Endpoint **Comparison Method** ✓ NOEL LOEL TOEL PMSD S 15-1204-8978 96h Survival Rate Steel Many-One Rank Sum Test 16.7 >16.7 6.22% 1 Point Estimate Summary Analysis ID Endpoint **Point Estimate Method** ✓ Level  $\mu L/L$ 95% LCL 95% UCL S 04-0318-1598 96h Survival Rate Linear Interpolation (ICPIN) EC10 >16.7 --------1 **EC15** >16.7 --------EC20 >16.7 --------EC25 >16.7 ----EC40 >16.7 --------**EC50** >16.7 ------**Test Acceptability TAC Limits** Analysis ID Endpoint Attribute Test Stat Lower Upper Overlap Decision 04-0318-1598 96h Survival Rate 1 0.9 >> Yes Passes Criteria Control Resp Passes Criteria 15-1204-8978 96h Survival Rate 0.9 >> Control Resp 1 Yes 96h Survival Rate Summary Conc-µL/L Code Count Mean 95% LCL 95% UCL Min Max Std Err Std Dev CV% %Effect 0 1.0000 1.0000 1.0000 1.0000 0.0000 0.0000 0.00% D 4 1.0000 ---0.00% 3 4 1.0000 1.0000 1.0000 1.0000 1.0000 0.0000 0.0000 ---8.35 0.0500 5.13% 2.50% 4 0.9750 0.8954 1.0550 0.9000 1.0000 0.0250 2.50% 0.8954 1.0550 0.9000 1.0000 0.0250 0.0500 5.13% 4 0.9750 16.7 96h Survival Rate Detail MD5: 766BA0F6A592363228F6858710ABB13B Conc-µL/L Code Rep 1 Rep 2 Rep 3 Rep 4 0 D 1.0000 1.0000 1.0000 1.0000 3 1.0000 1.0000 1.0000 1:0000 8.35 1.0000 1.0000 0.9000 1.0000 1.0000 1.0000 16.7 1.0000 0.9000 96h Survival Rate Binomials Conc-µL/L Code Rep 1 Rep 2 Rep 3 Rep 4 0 D 10/10 10/10 10/10 10/10 3 10/10 10/10 10/10 10/10 10/10 10/10 9/10 10/10 8.35 10/10 9/10 10/10 10/10 16.7

Analyst:\_\_\_\_\_QA:\_\_\_\_

Fathead Minn	ow 96-h Acute	Survival Te	251						Aquat		assay or (	Consulting	Labs, Inc.
Analysis ID:	15-1204-8978	En	dpoint: 96h	Survival Ra	ate			CET	CETIS Version: CETISv1.9.7				
Analyzed:	20 Jul-21 15:0	8 <b>An</b> :	alysis: Nor	nparametric-	Control ve	s Tr	eatments	Stat	us Level	:	1		
Edit Date:	20 Jul-21 14:4	9 MD	<b>5 Hash:</b> 766	BAOF6A592	363228F	28F6858710ABB13B Ed			or ID:		000-189-	126-0	
Batch ID:	02-4273-4213	Tes	st Type: Sur	Survival (96h)					lyst:				
Start Date:	07 Jul-21 14:5	0 <b>Pro</b>	otocol: EP/	A/821/R-02-	012 (2002	2)		Dilu	ent:	Receiv	ving Wate	r	
Ending Date:	11 Jul-21 14:1	0 <b>Sp</b>	ecies: Pirr						e:	Not Ap	pplicable		
Test Length:			<b>con:</b> Act						rce:	Aquati	ic Biosyste	ems, CO	Age: <2
Sample ID:	20-8538-1072	Co	de: TR	U0721.006a	fml			Pro	ect:				
-	01 Jul-21 11:3	0 <b>Ma</b>	terial: Sar	nple Water				Sou	гсе:	Bioass	say Repor	t	
Receipt Date:	01 Jul-21 11:3	0 <b>CA</b>	S (PC):					Stat	ion:	Weym	nouth WTF	Infl. with E	Earth Tec (
Sample Age:	6d 3h (12 °C)			ssell Techno	ologies								
Data Transfor	m	Alt Hyp					NOEL	LOEL	TOEL		ти	MSDu	PMSD
Angular (Corre	ected)	C > T				_	16.7	>16.7		1		0.06216	6.22%
Steel Manv-O	ne Rank Sum	Test				-							
Control	vs Conc-µ		Test Stat	Critical	Ties	DF	P-Type	P-Value	Decis	ion(α:	:5%)		
Dilution Water			18	10		_	CDF	0.7500			ant Effect		
	8.35		16	10	1 (	6	CDF	0.5065		-	ant Effect		
	16.7		16	10	1 6	6	CDF	0.5065	Non-S	ignific	ant Effect	t	
Test Acceptat	oility Criteria	TAC	Limits										
Attribute	Test Sta		Upper	Overlap	Decisio	n							
Control Resp		Passes	Crit	a da									
Control Kesp	1	0.9	>>	Yes	1 03303	Om	ena						
		0.9	>>	Yes	1 43303								
ANOVA Table								P-Value	Decis	ion(α:	:5%)		
ANOVA Table Source		uares	>> Mean Squ 0.0022133	Jare	DF 3		<b>F Stat</b> 0.6667	P-Value 0.5885	Decis Non-S		:5%) cant Effect		
ANOVA Table Source Between	Sum Sq	uares 98	Mean Squ	Jare	DF		F Stat						
ANOVA Table Source Between Error	Sum Sq 0.00663	uares 98 9	Mean Squ 0.0022133	Jare	<b>DF</b> 3		F Stat						
ANOVA Table Source Between Error Total	Sum Sq 0.00663 0.03983	uares 98 9	Mean Squ 0.0022133	Jare	<b>DF</b> 3 12		F Stat						
ANOVA Table Source Between Error Total ANOVA Assur	Sum Sq 0.00663 0.03983 0.04647	uares 98 9	Mean Squ 0.0022133	Jare	<b>DF</b> 3 12 15		F Stat 0.6667		Non-S	Signific	cant Effect		
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ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro-	uares 98 9 38 Equality of V Equality of V ene Equality n-Darling A2 no Skewnes prov-Smirnov Wilk W Norr	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test ariance Test of Variance : Test s Test of Test	Jare 3 9	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677	at	F Stat 0.6667 Critical 5.953 5.953 3.878 2.576 0.2471	0.5885 <b>P-Value</b> 0.0097 0.5885 <1.0E-05 0.0037 <1.0E-05	Non-S Decis Indete Unequ Equal Non-N Non-N	ion(a: rmina Jal Varian Iormal Iormal Iormal	:1%) te riances I Distributi I Distributi I Distributi	on on on CV%	%Effect
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ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution 96h Survival I Conc-µL/L 0 3 3.35	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro- Rate Summary Code	uares 98 93 83 Equality of V Equality of V ene Equality n-Darling A2 no Skewnes prov-Smirnov Wilk W Norr Wilk W Norr 4 4 4	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test of Variance Test s Test v D Test nality Test mality Test Mean 1.0000 1.0000	Jare 3 9 Test 95% LCL 1.0000 1.0000	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677 95% UC 1.0000 1.0000	at .	F Stat           0.6667           Critical           5.953           5.953           3.878           2.576           0.2471           0.8408           Median           1.0000           1.0000	0.5885 <b>P-Value</b> 0.0097 0.5885 <1.0E-05 0.0037 <1.0E-05 <b>Min</b> 1.0000 1.0000	Non-S Decis Indete Unequ Equal Non-N Non-N Non-N Non-N Non-N Non-N Non-N Non-N Non-N Non-N	ion(a: rmina Jal Variau Iormal Iormal Iormal Iormal	:1%) te riances I Distributi I Distributi I Distributi Std Err 0.0000 0.0000	on on on <b>CV%</b> 0.00% 0.00%	0.00% 0.00%
ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution Distribution Distribution Conc-µL/L D 3 3.35 16.7	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro- Rate Summary Code	uares 98 93 38 Equality of V Equality of V ene Equality n-Darling A2 no Skewnes prov-Smirnov Wilk W Norr Count 4 4 4 4 4 4	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test of Variance : Test s Test of Variance : Test s Test of Variance : Test nality Test mality Test Mean 1.0000 1.0000 0.9750 0.9750	<b>Jare</b> 3 3 3 7 Test <b>95% LCL</b> 1.0000 1.0000 0.8954	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677 95% UC 1.0000 1.0000 1.0000	at .	F Stat           0.6667           Critical           5.953           5.953           3.878           2.576           0.2471           0.8408           Median           1.0000           1.0000           1.0000	0.5885 <b>P-Value</b> 0.0097 0.5885 <1.0E-05 0.0037 <1.0E-05 9.5E-05 <b>Min</b> 1.0000 1.0000 0.9000	Non-S Decis Indete Unequ Equal Non-N Non-N Non-N Non-N Non-N Non-N 1.0000 1.0000	ion(a: rmina Jal Variau Iormal Iormal Iormal Iormal	:1%) ite riances I Distributi I Distributi I Distributi Std Err 0.0000 0.0000 0.0250	on on on <b>CV%</b> 0.00% 0.00% 5.13%	0.00% 0.00% 2.50%
ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution Distribution Distribution Onc-µL/L D 3 3.35 16.7 Angular (Corr	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro- Rate Summary Code D	uares 98 98 98 98 98 98 98 98 99 88 99 88 99 99	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test of Variance : Test s Test v D Test nality Test Mean 1.0000 0.9750 0.9750 mary Mean	<b>95% LCL</b> 95% LCL 1.0000 1.0000 0.8954 0.8954 95% LCL	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677 95% UC 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	at SL	F Stat           0.6667           Critical           5.953           5.953           3.878           2.576           0.2471           0.8408           Median           1.0000           1.0000           1.0000           1.0000           Median	0.5885 P-Value 0.0097 0.5885 <1.0E-05 9.5E-05 Min 1.0000 1.0000 0.9000 0.9000 0.9000 Min	Non-S           Decis           Indete           Unequ           Equal           Non-N           Non-N           Non-N           Non-N           Non-N           1.0000           1.0000           1.0000           1.0000           Max	ion(a: ion(a: irmina Jal Varian Jormal Jormal Jormal Jormal Jormal Jormal Jormal	ant Effect (1%) te riances I Distributi I Distributi I Distributi I Distributi Std Err 0.0000 0.0250 0.0250 Std Err	on on on 0.00% 0.00% 5.13% 5.13% <b>CV%</b>	0.00% 0.00% 2.50% 2.50%
ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution 96h Survival I Conc-µL/L 0 3 8.35 16.7 Angular (Corr Conc-µL/L	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro- Rate Summary Code D	uares 98 98 98 98 98 98 98 98 98 99 99	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test of Variance : Test s Test D Test mality Test Mean 1.0000 0.9750 0.9750 0.9750 mary Mean 1.4120	Jare 3 3 5 Test 95% LCL 1.0000 1.0000 0.8954 0.8954 0.8954 95% LCL 1.4120	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677 95% UC 1.00000 1.00000 1.00000 1.0000 1.0000 1.000000 1	at	F Stat           0.6667           Critical           5.953           5.953           3.878           2.576           0.2471           0.8408           Median           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000	0.5885 P-Value 0.0097 0.5885 <1.0E-05 0.0037 <1.0E-05 9.5E-05 Min 1.0000 0.9000 0.9000 0.9000 Min 1.4120	Non-S           Decis           Indete           Unequ           Equal           Non-N           Non-N           Non-N           Non-N           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000	ion(a: rmina Jal Variat Iormal Iormal Iormal Iormal Iormal	<pre>cant Effect cant Effect c</pre>	on on on CV% 0.00% 5.13% 5.13% CV% 0.00%	0.00% 0.00% 2.50% 2.50% %Effect 0.00%
ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution 96h Survival I Conc-µL/L 0 3 8.35 16.7	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro- Rate Summary Code D	uares 98 98 98 98 98 98 98 98 99 88 99 88 99 99	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test of Variance : Test s Test v D Test nality Test Mean 1.0000 0.9750 0.9750 mary Mean	<b>95% LCL</b> 95% LCL 1.0000 1.0000 0.8954 0.8954 95% LCL	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677 95% UC 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	at	F Stat           0.6667           Critical           5.953           5.953           3.878           2.576           0.2471           0.8408           Median           1.0000           1.0000           1.0000           1.0000           Median	0.5885 P-Value 0.0097 0.5885 <1.0E-05 9.5E-05 Min 1.0000 1.0000 0.9000 0.9000 0.9000 Min	Non-S           Decis           Indete           Unequ           Equal           Non-N           Non-N           Non-N           Non-N           Non-N           1.0000           1.0000           1.0000           1.0000           Max	ion(a: rmina Jal Variat Iormal Iormal Iormal Iormal Iormal 0 0 0 0	<pre>cant Effect cant Effect c</pre>	on on on 0.00% 0.00% 5.13% 5.13% CV% 0.00% 0.00%	0.00% 0.00% 2.50% 2.50% %Effect 0.00% 0.00%
ANOVA Table Source Between Error Total ANOVA Assur Attribute Variance Distribution 96h Survival I Conc-µL/L 0 3 8.35 16.7 Angular (Corr Conc-µL/L 0	Sum Sq 0.00663 0.03983 0.04647 mptions Tests Test Bartlett I Levene Mod Lev Anderso D'Agosti Kolmogo Shapiro- Rate Summary Code D	uares 98 98 98 98 98 98 98 98 98 98	Mean Squ 0.0022133 0.0033199 ariance Test ariance Test of Variance : Test s Test D Test mality Test Mean 1.0000 0.9750 0.9750 0.9750 mary Mean 1.4120	Jare 3 3 5 Test 95% LCL 1.0000 1.0000 0.8954 0.8954 0.8954 95% LCL 1.4120	DF 3 12 15 Test Sta 6 0.6667 2.447 2.906 0.375 0.677 95% UC 1.00000 1.0000 1.00000 1.00000 1.0000 1.0000 1.000000 1	at :L	F Stat           0.6667           Critical           5.953           5.953           3.878           2.576           0.2471           0.8408           Median           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000	0.5885 P-Value 0.0097 0.5885 <1.0E-05 0.0037 <1.0E-05 9.5E-05 Min 1.0000 0.9000 0.9000 0.9000 Min 1.4120	Non-S           Decis           Indete           Unequ           Equal           Non-N           Non-N           Non-N           Non-N           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000           1.0000	ion(a: rmina Jal Variat Iormal Iormal Iormal Iormal Iormal 0 0 0 0 0	<pre>cant Effect cant Effect c</pre>	on on on CV% 0.00% 5.13% 5.13% CV% 0.00%	0.00% 0.00% 2.50% 2.50% %Effect 0.00%

P QA:\_ Analyst:\_\_\_\_

CETIS Analytical Report	
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**Report Date:** 21 Jul-21 15:02 (p 2 of 2) Test Code/ID:

TRU0721.006afml / 03-7525-8897

### Fathead Minnow 96-h Acute Survival Test Aquatic Bioassay & Consulting Labs, Inc. Analysis ID: 15-1204-8978 Endpoint: 96h Survival Rate CETIS Version: CETISv1.9.7 Analyzed: 20 Jul-21 15:08 Analysis: Nonparametric-Control vs Treatments **Status Level:** 1 Edit Date: 20 Jul-21 14:49 MD5 Hash: 766BA0F6A592363228F6858710ABB13B Editor ID: 000-189-126-0

### 96h Survival Rate Detail

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	0.9000	1.0000
16.7		1.0000	0.9000	1.0000	1.0000

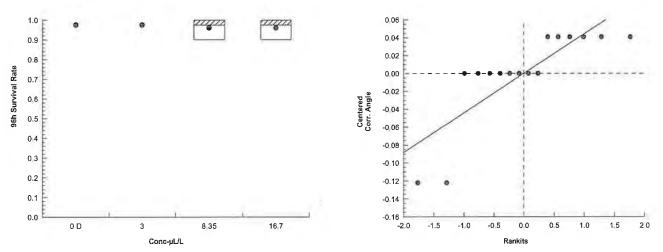
# Angular (Corrected) Transformed Detail

Code	Rep 1	Rep 2	Rep 3	Rep 4	
D	1.4120	1.4120	1.4120	1.4120	
	1.4120	1.4120	1.4120	1.4120	
	1.4120	1.4120	1.2490	1.4120	
	1.4120	1.2490	1.4120	1.4120	
		D 1.4120 1.4120 1.4120 1.4120	D 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120	D 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.2490	D 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.4120 1.2490 1.4120

### 96h Survival Rate Binomials

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
3		10/10	10/10	10/10	10/10
8.35		10/10	10/10	9/10	10/10
16.7		10/10	9/10	10/10	10/10

### Graphics





# **CETIS Analytical Report**

 Report Date:
 21 Jul-21 15:02 (p 1 of 2)

 Test Code/ID:
 TRU0721.006afml / 03-7525-8897

Fathead Minnow 96-h Acute Survival Test Aquatic Bioassay & Consulting Labs, Inc. 04-0318-1598 96h Survival Rate **CETIS Version:** CETISv1.9.7 Analysis ID: Endpoint: Linear Interpolation (ICPIN) 20 Jul-21 15:08 Status Level: Analyzed: Analysis: 000-189-126-0 MD5 Hash: 766BA0F6A592363228F6858710ABB13B Editor ID: Edit Date: 20 Jul-21 14:49 Batch ID: 02-4273-4213 Test Type: Survival (96h) Analyst: **Diluent: Receiving Water** Start Date: 07 Jul-21 14:50 Protocol: EPA/821/R-02-012 (2002) Ending Date: 11 Jul-21 14:10 Species: Pimephales promelas Brine: Not Applicable Source: Aquatic Biosystems, CO Age: <24 Test Length: 95h Taxon: Actinopterygii 20-8538-1072 Code: TRU0721.006afml Project: Sample ID: Sample Date: 01 Jul-21 11:30 Material: Sample Water Source: **Bioassay Report** Receipt Date: 01 Jul-21 11:30 CAS (PC): Station: Weymouth WTP Infl. with Earth Tec Q Sample Age: 6d 3h (12 °C) Client: Trussell Technologies Linear Interpolation Options X Transform **Y** Transform Seed Resamples Exp 95% CL Method 280 Two-Point Interpolation Linear Linear 0 Yes **Test Acceptability Criteria** TAC Limits Attribute Test Stat Lower Upper Overlap Decision Control Resp 0.9 >> Yes Passes Criteria 1 **Point Estimates**  $\mu L/L$ 95% LCL 95% UCL Level EC10 >16.7 ------EC15 >16.7 -------EC20 >16.7 ----.... EC25 >16.7 --------EC40 >16.7 -----EC50 >16.7 -------Isotonic Variate 96h Survival Rate Summary Calculated Variate(A/B) Conc-µL/L Code Count Mean Median Min Max CV% %Effect A/B Mean %Effect 0 D 4 1.0000 1.0000 1.0000 1.0000 0.00% 0.00% 40/40 1.0000 0.00% 0.00% 40/40 0.00% 3 4 1.0000 1.0000 1.0000 1.0000 0.00% 1.0000

96h Survival Rate Detail

8.35

16.7

4

4

0.9750

0.9750

1.0000

1.0000

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	0.9000	1.0000
16.7		1.0000	0.9000	1.0000	1.0000

0.9000

0.9000

1.0000

1.0000

5.13%

5.13%

2.50%

2.50%

39/40

39/40

0.9750

0.9750

2.50%

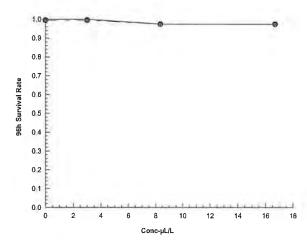
2.50%

### 96h Survival Rate Binomials

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
3		10/10	10/10	10/10	10/10
8.35		10/10	10/10	9/10	10/10
16.7		10/10	9/10	10/10	10/10

Analyst:\_\_\_\_\_QA:\_\_

CETIS Ana	alytical Report		Report Date: Test Code/ID:	21 Jul-21 15:02 (p 2 of 2) TRU0721.006afml / 03-7525-8897		
Fathead Minr	now 96-h Acute Sur	vival Test	Aquatic Bioassay & Consulting Labs, Inc.			
Analysis ID:	04-0318-1598	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7	
Analyzed:	20 Jul-21 15:08	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1	
Edit Date:	20 Jul-21 14:49	MD5 Hash:	766BA0F6A592363228F6858710ABB13B	Editor ID:	000-189-126-0	



Analyst:\_

# **CETIS Measurement Report**

 Report Date:
 21 Jul-21 15:02 (p 1 of 3)

 Test Code/ID:
 TRU0721.006afml / 03-7525-8897

Fathead Min	now 96-h Acute S	Survival	Test					Aquat	ic Bioassay &	Consulting	g Labs, Inc.	
Batch ID:	02-4273-4213	I	Fest Type:	Survival (96h)				Analyst: Diluent: Receiving Water				
Start Date:	07 Jul-21 14:50	F	Protocol:	EPA/821/R-02	-012 (2002)			Diluent:				
Ending Date:	: 11 Jul-21 14:10	5	Species:	Pimephales pr	omelas				Not Applicable			
Test Length:	95h	١	Taxon:	Actinopterygii	_			Source:	Aquatic Biosys	tems, CO	Age: <24	
Sample ID:	20-8538-1072	C	Code:	TRU0721.006	afml			Project:				
•	: 01 Jul-21 11:30		Material:	Sample Water					Bioassay Repo			
	: 01 Jul-21 11:30	C	CAS (PC):					Station:	Weymouth WT	P infl. with	Earth Tec Q	
Sample Age:	6d 3h (12 °C)		Client:	Trussell Techr	nologies		_					
Alkalinity (Ca	aCO3)-mg/L											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Er	r Std Dev	CV%	QA Coun	
0	D	3	120	120	120	120	120	0	0	0.00%	0	
16.7		3	125	125	125	125	125	0	0	0.00%	0	
Overall		6	122.5	119.6	125.4	120	125	1.118	2.739	2.24%	0 (0%)	
Conductivity	-µmhos											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Er		CV%	QA Count	
0	D	3	1044	1036	1052	1042	1048		3.215	0.31%	0	
3		3	1013	1004	1022	1010	1017		3.606	0.36%	0	
8.35		3	1013	1009	1017	1012	1015			0.17%	0	
16.7		3	1023	1010	1036	1019	1029		5.292	0.52%	0	
Overall		12	1023	1015	1032	1010	1048	3.963	13.73	1.34%	0 (0%)	
Dissolved Ox	xygen-mg/L											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL		Max	Std Er		CV%	QA Count	
0	D	3	7.833	6.659	9.007	7.3	8,2	0.1575		6.03%	0	
3		3	8	6.917	9.083	7.5	8,3	0.1453		5.45%	0	
8.35		3	7.867	6.832	8.901	7.4	8,2	0.1388		5.29%	0	
16.7		3	7.867	6.832	8.901	7.4	8,2	0.1388		5.29%	0	
Overall		12	7.892	7.652	8.132	7.3	8.3	0.109	0.3777	4.79%	0 (0%)	
Hardness (Ca												
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL		Max	Std Er		CV%	QA Count	
0	D	3	250	250	250	250	250	0	0	0.00%	0	
16.7 Overall		3 6	330 290	330 244	330 336	330 250	330 330	0 17.89	0 43.82	0.00%	0 (0%)	
		0	290	244	330	200		17.09	43.02	13.1178	0 (0 %)	
pH-Units		<u> </u>		0.5% 1.01	0.5% 11.01		Maria	044 5-	- 044 D	0)/0/	04.0	
Conc-µL/L	Code	Count	Mean				Max			CV%	QA Coun	
0	D	3	7.533	6.96	8.107	7.4	7.8	0.0769		3.07%	0	
3 8.35		3 3	7.533	7.154 7.39	7.913 7.677	7.4 7.5	7.7 7.6	0.0509 0.0192		2.03% 0.77%	0 0	
0.35 16.7		3	7.533 7.567	7.423	7.71	7.5	7.6	0.0192		0.76%	0	
Overall		12	7.542	7.463	7.62	7.4	7.8	0.0358		1.64%	0 (0%)	
Temperature	°C	12	7.042	7.400	7.0L		1.0	0.0000	0.1121		0 (0,0)	
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Coun	
0	D	3	24.07	23.78	24.35	24	24.2	0.0384		0.48%	0	
3		3	24.07	23.92	24.33	24	24.2	0.0191		0.24%	0	
-		3	24.1	23.85	24.35	24	24.2	0.0333		0.41%	Ő	
8.35												
8.35 16.7		3	24.13	23.75	24.51	24	24.3	0.0509		0.63%	0	

Analyst: \_\_\_\_\_ QA: P

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaCO3)-mg/L											
Conc-µL/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes			
0	D	1		120							
16.7				125							
0	D	2		120							
16.7				125							
0	D	3		120							
16.7				125							

### Conductivity-µmhos

Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		1043					
3				1017					
8.35				1012					
16.7				1029					
0	D	2		1042					
3				1010					
8.35				1012					
16.7				1019					
0	D	3		1048					
3				1012					
8.35				1015					
16.7				1021					

## Dissolved Oxygen-mg/L

Conc-µL/L	Code	Read	Time	Measure QA Diff-% Inst ID Analyst Notes	
0	D	1		8.2	
3				8.3	
8.35				8	
16.7				8	
0	D	2		8	
3				8.2	
8.35				8.2	
16.7				8.2	
0	D	3		7.3	
3				7.5	
8.35				7.4	
16.7				7.4	

### Hardness (CaCO3)-mg/L

Conc-µL/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		250				
16.7				330				
0	D	2		250				
16.7				330				
0	D	3		250				
16.7				330				

QA:\_ 1 Analyst:

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

pH-Units									
Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		7.4					
3				7.4					
8.35				7.5					
16.7				7.6					
0	D	2		7.4					
3				7.5					
8.35				7.5					
16.7				7.6					
0	D	3		7.8					
3				7.7					
8.35				7.6					
16.7				7.5					

### Temperature-°C

Conc-µL/L	Code	Read	Time	Measure QA Diff-% Inst ID Analyst Notes
0	D	1		24
3				24.1
8.35				24.1
16.7				24.1
0	D	2		24.2
3				24.1
8.35				24.2
16.7				24.3
0	D	3		24
3				24
8.35				24
16.7				24

Analyst: \_\_\_\_\_\_\_\_\_\_



July 21, 2021

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Weymouth WTP Infl. with EarthTec QZ
DATE RECEIVED:	1 July – 21
ABC LAB NO.:	TRU0721.006

# ACUTE CERIODAPHNIA SURVIVAL BIOASSAY

% Survival = 0 % Survival in 3.0 ul/l Sample

EC50 = 1.5 ul/l

Yours y truly,

Scott Johnson Laboratory Director

# **CETIS Summary Report**

 Report Date:
 21 Jul-21 15:03 (p 1 of 1)

 Test Code/ID:
 TRU0721.006acer / 01-9970-4374

Ceriodaphnia	96-h Acute Su	rvival Tes	t					Αqι	uatic I	Bioassay & C	consulting	Labs, Inc.
Batch ID: Start Date: Ending Date: Test Length:	11-4125-0527 07 Jul-21 14:5( 11 Jul-21 14:1( 95h	) P ) S	est Type: rotocol: pecies: axon:	: Survival (96h) EPA/821/R-02-012 (2002) Ceriodaphnia dubia Branchiopoda				Analyst: Diluent: Brine: Source:	No	Receiving Water Not Applicable Aquatic Biosystems, CO		<b>Age:</b> <24
Sample ID:	09-4593-1718	С	ode:	TRU0721.006a	icer			Project:				
•	01 Jul-21 11:30		aterial:	Sample Water				Source:	Bic	assay Report		
	01 Jul-21 11:30		AS (PC):	·				Station:		eymouth WTP		arth Tec Q
Sample Age:	6d 3h (12 °C)	С	lient:	Trussell Techn	ologies							
Point Estimat	e Summary											
Analysis ID	Endpoint		Point	Estimate Meth	od	v	/ Leve	el µL/	۲L.	95% LCL	95% UCL	
01-5908-9405	96h Survival R	ate	Linea	r Interpolation (I	CPIN)		EC1	0 0.3		0.3	0.3	
							EC1	5 0.4	5	0.45	0.45	
							EC2			0.6	0.6	
							EC2	5 0.7	5	0.75	0.75	
							EC4	0 1.2		1.2	1.2	
							EC5	0 1.5		1.5	1.5	
Test Acceptal	bility					TAC I	Limits					
Analysis ID	Endpoint		Attrib	oute	Lower	Upp	er Ov	erlap	Decision		_	
01-5908-9405 96h Survival Rate			Contr	Control Resp 1			>>	Ye	s	Passes Cr	iteria	
12-5132-4588 96h Survival Rate		Contr	Control Resp 1			>> Yes			Passes Criteria			
96h Survival	Rate Summary											
Conc-µL/L	Code	Count	Mean				Max		l Err	Std Dev	CV%	%Effect
0	D	4	1.000		1.0000	1.0000	1.00		000	0.0000		0.00%
3		4	0.000		0.0000	0.0000	0.00		000	0.0000		100.00%
8.35		4	0.000		0.0000	0.0000	0.00		000	0.0000		100.00%
16.7		4	0.000	0 0.0000	0.0000	0.0000	0.00		000	0.0000		100.00%
96h Survival								MD5: 03	SCCEF	-1D141244C8	3E77C1C0	0B25A1DE
Conc-µL/L	Code	Rep 1	Rep 2		Rep 4				-			
0	D	1.0000	1.000		1.0000							
3		0.0000	0.000	0 0.0000	0:0000							
8.35		0.0000	0.000	0.0000	0.0000							
16.7		0.0000	0.000	0 0.0000	0.0000							
96h Survival	Rate Binomials											
Conc-µL/L	Code	Rep 1	Rep 2		Rep 4							
0	D	5/5	5/5	5/5	5/5							
		0/5	0/5	0/5	0/5							
3			OIE	0/5	0/5							
3 8.35		0/5	0/5	0/5	0/0							

Analyst: \_\_\_\_\_ QA: \_\_\_\_\_ AA35

## **CETIS Analytical Report**

 Report Date:
 21 Jul-21 15:03 (p 1 of 2)

 Test Code/ID:
 TRU0721.006acer / 01-9970-4374

Ceriodaphnia 96-h Acute Survival Test Aquatic Bioassay & Consulting Labs, Inc. 12-5132-4588 Endpoint: 96h Survival Rate **CETIS Version:** CETISv1.9.7 Analysis ID: Analyzed: 20 Jul-21 15:10 Analysis: Parametric-Two Sample Status Level: Edit Date: 20 Jul-21 14:52 MD5 Hash: 03CCEF1D141244C83E77C1C00B25A1DE Editor ID: 000-189-126-0 Batch ID: 11-4125-0527 Test Type: Survival (96h) Analyst: Start Date: 07 Jul-21 14:50 Protocol: EPA/821/R-02-012 (2002) **Diluent: Receiving Water** Ending Date: 11 Jul-21 14:10 Species: Ceriodaphnia dubia Brine: Not Applicable Test Length: 95h Taxon: Branchiopoda Source: Aquatic Biosystems, CO Age: <24 TRU0721.006acer Sample ID: 09-4593-1718 Code: Project: Sample Date: 01 Jul-21 11:30 Material: Sample Water Source: **Bioassay Report** Receipt Date: 01 Jul-21 11:30 CAS (PC): Station: Weymouth WTP Infl. with Earth Tec Q Sample Age: 6d 3h (12 °C) Client: **Trussell Technologies Test Acceptability Criteria TAC Limits** Decision Attribute Test Stat Lower Upper Overlap 0.9 Passes Criteria Control Resp >> Yes 1 **ANOVA Assumptions Tests** Attribute Test Stat Critical **P-Value** Decision(a:1%) Test Shapiro-Wilk W Normality Test Indeterminate Distribution 96h Survival Rate Summary 95% LCL 95% UCL Median Min Std Err CV% %Effect Conc-µL/L Code Count Mean Max 0.00% 1.0000 1.0000 0.0000 0.00% 0 D 4 1.0000 1.0000 1.0000 1.0000 4 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 100.00% 3 ----4 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 100.00% 8.35 ---0.0000 0.0000 0.0000 100.00% 4 0.0000 0.0000 0.0000 0.0000 16.7 ----Angular (Corrected) Transformed Summary Code Count 95% LCL 95% UCL Median Min Max Std Err CV% %Effect Conc-µL/L Mean 0.0000 0.00% 0.00% 0 D 4 1:3460 1.3450 1.3450 1.3450 1.3450 1.3450 3 4 0.2255 0.2255 0.2256 0.2255 0.2255 0.2255 0.0000 0.00% 83.24% 4 0.2255 0.2255 0.0000 0.00% 83.24% 8.35 0.2255 0.2255 0.2256 0.2255 0.2255 0.2255 0.2255 0.0000 0.00% 83.24% 4 0.2255 0.2255 0.2256 16.7 96h Survival Rate Detail Conc-µL/L Code Rep 1 Rep 2 Rep 3 Rep 4 0 D 1.0000 1.0000 1.0000 1.0000 3 0.0000 0.0000 0.0000 0.0000 8.35 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 16.7 Angular (Corrected) Transformed Detail Conc-µL/L Rep 3 Rep 4 Code Rep 1 Rep 2 1.3450 1.3450 0 D 1.3450 1.3450 0.2255 0.2255 0.2255 3 0.2255 0.2255 0.2255 0.2255 0.2255 8.35 16.7 0.2255 0.2255 0.2255 0.2255 96h Survival Rate Binomials Conc-µL/L Code Rep 1 Rep 2 Rep 3 Rep 4 0 D 5/5 5/5 5/5 5/5 3 0/5 0/5 0/5 0/5 0/5 0/5 0/5 0/5 8.35 0/5 0/5 0/5 16.7 0/5

Analyst:\_\_\_\_\_QA;

Analysis ID; Analyzed: Edit Date:	12-5132-4588 20 Jul-21 15:10 20 Jul-21 14:52		96h Survival Rate Parametric-Two Sample 03CCEF1D141244C83E		CETIS Version: Status Level: Editor ID:	CETISv1.9.7 1 000-189-126-0
Graphics						
1.0 0.9 0.8 0.7 0.7 0.6 0.5 0.5 0.4 0.3 0.2 0.1			Reject Nuil -	1.0 Centered O.8 0.8 0.5 0.5 0.5		
0.0	0 D 3	8,35	16.7	-2.0 -1.5	-10 -05 00	0.5 1.0 1.5 2.0
		Conc-µL/L			Rankits	

# **CETIS Analytical Report**

Ceriodaphnia 96-h Acute Survival Test

Report Date: Test Code/ID: TRU0721.006acer / 01-9970-4374

Aquatic Bioassay & Consulting Labs, Inc.

21 Jul-21 15:03 (p 2 of 2)

~\_\_\_\_ / Analyst:

21 Jul-21 15:03 (p 1 of 2) Report Date:

Test Code/ID: TRU0721.006acer / 01-9970-4374

Ceriod	aphnia	96-h Acute Surv	ival Test						Aq	uatic Bi	ioassay &	Consulting	Labs, Inc.
Analysi	is ID:	01-5908-9405	End	point:	96h Survival Ra	ate			CETIS Ve	ersion:	CETISv1	1.9.7	
Analyz	ed:	20 Jul-21 15:10	Anal	ysis:	Linear Interpola	ation (ICPIN	1)		Status Lo	evel:	1		
Edit Da	ite:	20 Jul-21 14:52	MD5	Hash:	03CCEF1D141	244C83E77	7C1C00	325A1DE	Editor ID	:	000-189	-126-0	
Batch I	D:	11-4125-0527	Test	Type:	Survival (96h)				Analyst:				
Start D	ate:	07 Jul-21 14:50	Prot	ocol:	EPA/821/R-02-	012 (2002)			Diluent:	Rece	eiving Wate	er	
Ending	Date:	11 Jul-21 14:10	Spe	cies:	Ceriodaphnia d	lubia			Brine:	Not	Applicable		
Test Le	ength:	95h	Тахо	on:	Branchiopoda				Source:	Aqua	atic Biosyst	tems, CO	Age: <24
Sample	D:	09-4593-1718	Cod	e:	TRU0721.006a	icer			Project:				
		01 Jul-21 11:30	Mate	erial:	Sample Water				Source:	Bioa	issay Repo	rt	
		01 Jul-21 11:30	CAS	(PC):	·				Station:			P Infl. with E	Earth Tec G
		6d 3h (12 °C)	Clie		Trussell Techn	ologies							
linear	Interno	plation Options										_	
X Tran		Y Transform	See	4	Resamples	Exp 95%	6 CI 1	Nethod					
Linear	sionn	Linear	0		280	Yes			Interpolati	on	-		
	nontel			_						-			
		bility Criteria Test Stat	TAC Li		r Overlan	Decision							
Attribu Control		1	0.9	Uppe >>	r Overlap Yes	Passes C							
			0.9		163	1 43363 0	Jillena						
Point E	stimat	es											
Level	μL/L	95% LCL	95% UCL										
EC10	0.3	0.3	0.3										
EC15	0.45	0.45	0.45										
EC20	0.6	0.6	0.6										
EC25	0.75	0.75	0.75										
EC40	1.2	1.2	1.2										
EC50	1.5	1.5	1.5										
96h Su	rvival	Rate Summary				Calc	ulated V	'ariate(A/E	3)			Isotor	ic Variate
Conc-	IL/L	Code	Count	Mean	Median	Min	Max	CVS	% %	Effect	A/B	Mean	%Effect
0		D	4	1.000	0 1.0000	1.0000	1.000	0.00	0.0	00%	20/20	1.0000	0.00%
3			4	0.000	0.0000	0.0000	0.000	0 0	10	0.00%	0/20	0.0000	100.00%
8.35			4	0.000	0 0.0000	0.0000	0.000	0	10	0.00%	0/20	0.0000	100.00%
16.7			4	0.000	0.0000	0.0000	0.000	0	10	0.00%	0/20	0.0000	100.00%
96h Su	rvival	Rate Detail											
Conc-µ	ıL/L	Code	Rep 1	Rep 2	2 Rep 3	Rep 4							
0		D	1.0000	1.000		1.0000							
3			0.0000	0.000	0.0000	0.0000							
8.35			0.0000	0.000		0.0000							
16.7			0.0000	0.000		0.0000							
96h Su	rvival	Rate Binomials											
Conc-µ		Code	Rep 1	Rep 2	2 Rep 3	Rep 4							
0		D	5/5	5/5	5/5	5/5							
3			0/5	0/5	0/5	0/5							
8.35			0/5	0/5	0/5	0/5							
0.00			5.0	0,0	0.0								

waa:\_\_\_\_\_P Analyst:\_\_\_

16.7

0/5

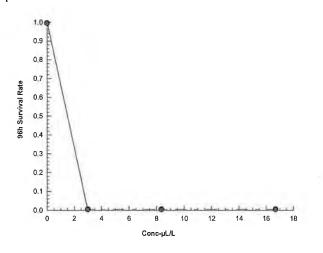
0/5

0/5

0/5

CETIS And	alytical Report			Report Date:	21 Jul-21 15:03 (p 2 of 2)		
	,			Test Code/ID:	TRU0721.006acer / 01-9970-4374		
Ceriodaphnia	a 96-h Acute Surviva	al Test		Aquatic Bioassay & Consulting Labs,			
Analysis ID:	01-5908-9405	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7		
Analyzed:	20 Jul-21 15:10	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1		
Edit Date:	20 Jul-21 14:52	MD5 Hash:	03CCEF1D141244C83E77C1C00B25A1DE	Editor ID:	000-189-126-0		

Graphics



Analyst: \_\_\_\_\_QA:\_\_\_

Report Date: 21 Jul-21 15:03 (p 1 of 3)

Test Code/ID: TRU0721.006acer / 01-9970-4374

Ceriodaphnia	a 96-h Acute Sur	vival lest						Aquati	ic Bioassay &	Consulting	g Labs, Inc.
Batch ID:	11-4125-0527			Survival (96h)				Analyst:			
Start Date:	07 Jul-21 14:50		otocol:	EPA/821/R-02	-012 (2002)			Diluent:	Receiving Wate	er	
-	: 11 Jul-21 14:10	Sp	ecies:	Ceriodaphnia o	dubia				Not Applicable		
Test Length:	95h	Та	xon:	Branchiopoda				Source:	Aquatic Biosys	tems, CO	<b>Age:</b> <24
Sample ID:	09-4593-1718	Co	ode:	TRU0721.006a	acer			Project:			
Sample Date	: 01 Jul-21 11:30	Ma	aterial:	Sample Water					Bioassay Repo		
Receipt Date	: 01 Jul-21 11:30	CA	AS (PC):					Station:	Weymouth WT	P Infl. with	Earth Tec Q
Sample Age:	: 6d 3h (12 °C)	CI	ient:	Trussell Techn	ologies						
Alkalinity (Ca	aCO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL		Max	Std Eri		CV%	QA Count
0	D	3	120	120	120	120	120	0	0	0.00%	0
16.7		3	125	125	125	125	125	0	0	0.00%	0
Overall		6	122.5	119.6	125.4	120	125	1.118	2.739	2.24%	0 (0%)
Conductivity	/-µmhos										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Count
0	D	3	1044	1036	1052	1042	1048	1.072	3.215	0.31%	0
3		3	1013	1004	1022	1010	1017	1.202	3.606	0.36%	0
8.35		3	1013	1009	1017	1012	1015	0.5774		0.17%	0
16.7		3	1023	1010	1036	1019	1029	1.764	5.292	0.52%	0
Overall		12	1023	1015	1032	1010	1048	3.963	13.73	1.34%	0 (0%)
Dissolved O	xygen-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Count
0	D	3	7.833	6.659	9.007	7.3	8.2	0.1575		6.03%	0
3		3	8	6.917	9.083	7.5	8.3	0.1453		5.45%	0
8.35		3	7.867	6.832	8.901	7.4	8.2	0.1388		5.29%	0
16.7		3	7.867	6.832	8.901	7.4	8.2	0.1388		5.29%	0
Overall		12	7.892	7.652	8.132	7.3	8.3	0.109	0.3777	4.79%	0 (0%)
Hardness (C	aCO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er		CV%	QA Count
0	D	3	250	250	250	250	250	0	0	0.00%	0
16.7		3	330	330	330	330	330	0	0	0.00%	0
Overall		6	290	244	336	250	330	17.89	43.82	15.11%	0 (0%)
pH-Units											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er		CV%	QA Count
0	D	3	7.533	6.96	8.107	7.4	7.8	0.0769		3.07%	0
3		3	7.533	7.154	7.913	7.4	7.7	0.0509		2.03%	0
8.35		3	7.533	7.39	7.677	7.5	7.6	0.0192		0.77%	0
16.7		3	7.567	7.423	7.71	7.5	7.6	0.0192		0.76%	0
Overall		12	7.542	7.463	7.62	7.4	7.8	0.0358	0.124	1.64%	0 (0%)
Temperature		-								0.177	
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL		Max	Std Er		CV%	QA Count 0
0	D	3	24.07	23.78	24.35	24	24.2 24.1	0.0384 0.0191		0.48% 0.24%	0
3		3	24.07	23.92	24.21 24.35	24 24	24.1 24.2	0.0191		0.24% 0.41%	0
8.35 16.7		3 3	24.1 24.13	23.85 23.75	24.35 24.51	24 24	24.2 24.3	0.0333		0.41%	0
11) /		3	24.13	40.10	24.0	24	24.0	0.0009	< U.IUZU	0.00/0	0

~QA:\_ Analyst:\_\_\_

 Report Date:
 21 Jul-21 15:03 (p 2 of 3)

 Test Code/ID:
 TRU0721.006acer / 01-9970-4374

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Alkalinity (CaC	:O3)-mg/L							
Conc-µL/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst Notes	
0	D	1		120				
16.7				125				
0	D	2		120				
16.7				125				
0	D	3		120				
16.7				125				

### Conductivity-µmhos

Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	inst ID	Analyst	Notes
0	D	1		1043					
3				1017					
8.35				1012					
16.7				1029	-				
0	D	2		1042					
3				1010					
8.35				1012					
16.7				1019					
0	D	3		1048					
3				1012					
8.35				1015					
16.7				1021					

### Dissolved Oxygen-mg/L

Conc-µL/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		8.2				
3				8.3				
8.35				8				
16.7				8				
0	D	2		8				
3				8.2				
8.35				8.2				
16.7				8.2				
0	D	3		7.3				
3				7.5				
8.35				7.4				
16.7				7.4				

### Hardness (CaCO3)-mg/L

Conc-µL/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		250				
16.7				330				
0	D	2		250				
16.7				330				
0	D	3		250				
16.7				330				

QA:\_\_P Analyst:

Test Code/ID: TRU0721.006acer / 01-9970-4374

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

pH-Units									
Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		7.4					
3				7.4					
8.35				7.5					
16.7				7.6					
0	D	2		7.4					
3				7.5					
8.35				7.5					
16.7				7.6					
0	D	3		7.8					
3				7.7					
8.35				7.6					
16.7				7.5					

### Temperature-°C

Conc-µL/L	Code	Read	Time	Measure QA Diff-% Inst ID Anal	yst Notes
0	D	1		24	
3				24.1	
8.35				24.1	
16.7				24.1	
0	D	2		24.2	
3				24.1	
8.35				24.2	
16.7				24.3	
0	D	3		24	
3				24	
8.35				24	
16.7				24	

Analyst:\_\_\_\_\_QA:\_\_\_\_



Appendix G – Lake Mathews 2021 Toxicity Test Report



September 8, 2021

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID .:	Lake Mathews with EarthTec QZ
DATE RECEIVED	1 July – 21
ABC LAB NO .:	TRU0721.007

# **RAINBOW TROUT SURVIVAL BIOASSAY**

% Survival = CON = 100.00% 3.0uL/L = 100.00% 8.35uL/L = 0.00% 16.7uL/L = 0.00%

EC50 = 5.675 ul/l

Yours very truly, No Scott Johnson

Laboratory Director

	mmary Repo	π					•	ort Date:		Sep-21 13:	
Fish 96-h Acu	Ite Survival Test						les	t Code/ID Aquat	ic Bioassay &	0721.007 / 1	
Batch ID:	15-2797-9235	T	est Type	Survival (96h)			Δna		loe Freas		,,
Start Date:	07 Jul-21 16:01		rotocol:	EPA/821/R-02	-012 (2002)		Dilu	-	aboratory Wate	r	
	11 Jul-21 14:01		pecies:	Oncorhynchus			Brin		lot Applicable	1	
Test Length:			axon:	Actinopterygii	Пукізэ		Sou		quatic Biosyste	ame CO	Age:
Sample ID:	01-7395-3681		ode:	TRU0721 007							Age:
-	01 Jul-21 11:30		aterial:	Sample Water			Proj Sou		Piecessy Depend		
-	01 Jul-21 11:30		AS (PC):	Sample Water			Stat		Bioassay Report		
Sample Age:			lient:	Trussell Techr	ologies		ગાવા		ake Mathews		
	arison Summary						_				
Analysis ID	Endpoint		Comp	arison Method			P-Value	Compa	rison Result		
	96h Survival Rate	)		/any-One Rank			0.5000		assed 96h sur	/ival rate	
Point Estimat	e Summary							-FF			
Analysis ID	Endpoint		Point	Estimate Meth	od	~	Level	μ <b>L</b> /L	95% LCL	95% UCL	
	96h Survival Rate	<u>,</u>		Interpolation (IC		V	EC10	3,535	3.535	3,535	
	oon our nut		Enteur	interpolation (it	21 IN)		EC15	3.803	3.803	3.803	
							EC20	4.07	4.07	4.07	
							EC25	4.338	4.338	4.338	
							FC40	5 1 4	514	514	
							EC40 EC50	5.14 5.675	5.14 5.675	5.14 5.675	
Test Acceptat	pility						EC50				
Test Acceptat	-		Attribu	ıte	Test Stat	TAC L	EC50 imits	5.675	5.675		
Analysis ID	Endpoint		Attribu		Test Stat	Lower	EC50 imits Upper	5.675 Overlag	5.675 Decision	5.675	
Analysis ID 04-3346-7794	-		Attribu Contro Contro	l Resp	Test Stat		EC50 imits	5.675	5.675	5_675	
Analysis ID 04-3346-7794 14-8891-5003	Endpoint 96h Survival Rate 96h Survival Rate		Contro	l Resp	1	Lower 0.9	EC50 imits Upper >>	5.675 Overlag Yes	5.675 Decision Passes Cr	5_675	
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F	Endpoint 96h Survival Rate		Contro	l Resp	1	Lower 0.9	EC50 imits Upper >>	5.675 Overlag Yes	5.675 Decision Passes Cr Passes Cr	5_675	%Effect
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary		Contro Contro	I Resp I Resp 95% LCL	1 1	Lower 0.9 0_9	EC50 imits Upper >> >>	5.675 Overlag Yes Yes	5.675 Decision Passes Cr Passes Cr	5,675 iteria iteria	%Effect
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code	Count	Contro Contro Mean	I Resp I Resp <b>95% LCL</b> 1.0000	1 1 95% UCL	Lower 0.9 0_9 Min	EC50 imits Upper >> >> Max	5.675 Overlag Yes Yes Std Err	5.675 Decision Passes Cr Passes Cr Std Dev	5.675 iteria iteria CV%	
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code	Count 4	Contro Contro Mean 1.0000	I Resp I Resp <b>95% LCL</b> 1.0000	1 1 95% UCL 1_0000	Lower 0.9 0.9 Min 1.0000	EC50 imits Upper >> >> Max 1.0000	5.675 Overlap Yes Yes Std Err 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000	5.675 iteria iteria CV%	0.00%
Analysis ID 04-3346-7794 14-8891-5003	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code	Count 4 4	Contro Contro Mean 1.0000 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000	1 1 95% UCL 1.0000 1.0000	Lower 0.9 0_9 Min 1.0000 1.0000	EC50 imits Upper >> >> Max 1.0000 1.0000	5.675 Overlag Yes Std Err 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000	5.675 iteria iteria CV%	0.00% 0.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N	Count 4 4 4	Contro Contro Mean 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7 96h Survival F	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N	Count 4 4 4	Contro Contro Mean 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7 96h Survival F Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail	<b>Count</b> 4 4 4 4	Contro Contro Mean 1.0000 1.0000 0.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3.35 16.7 96h Survival F Conc-µL/L 0	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 8 Rep 1	Contro Contro Mean 1.0000 1.0000 0.0000 0.0000 Rep 2	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b>	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 1 0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 Rep 2 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7 96h Survival F Conc-µL/L 0 3 3,35	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 4 1 0000 1.0000	Contro Contro Mean 1.0000 0.0000 0.0000 0.0000 Rep 2 1.0000 1.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7 96h Survival F Conc-µL/L 0 3 3,35	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code	Count 4 4 4 4 4 1 0000 1.0000 1.0000 0.0000	Contro Contro 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000 0.0000	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7 96h Survival F Conc-µL/L 0 3 3.35 6.7 96h Survival R	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N	Count 4 4 4 4 4 1 0000 1.0000 1.0000 0.0000	Contro Contro 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000	I Resp I Resp 95% LCL 1.0000 1.0000 0.0000 0.0000 Rep 3 1.0000 1.0000 0.0000	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 24-3346-7794 14-8891-5003 <b>36h Survival F</b> <b>Conc-µL/L</b> 3 3.35 16.7 <b>36h Survival F</b> <b>3</b> ,35 6.7 <b>6</b> .7 <b>3</b> ,35 <b>6</b> .7 <b>3</b> ,35 <b>6</b> .7 <b>3</b> ,35 <b>6</b> .7 <b>3</b> ,35 <b>6</b> .7 <b>3</b> ,35 <b>6</b> .7	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials	Count 4 4 4 4 1 0000 1.0000 0.0000 0.0000	Contro Contro Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 1.0000 0.0000	I Resp I Resp <b>95% LCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3.35 16.7 96h Survival F Conc-µL/L 0 3.35 16.7 96h Survival R Conc-µL/L	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count 4 4 4 4 1.0000 1.0000 0.0000 0.0000 0.0000 Rep 1	Contro Contro Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 0.0000 0.0000 0.0000	I Resp I Resp <b>95% LCL</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 3</b> 1.0000 1.0000 0.0000 0.0000	1 <b>95% UCL</b> 1.0000 1.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b>	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%
Analysis ID 04-3346-7794 14-8891-5003 96h Survival F Conc-µL/L 0 3 3.35 16.7 96h Survival F Conc-µL/L 0 3 3,35	Endpoint 96h Survival Rate 96h Survival Rate Rate Summary Code N Rate Detail Code N Rate Binomials Code	Count           4           4           4           4           1.0000           1.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000           0.0000	Contro Contro Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 0.0000 0.0000 <b>Rep 2</b> 10/10	I Resp I Resp <b>95% LCL</b> 1.0000 1.0000 0.0000 0.0000 1.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	1 1 95% UCL 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	Lower 0.9 0.9 Min 1.0000 1.0000 0.0000	EC50 imits Upper >> >> Max 1.0000 1.0000 0.0000 0.0000	5.675 <b>Overlag</b> Yes <b>Std Err</b> 0.0000 0.0000 0.0000 0.0000	5.675 Decision Passes Cr Passes Cr Std Dev 0.0000 0.0000 0.0000 0.0000 0.0000	5.675 iiteria iiteria <b>CV%</b>	0.00% 0.00% 100.00% 100.00%

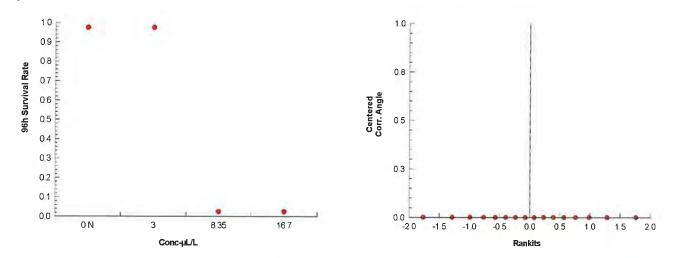
Analyst: 1 QA: C

	alytical Rep	oort						eport Date: est Code/ID		08 Sep-21 1 J0721 007 .	3:30 (p 1 o / 11-3625-3
Fish 96-h Ac	ute Survival Te	st						Aqua	tic Bioassay		
Analysis ID:	14-8891-5003		Endpoint:	96h Survival R	Rate		C	ETIS Versio	on: CETIS	/1.9_7	
Analyzed: Edit Date:	08 Sep-21 13: 08 Sep-21 13:		Analysis:	Nonparametric				atus Level			
				3A0D5E0FE4	0D419F8B	DE03F51126	503FC E	ditor ID: 007-979-628-1			
Batch ID: Start Date:	15-2797-9235 07 Jul-21 16:0		Test Type: Protocol:	Survival (96h)	040 (0000			Analyst: Joe Freas Diluent: Laboratory Water			
	11 Jul-21 14:0		Species:	EPA/821/R-02 Oncorhynchus		:)			aboratory Wa	ter	
Test Length:			Taxon:	Actinopterygii	THYRISS				Not Applicable Aquatic Biosys	tems CO	Age:
Sample ID:	01-7395-3681		Code:	TRU0721.007			Dr	oject:			riger
-	: 01 Jul-21 11:30		Material:	Sample Water				-	Bioassay Repo	ort	
-	: 01 Jul-21 11:30		CAS (PC):	oumpic water					ake Mathews	π	
Sample Age:			Client:	Trussell Techr	nologies		51		are mainews		
Data Transfor	rm	Alt H	/D			Compar	ison Resu	+			
Angular (Corre		C > T						urvival rate e	endpoint		
Steel Many-O	ne Rank Sum T	est									
Control	vs Conc-µ		Test S	tat Critical	Ties	DF P-Type	P-Value	- Decisio	οπ(α:5%)		
Negative Contr			18	12		6 CDF	0.5000		gnificant Effect	t	
Test Acceptal	bility Criteria	та	C Limits								
Attribute	Test Sta		Upper	Overlap	Decisio	n					
Control Resp	1	0.9	>>	Yes	Passes						
ANOVA Table											_
Source Between	Sum Squ 0	lares	Mean S	Square	DF	F Stat	P-Value		on(α:5%)		
Error	0		0		1 6			Indeterr	ninate		
Total	0		0		7	_					
	nptions Tests										
Attribute	Test				Tect Sta	t Critical	D Value	Desisis	- ( 40( )		
Variance	Variance	Ratio E Te	est		Test Sta	L Critical	P-Value	Indeterr	on(α:1%)	_	
Distribution			rmality Test					Indeterr			
96h Survival F	Rate Summary							macteri			
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCI	. Median	Min	Max	Std Err	CV%	%Effect
)	N	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
3		4	1,0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
3.35		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
6.7		4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
Angular (Corre	ected) Transfor	med Sum	mary								
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	. Median	Min	Max	Std Err	CV%	%Effect
)	N	4	1.4120	1.4120	1.4120	1.4120	1.4120	1.4120	0.0000	0.00%	0.00%
3		4	1.4120	1.4120	1.4120	1.4120	1.4120	1,4120	0.0000	0.00%	0.00%
35		4	0.1588	0.1588	0.1588	0.1588	0.1588	0.1588	0.0000	0.00%	88.76%
6.7		4	0.1588	0_1588	0,1588	0.1588	0.1588	0.1588	0.0000	0.00%	88.76%
6h Survival R	late Detail										
onc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4						
)	N	1,0000	1.0000	1.0000	1.0000						
3		1.0000	1.0000	1,0000	1.0000						
		1.0000 0.0000 0.0000	1.0000 0,0000	1,0000 0.0000	1.0000 0.0000						

Analyst: QA

CETIS An	alytical Repo	ort				Report Date: Test Code/ID:	08 Sep-21 13:30 (p 2 of 2) TRU0721.007 / 11-3625-3181
Fish 96-h Ac	ute Survival Test					Aquatic E	Bioassay & Consulting Labs, Inc.
Analysis ID: Analyzed: Edit Date:	14-8891-5003 08 Sep-21 13:30 08 Sep-21 13:26	A	nalysis: 1	•	ate -Control vs Treatments DD419F8BDE03F5112603FC	CETIS Version: Status Level: Editor ID:	CETISv1.9.7 1 007-979-628-1
Angular (Cor	rected) Transform	ned Detai	ľ				
Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4		
0	N	1.4120	1.4120	1.4120	1.4120		
3		1.4120	1.4120	1.4120	1.4120		
8,35		0.1588	0.1588	0.1588	0.1588		
16.7		0.1588	0.1588	0.1588	0.1588		
96h Survival	Rate Binomials						
Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4		
0	N	10/10	10/10	10/10	10/10		
3		10/10	10/10	10/10	10/10		
8.35		0/10	0/10	0/10	0/10		
16.7		0/10	0/10	0/10	0/10		

Graphics

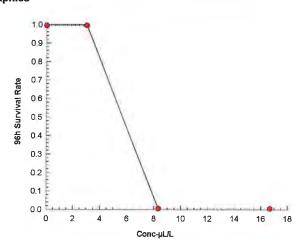


Analyst:

	S Ana	lytical Repo	ort						Tes	t Code/l	D:	TRU0	721.007 / 1	11-3625-318
Fish 9	6-h Acu	te Survival Test								Aqu	atic B	ioassay &	Consultin	g Labs, Inc
Analy		04-3346-7794		dpoint:	96h Survival R					IS Vers		CETISv1.	9.7	
Analy: Edit D		08 Sep-21 13:30 08 Sep-21 13:26		alysis: )5 Hash:	Linear Interpola 3A0D5E0FE40			12603FC		us Leve or ID:	21:	<b>1</b> 007-979-6	528-1	
Batch	ID:	15-2797-9235	Tes	st Type:	Survival (96h)				Ana	lyst:	Joe F	reas		
Start [	Date:	07 Jul-21 16:01	Pro	otocol:	EPA/821/R-02	-012 (2002)			Dilu	ent:	Labo	ratory Wate	r	
Ending	g Date:	11 Jul-21 14:01	Spe	ecies:	Oncorhynchus	mykiss			Brin	ie:	Not A	pplicable		
Test L	ength:	94h	Тах	con:	Actinopterygii				Sou	rce:	Aqua	tic Biosyste	ms, CO	Age:
Sampl	e ID:	01-7395-3681	Co	de:	TRU0721.007				Proj	ect:				
Sampl	e Date:	01 Jul-21 11:30	Ma	terial:	Sample Water				Sou	rce:	Bioas	say Report		
Receip	ot Date:	01 Jul-21 11:30	CA	S (PC):					Stat	ion:	Lake	Mathews		
Sampl	e Age:	6d 5h	Clie	ent:	Trussell Techn	ologies								
Linear	Interpo	lation Options												
X Tran	sform	Y Transform	See	ed	Resamples	Exp 95%	CL	Method						
Linear		Linear	0		280	Yes		Two-Poir	nt Interp	olation				
Test A	cceptab	ility Criteria	TACI	_imits										
Attribu	ite	Test Stat	Lower	Upper	Overlap	Decision								
Contro	Resp	1	0_9	>>	Yes	Passes C	riteria							-
Point E	Estimate	es							-					
Level	μL/L	95% LCL	95% UCL			_								
EC10	3.535	3.535	3.535				_							
EC10 EC15	3.535 3.803	3.535 3.803	3.535 3.803							_				
EC10 EC15 EC20	3.535 3.803 4.07	3.535 3.803 4.07	3.535 3.803 4.07											
EC10 EC15 EC20 EC25	3.535 3.803 4.07 4.338	3.535 3.803 4.07 4.338	3.535 3.803 4.07 4.338											
EC10 EC15 EC20 EC25 EC40	3.535 3.803 4.07 4.338 5.14	3.535 3.803 4.07 4.338 5.14	3.535 3.803 4.07 4.338 5.14											
EC10 EC15 EC20 EC25 EC40 EC50	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338			0.44		//0	(D)					ie Veriede
EC10 EC15 EC20 EC25 EC40 EC50	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675		Madian			Variate(A		0/156		4/2	-	nic Variate
EC10 EC15 EC20 EC25 EC40 EC50 B6h Su Conc-	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675 Rate Summary Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b>	Mean	Median	Min	Мах	C	1%	%Effe		A/B	Mean	%Effect
EC10 EC15 EC20 EC25 EC40 EC50 EC50 EC50	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4	<b>Mean</b> 1.0000	1.0000	Min 1.0000	Max 1.000	<b>C</b>	<b>/%</b> 00%	0.00%	6	40/40	Mean 1.0000	%Effect 0.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>20nc</b> -1	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675 Rate Summary Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4	Mean 1.0000 1.0000	) 1.0000 ) 1.0000	Min 1.0000 1.0000	Max 1.000 1.000	<b>C</b> 00 0.	<b>√%</b> 00% 00%	0.00% 0.00%	6 6	40/40 40/40	Mean 1.0000 1.0000	%Effect 0.00% 0.00%
EC10 EC15 EC20 EC25 EC40 EC50 96h Su Conc-1 D 3 3.35	3.535 3.803 4.07 4.338 5.14 5.675	3.535 3.803 4.07 4.338 5.14 5.675 Rate Summary Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4	<b>Mean</b> 1.0000	1.0000         1.0000         0.0000	Min 1.0000	Max 1.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00%	6 6 0%	40/40	Mean 1.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>3</b> 3.35 16.7	3.535 3.803 4.07 4.338 5.14 5.675 rvival R	3.535 3.803 4.07 4.338 5.14 5.675 Rate Summary Code	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4	Mean 1.0000 1.0000 0.0000	1.0000         1.0000         0.0000	Min 1.0000 1.0000 0.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> Conc-1 D 3 3.35 16.7 <b>96h Su</b>	3.535 3.803 4.07 4.338 5.14 5.675 rvival R	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4	Mean 1.0000 1.0000 0.0000	1.0000         1.0000         0.0000         0.0000         0.0000	Min 1.0000 1.0000 0.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc 4</b> 3.35 16.7 <b>96h Su</b> <b>Conc 4</b>	3.535 3.803 4.07 4.338 5.14 5.675 rvival R	3.535 3.803 4.07 4.338 5.14 5.675 Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4	Mean 1.0000 1.0000 0.0000 0.0000	<ul> <li>1.0000</li> <li>1.0000</li> <li>0.0000</li> <li>0.0000</li> <li>Rep 3</li> </ul>	Min 1.0000 1.0000 0.0000 0.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>20nc</b> 3 3.35 I6.7 <b>96h Su</b> <b>20nc</b> 1 0 <b>3</b>	3.535 3.803 4.07 4.338 5.14 5.675 rvival R	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 <b>Rep 1</b>	Mean 1.0000 0.0000 0.0000 Rep 2	<ul> <li>1.0000</li> <li>1.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>Rep 3</li> <li>1.0000</li> </ul>	Min 1.0000 1.0000 0.0000 0.0000 Rep 4	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc</b> -1 <b>3</b> 3.35 16.7 <b>96h Su</b> <b>Conc</b> -1 3	3.535 3.803 4.07 4.338 5.14 5.675 rvival R	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4 <b>Rep 1</b> 1.0000	Mean 1.0000 1.0000 0.00000 0.00000 <b>Rep 2</b> 1.0000	<ul> <li>1.0000</li> <li>1.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> </ul>	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>3</b> .35 16.7 <b>96h Su</b> <b>20nc</b> -1 <b>3</b> 3.35	3.535 3.803 4.07 4.338 5.14 5.675 rvival R	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 <b>Count</b> 4 4 4 4 4 4 <b>Rep 1</b> 1.0000 1.0000	Mean 1.0000 0.0000 0.0000 Rep 2 1.0000 1.0000	1.0000         1.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000	Min 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc</b> 3 3.35 16.7 <b>96h Su</b> <b>Conc</b> 3 3.35 16.7	3.535 3.803 4.07 4.338 5.14 5.675 rvival R iL/L	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 5.000 1.0000 1.0000 0.0000	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 0.0000 0.0000	1.0000         1.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>20nc-1</b> 3 3.35 (6.7 <b>20h Su</b> 3.35 (6.7 <b>20h Su</b>	3.535 3.803 4.07 4.338 5.14 5.675 rvival R iL/L	3.535 3.803 4.07 4.338 5.14 5.675 tate Summary Code N	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 5.000 1.0000 1.0000 0.0000	Mean 1.0000 0.0000 0.0000 <b>Rep 2</b> 1.0000 0.0000 0.0000	1.0000         1.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 1.0000 0.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc</b> -1 <b>3</b> 3.35 16.7 <b>96h Su</b> <b>Conc</b> -1 <b>96h Su</b> <b>Conc</b> -1	3.535 3.803 4.07 4.338 5.14 5.675 rvival R iL/L	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code N	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 1.0000 1.0000 0.0000 0.0000	Mean           1.0000           0.0000           0.0000           0.0000           1.0000           0.0000           1.0000           0.0000           0.0000           0.0000           0.0000           0.0000	1.0000         1.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000	Min 1.0000 0.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000 0.0000	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc 4</b> <b>3</b> 3.35 16.7 <b>3</b> 3.35 16.7 <b>3</b> 3.35 16.7 <b>3</b> 3.35 16.7	3.535 3.803 4.07 4.338 5.14 5.675 rvival R iL/L	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code N ate Detail Code	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 1.0000 1.0000 0.0000 0.0000 0.0000 <b>Rep 1</b>	Mean 1.0000 0.0000 0.0000 Rep 2 1.0000 1.0000 0.0000 0.0000 Rep 2	1.0000         1.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000         0.0000	Min 1.0000 1.0000 0.0000 <b>Rep 4</b> 1.0000 1.0000 0.0000 0.0000 <b>Rep 4</b>	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%
EC10 EC15 EC20 EC25 EC40 EC50 <b>96h Su</b> <b>Conc</b> 3 3.35 16.7 <b>96h Su</b> <b>Conc</b> 3 3.35 16.7	3.535 3.803 4.07 4.338 5.14 5.675 rvival R iL/L	3.535 3.803 4.07 4.338 5.14 5.675 ate Summary Code N ate Detail Code N ate Detail Code	3.535 3.803 4.07 4.338 5.14 5.675 Count 4 4 4 4 4 4 4 4 4 4 4 7 1.0000 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000	Mean           1.0000           0.0000           0.00000           0.00000           Rep 2           1.00000           0.00000           0.00000           0.00000           0.00000           0.00000           0.00000           0.00000           0.00000           0.00000           0.00000           0.00000           1.0/10	<ul> <li>1.0000</li> <li>1.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>1.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> <li>0.0000</li> </ul>	Min 1.0000 1.0000 0.0000 0.0000 Rep 4 1.0000 0.0000 0.0000 0.0000 0.0000 0.0000 Rep 4 10/10	Max 1.000 1.000 0.000	<b>C</b> 00 0. 00 0.	<b>√%</b> 00% 00%	0.00% 0.00% 100.0	6 6 0%	40/40 40/40 0/40	Mean 1.0000 1.0000 0.0000	%Effect 0.00% 0.00% 100.00%

A QA:-E Analyst:\_

ng Labs, Inc.







CE HS Mea	asurement	керо	π					Report Date Test Code/I		•	3:31 (p 1 of 11-3625-318
Fish 96-h Acu	ite Survival Test	t						Aqua	tic Bioassay a	& Consultin	ng Labs, Inc
Batch ID:	15-2797-9235		Test Type:	Survival (96h)				Analyst:	Joe Freas		
Start Date:	07 Jul-21 16:01		Protocol:	EPA/821/R-02	2-012 (2002)			Diluent:	Laboratory Wat	ter	
Ending Date:	11 Jul-21 14:01		Species:	Oncorhynchus	s mykiss			Brine:	Not Applicable		
Test Length:	94h		Taxon:	Actinopterygii				Source:	Aquatic Biosys	tems, CO	Age:
Sample ID:	01-7395-3681		Code:	TRU0721.007				Project:			
-	01 Jul-21 11:30		Material:	Sample Water				Source:	Bioassay Repo	rt	
Receipt Date:	01 Jul-21 11:30		CAS (PC):					Station:	Lake Mathews		
Sample Age:	6d 5h		Client:	Trussell Techr	nologies						
Alkalinity (Ca	CO3)-mg/L										
Conc-µL/L	Code	Count		95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Cour
0	N	2	125.5	119,1	131,9	125	126	0.3536	0.7071	0.56%	0
3		2	133.5	127.1	139.9	133	134	0.3536	0_7071	0.53%	0
8.35		2	136.5	130,1	142.9	136	137	0.3536	0.7071	0.52%	0
16.7		2	129.5	123.1	135.9	129	130	0.3536	0.7071	0.55%	0
Overall		8	131.2	127.5	135	125	137	1.578	4.464	3.40%	0 (0%)
Dissolved Oxy	/gen-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Cour
0	N	5	10.18	9.996	10.36	10	10.4	0.02966	6 0.1483	1.46%	0
3		5	10.04	9.57	10.51	9.4	10.4	0.07563	0.3782	3.77%	0
8.35		2	9.75	6.573	12.93	9.5	10	0.1768	0.3536	3.63%	0
16.7		2	9.7	5.888	13.51	9.4	10	0.2121	0.4243	4.37%	0
Overall		14	10	9.808	10.19	9.4	10.4	0.08895	0.3328	3.33%	0 (0%)
Hardness (Ca											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
0	N	2	125.5	119.1	131.9	125	126	0,3536	0.7071	0.56%	0
3		2	292.5	260.7	324.3	290	295	1.768	3.536	1.21%	0
3.35		2	327.5	295.7	359.3	325	330	1.768	3.536	1.08%	0
Overall		6	248.5	147.1	349.9	125	330	39.43	96.58	38.86%	0 (0%)
oH-Units											
Conc-µL/L	Code	Count	Mean	95% LCL 7.549	95% UCL	Min	Max	Std Err	Std Dev	CV%	QA Coun
3	N	5 5	7.9 7.86	7.536	8.251	7.4	8.1	0.05657		3.58%	0
3.35		2	7.00	5.159	8.184 10.24	7.4 7.5	8 7.9	0.05215		3.32%	0
16.7		2	7.65	4.473	10.24	7.4	7.9	0.1414 0.1768	0.2828 0.3536	3.67% 4.62%	0
Dverall		14	7.821	7.668	7.975	7.4	8.1	0.07124		3.41%	0 (0%)
emperature-°	с										- ( /
Conc-µL/L		Count	Mean	95% LCL	95% UCL	Min	Мах	Std Err	Std Dev	CV%	QA Coun
)		5	13.1	12.47	13.73	12.8	14	0.102	0.5099	3.89%	0
3		5	13.06	12.36	13.76	12.5	14	0.1128	0.5639	4.32%	0
3.35		2	13.3	5,676	20.92	12.7	13.9	0.4243	0.8485	6.38%	0
6.7		2	13.3	6.947	19.65	12.8	13.8	0.3536	0.7071	5.32%	0
Overall		14	13.14	12.84	13.45	12.5	14	0.1421	0.5316	4.05%	0 (0%)

h QA: Analyst:\_\_\_\_



July 21, 2021

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Matthew Raw with EarthTec QZ
DATE RECEIVED:	1 July – 21
ABC LAB NO.:	TRU0721.007

# ACUTE FATHEAD MINNOW SURVIVAL BIOASSAY

% Survival = 97.50% Survival in 16.7 ul/l Sample

EC50 = >16.7 ul/l

Yours Very truly,

M. Scott Johnson Laboratory Director

# **CETIS Summary Report**

21 Jul-21 15:04 (p 1 of 1) Report Date: Test Code/ID: TRU0721 007afml / 09-6969-6427

							_	est Code/				-6969-642
Fathead Minno	ow 96-h Acute	Survival 1	est					Aqua	itic Bio	bassay & C	Consulting	Labs, Inc.
	10-3180-3556			Survival (96h)				Analyst:				
	07 Jul-21 15:01		otocol:	EPA/821/R-02-				Diluent:		iving Wate	r	
Ending Date:		-	pecies:	Pimephales pro	omelas			Brine:		pplicable	00	
Test Length: 9	95h	Ta	axon:	Actinopterygii				Source:	Aqua	tic Biosyste	ems, CO	Age: <24
	13-0172-2416		ode:	TRU0721.007a	fml			Project:	-			
Sample Date: (			aterial:	Sample Water				Source:		say Repor		
Receipt Date: (			AS (PC):	T	-1!		;	Station:	∟аке	Matthew R	aw with Ear	th Tec QZ
Sample Age: 6	6a 4n (11 °C)	C.	lient:	Trussell Techno	biogres							
Multiple Comp	parison Summa	ary										
	Endpoint			parison Method		_√	NOEL			TOEL	PMSD	
07-1275-9365	96h Survival Ra	ate	Steel	Many-One Rank	Sum Test		16.7	>16.	7		4.96%	
Point Estimate	Summary											
Analysis ID	Endpoint		Point	Estimate Meth	od	$\checkmark$	Level	μL/L		95% LCL	95% UCL	
07-7480-8197	96h Survival Ra	ate	Linea	r Interpolation (IC	CPIN)		EC10					
							EC15					
							EC20					
							EC25					
							EC40			***		
							EC50	>16.	7			
Test Acceptabi	ility					TAC L	imits					
Analysis ID	Endpoint		Attrik	oute	Test Stat	Lower	Uppe	r Over	rlap	Decision		
07-1275-9365	96h Survival Ra	ate	Contr	ol Resp	1	0.9	>>	Yes		Passes C	riteria	
07-7480-8197	96h Survival Ra	ate	Contr	ol Resp	1	0.9	>>	Yes	-	Passes C	riteria	
96h Survival R	Rate Summary											
			Mear	95% LCL	95% UCL	Min	Max	Std	Err	Std Dev	CV%	%Effect
Conc-µL/L	Code	Count		0 1 0000	1.0000	4 0000	1.000	0 0.00	00	0.0000		0.00%
	Code D	Count 4	1.000			1.0000						
0 3			1.000	0 1.0000	1.0000	1.0000	1.000	0 0.00	00	0.0000		0.00%
0 3 8.35		4	1.000 1.000	00 1.0000 00 1.0000	1.0000 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00	00 00	0.0000 0.0000	-	0.00%
<b>Сопс-µL/L</b> 0 3 8.35 16.7		4 4	1.000	00 1.0000 00 1.0000	1.0000	1.0000	1.000	0 0.00 0 0.00	00 00	0.0000		
0 3 8.35 16.7	D	4 4 4	1.000 1.000	00 1.0000 00 1.0000	1.0000 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	-	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R</b>	D Rate Detail Code	4 4 4 8 Rep 1	1.000 1.000 0.975 <b>Rep</b> 2	00 1.0000 100 1.0000 100 0.8954 2 Rep 3	1.0000 1.0000 1.0550 Rep 4	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 96h Survival R Conc-µL/L	D Rate Detail	4 4 4	1.000 1.000 0.975	00 1.0000 100 1.0000 100 0.8954 2 Rep 3	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35	D Rate Detail Code	4 4 4 8 Rep 1	1.000 1.000 0.975 <b>Rep</b> 2	00 1.0000 00 1.0000 00 0.8954 2 Rep 3 00 1.0000	1.0000 1.0000 1.0550 Rep 4	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R</b> Conc-µL/L 0	D Rate Detail Code	4 4 4 4 <b>Rep 1</b> 1.0000	1.000 1.000 0.975 <b>Rep 1</b>	00 1.0000 100 1.0000 00 0.8954 2 Rep 3 100 1.0000 100 1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R Conc-µL/L</b> 0 3	D Rate Detail Code	4 4 4 <b>Rep 1</b> 1.0000 1.0000	1.000 1.000 0.975 <b>Rep</b> 2 1.000	00       1.0000         1.0000       0.8954         2       Rep 3         00       1.0000         100       1.0000         100       1.0000         100       1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R Conc-µL/L</b> 0 3 8.35 16.7	D Rate Detail Code D	4 4 4 <b>Rep 1</b> 1.0000 1.0000 1.0000 0.9000	1.000 1.000 0.975 <b>Rep</b> 2 1.000 1.000	00       1.0000         1.0000       0.8954         2       Rep 3         00       1.0000         100       1.0000         100       1.0000         100       1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000 1.0000 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R Conc-µL/L</b> 0 3 8.35 16.7 <b>96h Survival R</b>	D Rate Detail Code D	4 4 4 <b>Rep 1</b> 1.0000 1.0000 1.0000 0.9000	1.000 1.000 0.975 <b>Rep</b> 2 1.000 1.000	00       1.0000         1.0000       1.0000         00       0.8954         2       Rep 3         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000 1.0000 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R</b> <b>Сопс-µL/L</b> 96h Survival R Conc-µL/L	D Rate Detail Code D	4 4 4 <b>Rep 1</b> 1.0000 1.0000 1.0000 0.9000	1.000 1.000 0.975 <b>Rep</b> 1.000 1.000 1.000	00       1.0000         1.0000       1.0000         00       0.8954         2       Rep 3         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000 1.0000 1.0000 1.0000	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R</b> <b>Conc-µL/L</b> 96h Survival R Conc-µL/L 0	D Rate Detail Code D Rate Binomials Code	4 4 4 <b>Rep 1</b> 1.0000 1.0000 0.9000 <b>Rep 1</b>	1.000 1.000 0.975 <b>Rep</b> 1.000 1.000 1.000 <b>Rep</b>	00       1.0000         1.0000       1.0000         00       0.8954         2       Rep 3         00       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000         100       1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000 1.0000 1.0000 <b>Rep 4</b>	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%
0 3 8.35 16.7 <b>96h Survival R Conc-µL/L</b> 0 3 8.35	D Rate Detail Code D Rate Binomials Code	4 4 4 1.0000 1.0000 1.0000 0.9000 <b>Rep 1</b> 10/10	1.000 1.000 0.975 <b>Rep</b> 1.000 1.000 1.000 <b>Rep</b> 10/10	00       1.0000         1.0000       1.0000         00       0.8954         2       Rep 3         10       1.0000         10       1.0000         10       1.0000         10       1.0000         10       1.0000         10       1.0000         10       1.0000         10       1.0000         10       1.0000	1.0000 1.0000 1.0550 <b>Rep 4</b> 1.0000 1.0000 1.0000 <b>Rep 4</b> 10/10	1.0000 1.0000	1.000 1.000	0 0.00 0 0.00 0 0.02	00 00 50	0.0000 0.0000 0.0500	  5.13%	0.00% 2.50%

Analyst: \_\_\_\_\_QA: M35

21 Jul-21 15:03 (p 1 of 2) Report Date:

Test Code/ID: TRU0721.007afml / 09-6969-6427

Analysis ID: 07	-1275-9365	E.	ndpoint:	96h Survival Ra	to				CET	S Version	CETISV	197	
	Jul-21 15:15		•	Nonparametric-		Tre	atmonte			s Version s Level:	1	1.9.7	
,	Jul-21 15:12			64CD5B1D749				E9E9			000-189	-126-0	
	2190 2556	Te	of Tunot	Suprival (06b)					Analy				
	-3180-3556 Jul-21 15:01			Survival (96h)							ooiving Wot		
				EPA/821/R-02-		)			Dilue		ceiving Wate	er	
Ending Date: 11		-		Pimephales pro	meias				Brine		t Applicable		A
Test Length: 95	'n	18	ixon:	Actinopterygii					Sour	ce: Aq	uatic Biosys	tems, CO	Age: <24
	-0172-2416	C	ode:	TRU0721.007a	fml				Proje	ct:			
Sample Date: 01	Jul-21 11:30	M	aterial:	Sample Water					Sour	ce: Bio	bassay Repo	rt	
Receipt Date: 01		C	AS (PC):						Statio	on: La	ke Matthew I	Raw with Ea	rth Tec QZ
Sample Age: 6d	4h (11 °C)	CI	ient:	Trussell Techno	ologies								
Data Transform		Alt Hyp				1	NOEL	LOE	L	TOEL	TU	MSDu	PMSD
Angular (Correcte	ed)	C > T					16.7	>16.	7			0.04964	4.96%
Steel Many-One	Rank Sum Te	st											
Control vs			Test S	tat Critical	Ties D	F F	P-Type	P-Va	lue	Decisio	ı(α:5%)		
Dilution Water	3		18	10	1 6		CDF	0.75			nificant Effect	t	
	8.35		18	10	1 6	(	CDF	0.75	00	-	nificant Effec		
	16.7		16	10	1 6	(	CDF	0.50	65	-	nificant Effec		
Test Acceptabilit	ty Criteria	TAC	Limits										
Attribute	Test Stat		Upper	Overlap	Decisio	n							
Control Resp	1	0.9	>>	Yes	Passes	Crite	eria						
ANOVA Table								-					
	C		Maaa	C	DE		C Otat	D Va		Desisio	e (m EP/)		
Source	Sum Squa			Square	DF 3	_	F Stat	P-Va		Decision		4	
Between	0.0049799		0.0016				1	0.42	02	Non-Sigi	nificant Effec	π	
Error Total	0.0199195		0.0016	0	12 15	-							
TUTAT	0.0240334				10								
ANOVA Assumpt	tions Tests												
-	Test				Test Sta	t (	Critical	P-Va	lue	Decisio			
Attribute	Test Bartlett Eq	-								Indeterm	inate		_
Attribute	<b>Test</b> Bartlett Eq Levene Eq	uality of V	/ariance T	est	9	Ę	5.953	0.00	21	Indeterm Unequal	iinate Variances	_	
<b>Attribute</b> Variance	Test Bartlett Eq Levene Eq Mod Lever	uality of V ne Equalit	/ariance T y of Variar	est	9 1	Ę	5.953 5.953	0.002 0.420	21 62	Indeterm Unequal Equal Va	iinate Variances ariances		
<b>Attribute</b> Variance	Test Bartlett Eq Levene Eq Mod Lever Anderson-	uality of ne Equalit Darling A	/ariance T y of Variar 2 Test	est	9 1 3.496	ŧ	5.953 5.953 3.878	0.002 0.420 <1.0	21 62 E-05	Indeterm Unequal Equal Va Non-Nor	iinate Variances ariances mal Distribut		
ANOVA Assumpt Attribute Variance Distribution	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino	uality of N ne Equalit Darling A o Skewne	/ariance T y of Variar 2 Test ss Test	est	9 1 3.496 3.733	5	5.953 5.953 3.878 2.576	0.00) 0.420 <1.0 0.000	21 62 E-05 02	Indeterm Unequal Equal Va Non-Nor Non-Nor	iinate Variances ariances mal Distribut mal Distribut	ion	
<b>Attribute</b> Variance	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro	uality of N ne Equalit Darling A o Skewne ov-Smirno	/ariance T y of Variar 2 Test ss Test v D Test	est nce Test	9 1 3.496 3.733 0.4375	5 5 2 2	5.953 5.953 3.878 2.576 0.2471	0.002 0.420 <1.0 0.000 <1.0	21 62 E-05 02 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor	inate Variances ariances mal Distribut mal Distribut	ion ion	
Attribute Variance Distribution	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W	uality of N ne Equalit Darling A o Skewne ov-Smirno	/ariance T y of Variar 2 Test ss Test v D Test	est nce Test	9 1 3.496 3.733	5 5 2 2	5.953 5.953 3.878 2.576	0.00) 0.420 <1.0 0.000	21 62 E-05 02 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor	iinate Variances ariances mal Distribut mal Distribut	ion ion	
<b>Attribute</b> Variance	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W	uality of N ne Equalit Darling A o Skewne ov-Smirno	/ariance T y of Variar 2 Test ss Test v D Test	est nce Test	9 1 3.496 3.733 0.4375 0.5647	5 5 2 0 0 0	5.953 5.953 3.878 2.576 0.2471 0.8408	0.002 0.424 <1.0 0.000 <1.0 <1.0	21 62 E-05 02 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor	inate Variances ariances mal Distribut mal Distribut mal Distribut	ion ion ion	
Attribute Variance Distribution 96h Survival Rat Conc-μL/L	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W e Summary Code	uality of V ne Equalit Darling A Skewne ov-Smirno ilk W Nor Count	/ariance T y of Variar 2 Test ss Test v D Test mality Tes Mean	est nce Test t <b>95% LCL</b>	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b>	5 2 () ()	5.953 5.953 3.878 2.576 0.2471 0.8408 Median	0.002 0.420 <1.0 0.000 <1.0 <1.0 Min	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor	variances variances mal Distribut mal Distribut mal Distribut mal Distribut	ion ion ion CV%	%Effect
Attribute Variance Distribution 96h Survival Rat Conc-μL/L 0	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W	uality of V ne Equalit Darling A o Skewnes ov-Smirno ilk W Nor Count 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000	est nce Test t <b>95% LCL</b> 0 1.0000	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000	{ { { { ( ( (	5.953 5.953 3.878 2.576 0.2471 0.8408 Median 1.0000	0.002 0.420 <1.0 0.000 <1.0 <1.0 <b>Min</b> 1.000	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Max 1.0000	Variances variances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000	ion ion ion <b>CV%</b> 0.00%	0.00%
Attribute Variance Distribution 96h Survival Rat Conc-μL/L 0 3	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W e Summary Code	uality of V ne Equalit Darling A o Skewnes ov-Smirno iilk W Nor iilk W Nor <b>Count</b> 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000	est ince Test t 95% LCL 0 1.0000 0 1.0000	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000	₹ ₹ 2 ( ( (	5.953 5.953 3.878 2.576 0.2471 0.8408 <b>Median</b> 1.0000 1.0000	0.002 0.424 <1.0 0.000 <1.0 <1.0 Min 1.000	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Max 1.0000 1.0000	Variances ariances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000 0.0000	ion ion <b>CV%</b> 0.00% 0.00%	0.00% 0.00%
Attribute Variance Distribution 96h Survival Rat Conc-μL/L 0 3 8.35	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W e Summary Code	uality of V ne Equalit Darling A o Skewne ov-Smirno ilk W Nor <b>Count</b> 4 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000	est ince Test t 95% LCL 0 1.0000 0 1.0000 0 1.0000	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000 1.0000		5.953 5.953 3.878 2.576 0.2471 0.8408 <b>Median</b> 1.0000 1.0000 1.0000	0.002 0.424 <1.0 0.000 <1.0 <1.0 Min 1.000 1.000	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Non-Nor Non-Nor 1.0000 1.0000	variances ariances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000 0.0000 0.0000	ion ion <b>CV%</b> 0.00% 0.00% 0.00%	0.00% 0.00% 0.00%
Attribute Variance Distribution 96h Survival Rat Conc-μL/L 0 3 8.35	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W e Summary Code	uality of V ne Equalit Darling A o Skewnes ov-Smirno iilk W Nor iilk W Nor <b>Count</b> 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000	est ince Test t 95% LCL 0 1.0000 0 1.0000 0 1.0000	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000		5.953 5.953 3.878 2.576 0.2471 0.8408 <b>Median</b> 1.0000 1.0000	0.002 0.424 <1.0 0.000 <1.0 <1.0 Min 1.000	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Max 1.0000 1.0000	Variances ariances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000 0.0000	ion ion <b>CV%</b> 0.00% 0.00%	0.00% 0.00%
Attribute Variance Distribution 96h Survival Rat Conc-μL/L 0 3 8.35 16.7	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W te Summary Code D	uality of V ne Equalit Darling A o Skewne: ov-Smirno iilk W Nor <b>Count</b> 4 4 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000 0.9750	est ince Test t 95% LCL 0 1.0000 0 1.0000 0 1.0000	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000 1.0000		5.953 5.953 3.878 2.576 0.2471 0.8408 <b>Median</b> 1.0000 1.0000 1.0000	0.002 0.424 <1.0 0.000 <1.0 <1.0 Min 1.000 1.000	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Non-Nor Non-Nor 1.0000 1.0000	variances ariances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000 0.0000 0.0000	ion ion <b>CV%</b> 0.00% 0.00% 0.00%	0.00% 0.00% 0.00%
Attribute Variance Distribution 96h Survival Rat Conc-µL/L 0 3 8.35 16.7 Angular (Correct	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W te Summary Code D	uality of V ne Equalit Darling A o Skewne: ov-Smirno iilk W Nor <b>Count</b> 4 4 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000 0.9750	est ince Test t 95% LCL 0 1.0000 0 1.0000 0 1.0000	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000 1.0000		5.953 5.953 3.878 2.576 0.2471 0.8408 <b>Median</b> 1.0000 1.0000 1.0000	0.002 0.424 <1.0 0.000 <1.0 <1.0 Min 1.000 1.000	21 62 E-05 02 E-05 E-05	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Non-Nor Non-Nor 1.0000 1.0000	variances ariances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000 0.0000 0.0000	ion ion <b>CV%</b> 0.00% 0.00% 0.00%	0.00% 0.00% 0.00%
Attribute Variance Distribution 96h Survival Rat Conc-µL/L 0 3 8.35 16.7 Angular (Correct Conc-µL/L	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostino Kolmogoro Shapiro-W e Summary Code D	uality of V ne Equalit Darling A o Skewne: ov-Smirno ilk W Nor <u>Count</u> 4 4 4 4 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000 0.9750 mary	est hce Test t 95% LCL 0 1.0000 1.0000 0 1.0000 0 0.8954 95% LCL	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000 1.0000 1.0000		5.953 5.953 3.878 2.576 0.2471 0.8408 <b>Median</b> 1.0000 1.0000 1.0000	0.002 0.424 <1.0 0.004 <1.0 <1.0 1.004 1.004 1.004 0.904	21 62 E-05 02 E-05 E-05 00 00 00 00	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Non-Nor 1.0000 1.0000 1.0000	inate Variances ariances mal Distribut mal Distribut mal Distribut <b>Std Err</b> 0.0000 0.0000 0.0000 0.0250	ion ion <b>CV%</b> 0.00% 0.00% 0.00% 5.13%	0.00% 0.00% 0.00% 2.50%
Attribute Variance Distribution	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostinc Kolmogorc Shapiro-W e Summary Code D	uality of V ne Equalit Darling A o Skewne: ov-Smirno ilk W Nor Count 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 0 0 0 0	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000 0.9750 mary <u>Mean</u>	est ince Test t 95% LCL 0 1.0000 0 1.0000 0 0.8954 95% LCL 0 1.4120	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000 1.0000 <b>95% UC</b>		5.953 5.953 3.878 2.576 0.2471 0.8408 Median 1.0000 1.0000 1.0000 Median	0.002 0.420 <1.0 <1.0 <1.0 <1.00 1.000 1.000 0.900 Min	21 62 E-05 02 E-05 E-05 00 00 00 00 00 00	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Non-Nor 1.0000 1.0000 1.0000 1.0000	inate Variances ariances mal Distribut mal Distribut mal Distribut Std Err 0.0000 0.0000 0.0250 Std Err	ion ion CV% 0.00% 0.00% 5.13% CV%	0.00% 0.00% 2.50% %Effect 0.00% 0.00%
Attribute Variance Distribution 96h Survival Rat Conc-µL/L 0 3 8.35 16.7 Angular (Correct Conc-µL/L 0	Test Bartlett Eq Levene Eq Mod Lever Anderson- D'Agostinc Kolmogorc Shapiro-W e Summary Code D	uality of V ne Equalit Darling A o Skewne: ov-Smirno ilk W Nor Count 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	/ariance T y of Variar 2 Test ss Test v D Test mality Tes <u>Mean</u> 1.0000 1.0000 0.9750 mary <u>Mean</u> 1.4120	est ince Test t 95% LCL 0 1.0000 0 1.0000 0 1.0000 0 0.8954 95% LCL 0 1.4120 1.4120 1.4120	9 1 3.496 3.733 0.4375 0.5647 <b>95% UC</b> 1.0000 1.0000 1.0000 <b>95% UC</b> 1.4120		5.953 5.953 3.878 2.576 0.2471 0.8408 Median 1.0000 1.0000 1.0000 Median 1.4120	0.002 0.424 <1.0 0.000 <1.0 <1.0 <1.000 1.000 0.900 Min 1.412	21 62 E-05 02 E-05 E-05 00 00 00 00 00 00 00 00 00 00 00 00 0	Indeterm Unequal Equal Va Non-Nor Non-Nor Non-Nor Non-Nor 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	inate Variances ariances mal Distribut mal Distribut mal Distribut Std Err 0.0000 0.0000 0.0250 Std Err 0.0000	ion ion CV% 0.00% 0.00% 5.13% CV% 0.00%	0.00% 0.00% 2.50% %Effect 0.00%

Analyst: \_\_\_\_\_QA:\_\_\_

**Report Date:** Test Code/ID:

Aquatic Bioassay & Consulting Labs, Inc.

21 Jul-21 15:03 (p 2 of 2) TRU0721.007afml / 09-6969-6427

### Fathead Minnow 96-h Acute Survival Test

Analysis ID:	07-1275-9365	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7
Analyzed:	20 Jul-21 15:15	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1
Edit Date:	20 Jul-21 15:12	MD5 Hash:	64CD5B1D74951B1BFA48CE8575DEE9E9	Editor ID:	000-189-126-0

### 96h Survival Rate Detail

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	1.0000	1.0000
16.7		0.9000	1.0000	1.0000	1.0000

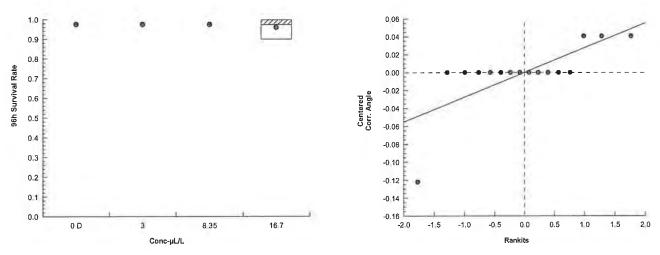
### Angular (Corrected) Transformed Detail

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.4120	1.4120	1.4120	1.4120
3		1.4120	1.4120	1.4120	1.4120
8.35		1.4120	1.4120	1.4120	1.4120
16.7		1.2490	1.4120	1.4120	1.4120

### 96h Survival Rate Binomials

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
3		10/10	10/10	10/10	10/10
8.35		10/10	10/10	10/10	10/10
16.7		9/10	10/10	10/10	10/10

### Graphics



Analyst:\_\_\_\_\_QA:\_\_\_

Report Date: 21 Jul-21 15:03 (p 1 of 2) Test Code/ID: TRU0721.007afml / 09-6969-6427

Fathead Minn	ow 96-h Acute Surv	vival Test				Aqua	tic Bi	oassay & Consulting	Labs, Inc.
Analysis ID:	07-7480-8197	Endpoint:	96h Survival R	ate		CETIS Vers	ion;	CETISv1.9.7	
Analyzed:	20 Jul-21 15:15	Analysis:	Linear Interpola	ation (ICPIN)		Status Leve	el:	1	
Edit Date:	20 Jul-21 15:12	MD5 Hash:	64CD5B1D749	51B1BFA48CE8	575DEE9E9	Editor ID:		000-189-126-0	
Batch ID:	10-3180-3556	Test Type:	Survival (96h)			Analyst:			
Start Date:	07 Jul-21 15:01	Protocol:	EPA/821/R-02-	-012 (2002)		Diluent:	Rece	eiving Water	
Ending Date:	11 Jul-21 14:15	Species:	Pimephales pro	omelas		Brine:	Not A	Applicable	
Test Length:	95h	Taxon:	Actinopterygii			Source:	Aqua	atic Biosystems, CO	Age: <24
Sample ID:	13-0172-2416	Code:	TRU0721.007a	ıfml		Project:			
Sample Date:	01 Jul-21 11:30	Material:	Sample Water			Source:	Bioas	ssay Report	
Receipt Date:	01 Jul-21 11:30	CAS (PC):				Station:	Lake	Matthew Raw with Ea	arth Tec QZ
Sample Age:	6d 4h (11 °C)	Client:	Trussell Techn	ologies					
Linear Interpo	plation Options				-0-00				
X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method				
Linear	Linear	0	280	Yes	Two-Point	Interpolation			

Test Acceptabili	ty Criteria	TAC	Limits			
Attribute	Test Stat	Lower	Upper	Overlap	Decision	
Control Resp	1	0.9	>>	Yes	Passes Criteria	

### **Point Estimates**

Level	µL/L	95% LCL	95% UCL
EC10	>16.7		
EC15	>16.7		
EC20	>16.7		
EC25	>16.7		
EC40	>16.7		
EC50	>16.7		

96h Survival R	ate Summary	1	Calculated Variate(A/B)								Isotonic Variate	
Conc-µL/L	Code	Count	Mean	Median	Min	Max	CV%	%Effect	A/B	Mean	%Effect	
0	D	4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	40/40	1.0000	0.00%	
3		4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	40/40	1.0000	0.00%	
8.35		4	1.0000	1.0000	1.0000	1.0000	0.00%	0.00%	40/40	1.0000	0.00%	
16.7		4	0.9750	1.0000	0.9000	1.0000	5.13%	2.50%	39/40	0.9750	2.50%	

#### 96h Survival Rate Detail

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
3		1.0000	1.0000	1.0000	1.0000
8.35		1.0000	1.0000	1.0000	1.0000
16.7		0.9000	1.0000	1.0000	1.0000

### 96h Survival Rate Binomials

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
3		10/10	10/10	10/10	10/10
8.35		10/10	10/10	10/10	10/10
16.7		9/10	10/10	10/10	10/10

Analyst:\_\_\_\_\_QA:\_\_\_\_

ETIS An	alytical Report			Report Date: Test Code/ID:	21 Jul-21 15:03 (p 2 of 2) TRU0721.007afml / 09-6969-6427
athead Min	now 96-h Acute Sur	vival Test		Aquatic B	ioassay & Consulting Labs, Inc.
analysis ID: analyzed: dit Date:	07-7480-8197 20 Jul-21 15:15 20 Jul-21 15:12	Analysis:	96h Survival Rate Linear Interpolation (ICPIN) 64CD5B1D74951B1BFA48CE8575DEE9E9	CETIS Version: Status Level: Editor ID:	CETISv1.9.7 1 000-189-126-0
37 aphics 1.0 0.9 0.8 0.7 0.6 0.5 98 0.6 0.5 98 0.4 0.3 0.2 0.1 0.0 0.3 0.2 0.1 0.0 0.9 0.8 0.7 0.6 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	•	0	•		

 Report Date:
 21 Jul-21 15:04 (p 1 of 3)

 Test Code/ID:
 TRU0721.007afml / 09-6969-6427

Fathead Minr	now 96-h Acute	Survival T	ſest					Aqua	tic Bioassay &	Consulting	g Labs, Inc.
Batch ID:	10-3180-3556	Те	est Type:	Survival (96h)				Analyst:			
Start Date:	07 Jul-21 15:01		rotocol:	EPA/821/R-02	. ,			Diluent:	Receiving Wat		
•	11 Jul-21 14:15	•	pecies:	Pimephales pr	omelas			Brine:	Not Applicable		
Test Length:	95h	Та	axon:	Actinopterygii				Source:	Aquatic Biosys	tems, CO	<b>Age:</b> <24
Sample ID:	13-0172-2416		ode:	TRU0721.007a	afm!			Project:			
Sample Date:	: 01 Jul-21 11:30	Ma	aterial:	Sample Water				Source:	Bioassay Repo	ort	
Receipt Date	: 01 Jul-21 11:30	CA	AS (PC):					Station:	Lake Matthew	Raw with E	arth Tec QZ
Sample Age:	6d 4h (11 °C)	CI	lient:	Trussell Techn	ologies						
Alkalinity (Ca	CO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std E	r Std Dev	CV%	QA Count
0	D	3	123	123	123	123	123	0	0	0.00%	0
16.7		3	129	129	129	129	129	0	0	0.00%	0
Overall		6	126	122.6	129.4	123	129	1.342	3.286	2.61%	0 (0%)
Conductivity	-µmhos										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std E	r Std Dev	CV%	QA Count
0	D	3	1009	1002	1016	1007	1012	0.881	2.646	0.26%	0
3		3	1011	1008	1014	1010	1012	0.3849	9 1.155	0.11%	0
8.35		3	1005	996	1014	1001	1008	1.202	3.606	0.36%	0
16.7		3	1012	1011	1014	1012	1013	0.192	5 0.5774	0.06%	0
Overall		12	1009	1007	1011	1001	1013	1.001	3.467	0.34%	0 (0%)
Dissolved Ox	kygen-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std E	r Std Dev	CV%	QA Count
0	D	3	7.9	6.586	9.214	7.3	8.3	0.1764	0.5291	6.70%	0
3		3	7.933	6.929	8.937	7.5	8.3	0.134	0.4041	5.09%	0
8.35		3	7.9	6.817	8.983	7.4	8.2	0.145	0.4359	5.52%	0
16.7		3	7.867	6.832	8.901	7.4	8.2	0.138	0.4163	5.29%	0
Overall		12	7.9	7.656	8.144	7.3	8.3	0.110	3 0.3838	4.86%	0 (0%)
Hardness (Ca	aCO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std E	rr Std Dev	CV%	QA Count
0	D	3	295	295	295	295	295	0	0	0.00%	0
16.7		3	330	330	330	330	330	0	0	0.00%	0
Overall		6	312.5	292.4	332.6	295	330	7.826	19.17	6.13%	0 (0%)
pH-Units											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std E	r Std Dev	CV%	QA Count
0	D	3	7.667	7.38	7.954	7.6	7.8	0.0384	49 0.1155	1.51%	0
3		3	7.7	7.452	7.948	7.6	7.8	0.0333	33 0.1	1.30%	0
8.35		3	7.633	7.49	7.777	7.6	7.7	0.0192	0.05773	0.76%	0
16.7		3	7.633	7.49	7.777	7.6	7.7	0.0193	0.05773	0.76%	0
Overall		12	7.658	7.608	7.709	7.6	7.8	0.0228	39 0.0793	1.04%	0 (0%)
Temperature	-°C										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std E	r Std Dev	CV%	QA Count
0	D	3	24.1	23.85	24.35	24	24.2	0.033	0.09989	0.41%	0
3		3	24.1	23.85	24.35	24	24.2	0.0333	0.09989	0.41%	0
8.35		3	24.1	23.85	24.35	24	24.2	0.033	0.09989	0.41%	0
								0.000	0 00000	0 440/	0
16.7		3	24.1	23.85	24.35	24	24.2	0.0333	0.09989	0.41%	U

Analyst:\_ QA:

 Report Date:
 21 Jul-21 15:04 (p 2 of 3)

 Test Code/ID:
 TRU0721.007afml / 09-6969-6427

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		123	Sep 1	Din 70	morie	7 analyst	Hoteo
16.7	-			129					
0	D	2		123					
16.7	D	2		129					
0	D	3	_	123					
0 16.7	D	3		123					
_		_		129					
Conductivity-µ	mhos								
Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		1012					
3				1010					
8.35				1008					
16.7				1012					
0	D	2		1007					
3				1010					
8.35				1006					
16.7				1012					
0	D	3		1008					-
3				1012					
8.35				1001					
16.7				1013					
Dissolved Oxy	aon-ma/l				-				
		Deed	<b>T</b> i		~	D:66.0/	les et ID	Ameliat	Mater
Conc-µL/L 0	Code D	Read	Time	Measure 8.3	QA	Diff-%	Inst ID	Analyst	Notes
3	D	i.		8.3					
3 8.35				8.2					
16.7				8.2 8.2					
					_		_		
0	D	2		8.1					
3				8					
8.35				8.1					
16.7		-		8					
				7.0					
	D	3		7.3					
0 3	D	3		7.5					
3 8.35	D	3		7.5 7.4					
3	D	3		7.5					
3 8.35 16.7		3		7.5 7.4					
3 8.35 16.7 Hardness (CaC	:O3)-mg/L		Time	7.5 7.4 7.4	QA	Diff-%	Inst ID	Analyst	Notes
3 8.35 16.7 Hardness (CaC Conc-µL/L	:O3)-mg/L Code	Read	Time	7.5 7.4 7.4 Measure	QA	Diff-%	Inst ID	Analyst	Notes
3 8.35 16.7 <b>Hardness (CaC</b> <b>Conc-µL/L</b> 0	:O3)-mg/L		Time	7.5 7.4 7.4 Measure 295	QA	Diff-%	Inst ID	Analyst	Notes
3 8.35 16.7 Hardness (CaC Conc-µL/L 0 16.7	:03)-mg/L Code D	Read 1	Time	7.5 7.4 7.4 Measure 295 330	QA	Diff-%	Inst ID	Analyst	Notes
3 8.35 16.7 Hardness (CaC Conc-µL/L 0 16.7 0	:O3)-mg/L Code	Read	Time	7.5 7.4 7.4 Measure 295 330 295	QA	Diff-%	Inst ID	Analyst	Notes
3 8.35 16.7 Hardness (CaC Conc-µL/L 0 16.7 0 16.7	Code D D	Read 1 2	Time	7.5 7.4 7.4 <b>Measure</b> 295 330 295 330	QA	Diff-%	Inst ID	Analyst	Notes
3 8.35	:03)-mg/L Code D	Read 1	Time	7.5 7.4 7.4 Measure 295 330 295	QA	Diff-%	Inst ID	Analyst	Notes

Analyst: \_\_\_\_\_ QA; P

 Report Date:
 21 Jul-21 15:04 (p 3 of 3)

 Test Code/ID:
 TRU0721.007afml / 09-6969-6427

Fathead Minnow 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

pH-Units							
Conc-µL/L	Code	Read	Time Measure	e QA Diff-%	Inst ID	Analyst	Notes
0	D	1	7.6				
3			7.6				
8.35			7.6				
16.7			7.6				
0	D	2	7.6				
3			7.7				
8.35			7.6				
16.7			7.6				
0	D	3	7.8				
3			7.8				
8.35			7.7				
16.7			7.7				

### Temperature-°C

Conc-µL/L	Code	Read	Time	Measure QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		24.2				
3				24.2				
8.35				24.2				
16.7				24.2				
0	D	2		24.1				
3				24.1				
8.35				24.1				
16.7				24.1				
0	D	3		24				
3				24				
8.35				24				
16.7				24				

Analyst: \_\_\_\_\_ QA: \_\_\_\_



July 21, 2021

Mr. David Hokanson Trussell Technologies 232 N. Lake Avenue Pasadena, CA 91101

Dear Mr. Hokanson:

We are pleased to present the enclosed bioassay report. The test was conducted under guidelines prescribed in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms EPA-821-R-02-012.* "All acceptability criteria were met and the concentration-response was normal. This is a valid test." Results were as follows:

CLIENT:	Trussell Technologies
SAMPLE ID.:	Lake Matthew Raw with EarthTec QZ
DATE RECEIVED:	1 July – 21
ABC LAB NO.:	TRU0721.007

# ACUTE CERIODAPHNIA SURVIVAL BIOASSAY

% Survival = 15 % Survival in 3.0 ul/l Sample

EC50 = 1.765 ul/l

Yours very truly,

Scott Johnson Laboratory Director

# **CETIS Summary Report**

 Report Date:
 21 Jul-21 15:07 (p 1 of 1)

 Test Code/ID:
 TRU0721.007acer / 09-4100-3530

											1.00 0000
Ceriodaphnia	96-h Acute Surv	vival Test						Aquatio	: Bioassay & C	Consulting	Labs, Inc.
Batch ID: Start Date: Ending Date: Test Length:	00-9683-5858 07 Jul-21 15:01 11 Jul-21 14:15 95h	Test Ty Protoco Species Taxon:	ol: El s: C	urvival (96h) PA/821/R-02-( eriodaphnia di ranchiopoda	Anal Dilue Brine Sour	ent: L e: N	aboratory Wate ot Applicable quatic Biosyste		Age:		
Receipt Date:	16-7326-1851 01 Jul-21 11:30 01 Jul-21 11:30 6d 4h (11 °C)	Code: Materia CAS (P Client:	ul: Sa C):	RU0721.007a ample Water russell Techno	Proje Sour Stati	rce: B	ioassay Repor ake Matthew R		th Tec QZ		
Single Comp	arison Summary			_							
Analysis ID	Endpoint		ompar	ison Method			P-Value	Compa	rison Result		5
	96h Survival Rat			ny-One Rank	Sum Test		0.0105		ailed 96h surviv	val rate	- F
Point Estimat	e Summary										
Analysis ID	Endpoint	P	oint Es	stimate Metho	bd	$\checkmark$	Level	µL/L	95% LCL	95% UCL	
00-7855-5265	96h Survival Rat	e Li	near In	terpolation (IC	CPIN)		EC10 EC15 EC20 EC25 EC40 EC50	0.3529 0.5294 0.7059 0.8824 1.412 1.765	0.2682 0.4024 0.5365 0.6706 1.073 1.341	0.4739 0.7109 0.9479 1.185 1.896 2.37	
Test Acceptal	bility					TAC L	imits				
Analysis ID	Endpoint	A	ttribute	e	Test Stat	Lower	Upper	Overla	p Decision		
	96h Survival Rat 96h Survival Rat		ontrol F ontrol F	-	1	0.9 0.9	>>	Yes Yes	Passes C Passes C		
96h Survival I	Rate Summary				-						
Conc-µL/L	Code	Count M	ean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	D	4 1.	0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000		0.00%
3			.1500	-0.1547	0.4547	0.0000	0.4000	0.0957	0.1915	127.66%	85.00%
8.35			.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
16.7		4 0.	.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		100.00%
96h Survival I	Rate Detail						MD	5: 1FDA7	7366E4C07920	C7290D2E	2907677A
Conc-µL/L	Code		ep 2	Rep 3	Rep 4						
0	D		.0000	1.0000	1.0000						
3			.0000	0.0000	0.2000						
8.35			.0000	0.0000	0.0000						
16.7		0.0000 0.	.0000	0.0000	0.0000		_				
96h Survival I	Rate Binomials										
Conc-µL/L	Code	-	ep 2	Rep 3	Rep 4						_
0	D	5/5 5/		5/5	5/5						
		2/5 0/	'5	0/5	1/5						
3 8.35 16.7		0/5 0/ 0/5 0/	'5	0/5 0/5	0/5 0/5						

Analyst:\_\_\_\_\_QA:\_\_\_\_M35

 Report Date:
 21 Jul-21 15:07 (p 1 of 2)

 Test Code/ID:
 TRU0721.007acer / 09-4100-3530

Ceriodaphnia	96-h Acute Surv	vival Test									Aquatio	c Bio	assay & (	Consulting	Labs, Ind
Analysis ID:	12-0540-3137	End	point:	96h Su	rvival Ra	te				CETI	S Versio	on:	CETISv1	.9.7	
Analyzed:	20 Jul-21 15:16	Ana	alysis:	Nonpar	rametric-	Control vs	Tr	eatments		Statu	us Level:		1		
Edit Date:	20 Jul-21 15:16	MD	5 Hash:	1FDA7	366E4C0	792CC72	90	D2E29076	77A	Edito	or ID:		000-189-	126-0	
Batch ID:	00-9683-5858	Tes	t Type:	Surviva	al (96h)					Anal	yst:				
Start Date:	07 Jul-21 15:01		tocol:			)12 (2002	)			Dilue		.abora	atory Wate	er	
Ending Date:	11 Jul-21 14:15	Spe	cies:	Cerioda	aphnia du	ubia				Brine	e: N	lot Ap	oplicable		
Test Length:		-	on:	Branch	iopoda					Sour			ic Biosyst	ems, CO	Age:
Sample ID:	16-7326-1851	Cod	de:	TRU07	21.007a	cer				Proje	ect:				
Sample Date:	01 Jul-21 11:30	Mat	erial:	Sample	e Water					Sour		Bioass	say Repor	t	
Receipt Date:	01 Jul-21 11:30	CAS	S (PC):							Stati	on: L	ake I	Matthew F	Raw with Ear	th Tec Q
-	6d 4h (11 °C)	Clie		Trussel	ll Techno	logies									
Data Transfor	m	Alt Hyp						Comparis	on R	esult					PMSD
Angular (Corre	ected)	C > T						3µL/L faile	ed 96h	n survi	val rate e	endpo	int		18.13%
Steel Many-O	ne Rank Sum Te	est	_				-								
Control	vs Conc-µL/		Test	Stat Cr	ritical	Ties [	)F	P-Type	P-V	alue	Decisi	on(α:	5%)		
Dilution Water			10	12	2	0 6		CDF	0.01		Signific				
Test Acceptal	bility Criteria	TACL	imite												
Attribute	Test Stat		Uppe	r Ov	verlap	Decisio	n								
Control Resp	1	0.9	>>	Ye		Passes	_	teria				~			
ANOVA Table														_	
Source	Sum Squa	ares	Mean	Square	)	DF		F Stat	P-V	alue	Decisi		-		
Between	1.78769		1.787			1		73.46	0.00	001	Signific	cant E	Effect		
Error	0.146007		0.024	3345		6	_								
Total	1.9337					7									
ANOVA Assu	mptions Tests														
Attribute	Test					Test Sta	t	Critical	P-V	alue	Decisi				
Variance	Levene Ec	quality of Va	ariance -	Test		14.93		13.75	0.00	083	Unequ	al Va	riances		
	Mod Lever	ne Equality	of Varia	nce Tes	st	9.95		13.75	0.01	197	Equal V	Varia	nces		
	Variance F	Ratio F Tes	t								Indeter				
Distribution		Darling A2				0.7003		3.878	0.06				ribution		
	•	ov-Smirnov				0.25		0.3313	0.15				ribution		
	Shapiro-W	/ilk W Norm	nality Te	st		0.8543	_	0.6451	0.10	052	Norma	l Dist	ribution		_
96h Survival	Rate Summary														
Conc-µL/L	Code	Count	Mean		5% LCL	95% UC	_	Median	Min		Max		Std Err	CV%	%Effect
0	D	4	1.000		0000	1.0000		1.0000	1.00		1.0000		0.0000	0.00%	0.00%
3		4	0.150		0000	0.4547		0.1000	0.00		0.4000		0.0957	127.66%	85.00%
8.35		4	0.000		0000	0.0000		0.0000	0.00		0.0000		0.0000		100.00%
16.7		4	0.000	0 0.	0000	0.0000		0.0000	0.00	000	0.0000		0.0000		100.00%
Angular (Corr	rected) Transform	med Sumn	nary												
Conc-µL/L	Code	Count	Mean		5% LCL	95% UC	-	Median	Min		Мах		Std Err	CV%	%Effect
0	D	4	1.345		3450	1.3460		1.3450	1.34		1.3450		0.0000	0.00%	0.00%
3		4	0.399		0488	0.7509		0.3446	0.22		0.6847		0.1103	55.17%	70.28%
8.35		4	0.225		2255	0.2256		0.2255	0.22		0.2255		0.0000	0.00%	83.24%
16.7		4	0.225	5 0.:	2255	0.2256	_	0.2255	0.22	255	0.2255		0.0000	0.00%	83.24%
96h Survival I	Rate Detail														
					ep 3	Rep 4									

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	D	1.0000	1.0000	1.0000	1.0000	
3		0.4000	0.0000	0.0000	0.2000	
8.35		0.0000	0.0000	0.0000	0.0000	
16.7		0.0000	0.0000	0.0000	0.0000	

Analyst:\_

QA: P

Report Date: Test Code/ID:

Aquatic Bioassay & Consulting Labs, Inc.

21 Jul-21 15:07 (p 2 of 2) TRU0721.007acer / 09-4100-3530

Ceriodaphnia	96-h	Acute	Survival	Test
Genouapinna	30-11	Acute	ourvivar	reat

Analysis ID:	12-0540-3137	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7
Analyzed:	20 Jul-21 15:16	Analysis:	Nonparametric-Control vs Treatments	Status Level:	1
Edit Date:	20 Jul-21 15:16	MD5 Hash:	1FDA7366E4C0792CC7290D2E2907677A	Editor ID:	000-189-126-0

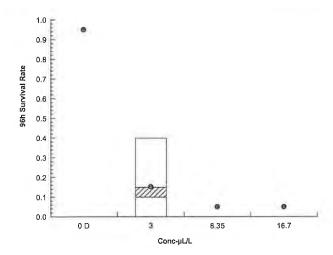
### Angular (Corrected) Transformed Detail

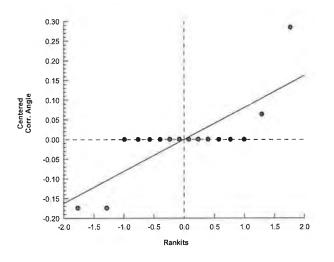
Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4	
0	D	1.3450	1.3450	1.3450	1.3450	
3		0.6847	0.2255	0.2255	0.4636	
8.35		0.2255	0.2255	0.2255	0.2255	
16.7		0.2255	0.2255	0.2255	0.2255	

### 96h Survival Rate Binomials

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
3		2/5	0/5	0/5	1/5
8.35		0/5	0/5	0/5	0/5
16.7		0/5	0/5	0/5	0/5

Graphics





Var P Analyst:\_

 Report Date:
 21 Jul-21 15:07 (p 1 of 2)

 Test Code/ID:
 TRU0721.007acer / 09-4100-3530

0/20

0/20

100.00%

100.00%

0.0000

0.0000

100.00%

100.00%

Ceriodaphnia 96-h Acute Survival Test Aquatic Bioassay & Consulting Labs, Inc. Analysis ID: 00-7855-5265 Endpoint: 96h Survival Rate **CETIS Version:** CETISv1.9.7 Analyzed: 20 Jul-21 15:16 Analysis: Linear Interpolation (ICPIN) Status Level: 1 Edit Date: 20 Jul-21 15:16 MD5 Hash: 1FDA7366E4C0792CC7290D2E2907677A Editor ID: 000-189-126-0 Batch ID: 00-9683-5858 Test Type: Survival (96h) Analyst: Start Date: 07 Jul-21 15:01 Protocol: EPA/821/R-02-012 (2002) Diluent: Laboratory Water Ending Date: 11 Jul-21 14:15 Species: Ceriodaphnia dubia Brine: Not Applicable Branchiopoda Aquatic Biosystems, CO Test Length: 95h Taxon: Source: Age: Sample ID: 16-7326-1851 Code: TRU0721.007acer Project: Sample Date: 01 Jul-21 11:30 Material: Sample Water Source: **Bioassay Report** Receipt Date: 01 Jul-21 11:30 CAS (PC): Station: Lake Matthew Raw with Earth Tec QZ Sample Age: 6d 4h (11 °C) Client: Trussell Technologies **Linear Interpolation Options** X Transform Y Transform Resamples Exp 95% CL Method Seed 280 0 Two-Point Interpolation Linear Linear Yes **Test Acceptability Criteria** TAC Limits Attribute Test Stat Lower Overlap Decision Upper Control Resp 0.9 >> Yes Passes Criteria 1 **Point Estimates**  $\mu L/L$ 95% UCL Level 95% LCL 0.2682 EC10 0.3529 0.4739 EC15 0.5294 0.4024 0.7109 EC20 0.7059 0.5365 0.9479 EC25 0.8824 0.6706 1.185 EC40 1.412 1.073 1.896 1.765 2.37 EC50 1.341 Calculated Variate(A/B) **Isotonic Variate** 96h Survival Rate Summary Median Min Max CV% %Effect A/B Mean %Effect Conc-µL/L Code Count Mean 0.00% 0.00% 20/20 1.0000 0.00% 0 D 4 1.0000 1.0000 1.0000 1.0000 3/20 0.1500 85.00% 3 4 0.1500 0.1000 0.0000 0.4000 127.66% 85.00%

### 96h Survival Rate Detail

8.35

16.7

4

4

0.0000

0.0000

0.0000

0.0000

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
3		0.4000	0.0000	0.0000	0.2000
8.35		0.0000	0.0000	0.0000	0.0000
16.7		0.0000	0.0000	0.0000	0.0000

0.0000

0.0000

0.0000

0.0000

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### 96h Survival Rate Binomials

Conc-µL/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
3		2/5	0/5	0/5	1/5
8.35		0/5	0/5	0/5	0/5
16.7		0/5	0/5	0/5	0/5

QA: Analyst:

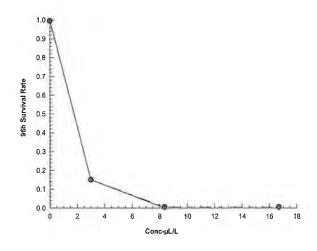
CETIS	Analytical	Report
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 Report Date:
 21 Jul-21 15:07 (p 2 of 2)

 Test Code/ID:
 TRU0721.007acer / 09-4100-3530

Ceriodaphnia	a 96-h Acute Surviva	al Test		Aquatic Bi	oassay & Consulting Labs, Inc.
Analysis ID:	00-7855-5265	Endpoint:	96h Survival Rate	CETIS Version:	CETISv1.9.7
Analyzed:	20 Jul-21 15:16	Analysis:	Linear Interpolation (ICPIN)	Status Level:	1
Edit Date:	20 Jul-21 15:16	MD5 Hash:	1FDA7366E4C0792CC7290D2E2907677A	Editor ID:	000-189-126-0

Graphics



~\_\_\_\_\_ ( Analyst:\_\_\_

 Report Date:
 21 Jul-21 15:07 (p 1 of 3)

 Test Code/ID:
 TRU0721.007acer / 09-4100-3530

Ceriodaphnia	96-h Acute Sur	vival T	est					Aquat	ic Bioassay &	Consulting	g Labs, Inc.
Batch ID: Start Date: Ending Date: Test Length:	00-9683-5858 07 Jul-21 15:01 11 Jul-21 14:15 95h		Test Type: Protocol: Species: Taxon:	Survival (96h) EPA/821/R-02 Ceriodaphnia o Branchiopoda	. ,			Brine:	Laboratory Wa Not Applicable Aquatic Biosys		Age:
Receipt Date:	16-7326-1851 01 Jul-21 11:30 01 Jul-21 11:30 6d 4h (11 °C)		Code: Material: CAS (PC): Client:	TRU0721.007a Sample Water Trussell Techr					Bioassay Repo Lake Matthew I		arth Tec QZ
Alkalinity (Ca	CO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Count
0	D	3	123	123	123	123	123	0	0	0.00%	0
16.7		3	129	129	129	129	129	0	0	0.00%	0
Overall		6	126	122.6	129.4	123	129	1.342	3.286	2.61%	0 (0%)
Conductivity-	umhos										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Er	r Std Dev	CV%	QA Count
0	D	3	1009	1002	1016	1007	1012			0.26%	0
3	_	3	1011	1008	1014	1010	1012			0.11%	0
8.35		3	1005	996	1014	1001	1008		3.606	0.36%	0
16.7		3	1012	1011	1014	1012	1013		0.5774	0.06%	0
Overall		12	1009	1007	1011	1001	1013	1.001	3.467	0.34%	0 (0%)
Dissolved Ox	vaen-ma/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Er	r Std Dev	CV%	QA Count
0	D	3	7.9	6.586	9.214	7.3	8.3	0.1764		6.70%	0
3	-	3	7.933	6.929	8.937	7.5	8.3	0.1347		5.09%	0
8.35		3	7.9	6.817	8.983	7.4	8.2	0.1453	0.4359	5.52%	0
16.7		3	7.867	6.832	8.901	7.4	8.2	0.1388	0.4163	5.29%	0
Overall		12	7.9	7.656	8.144	7.3	8.3	0.1108	0.3838	4.86%	0 (0%)
Hardness (Ca	CO3)-mg/L										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Count
0	D	3	295	295	295	295	295	0	0	0.00%	0
16.7		3	330	330	330	330	330	0	0	0.00%	0
Overall		6	312.5	292.4	332.6	295	330	7.826	19.17	6.13%	0 (0%)
pH-Units											
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Er	r Std Dev	CV%	QA Count
0	D	3	7.667	7.38	7.954	7.6	7.8	0.0384		1.51%	0
3		3	7.7	7.452	7.948	7.6	7.8	0.0333	3 0.1	1.30%	0
8.35		3	7.633	7.49	7.777	7.6	7.7	0.0192	4 0.05773	0.76%	0
16.7		3	7.633	7.49	7.777	7.6	7.7	0.0192	4 0.05773	0.76%	0
Overall		12	7.658	7.608	7.709	7.6	7.8	0.0228	9 0.0793	1.04%	0 (0%)
Temperature-	°C										
Conc-µL/L	Code	Count	Mean	95% LCL	95% UCL	Min	Мах	Std Er	r Std Dev	CV%	QA Count
0	D	3	24.1	23.85	24.35	24	24.2	0.0333		0.41%	0
3		3	24.1	23.85	24.35	24	24.2	0.0333	0.09989	0.41%	0
8.35		3	24.1	23.85	24.35	24	24.2	0.0333	0.09989	0.41%	0
16.7		3	24.1	23.85	24.35	24	24.2	0.0333	0.09989	0.41%	0
Overall		12	24.1	24.05	24.15	24	24.2	0.0246	2 0.08528	0.35%	0 (0%)

~\_\_\_\_\_QA:\_\_\_\_ Analyst:

Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		123					
16.7				129					
0	D	2		123					
16.7				129					
0	D	3		123					
16.7	5	U		129					
Conductivity-µ	mhos			120					
Conc-µL/L	Code	Read	Time	Measure	~	Diff-%	Inst ID	Analyst	Netes
0	D	1	Time	1012	QA	DIII-%	Instit	Analysi	Notes
3	D			1012					
8.35				1008					
16.7				1012					
0	D	2		1007					
3	-	-		1010					
8.35				1006					
16.7				1012					
0	D	3		1008					
3				1012					
8.35				1001					
16.7				1013					
Dissolved Oxy	gen-mg/L								
Conc-µL/L	Code	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
0	D	1		8.3					
3				8.3					
8.35				8.2					
16.7				8.2					
0	D	2		8.1					
3				8					
8.35				8.1					
16.7				8					
0	D	3		7.3					
3				7.5					
8.35				7.4					
16.7				7.4					
	:03)-mg/L								
Hardness (CaC	0-4-	Read	Time	Measure	QA	Diff-%	Inst ID	Analyst	Notes
Hardness (CaC Conc-µL/L	Code			295					
<b>Conc-µL/L</b> 0	D	1							
Conc-µL/L		1		330					
<b>Conc-μL/L</b> 0 16.7 0		2		295					
<b>Сопс-µL/L</b> 0 16.7	D								
<b>Conc-μL/L</b> 0 16.7 0	D			295					

Mai P Analyst:\_

 Report Date:
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Ceriodaphnia 96-h Acute Survival Test

Aquatic Bioassay & Consulting Labs, Inc.

pH-Units									
Conc-µL/L	Code	Read	Time	Measure QA	A Diff-%	Inst ID	Analyst	Notes	
0	D	1		7.6					
3				7.6					
8.35				7.6					
16.7				7.6					
0	D	2		7.6					
3				7.7					
8.35				7.6					
16.7				7.6					
0	D	3		7.8					
3				7.8					
8.35				7.7					
16.7				7.7					

### Temperature-°C

Conc-µL/L	Code	Read	Time	Measure QA Diff-% Inst ID Analyst Notes
0	D	1		24.2
3				24.2
8.35				24.2
16.7				24.2
0	D	2		24.1
3				24.1
8.35				24.1
16.7				24.1
0	D	3		24
3				24
8.35				24
16.7				24

Analyst: \_\_\_\_\_\_QA:\_\_\_\_\_

EN, 100 No. Date: Time: Date: Time: Comments b 2 0 wer man 707 50 È Analysis ç 11 Temp. upon sample receipt: Relinquised By:(signature) eg. Received By: (signature) Normer Number Nu 1 ġ M P1 m 3 1250 ml 11:30 15 Sul 105 GI 711/21 1130 Date: Time: Date: Time: David Hokan Son Andrew ILudaharleo (626) 390-3638 Project Mgr. 1202/1/2 Lake Matthews Row Weymouth WTP Enfl Project Name/Number: 3 Sampled By (signature) Sample ID FachTec P.O.# Technologne S Matrix Sound Lywa Nich Ma 91101 232 N. Lake hur 390 - 3638 Grab 2 Relinquised By:(signature) C.4 duoo Received By: (signature) 11:30 Time 11:30 Phone Number: Pasadeza. Trussell Address (626) Date Client: 7/1/21 7/1/21

CHAIN OF CUSTODY RECORD

Aquatic Bioassay and Consulting Laboratories 29 N. Olive Street Ventura, CA 93001 Phone: (805) 643-5621 Fax: (805) 643-2930

### SAFETY DATA SHEET According to OSHA Hazard Communication Standard 29 CFR 1910.1200 (GHS)

#### EARTH SCIENCE LABORATORIES, INC.

113 SE 22<sup>nd</sup> Street, Suite 105 Rogers, AR 72756 earthsciencelabs.com

Emergency Phone Number: 1-800-535-5053 (Infotrac) Information Phone Number: 1-800-962-1492

Material Name: EarthTec QZ™

Page: 1 of 4 Issue Date: 01/14 Revision Date: 01/2020

#### Section 1 – IDENTIFICATION

Product Name: EarthTec QZ™

EPA Reg. No. 64962-1

Manufactured by: Earth Science Laboratories, Inc. 903 N 47<sup>th</sup> St., Suite 105 Rogers, AR 72756

Certified to: NSF/ANSI Standard 60. Do not exceed 19 mg/L.

#### Section 2 -HAZARDS IDENTIFICATION

NFPA HMIS III: Health = 2, Fire = 0, Reactivity = 1 H2///F0/PH1

GHS Signal Word: Warning GHS Hazard Pictograms:



GHS Classifications: Physical, Corrosive to Metals, 1 Health, Acute Toxicity, 4 Oral Health, Harmful if absorbed through skin. Avoid contact with skin, 2 Health, Causes substantial but temporary eye injury. Do not get in eyes, 2 Environmental, Hazards to the aquatic environment - Chronic, 1

#### **GHS Phrases:**

- H290 May be corrosive to metal
- H302 Harmful if swallowed
- H315 Causes skin irritation
- H319 Causes serious eye irritation
- H410 Very toxic to aquatic life with long lasting effects

#### **GHS Precautionary Statements:**

- P102 Keep out of reach of children.
- P233 Keep container tightly closed.
- P262 Do not get in eyes, on skin or clothing.
- P264 Wash skin thoroughly after handling.
- P270 Do not eat, drink or smoke when handling this product.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P281 Use personal protective equipment as required.
- P301+310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- P301+330+331 IF SWALLOWED: Rinse mouth. DO NOT induce vomiting.
- P303+361+353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing.
- Rinse skin with water/shower.
- P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P305+351+338 – IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if
- present and easy to do. Continue rinsing.
- P403+233 Store in a well ventilated place. Keep container tightly closed
- P501 Dispose of contents /container according to State and Federal laws.

### Section 3 - COMPOSITION/INFORMATION ON INGREDIENT

Components	CAS#	OSHA PEL	ACGIH TLV	<sup>6</sup> /0
Copper sulfate pentahydrate	7758-99-8	1mg/m <sup>3</sup>	1mg/m <sup>3</sup>	18.25-21.75%

#### Section 4 - FIRST AID MEASURES

If in Eyes: Hold eye open and rinse slowly and gently with water for 20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for advice.

If on Skin or Clothing: Take off contaminated clothing. Rinse skin immediately with plenty of soap and water for 15 to 20 minutes. Call a poison control center or doctor for treatment.

If Swallowed: Call a poison control center or doctor immediately for treatment advice. Have a person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything to an unconscious person.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact INFOTRAC 1-800-535-5053 for emergency treatment.

#### Section 5 - FIRE FIGHTING MEASURES

 Flash Point: N/E
 UFL: N/E
 LFL: N/E

 Hazardous Combustion Products: May react with high carbon metals to produce hydrogen gas, which can form an explosive mixture.
 Fire Fighting Equipment/Instructions: Firefighters must wear MSHA/NIOSH approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

NFPA Ratings:	Fire: 0	Health: 2	Reactivity: 1	Other: X
HMIS III Ratings:	Fire: 0	Health: 2	Reactivity: 1	Personal Protection: X

#### Section 6 - ACCIDENTAL RELEASE MEASURES

Containment Procedures: Flush with water into retaining area or container. Caution should be exercised regarding personal safety and exposure to released product.

Clean-Up Procedures: Neutralize solution with bicarbonate of soda.

Evacuation Procedures: Keep unnecessary people away; isolate hazard area and deny entry.

Special Instructions: Notify local authorities and the National Response Center, if required.

#### Section 7-HANDLING AND STORAGE

Application and Handling Equipment: Application, handling or storage equipment MUST consist of fiberglass, PVC, polypropylene, viton, corrosion resistant plastics or stainless steel. Never use mild steel, nylon, brass or copper around product. Always rinse and clean equipment thoroughly each night with plenty of fresh, clean water.

Storage: Store in a safe place away from pets and keep out of the reach of children. Store away from excessive heat. Product will freeze. Always store product above 32 degrees F (Do Not Freeze). Freezing may cause product separation. Always keep container closed. Keep away from galvanized pipe, and any nylon storage or handling equipment.

#### Section 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

#### **Personal Protective Equipment (PPE)**

Mixers, loaders, applicators and other handlers must wear the following: long-sleeved shirt, long pants, shoes plus socks, chemical-resistant gloves made of any water proof material (Chemical Resistance Category A), and protective eyewear.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been drenched or heavily contaminated with the product's concentrate. Do not reuse them.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear blue liquid Physical State: Liquid pH: 0.2/0.3 Vapor Pressure: 0.1mm 68° F Boiling Point: 220° F Melting Point: N/A Odor: Minimal odor Vapor Density (Air=1): 1.0 Evaporation Rate: N/A Solubility in Water: Complete Specific Gravity (H20=1): 1.188 +/- 0.05

#### Section 10 - STABILITY AND REACTIVITY

Chemical Stability: Stable. Conditions to Avoid: Avoid mixing with strong bases and strong reducing agents. Incompatibility: Incompatible with strong bases and strong reducing agents. Hazardous Decomposition Products: Sulfur dioxide and sulfur trioxide may be produced with decomposition. Hazardous Polymerization: Will not occur.

### Section 11 - TOXICOLOGICAL INFORMATION

Acute Toxicity / Chronic Toxicity: Continued overexposure to this solution may cause systemic toxicity. Carcinogenicity: N/A Signs and Symptoms of Exposure: Overexposure may cause the following specific symptoms, depending on the concentration and duration of exposure: vomiting, shallow respiration and lung function changes.

#### Section 12 - ECOLOGICAL INFORMATION

Waters treated with this product may be hazardous to aquatic organisms.

#### Section 13 - DISPOSAL CONSIDERATIONS

Pesticide wastes are acutely hazardous. Improper disposal of excess product mixture or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your state pesticide or environmental control agency, or the hazardous waste representative at the nearest EPA regional office for guidance. In the event of spill, neutralize with limestone or baking soda before disposal. May deteriorate concrete.

### Section 14 - TRANSPORT INFORMATION

DOT Information Proper Shipping Name: Corrosive liquid, acidic, inorganic, n.o.s., (contains cupric sulfate) Hazard Class: 8 UN/NA #: UN3264 Packing Group: III

• Packages that contain more than 5.1 US gallons are RQ (reportable quantity)

- Packages that contain less than 4.0 liters could be ORM-D
- The proper shipping information is the responsibility of the shipper and this information is only guidelines.
- •

### Section 15 - REGULATORY INFORMATION

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for Safety Data Sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

WARNING Causes substantial but temporary eye injury. Harmful if swallowed. Harmful if absorbed through skin.

#### Section 16 - OTHER INFORMATION

Date of Last Revision: January 2020

The information set forth berein is furnished free of charge and is based on technical data that Earth Science Laboratories, Inc. believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of the information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.