

Aqua Survey, Inc.

FINAL REPORT

PLANIT SAFE 3X3-5000 AR-AFFF SURROGATE TEST LIQUID ACUTE EFFECTS ON THE KILLIFISH, *FUNDULUS HETEROCLITUS*

STUDY # 36-037

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**PLANIT SAFE 3X3-5000
AR-AFFF SURROGATE TEST LIQUID
ACUTE EFFECTS ON THE
KILLIFISH, *FUNDULUS HETEROCLITUS***

METHOD USED

ASTM E 729 — 96

AUTHOR

York Terrell

STUDY COMPLETION DATE

April 25, 2016

PERFORMING LABORATORY

**Aqua Survey, Inc.
469 Point Breeze Road
Flemington, New Jersey 08822**

SPONSOR

**Vector Fire Technology Inc.
47 Sarahs Way
Coatesville, PA 19320**

LABORATORY PROJECT ID

STUDY # 36-037

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**PLANIT SAFE 3X3-5000 AR-AFFF SURROGATE TEST LIQUID
ACUTE EFFECTS ON THE KILLIFISH, *FUNDULUS HETEROCLITUS***

I. EXECUTIVE SUMMARY

The acute toxicity of the test substance, PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid to the killifish, *Fundulus heteroclitus*, was determined in a 96-hour, flow-through, aquatic effect test.

This test is designed to test a 6% FFF material using the killifish test organism. For a 6% FFF material, it is desired to have the LC₅₀ to be greater than 1,000 ppm. It turns out that we did not test a 6% concentration of the Planit Safe AFFF material, but a 100% concentration of this material. Our test concentrations were made at 4,000, 2,000, 1,000, 500 and 250 mg/L based on the assumption that the Planit Safe material as tested was a 6% concentration. Since the material as tested was actually 100% concentration of this material, the actual equivalent concentrations of a 6% concentration were 66,667, 33,333, 16,667, 8,333 and 4,167 mg/L.

A total of 20 killifish were exposed to each of five test substance concentrations. The test was performed in replicates of two (10 organisms per replicate). Exposure concentrations used throughout this report and in all endpoint calculations are the nominal concentrations of the total product. Replicate test results were pooled.

Killifish used for this test were actively feeding juveniles. The test had organisms with an average weight and length of 1.21 ± 0.18 g and 48 ± 2.1 mm, respectively. Water used as diluent was Manasquan seawater with a salinity of 15 ± 2 ppt. The test temperature was 22 ± 2 °C. The dissolved oxygen was maintained above 5.0 ppm via aeration.

The 96 hour LC₅₀ value for the PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid for the killifish, *Fundulus heteroclitus*, was determined to be >66,637 mg/L (6% solution), and the NOEC to be 66,667 mg/L (6% solution).

These study results indicate that an isolated or intermittent exposure to a concentration of PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid equal to or less than 66,667 mg/L (6% solution) is not likely to have an adverse effect on the killifish, *Fundulus heteroclitus*.

It should be noted that toxicity values might vary with different species, temperature and water qualities.

II. INTRODUCTION

Juvenile killifish were exposed to five concentrations of the test substance, PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid in a 96-hour, flow-through, aquatic effects test in order to permit a more accurate and complete assessment of its environmental impact. Test substance solutions were prepared through the addition of an appropriate aliquot of test substance stock solution to diluent water in the test vessels. Test solutions were delivered to test vessels via a proportional dilutor system. All exposure solutions were prepared in replicates of two. The killifish, *Fundulus heteroclitus*, was chosen for this test based on its ecological importance as a representative saltwater fish which can be reared within the laboratory. The objectives of the test were:

- 1) To determine if acute exposure to concentrations of the test substances would adversely affect the killifish; and,
- 2) If appropriate, provide an estimate of the 96-hour LC₅₀ value.

In this test, the killifish were observed for signs of stress, as well as mortality, when exposed to the test substance. For the purpose of calculating or estimating a 96-hour LC₅₀ value, mortality would serve as the requisite endpoint. The study results may be used to determine the likelihood of an adverse effect if the test substance enters a saltwater environment.

III. TEST ADMINISTRATION

A. Sponsor

Vector Fire Technology Inc.
47 Sarahs Way
Coatesville, PA 19320

B. Testing Facility

Aqua Survey, Inc.
469 Point Breeze Road
Flemington, NJ 08822

C. Dates of Experiment

Date of Study Initiation:	3/2/16
Date of Chemical Exposure:	3/13/16 – 3/17/16
Date of Study Completion:	April 25, 2016

D. Study Participants

Cheryl Hall
York Terrell
Michelle Thomas
Jon Doi, Ph.D.

Quality Assurance Officer
Study Director
Laboratory Manager
Executive Vice President

IV. TEST AND CONTROL SUBSTANCES

A. Test Substance

A 6% FFF test material solution is typically furnished for use in this test. In this case, a 100% solution was received and tested. The substance was received in a 1000 mL Nalgene bottle and identified as PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid. The test substance used for this test was supplied by the sponsor and received by this laboratory on March 2, 2016 and assigned ASI sample ID number 20160219. The MSDS (Material Safety Data Sheet) is provided in Appendix B.

B. Control Substance(s)

Negative Control: Diluent Water

V. MATERIALS AND METHODS

A. Test System

The killifish, *Fundulus heteroclitus*, was used for this test. The following taxonomic characterization applies to *Fundulus heteroclitus*:

Phylum - Chordata
Class - Osteichthyes
Order - Cyprinodontiformes
Family - Cyprinodontidae
Genus - *Fundulus*
Species – *heteroclitus*

B. Source of Organism

The killifish, *Fundulus heteroclitus*, used in this test were obtained from Aquatic Research Organisms, One Lafayette Road, Hampton, NH 03842. The organisms for the test were received by this laboratory on October 15, 2015 and assigned culture receiving log #35-021.

C. Source of Dilution Water

The water used for testing was Manasquan seawater adjusted to 15 ± 2 ppt using DI water. A complete summary of chemical characterization of reagent grade water used to prepare the dilution water is presented in Appendix A.

D. Acclimation Procedure

All killifish were held at test conditions prior to testing. The same supply of laboratory water was used as the source of test diluent water for the duration of the test.

E. Diet

Food used to maintain organisms for these tests was Trout Chow obtained from ABS, Fort Collins, CO and TetraMin flake food from Tetra Holding (US), Inc., Blacksburg, VA.

F. Characterization of Age and Size

Killifish used for this test were actively feeding juveniles. The test had organisms with an average weight and length of 1.21 ± 0.18 g and 48 ± 2.1 mm, respectively.

G. Collection of Organisms for Testing

Fish of relatively uniform size were collected and transferred, using a net, from the holding tanks to 1.0-liter polypropylene containers containing approximately 0.5 liters of diluent water. Sequential randomization was accomplished by allocating to each container no more than 20 percent of any one set of test organisms at a time. Fish were then transferred from the container to the test vessels by pouring the contents of the container (water and fish) through a net and rapidly transferring the fish from the net to the test vessel. Holding water was discarded.

H. Apparatus and Test Conditions

This acute aquatic effect test was performed in 9.0 L glass containers, each containing 3.0 L of exposure solution.

A modified Mount and Brungs proportional dilutor system was employed to deliver five test substance concentrations and a diluent water control to duplicate test vessels.

A flow-splitting chamber was used between the dilutor cells and test vessel for each concentration to promote mixing of the test substance and diluent water.

The dilutor system was calibrated prior to test initiation and daily thereafter.

The light/dark cycle of the photoperiod was 16 hours on/8 hours off with two 30-minute transition periods. Test temperature was at 22 ± 2 °C.

I. Preparation of Test Solutions

A 4,000 mg/L stock solution of the 100% concentrate, which is the equivalent of 66,667 mg/L of a 6% solution, was prepared by adding an appropriate amount of test substance per liter in diluent water. The appropriate amount of the test material was put into the dilution container and stirred vigorously with a mechanical stirrer for at least 15 minutes. The 4000 mg/L stock solution of the test substance in diluent water apparently exceeded the solubility limit as undissolved particles were observed in the stock solution. Fresh stock solutions were prepared daily.

A modified Mount and Brungs proportional dilutor system was employed to deliver five test substance concentrations and a diluent water control to duplicate test vessels. Nominal test substance exposure concentrations of 4,167, 8,333, 16,667, 33,333 and 66,667 mg/L of 6% test material were delivered to test vessels by adding appropriate volumes of the stock solution (i.e., 63, 125, 250, 500, and 1,000 ml, respectively), in a total volume of 1 L (using diluent water where appropriate). It should be noted that all concentrations exceeded the apparent solubility limit in diluent water as undissolved particles were observed in all test vessels throughout the test. A flow-splitting chamber was used between the dilutor cells and test vessel for each concentration to promote mixing of the test substance and diluent water. A 0.5-L portion of test solution was delivered to each replicate test vessel at approximately 40-minute intervals.

The flow of test solution through each vessel was a minimum of five (5) replacement volumes every 24-hours.

J. Test Procedures

The procedures used in this test were based on accepted methodologies¹⁻⁷. Observations for mortality and signs of stress were made during the test at 24, 48, 72 and 96 hours. Temperature, dissolved oxygen (D.O.), salinity and pH were measured at 0, 24, 48, 72 and 96 hours in each concentration. In addition, temperature was measured continuously (hourly) in one test vessel during the entire study.

Daily water quality measurements were made using a YSI Model 600 multiparameter probe and data logger. Continuous temperature measurements were made using a HOBO Water Temp Pro [H20-001].

The test was started when ten test organisms were placed into each of two replicate exposure vessels for each test substance concentration and control. All exposures were 96-hour flow through.

K. LC₅₀ Determinations

When appropriate, a computer program developed by Tidepool Scientific Software and Michael A. Ives is used to compute a point and interval (i.e. confidence interval) estimate of the LC₅₀. The program requires the following data: the concentration of the test substance; the number of organisms exposed; and the number of organisms that died.

VI. TEST RESULTS

Water quality parameters are summarized in Table 1. Mortality and LC₅₀ value are summarized in Table 2. Clinical observations are summarized in Table 3. Raw data for biological effects and water quality parameters are provided in Appendix C.

VII. TEST VALIDITY

The following criteria for a valid test were evaluated during the study:

- A. Control organism survival was 100%. Control survival is recommended to be greater than 90% for an acceptable test.
- B. The dissolved oxygen level did not fall below 5.0 ppm.
- C. No abnormal occurrences (i.e., laboratory accidents) that might have influenced the outcome of the test were noted.

VIII. DISCUSSION

Nominal test concentrations of 4,167, 8,333, 16,667, 33,333 and 66,667 mg/L of a 6% solution of test material were used for this test.

The temperature remained at 22 ± 2 °C when measured in test vessels at 0, 24, 48, 72 and 96 hours. The extremes were 20.9 and 22.3 °C, while the extremes for

The temperature remained at 22 ± 2 °C when measured in test vessels at 0, 24, 48, 72 and 96 hours. The extremes were 20.9 and 22.3 °C, while the extremes for dissolved oxygen and pH measured at the same time intervals were 7.2 & 8.1 mg/L and 7.5 & 7.8 standard units, respectively. The salinity was maintained at 15 ± 2 ppt for the duration of the test. These values are considered to be acceptable for the organisms used in this test¹⁻⁷ and are not likely to have caused any adverse effects. It should also be noted that test vessels were aerated in order to maintain dissolved oxygen above 5.0 mg/L.

After 96 hours of exposure, no mortality was observed in all test concentrations. There was no mortality observed in the diluent water control.

The 96 hour LC₅₀ value for the killifish, *Fundulus heteroclitus*, was determined to be >66,667 mg/L of a 6% solution of test material, PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid. The NOEC value was determined to be 66,667 mg/l of a 6% solution of test material.

IX. CONCLUSIONS

These study results indicate that an isolated or intermittent exposure to a concentration of PLANIT SAFE 3X3-5000 AR-AFFF Surrogate Test Liquid equal to or less than 66,667 mg/L of a 6% solution of test material is not likely to have an adverse effect on the killifish, *Fundulus heteroclitus*.

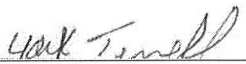
This test is designed to test a 6% FFF material using the killifish test organism. For a 6% FFF material, it is desired to have the LC₅₀ to be greater than 1,000 ppm. It turns out that we did not test a 6% concentration of the Planit Safe AFFF material, but a 100% concentration of this material. Our test concentrations were made at 4,000, 2,000, 1,000, 500 and 250 mg/L based on the assumption that the Planit Safe material as tested was a 6% concentration. Since the material as tested was actually 100% concentration of this material, the actual concentrations of a 6% concentration was 66,667, 33,333, 16,667, 8,333 and 4,167 mg/L. As there was no toxicity at any of these test concentrations, we can say that a 6% concentration of Planit Safe AFFF material has an LC₅₀ greater than 66,667 mg/L, which is much higher than the desired LC₅₀ of greater than 1,000 ppm. It should be noted that toxicity values might vary with different species, temperature and water qualities.

X. REFERENCES

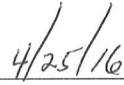
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SIGNATURE PAGE

**PLANIT SAFE 3X3-5000 AR-AFFF SURROGATE TEST LIQUID
ACUTE EFFECTS ON THE KILLIFISH, *FUNDULUS HETEROCLITUS***



York Terrell
Study Director



Date

TABLE 1

**PLANIT SAFE 3X3-5000 AR-AFFF Surrogate test liquid Acute Effects
on the Killifish, *Fundulus heteroclitus***

WATER QUALITY PARAMETERS

Parameter	Time Interval (hour)	Nominal Concentration (mg/L)					
		DWC	4,167	8,333	16,667	33,333	66,667
Dissolved Oxygen (mg/L)	0	8.0	8.0	8.0	8.0	8.1	7.8
	24	7.2	7.4	7.5	7.6	7.5	7.4
	48	7.4	7.4	7.5	7.5	7.5	7.4
	72	7.5	7.6	7.7	7.7	7.7	7.6
	96	7.4	7.5	7.7	7.7	7.7	7.7
PH (Standard Units)	0	7.8	7.8	7.7	7.8	7.8	7.7
	24	7.7	7.7	7.7	7.7	7.7	7.6
	48	7.6	7.7	7.7	7.7	7.7	7.7
	72	7.5	7.6	7.7	7.7	7.7	7.7
	96	7.5	7.6	7.7	7.7	7.7	7.7
Temperature (°C)	0	21.0	20.9	21.0	21.0	21.0	21.0
	24	21.3	21.4	21.4	21.4	21.5	21.5
	48	21.4	21.4	21.4	21.4	21.5	21.6
	72	21.8	21.9	21.9	21.9	21.9	22.0
	96	22.2	22.2	22.2	22.2	22.3	22.3
Salinity (ppt)	0	15.2	15.3	15.2	15.2	15.2	15.2
	24	15.5	15.5	15.5	15.5	15.4	15.4
	48	15.2	15.3	15.3	15.3	15.4	15.5
	72	15.3	15.2	15.2	15.2	15.2	15.3
	96	15.4	15.4	15.4	15.4	15.4	15.4

DWC = Diluent Water Control

TABLE 2

**PLANIT SAFE 3X3-5000 AR-AFFF Surrogate test liquid Acute Effects
on the Killifish, *Fundulus heteroclitus***

PERCENT MORTALITIES AND LC₅₀ VALUES

PERCENT MORTALITY

Time Intervals (hours)	Nominal Concentration (mg/L)					
	DWC	4,167	8,333	16,667	33,333	66,667
24	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)
48	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)
72	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)
96	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)	0% (0/20)

DWC = Dilution Water Control

LC₅₀ VALUES (mg/L)

LC ₅₀ mg/L		24 hours +	48 hours +	72 hours +	96 hours +
		>66,667	>66,667	>66,667	>66,667
95% Confidence Limits	Low	N/A	N/A	N/A	N/A
	High	N/A	N/A	N/A	N/A

+ = Determined by visual inspection of data

TABLE 3

**PLANIT SAFE 3X3-5000 AR-AFFF Surrogate test liquid Acute Effects
on the Killifish, *Fundulus heteroclitus***

CLINICAL OBSERVATIONS

Observations Interval (hours)	Nominal Concentration (mg/L)					
	DWC	4,167	8,333	16,667	33,333	66,667
24	N	N	N	N	N	N
	N	N	N	N	N	N
48	N	N	N	N	N	N
	N	N	N	N	N	N
72	N	N	N	N	N	N
	N	N	N	N	N	N
96	N	N	N	N	N	N
	N	N	N	N	N	N

DWC = Diluent Water Control

N = Normal

Behavior

QU = Quiescent
HY = Hyper excitable
SF = Surfacing
SD = Sounding
SP = Spasmodic

Swimming

SE = Erratic
GY = Gyrating
SI = Inverted
SS = On Side
SC = Ceased

Integument

MS = Mucus Shedding
MC = Mucus
Coagulation
HM = Hemorrhagic

Pigmentation

LD = Light Discolored
DD = Dark Discolored

Respiration

RS = Slow
RR = Rapid
RI = Irregular
RL = Labor
GA = Gulping Air

APPENDIX A

**PLANIT SAFE 3X3-5000 AR-AFFF SURROGATE TEST LIQUID AFFF
ACUTE EFFECTS ON THE KILLIFISH, *FUNDULUS HETEROCLITUS***

WATER CHARACTERIZATION

ANALYTICAL RESULTS

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

Aqua Survey, Inc.
469 Point Breeze Road
Flemington NJ 08822

June 03, 2015

Project: In House Water AnalysisSubmittal Date: 05/12/2015
Group Number: 1560489
PO Number: RMF121713
State of Sample Origin: NJClient Sample Description2015 0426 (DI H2O) Grab Water Sample
2015 0427 (Manasquan H2O) Grab Salt Water SampleLancaster Labs (LL) #7884089
7884090

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our scopes of accreditation can be viewed at <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>.

ELECTRONIC Aqua Survey, Inc.
COPY TO
1 COPY TO Aqua Survey, Inc.

Attn: Joanna Hunt

Attn: Jon Doi

Respectfully Submitted,

Barbara A. Weyandt
Specialist

(717) 556-7264

Project Name: In House Water Analysis
LL Group #: 1560489

General Comments:

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below. Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:**EPA 608, Pesticides/PCBs****Sample #s: 7884090**

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken:
The sample was re-extracted outside the method required holding time and the QC is compliant. All results are reported from the first trial. Similar results were obtained in both trials with the exception that endosulfan I was detected in the reextract at a concentration of .047 ug/l.

Sample #s: 7884089

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken:
The sample was re-extracted outside the method required holding time and the QC is compliant. All results are reported from the first trial. Similar results were obtained in both trials.

Batch #: 151380003A (Sample number(s): 7884089-7884090)

The relative percent difference(s) for the following analyte(s) in the LCS/LCSD were outside acceptance windows: Alpha BHC

The recovery(ies) for one or more surrogates were outside of the QC window for sample(s) 7884089, 7884090, LCSD

Batch #: 151380004A (Sample number(s): 7884089)

The recovery(ies) for the following analyte(s) in the LCS and/or LCSD exceeded the acceptance window indicating a positive bias: PCB-1016, PCB-1260

The recovery(ies) for one or more surrogates were outside of the QC window for sample(s) LCS, LCSD

EPA 218.6, Wet Chemistry

Sample #s: 7884089, 7884090

The holding time was not met. The client was notified and the data reported.

SM 5310 C-2000, Wet Chemistry

Batch #: 15135049501B (Sample number(s): 7884089 UNSPK: P882154 BKG: P882154)

The duplicate RPD for the following analyte(s) exceeded the acceptance window:
Total Organic Carbon

Sample Description: 2015 0426 (DI H2O) Grab Water Sample
Annual Saltwater/DI water analysis

LL Sample # WW 7884089
LL Group # 1560489
Account # 06988

Project Name: In House Water Analysis

Collected: 05/12/2015 09:00

Aqua Survey, Inc.

Submitted: 05/12/2015 15:15

469 Point Breeze Road

Reported: 06/03/2015 06:57

Flemington NJ 08822

426DI

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Pesticides/PCBs		EPA 608	ug/l	ug/l	ug/l	
07572	Aldrin	309-00-2	< 0.0017	0.0017	0.0086	1
07572	Alpha BHC	319-84-6	< 0.0028	0.0028	0.0086	1
07572	Beta BHC	319-85-7	< 0.0042	0.0042	0.0086	1
07572	Gamma BHC - Lindane	58-89-9	< 0.0022	0.0022	0.0086	1
07572	Alpha Chlordane	5103-71-9	< 0.0022	0.0022	0.0086	1
07572	Chlordane	57-74-9	< 0.069	0.069	0.43	1
07572	Gamma Chlordane	5103-74-2	< 0.0036	0.0036	0.0086	1
07572	o,p-DDD	53-19-0	< 0.0043	0.0043	0.017	1
07572	p,p-DDD	72-54-8	< 0.0046	0.0046	0.017	1
07572	o,p-DDE	3424-82-6	< 0.0060	0.0060	0.017	1
07572	p,p-DDE	72-55-9	< 0.0043	0.0043	0.017	1
07572	o,p-DDT	789-02-6	< 0.0044	0.0044	0.017	1
07572	p,p-DDT	50-29-3	< 0.0045	0.0045	0.017	1
07572	Delta BHC	319-86-8	< 0.0033	0.0033	0.0086	1
07572	Dieldrin	60-57-1	< 0.0044	0.0044	0.017	1
07572	Endosulfan I	959-98-8	< 0.0044	0.0044	0.0086	1
07572	Endosulfan II	33213-65-9	< 0.0095	0.0095	0.017	1
07572	Endosulfan Sulfate	1031-07-8	< 0.0043	0.0043	0.017	1
07572	Endrin	72-20-8	< 0.0060	0.0060	0.017	1
07572	Endrin Aldehyde	7421-93-4	< 0.017	0.017	0.086	1
07572	Endrin Ketone	53494-70-5	< 0.0043	0.0043	0.017	1
07572	HCB	118-74-1	< 0.0026	0.0026	0.0086	1
07572	Heptachlor	76-44-8	< 0.0022	0.0022	0.0086	1
07572	Heptachlor Epoxide	1024-57-3	< 0.0022	0.0022	0.0086	1
07572	Methoxychlor	72-43-5	< 0.043	0.043	0.086	1
07572	Mirex	2385-85-5	< 0.0086	0.0086	0.043	1
06030	PCB-1016	12674-11-2	< 0.086	0.086	0.43	1
06030	PCB-1221	11104-28-2	< 0.086	0.086	0.43	1
06030	PCB-1232	11141-16-5	< 0.086	0.086	0.43	1
06030	PCB-1242	53469-21-9	< 0.086	0.086	0.43	1
06030	PCB-1248	12672-29-6	< 0.086	0.086	0.43	1
06030	PCB-1254	11097-69-1	< 0.086	0.086	0.43	1
06030	PCB-1260	11096-82-5	< 0.13	0.13	0.43	1
06030	Total PCBs	1336-36-3	< 0.086	0.086	0.43	1
07572	Telodrin	297-78-9	< 0.0017	0.0017	0.0086	1
07572	Toxaphene	8001-35-2	< 0.26	0.26	0.86	1

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken:
The sample was re-extracted outside the method required holding time and the QC is compliant. All results are reported from the first trial. Similar results were obtained in both trials.

Metals		EPA 200.8 rev 5.4	mg/l	mg/l	mg/l	
06025	Arsenic	7440-38-2	< 0.00082	0.00082	0.0020	1
06028	Cadmium	7440-43-9	< 0.00017	0.00017	0.00050	1
06033	Copper	7440-50-8	< 0.00050	0.00050	0.0020	1
06035	Lead	7439-92-1	< 0.000082	0.000082	0.0010	1
06039	Nickel	7440-02-0	< 0.00079	0.00079	0.0020	1
06042	Silver	7440-22-4	< 0.00013	0.00013	0.00050	1

*=This limit was used in the evaluation of the final result

Sample Description: 2015 0426 (DI H2O) Grab Water Sample
Annual Saltwater/DI water analysis

LL Sample # WW 7884089
LL Group # 1560489
Account # 06988

Project Name: In House Water Analysis

Collected: 05/12/2015 09:00

Aqua Survey, Inc.

Submitted: 05/12/2015 15:15

469 Point Breeze Road

Reported: 06/03/2015 06:57

Flemington NJ 08822

426DI

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Metals						
00259	Mercury	EPA 245.1 rev 3 7439-97-6	mg/l < 0.000050	mg/l 0.000050	mg/l 0.00020	1
Wet Chemistry						
12868	Hexavalent Chromium	EPA 218.6 18540-29-9	ug/l < 0.015	ug/l 0.015	ug/l 0.050	1
The holding time was not met. The client was notified and the data reported.						
01504	Fluoride	EPA 300.0 16984-48-8	mg/l < 0.050	mg/l 0.050	mg/l 0.10	1
00273	Total Organic Carbon	SM 5310 C-2000 n.a.	mg/l < 0.50	mg/l 0.50	mg/l 1.0	1
00203	Total Solids	SM 2540 B-1997 n.a.	mg/l < 12.0	mg/l 12.0	mg/l 40.0	1
00240	Chlorine Residual (DPD)	SM 4500-CL F-2000 n.a.	mg/l < 0.040	mg/l 0.040	mg/l 0.10	1
The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.						
12152	pH	SM 4500-H+ B-2000 n.a.	Std. Units 6.0	Std. Units 0.010	Std. Units 0.010	1
The 40 CFR Part 136 requires that this analysis be performed immediately (within 15 minutes) upon sample collection. Because this was not possible, the result may not be used for reporting purposes.						
Microbiology						
00307	Heterotrophic Plate Count	SM 9215 B-1994 n.a.	cfu/ml 87	cfu/ml 1	cfu/ml 1	n.a.

General Sample Comments

State of New Jersey Lab Certification No. PA011

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06030	PCBs in Water by 608	EPA 608	1	151380004A	05/19/2015 09:35	Monica M Souders	1
07572	Pesticides in Water by 608	EPA 608	1	151380003A	05/19/2015 22:50	Lisa A Reinert	1
11960	Method 608 PCB Water Ext.	EPA 608	1	151380004A	05/18/2015 15:00	Seth A Farrier	1

*=This limit was used in the evaluation of the final result

Sample Description: 2015 0426 (DI H2O) Grab Water Sample
Annual Saltwater/DI water analysis

LL Sample # WW 7884089
LL Group # 1560489
Account # 06988

Project Name: In House Water Analysis

Collected: 05/12/2015 09:00

Aqua Survey, Inc.

Submitted: 05/12/2015 15:15

469 Point Breeze Road

Reported: 06/03/2015 06:57

Flemington NJ 08822

426DI

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10241	Method 608 Water Extraction	EPA 608	1	151380003A	05/18/2015 15:00	Seth A Farrier	1
06025	Arsenic	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:40	Choon Y Tian	1
06028	Cadmium	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:40	Choon Y Tian	1
06033	Copper	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:40	Choon Y Tian	1
06035	Lead	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:40	Choon Y Tian	1
06039	Nickel	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:40	Choon Y Tian	1
06042	Silver	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:40	Choon Y Tian	1
00259	Mercury	EPA 245.1 rev 3	1	151345714003	05/18/2015 08:27	Damary Valentin	1
07050	ICP/MS EPA-600 Digest	EPA 200.8 rev 5.4	1	151347050004	05/15/2015 08:30	Christopher M Klumpp	1
05714	PW/WW Hg Digest	EPA 245.1 rev 3	1	151345714003	05/15/2015 09:50	Christopher M Klumpp	1
12868	Hexavalent Chromium	EPA 218.6	1	15139987141A	05/19/2015 14:10	Clinton M Wilson	1
01504	Fluoride	EPA 300.0	1	15135667151A	05/15/2015 21:46	Drew M Gerhart	1
00273	Total Organic Carbon	SM 5310 C-2000	1	15135049501B	05/15/2015 12:20	James S Mathiot	1
00203	Total Solids	SM 2540 B-1997	1	15133020301A	05/13/2015 12:27	Susan A Engle	1
00240	Chlorine Residual (DPD)	SM 4500-CL F-2000	1	15134024001A	05/14/2015 19:00	Daniel S Smith	1
12152	pH	SM 4500-H+ B-2000	1	15133002201A	05/13/2015 13:38	Michele L Graham	1
00307	Heterotrophic Plate Count	SM 9215 B-1994	1	051215HLCB	05/15/2015 11:36	Hannah L Cottman	n.a.

*=This limit was used in the evaluation of the final result

Sample Description: 2015 0427 (Manasquan H2O) Grab Salt Water Sample
Annual Saltwater/DI water analysis

LL Sample # WW 7884090
LL Group # 1560489
Account # 06988

Project Name: In House Water Analysis

Collected: 05/12/2015 10:25

Aqua Survey, Inc.

Submitted: 05/12/2015 15:15

469 Point Breeze Road

Reported: 06/03/2015 06:57

Flemington NJ 08822

427MS

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Pesticides/PCBs		EPA 608	ug/l	ug/l	ug/l	
07572	Aldrin	309-00-2	< 0.0017	0.0017	0.0085	1
07572	Alpha BHC	319-84-6	< 0.0027	0.0027	0.0085	1
07572	Beta BHC	319-85-7	< 0.0042	0.0042	0.0085	1
07572	Gamma BHC - Lindane	58-89-9	< 0.0021	0.0021	0.0085	1
07572	Alpha Chlordane	5103-71-9	< 0.0021	0.0021	0.0085	1
07572	Chlordane	57-74-9	< 0.068	0.068	0.42	1
07572	Gamma Chlordane	5103-74-2	< 0.0036	0.0036	0.0085	1
07572	o,p-DDD	53-19-0	< 0.0042	0.0042	0.017	1
07572	p,p-DDD	72-54-8	< 0.0045	0.0045	0.017	1
07572	o,p-DDE	3424-82-6	< 0.0059	0.0059	0.017	1
07572	p,p-DDE	72-55-9	< 0.0042	0.0042	0.017	1
07572	o,p-DDT	789-02-6	< 0.0043	0.0043	0.017	1
07572	p,p-DDT	50-29-3	< 0.0044	0.0044	0.017	1
07572	Delta BHC	319-86-8	< 0.0032	0.0032	0.0085	1
07572	Dieldrin	60-57-1	< 0.0043	0.0043	0.017	1
07572	Endosulfan I	959-98-8	< 0.0043	0.0043	0.0085	1
07572	Endosulfan II	33213-65-9	< 0.0093	0.0093	0.017	1
07572	Endosulfan Sulfate	1031-07-8	< 0.0042	0.0042	0.017	1
07572	Endrin	72-20-8	< 0.0059	0.0059	0.017	1
07572	Endrin Aldehyde	7421-93-4	< 0.017	0.017	0.085	1
07572	Endrin Ketone	53494-70-5	< 0.0042	0.0042	0.017	1
07572	HCB	118-74-1	< 0.0025	0.0025	0.0085	1
07572	Heptachlor	76-44-8	< 0.0022	0.0022	0.0085	1
07572	Heptachlor Epoxide	1024-57-3	< 0.0022	0.0022	0.0085	1
07572	Methoxychlor	72-43-5	< 0.042	0.042	0.085	1
07572	Mirex	2385-85-5	< 0.0085	0.0085	0.042	1
07572	Telodrin	297-78-9	< 0.0017	0.0017	0.0085	1
07572	Toxaphene	8001-35-2	< 0.25	0.25	0.85	1

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. The following corrective action was taken:
The sample was re-extracted outside the method required holding time and the QC is compliant. All results are reported from the first trial. Similar results were obtained in both trials with the exception that endosulfan I was detected in the reextract at a concentration of .047 ug/l.

Metals		EPA 200.8 rev 5.4	mg/l	mg/l	mg/l	
06028	Cadmium	7440-43-9	0.00024 J	0.00017	0.00050	1
06033	Copper	7440-50-8	0.0013 J	0.00050	0.0020	1
06035	Lead	7439-92-1	0.00037 J	0.000082	0.0010	1
06039	Nickel	7440-02-0	0.0017 J	0.00079	0.0020	1
06042	Silver	7440-22-4	< 0.00013	0.00013	0.00050	1
06049	Zinc	7440-66-6	0.0068 J	0.0024	0.0150	1

		EPA 245.1 rev 3	mg/l	mg/l	mg/l	
00259	Mercury	7439-97-6	< 0.000050	0.000050	0.00020	1

Wet Chemistry		EPA 218.6	ug/l	ug/l	ug/l	
06467	Hexavalent Chromium	18540-29-9	< 5.0	5.0	10.0	1

*=This limit was used in the evaluation of the final result

Sample Description: 2015 0427 (Manasquan H2O) Grab Salt Water Sample
Annual Saltwater/DI water analysis

LL Sample # WW 7884090
LL Group # 1560489
Account # 06988

Project Name: In House Water Analysis

Collected: 05/12/2015 10:25

Aqua Survey, Inc.

Submitted: 05/12/2015 15:15

469 Point Breeze Road

Reported: 06/03/2015 06:57

Flemington NJ 08822

427MS

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit*	Limit of Quantitation	Dilution Factor
Wet Chemistry		EPA 218.6	ug/l	ug/l	ug/l	
	The holding time was not met. The client was notified and the data reported.					
12868	Hexavalent Chromium	18540-29-9	< 0.015	0.015	0.050	1
	The holding time was not met. The client was notified and the data reported.					

General Sample Comments

State of New Jersey Lab Certification No. PA011

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07572	Pesticides in Water by 608	EPA 608	1	151380003A	05/19/2015 23:03	Lisa A Reinert	1
10241	Method 608 Water Extraction	EPA 608	1	151380003A	05/18/2015 15:00	Seth A Farrier	1
06028	Cadmium	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:42	Choon Y Tian	1
06033	Copper	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:42	Choon Y Tian	1
06035	Lead	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:42	Choon Y Tian	1
06039	Nickel	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:42	Choon Y Tian	1
06042	Silver	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:42	Choon Y Tian	1
06049	Zinc	EPA 200.8 rev 5.4	1	151347050004A	05/19/2015 14:42	Choon Y Tian	1
00259	Mercury	EPA 245.1 rev 3	1	151345714003	05/18/2015 08:37	Damary Valentin	1
07050	ICP/MS EPA-600 Digest	EPA 200.8 rev 5.4	1	151347050004	05/15/2015 08:30	Christopher M Klumpp	1
05714	PW/WW Hg Digest	EPA 245.1 rev 3	1	151345714003	05/15/2015 09:50	Christopher M Klumpp	1
06467	Hexavalent Chromium	EPA 218.6	2	15140987301A	05/20/2015 15:10	Clinton M Wilson	1
12868	Hexavalent Chromium	EPA 218.6	1	15139987141A	05/19/2015 14:30	Clinton M Wilson	1

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Aqua Survey, Inc.
Reported: 06/03/2015 06:57

Group Number: 1560489

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

<u>Analysis Name</u>	<u>Blank Result</u>	<u>Blank MDL**</u>	<u>Blank LOQ</u>	<u>Report Units</u>	<u>LCS %REC</u>	<u>LCSD %REC</u>	<u>LCS/LCSD Limits</u>	<u>RPD</u>	<u>RPD Max</u>
Batch number: 151380003A	Sample number(s): 7884089-7884090								
Aldrin	< 0.0016	0.0016	0.0080	ug/l	74	59	42-122	23	30
Alpha BHC	< 0.0026	0.0026	0.0080	ug/l	96	63	55-134	41*	30
Beta BHC	< 0.0039	0.0039	0.0080	ug/l	91	80	57-141	12	30
Gamma BHC - Lindane	< 0.0020	0.0020	0.0080	ug/l	92	74	58-127	22	30
Alpha Chlordane	< 0.0020	0.0020	0.0080	ug/l	91	86	54-135	6	30
Chlordane	< 0.064	0.064	0.40	ug/l					
Gamma Chlordane	< 0.0034	0.0034	0.0080	ug/l	93	88	53-138	6	30
o,p-DDD	< 0.0040	0.0040	0.016	ug/l					
p,p-DDD	< 0.0042	0.0042	0.016	ug/l	89	87	52-141	3	30
o,p-DDE	< 0.0056	0.0056	0.016	ug/l					
p,p-DDE	< 0.0040	0.0040	0.016	ug/l	88	84	49-144	5	30
o,p-DDT	< 0.0041	0.0041	0.016	ug/l					
p,p-DDT	< 0.0042	0.0042	0.016	ug/l	66	65	51-142	1	30
Delta BHC	< 0.0030	0.0030	0.0080	ug/l	94	87	55-141	8	30
Dieldrin	< 0.0041	0.0041	0.016	ug/l	90	85	58-133	6	30
Endosulfan I	< 0.0041	0.0041	0.0080	ug/l	83	78	50-126	6	30
Endosulfan II	< 0.0088	0.0088	0.016	ug/l	88	85	55-132	3	30
Endosulfan Sulfate	< 0.0040	0.0040	0.016	ug/l	88	87	54-139	1	30
Endrin	< 0.0056	0.0056	0.016	ug/l	65	79	35-143	20	30
Endrin Aldehyde	< 0.016	0.016	0.080	ug/l	91	81	50-131	12	30
Endrin Ketone	< 0.0040	0.0040	0.016	ug/l	90	80	50-143	12	30
HCB	< 0.0024	0.0024	0.0080	ug/l					
Heptachlor	< 0.0021	0.0021	0.0080	ug/l	80	63	38-111	25	30
Heptachlor Epoxide	< 0.0021	0.0021	0.0080	ug/l	91	84	56-140	8	30
Methoxychlor	< 0.040	0.040	0.080	ug/l	68	68	49-148	1	20
Mirex	< 0.0080	0.0080	0.040	ug/l					
Telodrin	< 0.0016	0.0016	0.0080	ug/l					
Toxaphene	< 0.24	0.24	0.80	ug/l					
Batch number: 151380004A	Sample number(s): 7884089								
PCB-1016	< 0.080	0.080	0.40	ug/l	123*	98	60-117	22	30
PCB-1221	< 0.080	0.080	0.40	ug/l					
PCB-1232	< 0.080	0.080	0.40	ug/l					
PCB-1242	< 0.080	0.080	0.40	ug/l					
PCB-1248	< 0.080	0.080	0.40	ug/l					
PCB-1254	< 0.080	0.080	0.40	ug/l					
PCB-1260	< 0.12	0.12	0.40	ug/l	128*	101	64-127	23	30
Total PCBs	< 0.080	0.080	0.40	ug/l					
Batch number: 151345714003	Sample number(s): 7884089-7884090								
Mercury	< 0.000050	0.00005	0.00020	mg/l	107		85-115		

*- Outside of specification

** - This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Aqua Survey, Inc.

Group Number: 1560489

Reported: 06/03/2015 06:57

<u>Analysis Name</u>	<u>Blank Result</u>	<u>Blank MDL**</u>	<u>Blank LOQ</u>	<u>Report Units</u>	<u>LCS %REC</u>	<u>LCSD %REC</u>	<u>LCS/LCSD Limits</u>	<u>RPD</u>	<u>RPD Max</u>
Batch number: 151347050004A	Sample number(s): 7884089-7884090								
Arsenic	< 0.00082	0.00082	0.0020	mg/l	102		85-115		
Cadmium	< 0.00017	0.00017	0.00050	mg/l	99		85-115		
Copper	< 0.00050	0.00050	0.0020	mg/l	96		85-115		
Lead	< 0.00082	0.00008	0.0010	mg/l	101		85-115		
Nickel	< 0.00079	0.00079	0.0020	mg/l	101		85-115		
Silver	< 0.00013	0.00013	0.00050	mg/l	101		85-115		
Zinc	< 0.0024	0.0024	0.0150	mg/l	103		85-115		
Batch number: 15135049501B	Sample number(s): 7884089								
Total Organic Carbon	< 0.50	0.50	1.0	mg/l	102		91-113		
Batch number: 15135667151A	Sample number(s): 7884089								
Fluoride	< 0.050	0.050	0.10	mg/l	99		90-110		
Batch number: 15139987141A	Sample number(s): 7884089-7884090								
Hexavalent Chromium	< 0.015	0.015	0.050	ug/l	102	101	90-110	1	20
Batch number: 15140987301A	Sample number(s): 7884090								
Hexavalent Chromium	< 5.0	5.0	10.0	ug/l	102		90-110		
Batch number: 15133002201A	Sample number(s): 7884089								
pH					99		95-105		
Batch number: 15133020301A	Sample number(s): 7884089								
Total Solids	< 12.0	12.0	40.0	mg/l	97		90-114		
Batch number: 15134024001A	Sample number(s): 7884089								
Chlorine Residual (DPD)	< 0.040	0.040	0.10	mg/l	99	99	95-105	0	3

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Background (BKG) = the sample used in conjunction with the duplicate

<u>Analysis Name</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>MS/MSD Limits</u>	<u>RPD</u>	<u>RPD MAX</u>	<u>BKG Conc</u>	<u>DUP Conc</u>	<u>DUP RPD</u>	<u>Dup RPD Max</u>
Batch number: 151345714003	Sample number(s): 7884089-7884090 UNSPK: 7884089 BKG: 7884089								
Mercury	107		80-120			< 0.000050	< 0.000050	0 (1)	20
Batch number: 151347050004A	Sample number(s): 7884089-7884090 UNSPK: P886265 BKG: P886265								
Arsenic	101		70-130			< 0.00082	< 0.00082	0 (1)	20
Cadmium	102		70-130			0.00061	0.00064	4 (1)	20
Copper	98		70-130			0.0023	0.0024	3 (1)	20
Lead	101		70-130			< 0.000082	< 0.000082	0 (1)	20
Nickel	103		70-130			0.0125	0.0131	5	20
Silver	101		70-130			< 0.00013	< 0.00013	0 (1)	20
Zinc	103		70-130			0.0577	0.0575	0 (1)	20
Batch number: 15135049501B	Sample number(s): 7884089 UNSPK: P882154 BKG: P882154								
Total Organic Carbon	106		63-142			1.2	1.4	12* (1)	4

*- Outside of specification

** - This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Aqua Survey, Inc.
Reported: 06/03/2015 06:57

Group Number: 1560489

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 15135667151A Fluoride	107		90-110	UNSPK: P889510	BKG: P889510	< 0.25	< 0.25	0 (1)	20
Batch number: 15139987141A Hexavalent Chromium	101		90-110	UNSPK: 7884089	BKG: 7884089	< 0.015	< 0.015	0 (1)	20
Batch number: 15140987301A Hexavalent Chromium	104	104	90-110	0	2	< 5.0	< 5.0	0 (1)	20
Batch number: 15133002201A pH				UNSPK: P895167	BKG: P895167	7.4	7.5	1	3
Batch number: 15133020301A Total Solids	91		90-114	UNSPK: P878971	BKG: P878971	2,540	2,580	1	5
Batch number: 15134024001A Chlorine Residual (DPD)				UNSPK: P886461	BKG: P886461	1.1	1.1	2	4

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: Pesticides in Water by 608
Batch number: 151380003A

	Tetrachloro-m-xylene	Decachlorobiphenyl
7884089	13*	66
7884090	20*	76
Blank	87	51
LCS	83	47
LCSD	30*	33
Limits:	39-138	32-149

Analysis Name: PCBs in Water by 608
Batch number: 151380004A

	Tetrachloro-m-xylene	Decachlorobiphenyl
7884089	95	69
Blank	91	50
LCS	112	26*
LCSD	89	21*
Limits:	49-141	36-153

*- Outside of specification

** - This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.

The following information is provided for your reference. It is not intended to be a substitute for the information provided in the actual document.

Acct. # 6988 For Eurofins Lancaster Laboratories Environmental use only
Group # 1560489 Sample # 7884089-90
Instructions on reverse side correspond with circled numbers.

Eurofins Lancaster Laboratories Environmental, LLC • 2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300
The white copy should accompany samples to Eurofins Lancaster Laboratories Environmental. The yellow copy should be retained by the client.

Client: Aqua Survey**Delivery and Receipt Information**

Delivery Method:	<u>ELLE Courier</u>	Arrival Timestamp:	<u>05/12/2015 15:15</u>
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>NJ</u>		

Arrival Condition Summary

Shipping Container Sealed:	No	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	No	Sample Date/Times match COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace \geq 6mm:	N/A
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	0
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Patrick Engle (3472) at 16:11 on 05/12/2015***Samples Chilled Details***Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.*

<u>Cooler #</u>	<u>Thermometer ID</u>	<u>Corrected Temp</u>	<u>Therm. Type</u>	<u>Ice Type</u>	<u>Ice Present?</u>	<u>Ice Container</u>	<u>Elevated Temp?</u>
1	DT121	0.7	DT	Wet	Y	Loose	N

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	BMQL	Below Minimum Quantitation Level
N.D.	none detected	MPN	Most Probable Number
TNTC	Too Numerous To Count	CP Units	cobalt-chloroplatinate units
IU	International Units	NTU	nephelometric turbidity units
umhos/cm	micromhos/cm	ng	nanogram(s)
C	degrees Celsius	F	degrees Fahrenheit
meq	milliequivalents	lb.	pound(s)
g	gram(s)	kg	kilogram(s)
µg	microgram(s)	mg	milligram(s)
mL	milliliter(s)	L	liter(s)
m3	cubic meter(s)	µL	microliter(s)
		pg/L	picogram/liter
<	less than		
>	greater than		
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
ppb	parts per billion		
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

Laboratory Data Qualifiers:

- B - Analyte detected in the blank
- C - Result confirmed by reanalysis
- E - Concentration exceeds the calibration range
- J (or G, I, X) - estimated value \geq the Method Detection Limit (MDL or DL) and the $<$ Limit of Quantitation (LOQ or RL)
- P - Concentration difference between the primary and confirmation column $>40\%$. The lower result is reported.
- U - Analyte was not detected at the value indicated
- V - Concentration difference between the primary and confirmation column $>100\%$. The reporting limit is raised due to this disparity and evident interference...

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, ISO17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

APPENDIX B

**PLANIT SAFE 3X3-5000 AR-AFFF SURROGATE TEST LIQUID AFFF
ACUTE EFFECTS ON THE KILLIFISH, *FUNDULUS HETEROCLITUS***

MSDS



47 Sarahs Way
Coatesville, PA 19320
Phone: 610-466-1717
Fax: 610-466-1718
www.vectorfire.net

MATERIAL SAFETY DATA SHEET #MS3X3

***PLANIT SAFE*™ 3 X 3 (XG) TEST LIQUID**

Test Liquid Concentrate

Section 1. CHEMICAL PRODUCT/ COMPANY IDENTIFICATION

Material Identification

Product: ***PLANIT SAFE*** 3 x 3 (XG) Test Liquid Concentrate
Synonyms: Test Liquid
CAS No.: Mixture – No single CAS No. applicable

Company Identification

Manufacturer:

Vector Fire Technology, Inc.
47 Sarahs Way
Coatesville, PA 19320

Phone: 610-466-1717
Fax: 610-466-1718

Section 2. COMPOSTION/ INFORMATION OF INGREDIENTS

Components

CAS No.

Water	7732-18-5
Potassium Chloride	7447-40-7
Sodium Benzoate	532-32-1
Xanthan Gum	11138-66-2

Section 3. HAZARDS IDENTIFICATION

Potential Health Effects

Inhalation

Vapors are minimal at room temperature. If product is heated or sprayed as an aerosol, airborne material may cause respiratory irritation.

Skin Contact

Contact with liquid may cause slight irritation or dermatitis due to removal of oils from the skin.

Eye Contact

Contact with liquid may cause eye irritation.

Ingestion

Not a hazard in normal industrial use. Small amounts swallowed during normal handling operations are not likely to cause injury; swallowing large amounts may cause injury or irritation.

Additional Health Effects

Existing eye or skin sensitivity may be aggravated by exposure.

Carcinogenicity Information

No data available.

Section 4. FIRST AID MEASURES

Inhalation

No specific treatment is necessary since this material is not likely to be hazardous by inhalation. If exposed to excessive levels of airborne aerosol mists, remove to fresh air. Seek medical attention if effects occur.

Skin Contact

In case of skin contact, wash off with flowing water or shower. Launder clothing before re-use.

Eye Contact

In case of eye contact, flush eyes promptly with water for 15 minutes. Retract eyelid often to ensure thorough rinsing. Contact physician if irritation persists.

Ingestion

Swallowing less than an ounce is not expected to cause significant harm. For larger amounts do not induce vomiting. Give milk or water. Never administer anything by mouth to an unconscious person. Seek medical attention.

Section 5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point – Not Applicable

Fire and Explosion Hazards

Avoid contact with water reactive materials, burning metals and electrically energized equipment.

Extinguishing Media

Product is not an extinguishing media. Use media appropriate for surrounding materials.

Special Fire Fighting Instructions

None

Section 6. ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (Personnel) sections before proceeding with clean-up. Use appropriate Personal Protective Equipment during clean-up.

Accidental Release Measures

Concentrate or Test Liquid Solution

Stop flow if possible. Dilute with water to meet existing water quality standards. Flush area with water. Exercise caution, surfaces may be slippery. Disposal should be made in accordance with federal, state and local regulations.

Section 7. HANDLING AND STORAGE

Handling (Personnel)

Avoid contact with eyes, skin, or clothing. Avoid ingestion or inhalation. Rinse skin and eyes thoroughly in case of contact. Review HAZARDS and FIRST AID sections.

Storage

Recommended storage environment is between 35°F (2°C) and 120°F (49°C). Store product in original shipping container or tanks designed for product storage.

Section 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Special ventilation is not required.

Personal Protective Equipment

Respiratory

Recommended exposure limits (OSHA-PEL and ACGIH-TLV) have not been determined for this material. The need for respiratory protection is not required.

Protective Clothing

Rubber or PVC gloves recommended.

Eye Protection

Safety glasses, face shield, or chemical splash goggles must be worn when possibility exists for eye contact. Contact lenses should not be worn. Eye wash facilities are recommended.

Other Hygienic Practices

Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing and wash thoroughly before re-use.

Exposure Guidelines

Not Available

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point:	Not applicable
Vapor Pressure:	Not applicable
Vapor Density:	Not applicable
Melting Point:	Not applicable
Evaporation Rate:	<1 (Butyl Acetate= 1.0)
Solubility in Water:	100%
pH:	8.0
Specific Gravity:	1.00 @ 25°C
Odor:	Bland
Form:	Liquid
Color:	Water White

Section 10. STABILITY AND REACTIVITY

Chemical Stability

Stable

Incompatibility, Materials to Avoid

Avoid use of product on burning metals, electrically-energized equipment and contact with water reactive materials.

Polymerization

Will not occur.

Section 11. TOXICOLOGICAL INFORMATION

Mammalian Toxicity

This product has not been tested as a whole for acute oral and inhalation toxicity, primary eye irritation, or primary skin irritation.

Section 12. ECOLOGICAL INFORMATION

Ecotoxicological Information Aquatic Toxicity

No data available.

Environmental Fate (Stated in mg/l)

	As Concentrate	As 3% Solution with Water
BOD ₅	8,320	250
COD	16,900	507

Section 13. DISPOSAL CONSIDERATIONS

PLANIT SAFE 3 x 3 Test Liquid Concentrate, as sold, is not a RCRA- listed waste or hazardous waste as characterized by 40 CFR 261. However, State, and local requirements for waste disposal may be more restrictive or otherwise different from Federal regulations. Proper clean up and disposal of this material into drains, sewers, or waterways is not expected to cause an environmental impact, however, consult with state or local authorities having jurisdiction regarding the proper regulations, requirements, or concerns encompassed within your site disposal plan.

PLANIT SAFE 3 x 3 Test Liquid Concentrate can be treated by waste water treatment facilities. Discharge into biological sewer treatment facilities may be done with prior approval. Specific concerns are high BOD load. Dilution will reduce BOC and COD factors proportionately. Low dosage flow rate to the treatment plant may be helpful. Disposal should be made in accordance with federal, state and local regulations.

Section 14. TRANSPORTATION INFORMATION

Shipping Information

Proper Shipping Name: Not a DOT Hazardous Substance

Hazard Class: Not Regulated

UN Number: None

Section 15. REGULATORY INFORMATION

U.S. Federal Regulations

Toxic Substances Control Act (TSCA)

All components of this product are listed in the TSCA inventory.

Superfund Amendments and Reauthorization Act of 1986 (SARA), Title III

Section 302/304

There are no components of this material with known CAS numbers which are on the Extremely Hazardous Substances (EHS) list.

Section 311 & 312

This material does not contain any components subject to Section 311 & 312 reporting requirements.

Section 313

This material does not contain any components subject to Section 313 reporting requirements.

COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

This material does not contain any components which are subject to the reporting requirements of CERCLA.

OTHER REGULATORY INFORMATION

None

STATE REGULATIONS

PENNSYLVANIA RIGHT-TO-KNOW HAZARDOUS SUBSTANCES LIST

PA Hazardous Substances present at levels greater than 1%:

None

Section 16. OTHER INFORMATION

NFPA Rating

Health 0

Flammability 0

Reactivity 0

ADDITIONAL INFORMATION

Revision Summary

11/22/04 New Issue

The information contained herein is furnished without warranty either expressed or implied. This data sheet is not a part of any contract of sale. The information contained herein is believed to be correct or is obtained from sources believed to be generally reliable. However, it is the responsibility of the user of these materials to investigate, understand, and comply with federal, state and local guidelines and procedures for safe handling and use of these materials. Vector Fire Technology, Inc. shall not be liable for any loss or damage arising directly or indirectly from the use of this product and Vector Fire Technology, Inc. assumes no obligation or liabilities for reliance on the information contained herein or omissions here from.

Nov. 22, 2004 Original Issue Date

APPENDIX C

**PLANIT SAFE 3X3-5000 AR-AFFF SURROGATE TEST LIQUID
ACUTE EFFECTS ON THE KILLIFISH, *FUNDULUS HETEROCLITUS***

BIOLOGICAL EFFECTS AND WATER QUALITIES

AQUA SURVEY, INC.

ACUTE EFFECTS FLOW THROUGH BIOASSAY-DILUTER INFORMATION

Study No. 36-037	Test Substance 20160219	Test System F. heteroclitus	Test Vessels Type glass jars	Exposure Vol. 4 L
Dilutor Prep Date 3/11/16	Pretest Cycles N/A	Pretest Duration N/A	Test Start Date 3/13/16	Test Start time 1040
Test End Date 3/17/17	Test End Time 1040	Test Cycles 166	Test Duration 96 Hrs	Vol./Cycle/Vessel 0.5

Proportion Chambers Calibration

Date	DWC	250 mg/L		500 mg/L		1000 mg/L		2000 mg/L		4000 mg/L	Comments
	DW	DW	SS	DW	SS	DW	SS	DW	SS	SS	
3/13/16	1000 mL	937 mL	63 mL	875 mL	125 mL	750 mL	250 ^{MIL} _{SS}	500 mL	500 mL	1000 mL	4T
3/14/16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4T
3/15/16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4T
3/16/16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	4T

DW = Diluent Water

SS = Stock Solution

Numbers = Calibrated (mL)

✓ = Visual Inspection

DWC = Diluent Water Control

Total Volume (DW+SS) = 1000 mL/Concentration

Splitters Output

Date	DWC		250 mg/L		500 mg/L		1000 mg/L		2000 mg/L		4000 mg/L		Initial/ Comments
	A	B	A	B	A	B	A	B	A	B	A	B	
3/13/16	500	500	500	500	500	500	490	510	510	490	520	480	4T
3/14/16	480	520	500	500	500	500	480	520	500	500	520	480	4T
3/15/16	490	510	500	500	480	520	500	500	490	510	510	490	4T
3/16/16	510	490	520	480	515	485	500	500	510	490	515	485	4T

Comment: Stock Solution: A 4000 mg/L stock solution was prepared daily. 336 grams of test substance was added in a total volume of 84 liters using diluent water. The 4000 mg/L of the test substance in diluent water exceeded its apparent solubility limit as undissolved particles were observed in the stock solution. 4/3/16

AQUA SURVEY, INC

ACUTE EFFECTS TEST-LENGTH AND WEIGHT

Study NO: <i>36-037</i>	Test System: <i>F. heteroclitus</i>	Test Start Date: <i>3/13/16</i>
----------------------------	--	------------------------------------

NO.	Length (mm)	Weight (gm.)	NO.	Length (mm)	Weight (gm.)
1	<i>48</i>	<i>1.09</i>	1		
2	<i>49</i>	<i>1.25</i>	2		
3	<i>46</i>	<i>1.07</i>	3		
4	<i>49</i>	<i>1.14</i>	4		
5	<i>47</i>	<i>1.33</i>	5		
6	<i>45</i>	<i>0.93</i>	6		
7	<i>50</i>	<i>1.30</i>	7		
8	<i>52</i>	<i>1.52</i>	8		
9	<i>48</i>	<i>1.09</i>	9		
10	<i>50</i>	<i>1.38</i>	10		
Mean			Mean		
Date Initials	<i>3/13/16</i> <i>Y</i>	<i>3/13/16</i> <i>YT</i>	Date Initials		

Comments:

AQUA SURVEY, INC

ACUTE EFFECTS TEST-SURVIVAL/MORTALITY-CLINICAL OBSERVATIONS

ASI#	Test Substance:	Test System:	Test Start Date:	Test Start Time:
36-037	20160219	E. heteractis	3/13/16	1040

Conc. (mg/L)	Survival/Mortality-Hours						Clinical Observations-Hours				
	Initial		24	48	72	96		24	48	72	96
DWC A	10		10	10	10	10		N	N	N	N
B	10		10	10	10	10		N	N	N	N
250 A	10		10	10	10	10		N	N	N	N
B	10		10	10	10	10		N	N	N	N
500 A	10		10	10	10	10		N	N	N	N
B	10		10	10	10	10		N	N	N	N
1000 A	10		10	10	10	10		N	N	N	N
B	10		10	10	10	10		N	N	N	N
2000 A	10		10	10	10	10		N	N	N	N
B	10		10	10	10	10		N	N	N	N
4000 A	10		10	10	10	10		N	N	N	N
B	10		10	10	10	10		N	N	N	N
A											
B											
Date	3/13/16		3/14/16	3/15/16	3/16/16	3/17/16		3/14/16	3/15/16	3/16/16	3/17/16
Initials	YT		YT	YT	YT	YT		YT	YT	YT	YT

CLINICAL SIGNS

N = Normal

Behavior	Swimming	Integument	Pigmentation	Respiration
QU = Quiescent	SE = Erratic	MS = Mucus Shedding	LD = Light Discolored	RS = Slow
HY = Hyper excitable	GY = Gyration	MC = Mucus Coagulation	DD = Dark Discolored	RR = Slow
SF = Surfacing	SI = Inverted	HM = Hemorrhagic		RI = Irregular
SD = Sounding	SS = On Side			RL = Labor
SP = Spasmodic	SC = Ceased			GA = Gulping Air

Comments: OF TEST SUBSTANCE D
 All concentrations exceeded it, apparent solubility limit
 in dilute water as undissolved particles was observed in
 all test vessel throughout the test. YT
 all test vessels were aerated. YT

037-0.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	03/13/16 11:04:03	20.98	24990.0	15.25	8.04	7.75
1	03/13/16 11:04:46	20.94	24906.0	15.19	8.03	7.75
2	03/13/16 11:05:17	21.00	24916.0	15.20	7.98	7.74
3	03/13/16 11:05:35	20.99	24910.0	15.19	7.98	7.75
4	03/13/16 11:05:55	21.01	24930.0	15.21	8.06	7.75
5	03/13/16 11:07:05	20.98	24942.0	15.21	7.84	7.74

Project #: 36-037 Test type: ☒ Acute ☐ Chronic ☐ Day Sed Tox ☐ OTHER: _____ Date: 3/13/16

Species: ☐ *A. bahia* ☐ *C. dilutus* ☐ *H. azteca* ☐ *M. beryllina* ☐ *P. promelas* ☒ OTHER: *F. heteroclitus*

Day of Study: 0

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 22 -24 °C ☐ 24 -26 °C ☐ 24 -26 °C ☒ 20 - 24 °C

Blue ☐

Salinity: ☐ 23-27 ppt ☐ 28 -32 ppt ☒ 13 - 17 ppt

Red ☐

Dissolved Oxygen: ☐ >2.5 mg/L ☒ 5.0 mg/L

Green ☒

pH: ☒ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____ Temp Correction Factor: _____

Actions taken:

Sun Mar 13 11:10:43 2016

Page 1 of 1

See deviation summary sheet ☐

Initials: YT

45

037-24.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	03/14/16 11:14:14	21.28	25384.0	15.51	7.19	7.74
1	03/14/16 11:15:09	21.35	25358.0	15.49	7.38	7.69
2	03/14/16 11:15:33	21.44	25362.0	15.49	7.46	7.67
3	03/14/16 11:15:58	21.43	25340.0	15.48	7.55	7.68
4	03/14/16 11:16:29	21.53	25292.0	15.44	7.53	7.67
5	03/14/16 11:17:03	21.52	25214.0	15.39	7.44	7.64

Project #: 36-037 Test type: ☒ Acute ☐ Chronic ☐ Day Sed Tox ☐ OTHER: _____ Date: 3/14/16

Species: ☐ *A. bahia* ☐ *C. dubia* ☐ *C. tentans* ☐ *H. azteca* ☐ *M. beryllina* ☐ *P. promelas* ☒ OTHER: *F. heteroclitus*

Day of Study: 24 Hrs.

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 22-24 °C ☐ 24-26 °C ☐ 25-27 °C ☒ 20 - 24 °C

Blue ☐

Salinity: ☐ 23-27 ppt ☐ 28-32 ppt ☒ 13 - 17 ppt

Red ☐

Dissolved Oxygen: ☐ >2.5 mg/L ☒ >5.0 mg/L

Green ☒

pH: ☒ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____ Temp Correction Factor: _____

Actions taken:

Mon Mar 14 11:33:11 2016

Page 1 of 1

See deviation summary sheet ☐

Initials: YT
46

037-48.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	03/15/16 10:10:29	21.39	24993.0	15.24	7.37	7.57
1	03/15/16 10:11:26	21.40	25029.0	15.27	7.43	7.65
2	03/15/16 10:12:01	21.44	25037.0	15.27	7.49	7.68
3	03/15/16 10:12:24	21.43	25073.0	15.30	7.53	7.69
4	03/15/16 10:12:48	21.52	25155.0	15.35	7.48	7.69
5	03/15/16 10:13:14	21.56	25301.0	15.45	7.41	7.67

Project #: 36-037 Test type: ☒ Acute ☐ Chronic ☐ Day Sed Tox ☐ OTHER: _____ Date: 3/15/16

Species: ☐ *A. bahia* ☐ *C. dubia* ☐ *C. tentans* ☐ *H. azteca* ☐ *M. beryllina* ☐ *P. promelas* ☒ OTHER: *E. heteroclitus*

Day of Study: 48 Hrs

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 22-24 °C ☐ 24-26 °C ☐ 25-27 °C ☒ 20 - 24 °C

Blue ☐

Salinity: ☐ 23-27 ppt ☐ 28-32 ppt ☒ 13 - 17 ppt

Red ☐

Dissolved Oxygen: ☐ >2.5 mg/L ☒ >5.0 mg/L

Green ☒

pH: ☒ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____ Temp Correction Factor: _____

Actions taken:

Tue Mar 15 10:28:45 2016

Page 1 of 1

See deviation summary sheet ☐

Initials: 97
47

037-72.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	03/16/16 08:29:22	21.83	25016.0	15.26	7.54	7.46
1	03/16/16 08:30:37	21.85	24965.0	15.22	7.57	7.60
2	03/16/16 08:31:22	21.86	24965.0	15.22	7.65	7.67
3	03/16/16 08:32:01	21.85	24967.0	15.22	7.70	7.69
4	03/16/16 08:32:33	21.94	24984.0	15.23	7.65	7.68
5	03/16/16 08:33:15	21.99	25029.0	15.26	7.56	7.65

Project #: 36-037 Test type: ☒ Acute ☐ Chronic ☐ Day Sed Tox ☐ OTHER: _____ Date: 3/16/16

Species: ☐ *A. bahia* ☐ *C. dubia* ☐ *C. tentans* ☐ *H. azteca* ☐ *M. beryllina* ☐ *P. promelas* ☒ OTHER: *E. histrioactis*

Day of Study: 22 Hrs

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 22-24 °C ☐ 24-26 °C ☐ 25-27 °C ☒ 20 - 24 °C

Blue ☐

Salinity: ☐ 23-27 ppt ☐ 28-32 ppt ☒ 13 - 17 ppt

Red ☐

Dissolved Oxygen: ☐ >2.5 mg/L ☒ >5.0 mg/L

Green ☒

pH: ☒ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____ Temp Correction Factor: _____

Actions taken:

Wed Mar 16 08:36:42 2016

Page 1 of 1

See deviation summary sheet ☐

Initials: gt
48

037-96.DAT

	DateTime	Temp	SpCond	Salinity	DO Conc	pH
	M/D/Y	C	uS/cm	ppt	mg/L	
0	03/17/16 08:42:55	22.18	25160.0	15.35	7.44	7.53
1	03/17/16 08:43:43	22.18	25195.0	15.37	7.53	7.60
2	03/17/16 08:44:10	22.22	25191.0	15.37	7.65	7.65
3	03/17/16 08:44:33	22.21	25199.0	15.37	7.71	7.69
4	03/17/16 08:44:55	22.29	25215.0	15.38	7.70	7.69
5	03/17/16 08:45:15	22.32	25266.0	15.42	7.66	7.67

Project #: 36-037 Test type: ☒ Acute ☐ Chronic ☐ Day Sed Tox ☐ OTHER: _____ Date: 3/17/16

Species: ☐ *A. bahia* ☐ *C. dubia* ☐ *C. tentans* ☐ *H. azteca* ☐ *M. beryllina* ☐ *P. promelas* ☒ OTHER: *F. heteroclitus*

Day of Study: 96 Hrs

OPERATIONAL RANGE: Check if OK

Meter Used:

Temperature: ☐ 22-24 °C ☐ 24-26 °C ☐ 25-27 °C ☒ 20 - 24 °C

Blue ☐

Salinity: ☐ 23-27 ppt ☐ 28-32 ppt ☒ 13 - 17 ppt

Red ☐

Dissolved Oxygen: ☐ >2.5 mg/L ☒ > 5.0 mg/L

Green ☒

pH: ☒ 7.3 to 8.3 ☐ 6.0 to 9.0 ☐ _____ to _____ Temp Correction Factor: _____

Actions taken:

Thu Mar 17 08:49:51 2016

Page 1 of 1

See deviation summary sheet ☐

Initials: 49

AQUA SURVEY, INC.

CULTURE ORGANISM DISTRIBUTION FORM

DATE: 3/13/16TEST JOB #: 36-037CLIENT: VFTTEST LOCATION: IN-LAB [☒]FIELD [☐]TEST SPECIES: E. heterochloaTOTAL NUMBER ORGANISMS TRANSFERRED: 120+AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS: JVTA. ORGANISMS1. ASI CULTURE/ HOLDING UNIT: 50 gallon tank2. RECEIVING LOG #: 35-00213. CULTURE LOG #: 35-00254. AGE/ SIZE INFORMATION: HD: 5/2015B. HOLDING [☒] CULTURE [☐] WATER PARAMETERS1. TEMPERATURE: 22±2°C2. SALINITY: 15±1 ppt3. WATER SOURCE: ManasquanB. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT

DATE: 3/13/16TIME: 1000BY: JVT

2. LIVESTOCK RECEIVING

DATE: 3/13/16TIME: 1000BY: JVT3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS: J

REMARKS:

AQUA SURVEY, INC.
CULTURE DEPARTMENT
GENERAL SPECIES HOLDING LOG

Species: F. menschikovi

Receiving [X] Culture []

Log #: 35-021

Test Job #: 36-037

Client:

VFT

Received on 10/15/15

Dates: Isolated for testing 3/3-13/16

Initial Stock @:

Food Type: Flake / Trout Chow

[illegible]

AQUA SURVEY, INC.
CULTURE DEPARTMENT

Organism Receiving Form

Receiving Log #: 35-021

Date: 10/15/15

Shipping Carrier: Fed Ex

Species: F. heteroclitus

Number Shipped: 300

Livestock Source/ Shipper: ARO

ASI Order Ref. Date: _____

ASI Order Ref. Initials: YT

Age/ Characteristics HB: 05/2015

Taxonomic Verification Log #: _____

Date: _____

Receiving Water Quality Parameters

D.O: 33.4 mg/L

Temp.: 16.6°C

NH₃/NO₂: 0.0/0.0

pH: 6.47

Salinity/ Hardness 29.5 ppt

Alkalinity: 120

Water- Clear/ Cloudy

Container Size: (2) large fish bags

ICE: (Y/N)

Type of Packing: (2) Styrofoam Boxes

Observation/ Condition of Livestock: Appear Well

Receiving Tech. Initials: J

Supervisors Initials: J



Aquatic Research Organisms

DATA SHEET

I. Organism History

Species FUNDULUS HETEROClitus
Source: Lab reared _____ Hatchery reared _____ Field collected ☒
Hatch date 05/2015 Receipt date 10/02/15
Lot number 100215mc Strain WILD
Brood origination HAMPTON NH

II. Water Quality

Temperature 22 °C Salinity 30 ppt D.O. SAT ppm
pH 8.3 su Hardness _____ ppm Alkalinity _____ ppm

III. Culture Conditions

Freshwater _____ Saltwater ☒ Other _____
Recirculating _____ Flow through ☒ Static renewal _____
DIET: Flake food ☒ Phytoplankton _____ Trout chow ☒
Artemia _____ Rotifers _____ YCT _____ Other _____
Prophylactic treatments: formalin 250 ppm / 1 hr X 2
Comments: 96 hr Freshwater dip

IV. Shipping Information

Client: AQUASURVEY # of Organisms 300+
Carrier: FEDEX Date shipped 10/14/15
Biologist: Stan Smitzki

36-037_MiniLab_A.hobo

#	Time, GMT-05:00	Temp, °C	Coupler Detached	Coupler Attached	Host Connected	Stopped	End Of File
1	03/11/16 11:00:00 AM	21.819	Logged				
2	03/11/16 12:00:01 PM	21.963					
3	03/11/16 01:00:02 PM	22.154					
4	03/11/16 02:00:03 PM	22.154					
5	03/11/16 03:00:04 PM	21.939					
6	03/11/16 04:00:05 PM	21.867					
7	03/11/16 05:00:06 PM	21.795					
8	03/11/16 06:00:07 PM	21.772					
9	03/11/16 07:00:08 PM	21.724					
10	03/11/16 08:00:09 PM	21.652					
11	03/11/16 09:00:10 PM	21.533					
12	03/11/16 10:00:11 PM	21.413					
13	03/11/16 11:00:12 PM	21.270					
14	03/12/16 12:00:13 AM	21.151					
15	03/12/16 01:00:14 AM	20.984					
16	03/12/16 02:00:15 AM	20.865					
17	03/12/16 03:00:16 AM	20.793					
18	03/12/16 04:00:17 AM	20.698					
19	03/12/16 05:00:18 AM	20.603					
20	03/12/16 06:00:19 AM	20.531					
21	03/12/16 07:00:20 AM	20.484					
22	03/12/16 08:00:21 AM	20.436					
23	03/12/16 09:00:22 AM	20.388					
24	03/12/16 10:00:23 AM	20.388					
25	03/12/16 11:00:24 AM	20.436					
26	03/12/16 12:00:25 PM	20.507					
27	03/12/16 01:00:26 PM	20.603					

36-037_MiniLab_A.hobo

#	Time, GMT-05:00	Temp, °C	Coupler Detached	Coupler Attached	Host Connected	Stopped	End Of File
28	03/12/16 02:00:27 PM	20.674					
29	03/12/16 03:00:28 PM	20.722					
30	03/12/16 04:00:29 PM	20.770					
31	03/12/16 05:00:30 PM	20.817					
32	03/12/16 06:00:31 PM	20.817					
33	03/12/16 07:00:32 PM	20.817					
34	03/12/16 08:00:33 PM	20.817					
35	03/12/16 09:00:34 PM	20.841					
36	03/12/16 10:00:35 PM	20.841					
37	03/12/16 11:00:36 PM	20.841					
38	03/13/16 12:00:37 AM	20.817					
39	03/13/16 01:00:38 AM	20.793					
40	03/13/16 02:00:39 AM	20.770					
41	03/13/16 03:00:40 AM	20.746					
42	03/13/16 04:00:41 AM	20.722					
43	03/13/16 05:00:42 AM	20.674					
44	03/13/16 06:00:43 AM	20.674					
45	03/13/16 07:00:44 AM	20.627					
46	03/13/16 08:00:45 AM	20.627					
47	03/13/16 09:00:46 AM	20.722					
48	03/13/16 10:00:47 AM	20.674					
49	03/13/16 11:00:48 AM	20.674					
50	03/13/16 12:00:49 PM	20.698					
51	03/13/16 01:00:50 PM	20.865					
52	03/13/16 02:00:51 PM	21.056					
53	03/13/16 03:00:52 PM	21.223					
54	03/13/16 04:00:53 PM	21.413					

36-037_MiniLab_A.hobo

#	Time, GMT-05:00	Temp, °C	Coupler Detached	Coupler Attached	Host Connected	Stopped	End Of File
55	03/13/16 05:00:54 PM	21.581					
56	03/13/16 06:00:55 PM	21.700					
57	03/13/16 07:00:56 PM	21.819					
58	03/13/16 08:00:57 PM	21.891					
59	03/13/16 09:00:58 PM	21.939					
60	03/13/16 10:00:59 PM	21.987					
61	03/13/16 11:01:00 PM	21.987					
62	03/14/16 12:01:01 AM	21.915					
63	03/14/16 01:01:02 AM	21.819					
64	03/14/16 02:01:03 AM	21.676					
65	03/14/16 03:01:04 AM	21.557					
66	03/14/16 04:01:05 AM	21.437					
67	03/14/16 05:01:06 AM	21.342					
68	03/14/16 06:01:07 AM	21.199					
69	03/14/16 07:01:08 AM	21.151					
70	03/14/16 08:01:09 AM	21.127					
71	03/14/16 09:01:10 AM	21.103					
72	03/14/16 10:01:11 AM	21.151					
73	03/14/16 11:01:12 AM	21.103					
74	03/14/16 12:01:13 PM	21.175					
75	03/14/16 01:01:14 PM	21.223					
76	03/14/16 02:01:15 PM	21.294					
77	03/14/16 03:01:16 PM	21.366					
78	03/14/16 04:01:17 PM	21.390					
79	03/14/16 05:01:18 PM	21.437					
80	03/14/16 06:01:19 PM	21.485					
81	03/14/16 07:01:20 PM	21.533					

36-037_MiniLab_A.hobo

#	Time, GMT-05:00	Temp, °C	Coupler Detached	Coupler Attached	Host Connected	Stopped	End Of File
82	03/14/16 08:01:21 PM	21.581					
83	03/14/16 09:01:22 PM	21.604					
84	03/14/16 10:01:23 PM	21.628					
85	03/14/16 11:01:24 PM	21.581					
86	03/15/16 12:01:25 AM	21.533					
87	03/15/16 01:01:26 AM	21.461					
88	03/15/16 02:01:27 AM	21.390					
89	03/15/16 03:01:28 AM	21.318					
90	03/15/16 04:01:29 AM	21.246					
91	03/15/16 05:01:30 AM	21.175					
92	03/15/16 06:01:31 AM	21.151					
93	03/15/16 07:01:32 AM	21.151					
94	03/15/16 08:01:33 AM	21.151					
95	03/15/16 09:01:34 AM	21.032					
96	03/15/16 10:01:35 AM	21.103					
97	03/15/16 11:01:36 AM	21.246					
98	03/15/16 12:01:37 PM	21.437					
99	03/15/16 01:01:38 PM	21.604					
100	03/15/16 02:01:39 PM	21.795					
101	03/15/16 03:01:40 PM	21.963					
102	03/15/16 04:01:41 PM	22.154					
103	03/15/16 05:01:42 PM	22.321					
104	03/15/16 06:01:43 PM	22.465					
105	03/15/16 07:01:44 PM	22.585					
106	03/15/16 08:01:45 PM	22.657					
107	03/15/16 09:01:46 PM	22.705					
108	03/15/16 10:01:47 PM	22.729					

