

PRODUCT TOXICITY TESTING RESULTS

VECTOR FIRE TECHNOLOGY

BIOASSAY PRODUCT TESTING

Prepared for:

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Accredited in accordance with
NELAP, ORELAP ID 4165

All testing reported herein was performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and EcoAnalysts is not responsible for use of less than the complete report. The test results summarized in this report apply only to the sample(s) evaluated. This document is uncontrolled when printed or accessed from electronic distribution.

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ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
CV	Coefficient of Variation
DI	Deionized
EPA	Environmental Protection Agency
EC ₅₀ / LC ₅₀	Effect/ Lethal Concentration to 50% of Test Population
LOEC	Lowest Observed Effect Concentration
µg/L	Microgram per Liter
mg/L	Milligrams per Liter
mS/cm	Millisiemens per centimeter
NOEC	No Observed Effect Concentration
QM	Quality Manual
SOP	Standard Operating Procedures

1. EXECUTIVE SUMMARY

EcoAnalysts conducted aquatic toxicity testing on three product samples provided by Vector Fire Technology. The objective of this program is to assess the potential toxicity of the products to *Pimephales promelas* (fathead minnow) acute survival (Table 1-1). The results of the toxicity testing are contained in this report.

Table 1-1. Toxicity Test Results Summary

Sample	Test	NOEC (mg/L)	LOEC (mg/L)	EC ₅₀ / LC ₅₀ (mg/L)
3SFF-USP batch #F032425-01X	Fathead Minnow (<i>Pimephales promelas</i>) 96-hour Survival	33,000	66,000	63,710
3SFF SP-100 batch #F032425-02X	Fathead Minnow (<i>Pimephales promelas</i>) 96-hour Survival	33,000	66,000	>66,000
3SFF-ARK batch #F032425-03X	Fathead Minnow (<i>Pimephales promelas</i>) 96-hour Survival	66,000	>66,000	>66,000

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

EC₅₀/LC₅₀ = Effect/ Lethal Concentration to 50% of test population

2. METHODS

The samples analyzed for toxicity were evaluated using criteria outlined in the most recently promulgated United States Environmental Protection Agency (USEPA) guidance documents outlined in Section 4.

2.1 Bioassay Testing

Bioassay testing for this project consisted of three acute bioassays. The test conducted in support of this project is summarized in Table 2-1.

Table 2-1. Biological Testing Performed.

Test Type	Test Descriptor	Species	Method
Acute	96-hour Survival	<i>Pimephales promelas</i> Fathead Minnow	EPA-821-R-02-012 Method 2000.0; SOP TOX017.10

2.2 Sample

Vector Fire Technology provided three product samples for evaluation which were received on March 28, 2025. The samples were stored away from moisture and remained tightly sealed in the package in which they were received in.

2.3 Water for Bioassay Testing

The Freshwater diluent used in the *P. promelas* tests were prepared using the EPA method of creating reconstituted moderately-hard water with laboratory grade deionized water as dilution water. Extensive testing on a variety of test species has shown that there is no significant potential for toxicity or bioaccumulation of contaminants from this water supply. Chemical analysis of this water source is conducted and reviewed on an annual basis.

2.4 Sample Preparation

EcoAnalysts followed the guidance for preparing the sample as discussed with the client:

Product Sample Preparation:

P. promelas Test

1. Weigh out the appropriate amount of mg of pure product sample and add to reconstituted moderately-hard water with a final volume of 1 liter to create each test concentration. This method was used for test initiation and renewals.

2.5 Data Management and Analysis

Endpoint data were calculated for each replicate and the mean value and standard deviation were determined for each of the test treatments. All hand-entered data were reviewed for data entry errors, which were corrected prior to summary calculations. A minimum of 10% of all calculations and data sorting were reviewed for errors. Review counts were conducted on any apparent outliers.

Statistical comparisons were made according to the EPA guidance. Statistical comparisons were performed using CETIS™ software (CETIS 2022).

2.6 Quality Assurance/Quality Control

The quality assurance objectives for toxicity testing conducted by the testing laboratory are detailed in the method specific guidance documents and the laboratory's quality manual (QM). These objectives for accuracy and precision involve all aspects of the testing process, including the following:

- Source and Condition of Test Organisms
- Condition of Equipment
- Test Conditions
- Instrument Calibration
- Use of Reference Toxicants
- Record Keeping
- Data Evaluation

The batch of test organisms obtained was evaluated in a reference toxicant test that was run within a month of the testing period to establish the sensitivity of the test organisms. The reference toxicant LC₅₀ or EC₅₀ should fall within two standard deviations of the historical laboratory mean. Water quality measurements were monitored to ensure that they fell within prescribed limits.

The methods employed in every phase of the toxicity testing program are detailed in the EcoAnalysts Standard Operating Practices (SOP). All EcoAnalysts staff members receive regular, documented training in all SOPs and test methods. Finally, all data collected and produced as a result of these analyses were recorded on approved data sheets. If an aspect of a test deviated from protocol, the test was evaluated to determine whether it was valid according to the regulatory agencies responsible for approval of the proposed permitting action.

3. RESULTS

The results of the testing are presented in this section. Statistical comparisons and laboratory documents are provided in Appendix A. Chain-of-custody and sample receipt logs are provided in Appendix B.

3.1 Fathead Minnow (*Pimephales promelas*) Acute Test Results - 3SFF-USP batch #F032425-01X

The acute toxicity test with *P. promelas* was initiated on April 3, 2025. Mean survival and statistical results are summarized in Table 3-1. The test met the control acceptability criterion listed in Table 3-2. The test conditions are summarized in Table 3-2.

On Day 1, the dissolved oxygen (DO) fell below the EPA recommended range of 4.0 mg/L. Aeration was initiated in all test chambers, and the DO remained above 4.0 mg/L for the remainder of the test. Other than noted, water quality parameters were within the acceptable limits throughout the duration of the 96-hour static-renewal test.

The reference toxicant test results were within two standard deviations of the laboratory mean for survival at the time of testing (Table 3-2). This indicates that the organisms used in this study were of similar sensitivity to those previously tested at the EcoAnalysts laboratory.

Table 3-1. Endpoint Summary for the *Pimephales promelas* Acute Test

Conc. (mg/L)	3SFF-USP batch #F032425-01X				
	Mean Survival (%)	Standard Deviation (%)	NOEC (mg/L)	LOEC (mg/L)	LC ₅₀ /EC ₅₀ (mg/L)
Control (0)	100	0.0	33,000	66,000	63,710
4,125	100	0.0			
8,250	95.0	5.8			
16,500	97.5	5.0			
33,000	97.5	5.0			
66,000	47.5	9.6			

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

LC₅₀/EC₅₀ = Lethal/Effect Concentration to 50% of test population

Table 3-2. Test Condition Summary for *Pimephales promelas* Acute Test

Test Duration / Type		96-hour / Static Renewal
Species		<i>Pimephales promelas</i>
Supplier		Aquatic Biosystems
Date acquired		04/02/25
Test Dates		04/03/25 – 04/07/25
Age at test initiation (Recommended: 1 - 14 days)		7 Days
Samples used:		3SFF-USP batch #F032425-01X; P250328.08
Test Procedures		EPA-821-R-02-012, Test Method 2000.0; SOP TOX017.10
Test location		EcoAnalysts Port Gamble Laboratory
Control water / Diluent		Reconstituted Fresh Water (RFW)
Test Lighting		16-hour light / 8-hour dark
Test Chamber		12 oz. Plastic Chamber
Exposure volume		250 mL
Replicates/treatment		4
Concentration/treatment		4,125, 8,250, 16,500, 33,000, 66,000 mg/L
Organisms/replicate		10
Feeding		0.2 mL concentrated <i>Artemia</i> nauplii, two hours prior to renewal
Test solution renewal		Day 2
Test Dissolved Oxygen (Recommended: > 2.0 mg/L)		1.3 – 9.3 mg/L
Test Temperature (Recommended: 20 ± 1°C)		18.8 – 20.4°C
Test Conductivity Recommended: NA		112 – 1877 µS/cm
Test pH (Range not specified) Targeted Range: 6 – 9 units		7.2 – 8.2 units
Quality Assurance		
Control performance standards Survival (Recommended): ≥ 90%		100%; meets acceptability criterion
Reference Toxicant Date		04/04/25
Survival	Reference Toxicant LC ₅₀	80.9 µg/L Copper
	Laboratory Mean LC ₅₀ ; Range LC ₅₀ (±2 SD)	109 µg/L (30.1 – 394 µg/L Copper)
Deviations from Test Protocol		Dissolved oxygen

3.2 Fathead Minnow (*Pimephales promelas*) Acute Test Results - 3SFF SP-100 batch #F032425-02X

The acute toxicity test with *P. promelas* was initiated on April 3, 2025. Mean survival and statistical results are summarized in Table 3-3. The test met the control acceptability criterion listed in Table 3-4. The test conditions are summarized in Table 3-4.

Although DO was within the recommended range of 4.0 mg/L when measured on Day 1 (lowest DO measurement was 4.1 mg/L), aeration was added to all test chambers due to a lab error. However, on Day 3, the DO fell below the EPA recommended range of 4.0 mg/L in the 66,000 mg/L test concentration (Replicate 3) due to an air flow obstruction. The airline was fixed and the DO remained above 4.0 mg/L for the remainder of the test. Other than noted, water quality parameters were within the acceptable limits throughout the duration of the 96-hour static-renewal test.

The reference toxicant test results were within two standard deviations of the laboratory mean for survival at the time of testing (Table 3-4). This indicates that the organisms used in this study were of similar sensitivity to those previously tested at the EcoAnalysts laboratory.

Table 3-3. Endpoint Summary for the *Pimephales promelas* Acute Test

Conc. (mg/L)	3SFF SP-100 batch #F032425-02X				
	Mean Survival (%)	Standard Deviation (%)	NOEC (mg/L)	LOEC (mg/L)	LC ₅₀ /EC ₅₀ (mg/L)
Control (0)	100	0.0	33,000	66,000	>66,000
4,125	97.5	5.0			
8,250	97.5	5.0			
16,500	97.5	5.0			
33,000	100	0.0			
66,000	85.0	10.0			

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

LC₅₀/EC₅₀ = Lethal/Effect Concentration to 50% of test population

Table 3-4. Test Condition Summary for *Pimephales promelas* Acute Test

Test Duration / Type		96-hour / Static Renewal
Species		<i>Pimephales promelas</i>
Supplier		Aquatic Biosystems
Date acquired		04/02/25
Test Dates		04/03/25 – 04/07/25
Age at test initiation (Recommended: 1 - 14 days)		7 Days
Samples used:		3SFF SP-100 batch #F032425-02X; P250328.07
Test Procedures		EPA-821-R-02-012, Test Method 2000.0; SOP TOX017.10
Test location		EcoAnalysts Port Gamble Laboratory
Control water / Diluent		Reconstituted Fresh Water (RFW)
Test Lighting		16-hour light / 8-hour dark
Test Chamber		12 oz. Plastic Chamber
Exposure volume		250 mL
Replicates/treatment		4
Concentration/treatment		4,125, 8,250, 16,500, 33,000, 66,000 mg/L
Organisms/replicate		10
Feeding		0.2 mL concentrated <i>Artemia</i> nauplii, two hours prior to renewal
Test solution renewal		Day 2
Test Dissolved Oxygen (Recommended: > 2.0 mg/L)		3.4 – 9.4 mg/L
Test Temperature (Recommended: 20 ± 1°C)		19.1 – 20.3°C
Test Conductivity Recommended: NA		325 – 1882 µS/cm
Test pH (Range not specified) Targeted Range: 6 – 9 units		7.5 – 8.2 units
Quality Assurance		
Control performance standards Survival (Recommended): ≥ 90%		100%; meets acceptability criterion
Reference Toxicant Date		04/04/25
Survival	Reference Toxicant LC ₅₀	80.9 µg/L Copper
	Laboratory Mean LC ₅₀ ; Range LC ₅₀ (±2 SD)	109 µg/L (30.1 – 394 µg/L Copper)
Deviations from Test Protocol		Dissolved oxygen

3.3 Fathead Minnow (*Pimephales promelas*) Acute Test Results - 3SFF-ARK batch #F032425-03X

The acute toxicity test with *P. promelas* was initiated on April 3, 2025. Mean survival and statistical results are summarized in Table 3-5. The test met the control acceptability criterion listed in Table 3-6. The test conditions are summarized in Table 3-6.

On Day 1 the DO fell below the EPA recommended range of 4.0 mg/L. Due to a lab error, the test was not aerated until the low DO was observed on Day 2. At that time, aeration was initiated in all test chambers, and the DO remained above 4.0 mg/L for the remainder of the test. This deviation had no negative effects on the test results. Other than noted, water quality parameters were within the acceptable limits throughout the duration of the 96-hour static-renewal test.

The reference toxicant test results were within two standard deviations of the laboratory mean for survival at the time of testing (Table 3-6). This indicates that the organisms used in this study were of similar sensitivity to those previously tested at the EcoAnalysts laboratory.

Table 3-5. Endpoint Summary for the *Pimephales promelas* Acute Test

Conc. (mg/L)	3SFF-ARK batch #F032425-03X				
	Mean Survival (%)	Standard Deviation (%)	NOEC (mg/L)	LOEC (mg/L)	LC ₅₀ /EC ₅₀ (mg/L)
Control (0)	100	0.0	66,000	>66,000	>66,000
4,125	97.5	5.0			
8,250	100	0.0			
16,500	100	0.0			
33,000	100	0.0			
66,000	95.0	5.8			

NOEC = No Observed Effect Concentration

LOEC = Lowest Observed Effect Concentration

LC₅₀/EC₅₀ = Lethal/Effect Concentration to 50% of test population

Table 3-6. Test Condition Summary for *Pimephales promelas* Acute Test

Test Duration / Type		96-hour / Static Renewal
Species		<i>Pimephales promelas</i>
Supplier		Aquatic Biosystems
Date acquired		04/02/25
Test Dates		04/03/25 – 04/07/25
Age at test initiation (Recommended: 1 - 14 days)		7 Days
Samples used:		3SFF-ARK batch #F032425-03X; P250328.06
Test Procedures		EPA-821-R-02-012, Test Method 2000.0; SOP TOX017.10
Test location		EcoAnalysts Port Gamble Laboratory
Control water / Diluent		Reconstituted Fresh Water (RFW)
Test Lighting		16-hour light / 8-hour dark
Test Chamber		12 oz. Plastic Chamber
Exposure volume		250 mL
Replicates/treatment		4
Concentration/treatment		4,125, 8,250, 16,500, 33,000, 66,000 mg/L
Organisms/replicate		10
Feeding		0.2 mL concentrated <i>Artemia</i> nauplii, two hours prior to renewal
Test solution renewal		Day 2
Test Dissolved Oxygen (Recommended: > 2.0 mg/L)		1.1 – 9.2 mg/L
Test Temperature (Recommended: 20 ± 1°C)		18.9 – 20.1°C
Test Conductivity Recommended: NA		323 – 1980 µS/cm
Test pH (Range not specified) Targeted Range: 6 – 9 units		7.3 – 8.2 units
Quality Assurance		
Control performance standards Survival (Recommended): ≥ 90%		100%; meets acceptability criterion
Reference Toxicant Date		04/04/25
Survival	Reference Toxicant LC ₅₀	80.9 µg/L Copper
	Laboratory Mean LC ₅₀ ; Range LC ₅₀ (±2 SD)	109 µg/L (30.1 – 394 µg/L Copper)
Deviations from Test Protocol		Dissolved oxygen

5. REFERENCES

- CETIS. 2022 CETIS™ Comprehensive Environmental Toxicity Information System User's Guide. Tidepool Scientific Software. McKinleyville, CA.
- USEPA. 2002b. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012
- WDOE. 2016. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised June 2016

APPENDIX A

Statistical Comparisons
Laboratory Documents

ERROR CODES FOR DATASHEETS

CA	Called away; task completed by another tech
DC	Test solution too turbid or too dark to count organisms
FB	Found body – animal found that was previously noted as missing
IE	Incorrect Entry
IW	Illegible writing
MC	Miscount
MR	Meter reading changed; Meter no ready
NB	No body (no organism found)
SM	Stray Mark
WC	Wrong Cell (incorrect data box used)
WD	Wrong Date (incorrect date entered)
WN	Wrong number (incorrect number entered)
WP	Wrong page (incorrect data sheet)
WT	Wrong Time (incorrect time entered)

APPENDIX A1

Pimephales promelas (fathead minnow)

96-Hour Survival Test Datasheets

CETIS Summary Report

Report Date: 15 Apr-25 09:42 (p 1 of 1)
Test Code/ID: P250328.08 / 20-4393-9504

Fathead Minnow 96-h Acute Survival Test

EcoAnalysts

Batch ID: 04-4879-9570	Test Type: Survival (96h)	Analyst: Michelle Bennett
Start Date: 03 Apr-25 14:46	Protocol: EPA/821/R-02-012 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 07 Apr-25 13:39	Species: Pimephales promelas	Brine:
Test Length: 95h	Taxon: Actinopterygii	Source: Aquatic Biosystems, CO Age: 7D
Sample ID: 01-5010-8261	Code: P250328.08	Project: Product Testing
Sample Date: 24 Mar-25 15:10	Material: Product Testing	Source: Vector Fire Technology
Receipt Date: 28 Mar-25 12:20	CAS (PC):	Station: 3SFF-USP batch #F032425-01X
Sample Age: 10d (13.2 °C)	Client: Vector Fire Technology	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	PMSD	S
05-0952-7777	96h Proportion Survived	Steel Many-One Rank Sum Test	33000	66000	46670	7.74%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	S
15-0089-1367	96h Proportion Survived	Trimmed Spearman-Kärber	EC50	63710	51580	78710	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
05-0952-7777	96h Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria
15-0089-1367	96h Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria

96h Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	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%	0.00%
4125		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
8250		4	0.9500	0.8581	1.0420	0.9000	1.0000	0.0289	0.0577	6.08%	5.00%
16500		4	0.9750	0.8954	1.0550	0.9000	1.0000	0.0250	0.0500	5.13%	2.50%
33000		4	0.9750	0.8954	1.0550	0.9000	1.0000	0.0250	0.0500	5.13%	2.50%
66000		4	0.4750	0.3227	0.6273	0.4000	0.6000	0.0479	0.0957	20.16%	52.50%

96h Proportion Survived Detail

MD5: C8F1ED4EF7F09B45B65F9C8A523FC59E

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
4125		1.0000	1.0000	1.0000	1.0000
8250		0.9000	1.0000	1.0000	0.9000
16500		1.0000	1.0000	1.0000	0.9000
33000		1.0000	0.9000	1.0000	1.0000
66000		0.5000	0.6000	0.4000	0.4000

96h Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
4125		10/10	10/10	10/10	10/10
8250		9/10	10/10	10/10	9/10
16500		10/10	10/10	10/10	9/10
33000		10/10	9/10	10/10	10/10
66000		5/10	6/10	4/10	4/10

CETIS Test Data Worksheet

Report Date: 15 Apr-25 09:23 (p 1 of 1)
 Test Code/ID: P250328.08 / 20-4393-9504

Fathead Minnow 96-h Acute Survival Test

EcoAnalysts

Start Date: 03 Apr-25 14:46 Species: Pimephales promelas Sample Code: P250328.08
 End Date: 07 Apr-25 13:39 Protocol: EPA/821/R-02-012 (2002) Sample Source: Vector Fire Technology
 Sample Date: 24 Mar-25 15:10 Material: Product Testing Sample Station: 3SFF-USP batch #F032425-01X

Conc-mg/L	Code	Rep	Pos	# Exposed	Survival 24h	Survival 48h	Survival 72h	Survival 96h	Notes
0	D	1	5	10				10	
0	D	2	20	10				10	
0	D	3	1	10				10	
0	D	4	22	10				10	
4125		1	7	10				10	
4125		2	4	10				10	
4125		3	2	10				10	
4125		4	3	10				10	
8250		1	16	10				9	
8250		2	6	10				10	
8250		3	9	10				10	
8250		4	17	10				9	
16500		1	8	10				10	
16500		2	11	10				10	
16500		3	14	10				10	
16500		4	24	10				9	
33000		1	13	10				10	
33000		2	23	10				9	
33000		3	21	10				10	
33000		4	19	10				10	
66000		1	15	10				5	
66000		2	12	10				6	
66000		3	10	10				4	
66000		4	18	10				4	

GENERAL

Client	Vector Fire Technology
Project	Product Testing
Project Number	PG2195
Project Manager	M. Bennett
Date Sample Received	3/28/2025
Test type	96-Hour Acute Toxicity with FHM
Matrix	Liquid
Test Acceptability	≥ 90% average survival of control
Test Start Date	04/03/25
Test Species	<i>Pimephales promelas</i>
Organism Batch	ABS040225.01
Organism Acquired	4/2/2025
Organism Acclimation	1
Organism Age	7 days
Test Protocol	Tox 017
Regional Protocol	USEPA EPA-821-R-02-012
Test Location	Bath 1
Light Intensity	50-100 foot candles
Light Cycle	16L:8D
Water Description	moderately hard fresh water
Organisms per Replicate	10
Test Chamber Size	12 oz
Exposure Volume	250 mL
Feeding Information	0.2 mL <i>Artemia nauplii</i> 2 hrs prior to renewal (96-hour test)
Test Dissolved Oxygen	> 4
Test Temperature	20 ± 1
Conductivity	
Test pH	7.5 ± 1.5

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	Max
DO	4	
Temp	18.5	21.4
Conductivity		
pH	6	9

TEST START TIME/INIT: 1446 CS (TW/LG)

TEST END TIME/INIT: 1339 TVL

CLIENT SAMPLE ID	LAB ID
3SFF-USP batch #F032425-01X	P250328.08

Concentrations (mg/L)

1	Control
2	4125
3	8250
4	16500
5	33000
6	66000
7	.
8	.
9	.

Food Batch ID

491842

Copy and Past VALUES from

Treatment	Rep	Chamber
Control	1	24
Control	2	4
Control	3	12
Control	4	22
4125	1	3
4125	2	21
4125	3	20
4125	4	17
8250	1	23
8250	2	7
8250	3	8
8250	4	13
16500	1	6
16500	2	10
16500	3	14
16500	4	2
33000	1	5
33000	2	1
33000	3	18
33000	4	16
66000	1	15
66000	2	19
66000	3	9
66000	4	11
.	1	
.	2	
.	3	
.	4	

v.1

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	3SFF-USP batch #F032425-01X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.08	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM

Day of Test	Concentration (mg/L)	Spiking Amount (mg/L)	Total Volume (mL)	Diluent Type	RFW
0	0	0	1000		
	4125	4125	1000		
	8250	8250	1000		
	16500	16500	1000		
	33000	33000	1000		
	66000	66000	1000		

Day of Test	Concentration (mg/L)	Spiking Amount (mg/L)	Total Volume (mL)
2	0	0	1000
	4125	4125	1000
	8250	8250	1000
	16500	16500	1000
	33000	33000	1000
	66000	66000	1000

Test Dilution Prep

Date	Balance ID	Sample ID (P#)	Water Batch ID	Initials	Comments
4/3/2025	7	P250328.08	RFW032525.01	LG	66000 concentration is quite viscous-LG 4/3
4/5/2025	7	P250328.08	RFW040225.01	SN	

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	3SFF-USP batch #F032425-01X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.08	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM

		Concentration (mg/L)	DO (mg/L)	TEMP (°C)	CONDUCTIVITY (µS/cm)	pH	Comments
Day 0		Control	9.0	19.0	342	8.2	
Stock		4125	9.2	18.8	442	8.2	
Date	4/3/825	8250	9.1	18.9	541	8.1	
Time	1147	16500	9.2	18.9	736	8.1	
Tech	NL	33000	9.2	18.9	112	8.1	
Meter #	8	66000	9.2	18.9	1877	8.1	
Day 1		Control	8.2	19.6	345	7.9	
Rep 1		4125	7.5	19.5	441	7.6	
Date	04/04/25	8250	6.8	19.4	537	7.5	
Time	816	16500	6.4	19.6	719	7.3	
Tech	TVL	33000	3.7	19.6	1079	7.2	Low DO, test aerated-TVL 4/4/25
Meter #	8	66000	1.3	19.7	1749	7.2	
Day 2		Control	8.9	19.5	351	8.1	
Rep 2		4125	9.0	19.7	448	8.0	
Date	04/05/25	8250	8.5	19.6	539	7.9	
Time	955	16500	8.9	19.6	732	8.1	
Tech	SN	33000	8.2	19.9	1094	7.9	
Meter #	7	66000	4.6	19.6	1787	7.4	
Day 2		Control	9.2	19.0	325	8.2	
Renewal Stock		4125	9.3	19.0	424	8.1	
Date	04/05/25	8250	9.3	19.0	523	8.1	
Time	940	16500	9.3	19.0	717	8.1	
Tech	SN	33000	9.3	19.0	1103	8.1	
Meter #	7	66000	9.3	19.0	1845	8.0	
Day 3		Control	8.9	20.4	332	8.2	
Rep 3		4125	8.9	20.4	428	8.2	
Date	04/06/25	8250	8.8	19.8	531	8.2	
Time	1438	16500	8.9	20.1	724	8.2	
Tech	KD	33000	8.1	20.2	1104	8.0	
Meter #	7	66000	7.7	20.1	1820	7.8	
Day 4		Control	8.5	19.5	336	8.2	
Rep 4		4125	8.8	19.6	433	8.2	
Date	04/07/25	8250	8.8	19.8	530	8.2	
Time	828	16500	7.8	19.8	729	8.1	
Tech	TVL	33000	7.9	19.8	1081	8.0	
Meter #	7	66000	6.3	19.6	1865	7.7	

v.1

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	USP batch #F032425-01X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.08	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM
Abbreviation Key:

NB = No Body

FB = Found Body

ST = Stranded

NB = No Body FB = Found Body ST = Stranded		Day 1			Day 2			Day 3			Day 4			
		Date	04/04/25		Date	04/05/25		Date	04/06/25		Date	04/07/25		
		Time	832		Time	1247		Time	1554		Time	1339		
		Tech	TVL		Tech	SN		Tech	KD		Tech	TVL		
Concentration (mg/L)	REP	Alive	Dead	Obs	Alive	Dead	Obs	Alive	Dead	Obs	Alive	Dead	Obs	Comments
Control	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
4125	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
8250	1	9	1		9	0		9	0		9	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		9	1		
16500	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		9	1		9	0		
33000	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		9	1		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
66000	1	7	3		6	1		6	0		5	1		
	2	10	0		8	2		6	2		6	0		
	3	8	2		7	1		4	3		4	0		
	4	5	5		5	0		4	1		4	0		
Feed (Time/Init.)														
0.2 mL Artemia nauplii 2 hrs prior to renewal (96-hour test)					NL									

CETIS Summary Report

Report Date: 15 Apr-25 09:56 (p 1 of 1)
Test Code/ID: P250328.07 / 11-3318-0969

Fathead Minnow 96-h Acute Survival Test

EcoAnalysts

Batch ID: 17-8867-1827	Test Type: Survival (96h)	Analyst: Michelle Bennett
Start Date: 03 Apr-25 14:47	Protocol: EPA/821/R-02-012 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 07 Apr-25 13:26	Species: Pimephales promelas	Brine:
Test Length: 95h	Taxon: Actinopterygii	Source: Aquatic Biosystems, CO Age: 7D
Sample ID: 11-8203-8706	Code: P250328.07	Project: Product Testing
Sample Date: 24 Mar-25 17:30	Material: Product Testing	Source: Vector Fire Technology
Receipt Date: 28 Mar-25 12:20	CAS (PC):	Station: 3SFF SP-100 batch #F032425-02X
Sample Age: 9d 21h (16.2 °C)	Client: Vector Fire Technology	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	PMSD	S
13-0874-0502	96h Proportion Survived	Steel Many-One Rank Sum Test	33000	66000	46670	8.27%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	S
03-1889-8445	96h Proportion Survived	Linear Interpolation (ICPIN)	EC50	>66000	---	---	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
03-1889-8445	96h Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria
13-0874-0502	96h Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria

96h Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	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%	0.00%
4125		4	0.9750	0.8954	1.0550	0.9000	1.0000	0.0250	0.0500	5.13%	2.50%
8250		4	0.9750	0.8954	1.0550	0.9000	1.0000	0.0250	0.0500	5.13%	2.50%
16500		4	0.9750	0.8954	1.0550	0.9000	1.0000	0.0250	0.0500	5.13%	2.50%
33000		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
66000		4	0.8500	0.6909	1.0090	0.7000	0.9000	0.0500	0.1000	11.76%	15.00%

96h Proportion Survived Detail

MD5: 027D06CE60A76541F2DBEFEBAC9E559A

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
4125		0.9000	1.0000	1.0000	1.0000
8250		1.0000	1.0000	0.9000	1.0000
16500		0.9000	1.0000	1.0000	1.0000
33000		1.0000	1.0000	1.0000	1.0000
66000		0.9000	0.9000	0.7000	0.9000

96h Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
4125		9/10	10/10	10/10	10/10
8250		10/10	10/10	9/10	10/10
16500		9/10	10/10	10/10	10/10
33000		10/10	10/10	10/10	10/10
66000		9/10	9/10	7/10	9/10

CETIS Test Data Worksheet

Report Date: 15 Apr-25 09:54 (p 1 of 1)
 Test Code/ID: P250328.07 / 11-3318-0969

Fathead Minnow 96-h Acute Survival Test

EcoAnalysts

Start Date: 03 Apr-25 14:47 Species: Pimephales promelas Sample Code: P250328.07
 End Date: 07 Apr-25 13:26 Protocol: EPA/821/R-02-012 (2002) Sample Source: Vector Fire Technology
 Sample Date: 24 Mar-25 17:30 Material: Product Testing Sample Station: 3SFF SP-100 batch #F032425-02X

Conc-mg/L	Code	Rep	Pos	# Exposed	Survival 24h	Survival 48h	Survival 72h	Survival 96h	Notes
0	D	1	15	10				10	
0	D	2	20	10				10	
0	D	3	9	10				10	
0	D	4	21	10				10	
4125		1	2	10				9	
4125		2	13	10				10	
4125		3	14	10				10	
4125		4	11	10				10	
8250		1	22	10				10	
8250		2	3	10				10	
8250		3	16	10				9	
8250		4	4	10				10	
16500		1	18	10				9	
16500		2	10	10				10	
16500		3	19	10				10	
16500		4	7	10				10	
33000		1	12	10				10	
33000		2	17	10				10	
33000		3	1	10				10	
33000		4	23	10				10	
66000		1	8	10				9	
66000		2	6	10				9	
66000		3	5	10				7	
66000		4	24	10				9	

GENERAL

Client	Vector Fire Technology
Project	Product Testing
Project Number	PG2195
Project Manager	M. Bennett
Date Sample Received	3/28/2025
Test type	96-Hour Acute Toxicity with FHM
Matrix	Liquid
Test Acceptability	≥ 90% average survival of control
Test Start Date	04/03/25
Test Species	<i>Pimephales promelas</i>
Organism Batch	ABS040225.01
Organism Acquired	4/2/2025
Organism Acclimation	1
Organism Age	7 days
Test Protocol	Tox 017
Regional Protocol	USEPA EPA-821-R-02-012
Test Location	Bath 1
Light Intensity	50-100 foot candles
Light Cycle	16L:8D
Water Description	moderately hard fresh water
Organisms per Replicate	10
Test Chamber Size	12 oz
Exposure Volume	250 mL
Feeding Information	0.2 mL <i>Artemia nauplii</i> 2 hrs prior to renewal (96-hour test)
Test Dissolved Oxygen	> 4
Test Temperature	20 ± 1
Conductivity	
Test pH	7.5 ± 1.5

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	Max
DO	4	
Temp	18.5	21.4
Conductivity		
pH	6	9

TEST START TIME/INIT: 1447 CS (TW/LG)

TEST END TIME/INIT: 1326 TVL

CLIENT SAMPLE ID	LAB ID
3SFF SP-100 batch #F032425-02X	P250328.07

Concentrations (mg/L)

1	Control
2	4125
3	8250
4	16500
5	33000
6	66000
7	-
8	-
9	-

Food Batch ID

491842

Copy and Past VALUES fro

Treatment	Rep	Chamber
Control	1	24
Control	2	4
Control	3	12
Control	4	22
4125	1	3
4125	2	21
4125	3	20
4125	4	17
8250	1	23
8250	2	7
8250	3	8
8250	4	13
16500	1	6
16500	2	10
16500	3	14
16500	4	2
33000	1	5
33000	2	1
33000	3	18
33000	4	16
66000	1	15
66000	2	19
66000	3	9
66000	4	11
.	1	
.	2	
.	3	
.	4	

V.1

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	3SFF SP-100 batch #F032425-02X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.07	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM

Day of Test	Concentration (mg/L)	Spiking Amount (mg/L)	Total Volume (mL)	Diluent Type	RFW
0	0	0	1000		
	4125	4125	1000		
	8250	8250	1000		
	16500	16500	1000		
	33000	33000	1000		
	66000	66000	1000		

Day of Test	Concentration (mg/L)	Spiking Amount (mg/L)	Total Volume (mL)
2	0	0	1000
	4125	4125	1000
	8250	8250	1000
	16500	16500	1000
	33000	33000	1000
	66000	66000	1000

Test Dilution Prep

Date	Balance ID	Sample ID (P#)	Water Batch ID	Initials	Comments
4/3/2025	7	P25038.07	RFW032525.01	LG	Higher concentrations are frothy, 66000 concent
4/5/2025	7	P25038.07	RFW040225.01	SN	mold growing in product jar

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	3SFF SP-100 batch #F032425-02X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.07	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM

		Concentration (mg/L)	DO (mg/L)	TEMP (°C)	CONDUCTIVITY	pH	Comments
			> 4	19 - 21	(µS/cm)	6 - 9	
Day 0		Control	9.2	19.1	343	7.8	
Stock		4125	9.2	19.2	432	7.8	
Date	04/03/25	8250	9.2	19.1	496	7.9	
Time	1313	16500	9.2	19.2	721	8.0	
Tech	MM	33000	9.2	19.2	1090	8.0	
Meter #	7	66000	9.2	19.1	1826	8.2	
Day 1		Control	8.6	19.3	358	8.0	Test was aerated by mistake. MB 4/30/25
Rep 1		4125	7.2	19.3	442	7.7	
Date	04/04/25	8250	6.4	19.3	534	7.6	
Time	7:29	16500	5.0	19.3	719	7.6	
Tech	TVL	33000	5.7	19.3	1092	7.7	
Meter #	8	66000	4.1	19.4	1808	7.6	
Day 2		Control	9.4	19.3	362	8.2	
Rep 2		4125	9.2	19.7	443	8.2	
Date	04/05/25	8250	9.1	19.6	540	8.2	
Time	1135	16500	9.0	19.5	721	8.2	
Tech	SN	33000	8.3	19.5	1074	7.9	
Meter #	7	66000	7.4	19.4	1835	7.8	
Day 2		Control	9.3	19.2	325	8.2	
Renewal Stock		4125	9.2	19.5	422	8.1	
Date	04/05/25	8250	9.2	19.4	515	8.2	
Time	1127	16500	9.2	19.3	707	8.2	
Tech	SN	33000	9.2	19.4	1084	8.2	
Meter #	7	66000	9.2	19.3	1822	8.2	
Day 3		Control	8.9	20.1	327	8.2	
Rep 3		4125	8.7	20.3	425	8.2	
Date	04/06/25	8250	8.6	20.3	518	8.1	
Time	1508	16500	8.5	20.2	714	8.1	
Tech	KD	33000	7.3	20.1	1094	7.8	
Meter #	7	66000	3.4	20.2	1843	7.5	DO out of range, management notified; airflow to chamber increased - KD 4/6/25
Day 4		Control	8.6	19.4	333	8.2	
Rep 4		4125	8.9	19.4	435	8.2	
Date	04/07/25	8250	8.8	19.4	529	8.2	
Time	803	16500	8.0	19.5	717	7.9	
Tech	TVL	33000	8.1	19.6	1112	8.0	
Meter #	7	66000	6.8	19.5	1882	7.9	

v.1

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	100 batch #F032425-02X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.07	MATRIX	Liquid	NO. OF ORGANISMS	10

Abbreviation Key:

NB = No Body

FB = Found Body

ST = Stranded

96-Hour Acute Toxicity with FHM

Abbreviation Key:
NB = No Body
FB = Found Body
ST = Stranded

Concentration (mg/L)		REP	Day 1			Day 2			Day 3			Day 4			Comments
			Date	04/04/25		Date	04/05/25		Date	04/06/25		Date	04/07/25		
			Time	752		Time	1326		Time	1623		Time	1326		
			Tech	TVL		Tech	SN		Tech	KD		Tech	TVL		
Alive		Dead	Obs	Alive		Dead	Obs	Alive		Dead	Obs	Alive		Dead	Obs
Control	1	10	0		10	0		10	0		10	0			
	2	10	0		10	0		10	0		10	0			
	3	10	0		10	0		10	0		10	0			
	4	10	0		10	0		10	0		10	0			
4125	1	10	0		10	0		9	1		9	0			
	2	10	0		10	0		10	0		10	0			
	3	10	0		10	0		10	0		10	0			
	4	9	1		10	0		10	0		10	0			
8250	1	10	0		10	0		10	0		10	0			
	2	10	0		10	0		10	0		10	0			
	3	10	0		10	0		9	1		9	0			
	4	10	0		10	0		10	0		10	0			
16500	1	10	0		9	1		9	0		9	0			
	2	10	0		10	0		10	0		10	0			
	3	10	0		10	0		10	0		10	0			
	4	10	0		10	0		10	0		10	0			
33000	1	10	0		10	0		10	0		10	0			
	2	10	0		10	0		10	0		10	0			
	3	10	0		10	0		10	0		10	0			
	4	10	0		10	0		10	0		10	0			
66000	1	10	0		10	0		9	1		9	0			
	2	9	1		9	0		9	0		9	0			
	3	8	2		8	0		7	1		7	0			
	4	10	0		10	0		9	0		9	0			
Feed (Time/Init.)															
0.2 mL Artemia nauplii 2 hrs prior to renewal (96-hour test)					NL										

CETIS Summary Report

Report Date: 15 Apr-25 10:26 (p 1 of 1)
 Test Code/ID: P250328.06 / 01-8390-9876

Fathead Minnow 96-h Acute Survival Test

EcoAnalysts

Batch ID: 05-9151-7865 Test Type: Survival (96h) Analyst: Michelle Bennett
 Start Date: 03 Apr-25 14:47 Protocol: EPA/821/R-02-012 (2002) Diluent: Mod-Hard Synthetic Water
 Ending Date: 07 Apr-25 13:03 Species: Pimephales promelas Brine:
 Test Length: 94h Taxon: Actinopterygii Source: Aquatic Biosystems, CO Age: 7D

Sample ID: 02-7866-8467 Code: P250328.06 Project: Product Testing
 Sample Date: 24 Mar-25 16:45 Material: Product Testing Source: Vector Fire Technology
 Receipt Date: 28 Mar-25 12:20 CAS (PC): Station: 3SFF-ARK batch #F032425-03X
 Sample Age: 9d 22h (16.2 °C) Client: Vector Fire Technology

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓ NOEL	LOEL	TOEL	PMSD	S
06-6849-6286	96h Proportion Survived	Steel Many-One Rank Sum Test	66000	>66000	---	5.9%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓ Level	mg/L	95% LCL	95% UCL	S
09-9909-5993	96h Proportion Survived	Linear Interpolation (ICPIN)	EC50	>66000	---	---	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
06-6849-6286	96h Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria
09-9909-5993	96h Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria

96h Proportion Survived Summary

Conc-mg/L	Code	Count	Mean	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%	0.00%
4125		4	0.9750	0.8954	1.0550	0.9000	1.0000	0.0250	0.0500	5.13%	2.50%
8250		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
16500		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
33000		4	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.00%
66000		4	0.9500	0.8581	1.0420	0.9000	1.0000	0.0289	0.0577	6.08%	5.00%

96h Proportion Survived Detail

MD5: 10B039DCE964971217354AF456BF3125

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
4125		1.0000	1.0000	1.0000	0.9000
8250		1.0000	1.0000	1.0000	1.0000
16500		1.0000	1.0000	1.0000	1.0000
33000		1.0000	1.0000	1.0000	1.0000
66000		1.0000	0.9000	0.9000	1.0000

96h Proportion Survived Binomials

Conc-mg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
4125		10/10	10/10	10/10	9/10
8250		10/10	10/10	10/10	10/10
16500		10/10	10/10	10/10	10/10
33000		10/10	10/10	10/10	10/10
66000		10/10	9/10	9/10	10/10

CETIS Test Data Worksheet

Report Date: 15 Apr-25 10:25 (p 1 of 1)
 Test Code/ID: P250328.06 / 01-8390-9876

Fathead Minnow 96-h Acute Survival Test

EcoAnalysts

Start Date: 03 Apr-25 14:47 Species: Pimephales promelas Sample Code: P250328.06
 End Date: 07 Apr-25 13:03 Protocol: EPA/821/R-02-012 (2002) Sample Source: Vector Fire Technology
 Sample Date: 24 Mar-25 16:45 Material: Product Testing Sample Station: 3SFF-ARK batch #F032425-03X

Conc-mg/L	Code	Rep	Pos	# Exposed	Survival 24h	Survival 48h	Survival 72h	Survival 96h	Notes
0	D	1	1	10				10	
0	D	2	17	10				10	
0	D	3	23	10				10	
0	D	4	5	10				10	
4125		1	9	10				10	
4125		2	7	10				10	
4125		3	6	10				10	
4125		4	21	10				9	
8250		1	18	10				10	
8250		2	19	10				10	
8250		3	10	10				10	
8250		4	16	10				10	
16500		1	15	10				10	
16500		2	13	10				10	
16500		3	11	10				10	
16500		4	12	10				10	
33000		1	14	10				10	
33000		2	20	10				10	
33000		3	24	10				10	
33000		4	4	10				10	
66000		1	8	10				10	
66000		2	3	10				9	
66000		3	22	10				9	
66000		4	2	10				10	

GENERAL

Client	Vector Fire Technology
Project	Product Testing
Project Number	PG2195
Project Manager	M. Bennett
Date Sample Received	3/28/2025
Test type	96-Hour Acute Toxicity with FHM
Matrix	Liquid
Test Acceptability	≥ 90% average survival of control
Test Start Date	04/03/25
Test Species	<i>Pimephales promelas</i>
Organism Batch	ABS040225.01
Organism Acquired	4/2/2025
Organism Acclimation	1
Organism Age	7 days
Test Protocol	Tox 017
Regional Protocol	USEPA EPA-821-R-02-012
Test Location	Bath 1
Light Intensity	50-100 foot candles
Light Cycle	16L:8D
Water Description	moderately hard fresh water
Organisms per Replicate	10
Test Chamber Size	12 oz
Exposure Volume	250 mL
Feeding Information	0.2 mL <i>Artemia nauplii</i> 2 hrs prior to renewal (96-hour test)
Test Dissolved Oxygen	> 4
Test Temperature	20 ± 1
Conductivity	
Test pH	7.5 ± 1.5

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	Max
DO	4	
Temp	18.5	21.4
Conductivity		
pH	6	9

TEST START TIME/INIT: 1447 CS (TW/LG)

TEST END TIME/INIT: 1303 TVL

CLIENT SAMPLE ID	LAB ID
3SFF-ARK batch #F032425-03X	P250328.06

Concentrations (mg/L)

1	Control
2	4125
3	8250
4	16500
5	33000
6	66000
7	.
8	.
9	.

Food Batch ID
491842

Copy and Past VALUES from

Treatment	Rep	Chamber
Control	1	24
Control	2	4
Control	3	12
Control	4	22
4125	1	3
4125	2	21
4125	3	20
4125	4	17
8250	1	23
8250	2	7
8250	3	8
8250	4	13
16500	1	6
16500	2	10
16500	3	14
16500	4	2
33000	1	5
33000	2	1
33000	3	18
33000	4	16
66000	1	15
66000	2	19
66000	3	9
66000	4	11
.	1	
.	2	
.	3	
.	4	

v.1

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	3SFF-ARK batch #F032425-03X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.06	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM

Day of Test	Concentration (mg/L)	Spiking Amount (mg/L)	Total Volume (mL)	Diluent Type	RFW
0	0	0	1000		
	4125	4125	1000		
	8250	8250	1000		
	16500	16500	1000		
	33000	33000	1000		
	66000	66000	1000		

Day of Test	Concentration (mg/L)	Spiking Amount (mg/L)	Total Volume (mL)
2	0	0	1000
	4125	4125	1000
	8250	8250	1000
	16500	16500	1000
	33000	33000	1000
	66000	66000	1000

Test Dilution Prep

Date	Balance ID	Sample ID (P#)	Water Batch ID	Initials	Comments
4/3/2025	7	P250328.06	RFW032525.01	LG	Higher concentrations are frothy, 66000 concentration is slightly viscous-LG 4/3
4/5/2025	7	P250328.06	RFW040225.01	SN	mold growing in product jar

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	3SFF-ARK batch #F032425-03X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.06	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Toxicity with FHM

		Concentration (mg/L)	DO (mg/L)	TEMP (°C)	CONDUCTIVITY (µS/cm)	pH	Comments
Day 0		Control	9.2	18.9	352	8.0	
Stock		4125	9.2	18.9	439	8.0	
Date	04/03/25	8250	9.2	19.0	537	8.0	
Time	1404	16500	9.2	19.0	733	8.0	
Tech	MM	33000	9.2	19.0	1119	8.0	
Meter #	7	66000	9.2	19.0	1887	8.0	
Day 1		Control	8.3	19.4	352	7.7	
Rep 1		4125	7.3	19.3	435	7.7	
Date	04/04/25	8250	7.1	19.4	528	7.7	
Time	755	16500	6.0	19.4	715	7.6	
Tech	TVL	33000	5.3	19.4	1065	7.6	
Meter #	8	66000	3.2	19.4	1706	7.7	low DO- TVL 4/4/25
Day 2		Control	8.3	19.6	361	7.9	
Rep 2		4125	5.0	19.6	448	7.5	
Date	04/05/25	8250	3.7	19.7	538	7.4	***Test was aerated 4/5/25 SN
Time	1013	16500	1.8	19.7	720	7.3	
Tech	SN	33000	1.1	19.7	1083	7.4	
Meter #	7	66000	1.6	19.6	1784	7.4	
Day 2		Control	9.2	19.4	323	8.2	
Renewal Stock		4125	9.2	19.5	434	8.1	
Date	04/05/25	8250	9.2	19.4	519	8.1	
Time	1118	16500	9.2	19.4	716	8.0	
Tech	SN	33000	9.2	19.3	1099	7.9	
Meter #	7	66000	9.1	19.4	1864	7.8	
Day 3		Control	8.9	20.1	333	8.2	
Rep 3		4125	8.7	20.0	436	8.1	
Date	04/06/25	8250	8.7	20.1	522	8.1	
Time	1536	16500	8.2	19.8	718	7.9	
Tech	KD	33000	7.0	19.8	1103	7.7	
Meter #	7	66000	6.0	19.6	1901	7.7	
Day 4		Control	8.8	19.1	340	8.2	
Rep 4		4125	8.8	19.2	444	8.2	
Date	04/07/25	8250	8.9	19.2	531	8.1	
Time	751	16500	8.5	19.3	731	8.0	
Tech	TVL	33000	8.2	19.4	1128	8.0	
Meter #	7	66000	8.7	19.2	1980	8.2	

v.1

CLIENT	Vector Fire Technology	DATE RECEIVED	3/28/25	PROTOCOL	Tox 017
PROJECT	Product Testing	TEST START DATE	4/3/25	PROJECT MANAGER	M. Bennett
CLIENT SAMPLE ID	ARK batch #F032425-03X	TEST END DATE	4/7/25	SPECIES	<i>Pimephales promelas</i>
LAB SAMPLE ID	P250328.06	MATRIX	Liquid	NO. OF ORGANISMS	10

Abbreviation Key:

NB = No Body
FB = Found Body
ST = Stranded

96-Hour Acute Toxicity with FHM

Abbreviation Key:
 NB = No Body
 FB = Found Body
 ST = Stranded

		Day 1			Day 2			Day 3			Day 4			
		Date	04/04/25		Date	04/05/25		Date	04/06/25		Date	04/07/25		
		Time	805		Time	1421		Time	06/05/04		Time	1302		
		Tech	TVL		Tech	SN		Tech	NL		Tech	TVL		
Concentration (mg/L)	REP	Alive	Dead	Obs	Alive	Dead	Obs	Alive	Dead	Obs	Alive	Dead	Obs	Comments
Control	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
4125	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		9	0	1NB	9	0		9	0		
8250	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
16500	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
33000	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
66000	1	10	0		10	0		10	0		10	0		
	2	9	1		9	0		9	0		9	0		
	3	10	0		10	0		10	0		9	1		
	4	10	0		10	0		10	0		10	0		
Feed (Time/Init.)														
0.2 mL Artemia nauplii 2 hrs prior to renewal (96-hour test)		NL												

ORGANISM RECEIPT LOG

Date: 4/2/25	Time: 1200	Batch No. ABS040225.01
Organism: Pimephales promelas		
Source / Supplier: ABS		
No. Ordered: 870	No. Received: 955	Source Batch: Collection date, <u>hatch date</u> etc.): 3/27/25
Condition of Organisms: Good		Approximate Size or Age: (Days from hatch, life stage, size class, etc.): 6 days old
Shipper: Fedex		B of L (Tracking No.) 4357 9735 3960
Condition of Container: Good		Received By: LG

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
A	21.8	20.4	381	7.4	2	-	LG
B	22.0	20.4	381	7.4	1	0.390	LG

*if >10% contact lab manager

Notes:

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 4/1/2025

SPECIES: *Pimephales promelas*

AGE: 5 day

LIFE STAGE: Larvae

HATCH DATE: 3/27/2025

BEGAN FEEDING: 3/28/2025

FOOD: *Artemia* sp.

Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>21°C</u>	<u>22-25°C</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>107 mg/l</u>	<u>80-120 mg/l</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>85 mg/l</u>	<u>80-100 mg/l</u>
pH:	<u>8.20</u>	<u>7.20-8.20</u>

Comments:



Facility Supervisor

Aquatic BioSystems, Inc • Quality Research Organisms

APPENDIX A1.1

Pimephales promelas (fathead minnow)

Reference Toxicant 96-Hour Survival Test

Reference Toxicant 96-h Acute Survival Test

All Matching Labs

Test Type: Survival

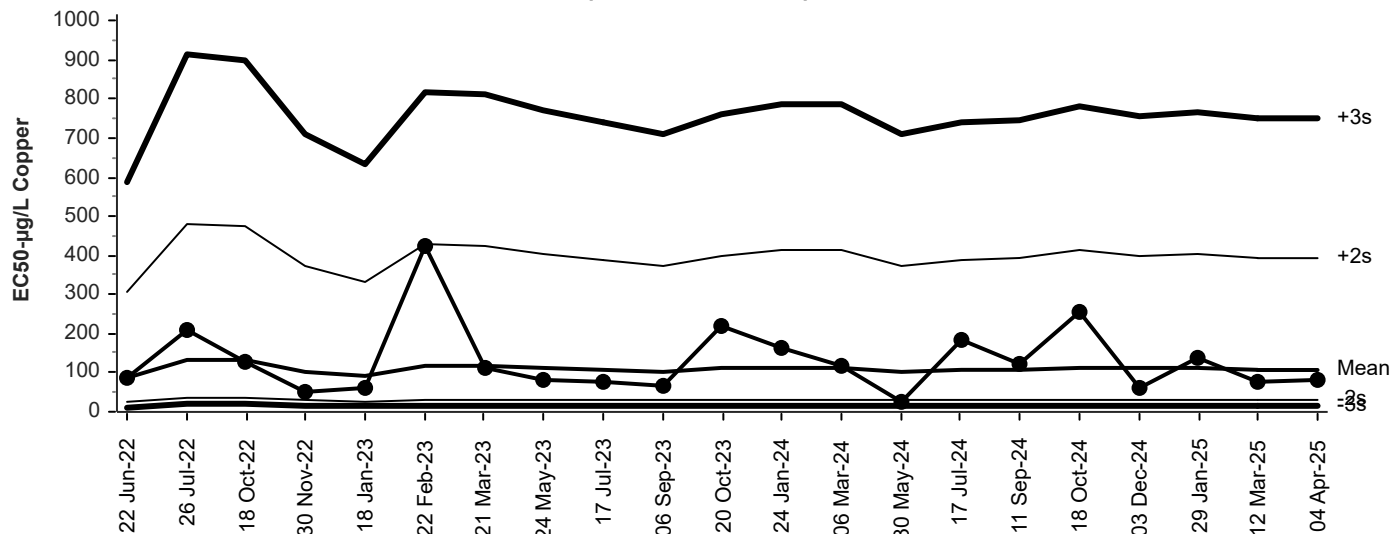
Organism: Pimephales promelas

Material: Copper

Protocol: EPA/821/R-02-012 (2002)

Endpoint: Proportion Survived

Source: Reference Toxicant-REF

Reference Toxicant 96-h Acute Survival Test
Proportion Survived Endpoint

Quality Control Data

Point	Year	Month	Day	Time	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID	Laboratory
1	2022	Jun	22	14:00	85.27	-23.7	-0.3812			09-2484-6701	03-6339-0355	EcoAnalysts
2		Jul	26	16:15	207.9	98.9	1.004			19-9606-8541	14-4105-6380	EcoAnalysts
3		Oct	18	15:33	126.6	17.6	0.2328			00-1244-9651	13-0675-8972	EcoAnalysts
4		Nov	30	17:05	50.09	-58.87	-1.208			05-6217-6706	05-6087-1351	EcoAnalysts
5	2023	Jan	18	15:48	59.46	-49.5	-0.9415			17-0281-5837	00-7848-0629	EcoAnalysts
6		Feb	22	14:21	423.7	314.7	2.111	(+)		19-9432-7182	17-7365-6004	EcoAnalysts
7		Mar	21	14:05	110	1.006	0.01429			04-0968-3570	09-3250-3169	EcoAnalysts
8		May	24	14:19	79.72	-29.24	-0.4857			20-8461-2086	00-7824-5483	EcoAnalysts
9		Jul	17	16:28	78.89	-30.07	-0.5019			18-7140-7619	00-8079-6291	EcoAnalysts
10		Sep	6	15:55	68.38	-40.59	-0.7244			10-4912-0113	18-0428-8216	EcoAnalysts
11		Oct	20	18:22	218.1	109.2	1.079			07-3619-2172	09-4739-7103	EcoAnalysts
12	2024	Jan	24	15:45	164.4	55.43	0.6393			00-7739-2786	15-8834-9791	EcoAnalysts
13		Mar	6	15:20	118.7	9.725	0.1329			11-6990-9224	11-8218-3094	EcoAnalysts
14		May	30	17:58	27.48	-81.48	-2.141	(-)		11-2670-8770	03-9667-1395	EcoAnalysts
15		Jul	17	15:49	185.6	76.62	0.8278			17-4003-3041	20-4812-4543	EcoAnalysts
16		Sep	11	16:50	122.5	13.49	0.1814			18-4320-0845	00-6696-7108	EcoAnalysts
17		Oct	18	13:10	256.2	147.2	1.329			19-3181-7814	10-5107-4387	EcoAnalysts
18		Dec	3	14:48	59.96	-49	-0.9285			03-9001-6808	19-9463-1325	EcoAnalysts
19	2025	Jan	29	14:33	135.7	26.71	0.3409			01-4802-7696	05-7735-2275	EcoAnalysts
20		Mar	12	14:04	75.06	-33.91	-0.5795			16-4733-4883	12-2190-5381	EcoAnalysts
21		Apr	4	14:05	80.91	-28.05	-0.4627			04-6721-1559	15-4504-9219	EcoAnalysts

CETIS Summary Report

Report Date: 15 Apr-25 10:42 (p 1 of 1)
Test Code/ID: R240207.68 / 04-6721-1559

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Batch ID: 03-8069-6417	Test Type: Survival	Analyst: Michelle Bennett
Start Date: 04 Apr-25 14:05	Protocol: EPA/821/R-02-012 (2002)	Diluent: Reconstituted Water
Ending Date: 08 Apr-25 13:11	Species: Pimephales promelas	Brine: Not Applicable
Test Length: 95h	Taxon: Actinopterygii	Source: Aquatic Biosystems, CO Age: 7D
Sample ID: 07-3392-0710	Code: R240207.68	Project: Reference Toxicant
Sample Date: 07 Feb-24	Material: Copper	Source: Reference Toxicant
Receipt Date: 07 Feb-24	CAS (PC):	Station: R240207.68
Sample Age: 422d 14h	Client: Internal Lab	

Multiple Comparison Summary

Analysis ID	Endpoint	Comparison Method	✓	NOEL	LOEL	TOEL	PMSD	S
17-1449-0162	Proportion Survived	Steel Many-One Rank Sum Test		50	100	70.71	18.0%	1

Point Estimate Summary

Analysis ID	Endpoint	Point Estimate Method	✓	Level	µg/L	95% LCL	95% UCL	S
15-4504-9219	Proportion Survived	Trimmed Spearman-Kärber		EC50	80.91	67.87	96.46	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits		Overlap	Decision
				Lower	Upper		
15-4504-9219	Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria
17-1449-0162	Proportion Survived	Control Resp	1	0.9	<<	Yes	Passes Criteria

Proportion Survived Summary

Conc-µg/L	Code	Count	Mean	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%	0.00%
25		4	0.9500	0.8581	1.0420	0.9000	1.0000	0.0289	0.0577	6.08%	5.00%
50		4	0.7500	0.4453	1.0550	0.6000	1.0000	0.0957	0.1915	25.53%	25.00%
100		4	0.4000	0.0563	0.7437	0.1000	0.6000	0.1080	0.2160	54.01%	60.00%
200		4	0.0750	-0.0046	0.1546	0.0000	0.1000	0.0250	0.0500	66.67%	92.50%
400		4	0.0500	-0.1091	0.2091	0.0000	0.2000	0.0500	0.1000	200.00%	95.00%

Proportion Survived Detail

MD5: 8B1350B8A2585F07293DD4C089DB041A

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
25		0.9000	0.9000	1.0000	1.0000
50		0.8000	1.0000	0.6000	0.6000
100		0.4000	0.1000	0.6000	0.5000
200		0.1000	0.1000	0.1000	0.0000
400		0.2000	0.0000	0.0000	0.0000

Proportion Survived Binomials

Conc-µg/L	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	10/10	10/10	10/10	10/10
25		9/10	9/10	10/10	10/10
50		8/10	10/10	6/10	6/10
100		4/10	1/10	6/10	5/10
200		1/10	1/10	1/10	0/10
400		2/10	0/10	0/10	0/10

CETIS Test Data Worksheet

Report Date: 15 Apr-25 10:40 (p 1 of 1)
Test Code/ID: R240207.68 / 04-6721-1559

Reference Toxicant 96-h Acute Survival Test

EcoAnalysts

Start Date: 04 Apr-25 14:05 Species: Pimephales promelas Sample Code: R240207.68
End Date: 08 Apr-25 13:11 Protocol: EPA/821/R-02-012 (2002) Sample Source: Reference Toxicant
Sample Date: 07 Feb-24 Material: Copper Sample Station: R240207.68

Conc-µg/L	Code	Rep	Pos	# Exposed	# Survived	Notes
0	D	1	1	10	10	
0	D	2	20	10	10	
0	D	3	6	10	10	
0	D	4	2	10	10	
25		1	11	10	9	
25		2	3	10	9	
25		3	24	10	10	
25		4	22	10	10	
50		1	4	10	8	
50		2	10	10	10	
50		3	16	10	6	
50		4	5	10	6	
100		1	8	10	4	
100		2	15	10	1	
100		3	21	10	6	
100		4	14	10	5	
200		1	17	10	1	
200		2	12	10	1	
200		3	13	10	1	
200		4	23	10	0	
400		1	19	10	2	
400		2	9	10	0	
400		3	18	10	0	
400		4	7	10	0	

GENERAL

Client	Internal
Associated Test	Various
Compound	Copper Chloride
Toxicant	Copper
Test Type	Reference Toxicant
Test type	96-Hour Acute Copper Ref Tox with FHM
Matrix	Liquid
Test Acceptability	≥ 90% average survival of control
Test Start Date	04/04/25
Test Species	<i>Pimephales promelas</i>
Organism Batch	ABS040225.01
Organism Acquired	4/2/2025
Organism Acclimation	2
Organism Age	7 Days
Test Protocol	TOX 017 / TOX 099
Regional Protocol	USEPA EPA-821-R-02-012
Test Location	Bath 1
Light Intensity	50-100 foot candles
Light Cycle	16L:8D
Water Description	moderately hard fresh water
Organisms per Replicate	10
Test Chamber Size	12 oz
Exposure Volume	250 mL
Feeding Information	0.2 mL <i>Artemia nauplii</i> 2 hrs prior to renewal (96-hour test)
Test Dissolved Oxygen	> 4
Test Temperature	20 ± 1
Conductivity	
Test pH	7.5 ± 1.5

Note: input lowest and highest decimal for temp

Test Parameters		
	Min	Max
DO	4	
Temp	18.5	21.4
Conductivity		
pH	6	9

TEST START TIME/INIT: 1405 MM (TVL)

TEST END TIME/INIT: 1311 EM

REFERENCE TOXICANT TEST ID	LOT #
R240207.68	BCCH9104

Concentrations (µg/L)

1	Control
2	25
3	50
4	100
5	200
6	400

Food Batch ID

311823

Copy and Past VALUES from

Treatment	Rep	Chamber
Control	1	19
Control	2	14
Control	3	18
Control	4	5
25	1	16
25	2	23
25	3	8
25	4	11
50	1	12
50	2	6
50	3	7
50	4	4
100	1	15
100	2	20
100	3	24
100	4	13
200	1	21
200	2	3
200	3	1
200	4	22
400	1	2
400	2	9
400	3	17
400	4	10

96-Hour Acute WET Test

v1	CLIENT	Internal	TEST TYPE	Reference Toxicant	PROTOCOL	TOX 017 / TOX 099
	ASSOCIATED TEST	Various	TEST START DATE	4/4/25	TOXICANT	Copper
	REF TOX ID	R240207.68	TEST END DATE	4/8/25	SPECIES	<i>Pimephales promelas</i>
	LOT #	BCCH9104	MATRIX	Liquid	NO. OF ORGANISMS	10

96-Hour Acute Copper Ref Tox with FHM

Dilution Preparation (Serial dilute by 50%)

CuCl ₂ *2H ₂ O Stock Solution (µg/L)	Target Stock Solution Conc. (µg/L)	Volume of Diluent (mLs)	Amt. of Toxicant (mL)
400,000	400	2000	2.00
400,000	200	2000	1.00
400,000	100	2000	0.50

Test Dilution Prep

Date	Balance ID	Water Batch ID	Initials	Highest Concentration Prepared	Comments
4/4/2025	7	RFW040225.01	EM	400	
4/6/2025	7	RFW040225.01	KD	400	

Water Quality

	Concentration (µg/L)	DO (mg/L)	TEMP (°C)	CONDUCTIVITY (µS/cm)	pH
	> 4	20 ± 1			7.5 ± 1.5
Day 0 (Stock)	Control	9.2	20.6	337	8.3
Date 4/4/2025	25	9.2	20.8	321	8.3
Time 1158	50	9.2	20.5	322	8.4
Tech EM	100	9.2	20.8	322	8.4
Meter # 7	200	9.2	20.6	321	8.4
	400	9.2	20.6	322	8.3
Daily WQ	Day 1	Day 2	Day 3	Day 4	
Meter #	T16	T16	T17		
Temp. Old	19.8	19.7	20.0		
Temp. New		19.6			
Day 4	Control	7.6	19.6	342	7.7
Replicate # 1	25	8.2	19.6	330	7.9
Date 4/8/2025	50	8.0	19.7	330	7.9
Time 1104	100	8.3	19.7	328	8.0
Tech EM	200	8.5	19.4	323	8.0
Meter # 10	400	8.5	19.7	330	8.0

Comments

v.1

CLIENT	Internal	TEST TYPE	Reference Toxicant	PROTOCOL	TOX 017 / TOX 099
ASSOCIATED TEST	Various	TEST START DATE	4/4/25	TOXICANT	Copper
REF TOX ID	R240207.68	TEST END DATE	4/8/25	SPECIES	<i>Pimephales promelas</i>
LOT #	BCCH9104	MATRIX	Liquid	NO. OF ORGANISMS	10

Abbreviation Key:

NB = No Body

FB = Found Body

ST = Stranded

96-Hour Acute Copper Ref Tox with FHM

Abbreviation Key:
NB = No Body
FB = Found Body
ST = Stranded

		Day 1			Day 2			Day 3			Day 4			
		Date	04/05/25		Date	04/06/25		Date	04/07/25		Date	04/08/25		
		Time	1231		Time	1317		Time	835		Time	1311		
		Tech	SN		Tech	KD		Tech	TVL		Tech	EM		
Concentration (µg/L)	REP	Alive	Dead	Obs	Alive	Dead	Obs	Alive	Dead	Obs	Alive	Dead	Obs	Comments
Control	1	10	0		10	0		10	0		10	0		
	2	10	0		10	0		10	0		10	0		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
25	1	10	0		9	1		9	0		9	0		
	2	10	0		10	0		10	0		9	1		
	3	10	0		10	0		10	0		10	0		
	4	10	0		10	0		10	0		10	0		
50	1	10	0		9	1		9	0		8	1		
	2	10	0		10	0		10	0		10	0		
	3	10	0		7	3		7	0		6	1		
	4	10	0		8	2		8	0		6	2		
100	1	8	2		6	2		6	0		4	2		
	2	8	2		3	5		3	0		1	2		
	3	8	2		6	2		6	0		6	0		
	4	8	2		5	3		5	0		5	0		
200	1	2	8		2	0		2	0		1	1		
	2	2	8		1	1		1	0		1	0		
	3	5	5		1	4		1	0		1	0		
	4	5	5		1	4		1	0		0	1		
400	1	4	6		4	0		3	1		2	1		
	2	0	10											
	3	1	9		1	0		0	1					
	4	2	8		1	1		1	0		0	1		
Feed (Time/Init.)														
0.2 mL Artemia nauplii 2 hrs prior to renewal (96-hour test)					TW									

ORGANISM RECEIPT LOG

Date: 4/2/25	Time: 1200	Batch No. ABS040225.01
Organism: Pimephales promelas		
Source / Supplier: ABS		
No. Ordered: 870	No. Received: 955	Source Batch: Collection date, <u>hatch date</u> etc.): 3/27/25
Condition of Organisms: Good		Approximate Size or Age: (Days from hatch, life stage, size class, etc.): 6 days old
Shipper: Fedex		B of L (Tracking No.): 4357 9735 3960
Condition of Container: Good		Received By: LG

Container	D.O. (mg/L)	Temp. (°C)	Cond. or Sal. (Include Units)	pH (Units)	# Dead	% Dead*	Tech. (Initials)
A	21.8	20.4	381	7.4	2	-	LG
B	22.0	20.4	381	7.4	1	0.390	LG

*if >10% contact lab manager

Notes:

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524



Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 4/1/2025

SPECIES: *Pimephales promelas*

AGE: 5 day

LIFE STAGE: Larvae

HATCH DATE: 3/27/2025

BEGAN FEEDING: 3/28/2025

FOOD: *Artemia* sp.

Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>21°C</u>	<u>22-25°C</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>107 mg/l</u>	<u>80-120 mg/l</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>85 mg/l</u>	<u>80-100 mg/l</u>
pH:	<u>8.20</u>	<u>7.20-8.20</u>

Comments:



Facility Supervisor

Aquatic BioSystems, Inc • Quality Research Organisms

APPENDIX A2

Safety Data Sheets (SDS)

1. IDENTIFICATION

Product Name	Planit Safe™ 3SFF- USP
Recommended use of the chemical	Surrogate Test Liquid
And restrictions on use	See Section 15
Company Identification	Vector Fire Technology, Inc. 1017 Charles St. Unit B Coatesville, PA 19320
Customer Information Number	(610) 466-1717
Emergency Telephone Number	(610) 466-1717
Issue Date	November 17, 2022
Revision Date	April 24, 2025 (Rev. B 042425)
Supersedes Date	March 25, 2025

Safety Data Sheet prepared in accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200) and the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

* Refer to Section 9 Physical and Chemical Properties

2. HAZARD IDENTIFICATION

Hazard Classification
Eye damage/Irritation – 4

Label Elements
Hazard Symbols



Signal Word: Warning

Hazard Statements
Contact with liquid may cause eye irritation.

Precautionary Statements

Prevention
Wash hands thoroughly after handling.
Wear eye protection.

Response
If in eyes: Flush with water for 15 minutes. Remove contact lenses if present and easy to do.
If eye irritation persists, get medical advice/attention.

Storage
None

Disposal
None

Other Hazards
Not identified



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

Specific Concentration Limits

The values listed below represent the percentages of ingredients of unknown toxicity

Acute oral toxicity	<5%
Acute dermal toxicity	<5%
Acute inhalation toxicity	<5%
Acute aquatic toxicity	<5%

3. COMPOSITION / INFORMATION ON INGREDIENTS

This product is a mixture

Component	CAS Number	Concentration
Water	7732-18-5	88-91%
Potassium Chloride	7447-40-7	<2%
Sodium Benzoate	532-32-1	<1%
Potassium Sorbate	24634-61-5	<1%
Propylene Glycol	57-55-6	<9%
Xanthan Gum	11138-66-2	<2%

4. FIRST-AID MEASURES

Description of necessary 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.

Eyes

Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if irritation persists.

Skin

Wash skin thoroughly with soap and water. Launder clothing before re-use.

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.

Most important symptoms/effects, acute and delayed

Aside from the information found under Description of necessary first-aid measures (above) and indication of immediate medical attention and special treatment needed, no additional symptoms



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

and effects are anticipated.

Indication of immediate medical attention and special treatment needed

None

Notes to Physicians

Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

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

Specific hazards arising from the chemical

None known

Specific protective actions for fire-fighters

None

6. ACCIDENTIAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

NOTE: Review FIRE-FIGHTING MEASURES and HANDLING (Personnel) sections before proceeding with clean-up. Use appropriate Personal Protective Equipment during clean-up. Exercise caution, surfaces may be slippery.

Environmental Precautions

Stop flow if possible. Dilute with water to meet existing water quality standards. Flush area with water.

Methods and materials for containment and clean-up

Contain and absorb using appropriate inert materials and transfer into suitable containers for recovery or disposal in accordance with federal, state and local regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

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

Conditions for safe storage

Store in original containers or tanks designed for product storage, between 35°F and 120°F (2°C and 49°C). Storage area should be cool, dry, under cover and out of direct sunlight.



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Appropriate engineering controls

Special ventilation is not required.

Individual protection measures

Respiratory Protection

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State	Liquid
Color	Water White
Odor	Bland
Odor Threshold	No data available
pH	6.3 – 7.2
Specific Gravity	1.00 – 1.02 @ 20 deg. C
Boiling Range/Point (°C/F)	84.4 C, 185 F
Melting Point	4.4 C, 24 F
Flash Point	n/a - water based liquid
Vapor Pressure	No data available
Evaporation Rate (BuAc=1)	<1
Solubility in Water	Soluble (100%) – requires physical agitation
Vapor Density (Air = 0)	n/a
VOC %	No data available
Partition coefficient (n-octanol/water)	No data available
Viscosity (centipoise)	200 – 8000 cps*
Auto-Ignition Temperature	n/a
Decomposition Temperature	No data available
Upper explosive limit	n/a
Lower explosive limit	n/a
Flammability (solid, gas)	n/a

* Non-Newtonian shear sensitive liquid. Viscosity varies with shear rate.



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical Stability

Stable

Possibility of Hazardous Reactions

Hazardous polymerization will not occur

Conditions to Avoid

Contact with incompatible materials

Incompatible Materials

Water reactive materials- burning metals – electrically energized equipment

Hazardous Decomposition Products

None

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

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

Specific Target Organ Toxicity (STOT) – single exposure

No data available

Specific Target Organ Toxicity (STOT) – repeat exposure

No data available

Serious Eye Damage/Irritation

No data available

Respiratory or Skin Sensitization

No data available

Carcinogenicity

No data available

Germ Cell Mutagenicity

No data available

Reproductive Toxicity

No data available

Aspiration Hazard

No data available



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

12. ECOLOGICAL INFORMATION

Ecotoxicity

See Ecotoxicological Information Aquatic Toxicity below.

Mobility in Soil

No relevant studies identified

Persistence/Degradability

See Environmental Fate below

No relevant studies identified

Bioaccumulative Potential

Other Adverse Effects

No relevant studies identified

Ecotoxicological Information Aquatic Toxicity

The acute toxicity of Planit Safe™ 3SFF SP-100 Surrogate Test Liquid has been studied and determined to have no adverse effects when evaluated in a 96-hour dilution series test using Fathead Minnows, *Pimephales promelas*, as a test specimen. This testing protocol was performed in accordance with EPA Method 2000.0. The 96-hour EC₅₀/LC₅₀ was determined to be 63,710 mg/L. It is unlikely that Planit Safe in the environment would approach the highest concentration used in this dilution series.

Environmental Fate

	Method	As shipped (mg/L)	As proportioned (diluted) at 3% with water (mg/L)
BOD ₅	SM 5210 B	99,300	2,979
COD	EPA 410.4	183,667	5,510

13. DISPOSAL CONSIDERATIONS

Planit Safe™ 3SFF- USP Surrogate 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 and local authorities having jurisdiction regarding the proper regulations or concerns encompassed within your site disposal plan.

Planit Safe™ 3SFF- USP Surrogate Test Liquid Concentrate can be treated by wastewater treatment facilities. Discharge into biological sewer treatment facilities may be done with prior approval. Specific concerns are high BOD load. Dilution will reduce BOD 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. **This material is non-foaming.**



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

14. TRANSPORT INFORMATION

Shipping information

Proper Shipping Name: Not a DOT-Hazardous Substance

Hazard Class: Not Regulated

UN Number: None

This information is not intended to convey all transportation classifications that may apply to this product. Classifications may vary by container volume and by regional regulations. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules when transporting this material.

15. REGULATORY INFORMATION

U.S. Federal Regulations

Toxic Substances Control Act (TCSA)

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

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

SARA Title III Sect. 302/304

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

SARA Title III Sect. 311/312 Categorization

This material does not contain any components subject to Sections 311 and 312 reporting requirements.

SARA Title III Sect. 313

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

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

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



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

16. OTHER INFORMATION

NFPA Ratings

NFPA Code for Health - 0

NFPA Code for Flammability - 0

NFPA Code for Reactivity - 0

NFPA Code for Special Hazards – None

State Regulations

Pennsylvania Right-To-Know Hazardous Substance List

PA Hazardous Substance present at levels greater than 1%
None

16. OTHER INFORMATION

Legend

ACGIH: American Conference of Governmental Industrial Hygienists

BOD5: Biochemical Oxygen Demand (5 day)

CAS#: Chemical Abstracts Service Number

COD: Chemical Oxygen Demand

EC50: Effect Concentration 50%

IARC: International Agency for Research on Cancer

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

N/A: Denotes no applicable information found or available

OSHA: Occupational Safety and Health Administration

PEL: Permissible Exposure Limit

RQ: Reportable Quantity

STEL: Short Term Exposure Limit

TLV: Threshold Limit Value

TSCA: Toxic Substance Control Act

Release Date: April 24, 2025

Replaces: March 25, 2025

Changes made: Updated to include most recent environmental fate (BOD₅ and COD) data.



SAFETY DATA SHEET

PLANIT SAFE™ 3SFF-USP SURROGATE TEST LIQUID

Information Source and References

The information contained herein is furnished without warranty either expressed or implied. This data sheet is not 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 herefrom.

1. IDENTIFICATION

Product Name	Planit Safe™ 3SFF SP-100
Recommended use of the chemical	Surrogate Test Liquid
And restrictions on use	See Section 15
Company Identification	Vector Fire Technology, Inc. 1017 Charles St. Unit B Coatesville, PA 19320
Customer Information Number	(610) 466-1717
Emergency Telephone Number	(610) 466-1717
Issue Date	Nov. 8, 2023
Revision Date	April 24, 2025 – Rev. B 042425
Supersedes Date	03/21/25

Safety Data Sheet prepared in accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200) and the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

* Refer to Section 9 Physical and Chemical Properties

2. HAZARD IDENTIFICATION

Hazard Classification
Eye damage/Irritation – 4

Label Elements
Hazard Symbols



Signal Word: Warning

Hazard Statements
Contact with liquid may cause eye irritation.

Precautionary Statements

Prevention
Wash hands thoroughly after handling.
Wear eye protection.

Response
If in eyes: Flush with water for 15 minutes. Remove contact lenses if present and easy to do.
If eye irritation persists, get medical advice/attention.

Storage
None

Disposal
None

Other Hazards
Not identified



SAFETY DATA SHEET

PLANIT SAFE™ 3SFF SP-100 SURROGATE TEST LIQUID

2. HAZARD IDENTIFICATION

Specific Concentration Limits

The values listed below represent the percentages of ingredients of unknown toxicity

Acute oral toxicity	<5%
Acute dermal toxicity	<5%
Acute inhalation toxicity	<5%
Acute aquatic toxicity	<5%

3. COMPOSITION / INFORMATION ON INGREDIENTS

This product is a mixture

Component	CAS Number	Concentration
Water	7732-18-5	94-98%
Potassium Chloride	7447-40-7	<2%
Sodium Benzoate	532-32-1	<1%
Potassium Sorbate	24634-61-5	<1%
Xanthan Gum	11138-66-2	<1%
Hydroxypropyl Methylcellulose	9904-65-3	<1%

4. FIRST-AID MEASURES

Description of necessary 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, exit and relocate to fresh air. Seek medical attention if effects occur.

Eyes

Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if irritation persists.

Skin

Wash skin thoroughly with soap and water. Launder clothing before re-use.

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.



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF SP-100 SURROGATE TEST LIQUID

4. FIRST-AID MEASURES

Most important symptoms/effects, acute and delayed

Aside from the information found under Description of necessary first-aid measures (above) and indication of immediate medical attention and special treatment needed, no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

None

Notes to Physicians

Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

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

Specific hazards arising from the chemical

None known

Specific protective actions for fire-fighters

None

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

NOTE: Review FIRE-FIGHTING MEASURES and HANDLING (Personnel) sections before proceeding with clean-up. Use appropriate Personal Protective Equipment during clean-up. Exercise caution, surfaces may be slippery.

Environmental Precautions

Stop flow if possible. Dilute with water to meet existing water quality standards. Flush area with water.

Methods and materials for containment and clean-up

Contain and absorb using appropriate inert materials and transfer into suitable containers for recovery or disposal in accordance with federal, state and local regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

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

Conditions for safe storage

Store in original containers or tanks designed for product storage, between 35°F and 120°F



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF SP-100 SURROGATE TEST LIQUID

(2°C and 49°C). Storage area should be cool, dry, under cover and out of direct sunlight.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Appropriate engineering controls

Special ventilation is not required.

Individual protection measures

Respiratory Protection

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State	Liquid
Color	Water White
Odor	Bland
Odor Threshold	No data available
pH	6.3 – 7.2
Specific Gravity	1.00 – 1.02 @ 20 deg. C
Boiling Range/Point (°C/F)	84.4 C, 185 F
Melting Point	4.4 C, 24 F
Flash Point	n/a - water based liquid
Vapor Pressure	No data available
Evaporation Rate (BuAc=1)	<1
Solubility in Water	Soluble (100%) – requires physical agitation
Vapor Density (Air = 0)	n/a
VOC %	No data available
Partition coefficient (n-octanol/water)	No data available
Viscosity (centipoise)	200 – 4000 cps*
Auto-Ignition Temperature	n/a
Decomposition Temperature	No data available
Upper explosive limit	n/a
Lower explosive limit	n/a
Flammability (solid, gas)	n/a

* Non-Newtonian shear sensitive liquid. Viscosity varies with shear rate.

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical Stability

Stable

Possibility of Hazardous Reactions

Hazardous polymerization will not occur

Conditions to Avoid

Contact with incompatible materials

Incompatible Materials

Water-reactive materials – burning metals – electrically energized equipment

Hazardous Decomposition Products

None

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

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

Specific Target Organ Toxicity (STOT) – single exposure

No data available

Specific Target Organ Toxicity (STOT) – repeat exposure

No data available

Serious Eye Damage/Irritation

No data available

Respiratory or Skin Sensitization

No data available

Carcinogenicity

No data available

Germ Cell Mutagenicity

No data available

Reproductive Toxicity

No data available

Aspiration Hazard

No data available



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF SP-100 SURROGATE TEST LIQUID

12. ECOLOGICAL INFORMATION

Ecotoxicity

See Ecotoxicological Information Aquatic Toxicity below.

Mobility in Soil

No relevant studies identified

Persistence/Degradability

See Environmental Fate below

No relevant studies identified

Bioaccumulative Potential

Other Adverse Effects

No relevant studies identified

Ecotoxicological Information Aquatic Toxicity

The acute toxicity of Planit Safe™ 3SFF SP-100 Surrogate Test Liquid has been studied and determined to have no adverse effects when evaluated in a 96-hour dilution series test using Fathead Minnows, *Pimephales promelas*, as a test specimen. This testing protocol was performed in accordance with EPA Method 2000.0. The 96-hour EC₅₀/LC₅₀ was determined to be >66,000 mg/L. This was the highest concentration tested in the dilution series, and it is unlikely that Planit Safe in the environment would approach this concentration.

Environmental Fate

	Method	As shipped (mg/L)	As proportioned (diluted) at 3% with water (mg/L)
BOD ₅	SM 5210 B	14,233	427
COD	EPA 410.4	25,300	759

13. DISPOSAL CONSIDERATIONS

Planit Safe™ 3SFF SP-100 Surrogate 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 and local authorities having jurisdiction regarding the proper regulations or concerns encompassed within your site disposal plan.

Planit Safe™ 3SFF SP-100 Surrogate Test Liquid Concentrate can be treated by wastewater treatment facilities. Discharge into biological sewer treatment facilities may be done with prior approval. Specific concerns are high BOD load. Dilution will reduce BOD 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. **This material is non-foaming.**



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF SP-100 SURROGATE TEST LIQUID

14. TRANSPORT INFORMATION

Shipping information

Proper Shipping Name: Not a DOT-Hazardous Substance

Hazard Class: Not Regulated

UN Number: None

This information is not intended to convey all transportation classifications that may apply to this product. Classifications may vary by container volume and by regional regulations. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules when transporting this material.

15. REGULATORY INFORMATION

U.S. Federal Regulations

Toxic Substances Control Act (TCSA)

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

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

SARA Title III Sect. 302/304

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

SARA Title III Sect. 311/312 Categorization

This material does not contain any components subject to Sections 311 and 312 reporting requirements.

SARA Title III Sect. 313

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

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

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



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF SP-100 SURROGATE TEST LIQUID

16. OTHER INFORMATION

NFPA Ratings

NFPA Code for Health - 0

NFPA Code for Flammability - 0

NFPA Code for Reactivity - 0

NFPA Code for Special Hazards – None

State Regulations

Pennsylvania Right-To-Know Hazardous Substance List

PA Hazardous Substance present at levels greater than 1%
None

16. OTHER INFORMATION

Legend

ACGIH: American Conference of Governmental Industrial Hygienists

BOD5: Biochemical Oxygen Demand (5 day)

CAS#: Chemical Abstracts Service Number

COD: Chemical Oxygen Demand

EC50: Effect Concentration 50%

IARC: International Agency for Research on Cancer

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

N/A: Denotes no applicable information found or available

OSHA: Occupational Safety and Health Administration

PEL: Permissible Exposure Limit

RQ: Reportable Quantity

STEL: Short Term Exposure Limit

TLV: Threshold Limit Value

TSCA: Toxic Substance Control Act

Release Date: Apr 24, 2025

Replaces: March 21, 2025

Changes made: Updated to include most recent environmental fate (BOD₅ and COD) data.



SAFETY DATA SHEET

***PLANIT SAFE™ 3SFF SP-100* SURROGATE TEST LIQUID**

Information Source and References

The information contained herein is furnished without warranty either expressed or implied. This data sheet is not 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 herefrom.

1. IDENTIFICATION

Product Name	Planit Safe™ 3SFF- ARK
Recommended use of the chemical	Surrogate Test Liquid
And restrictions on use	See Section 15
Company Identification	Vector Fire Technology, Inc. 1017 Charles St. Unit B Coatesville, PA 19320
Customer Information Number	(610) 466-1717
Emergency Telephone Number	(610) 466-1717
Issue Date	Nov. 17, 2022
Revision Date	April 24, 2025 – Rev. B 042425
Supersedes Date	March 25, 2025

Safety Data Sheet prepared in accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200) and the Globally Harmonized System of Classification and Labeling of Chemicals (GHS)

* Refer to Section 9 Physical and Chemical Properties

2. HAZARD IDENTIFICATION

Hazard Classification
Eye damage/Irritation – 4

Label Elements
Hazard Symbols



Signal Word: Warning

Hazard Statements
Contact with liquid may cause eye irritation.

Precautionary Statements

Prevention
Wash hands thoroughly after handling.
Wear eye protection.

Response
If in eyes: Flush with water for 15 minutes. Remove contact lenses if present and easy to do.
If eye irritation persists, get medical advice/attention.

Storage
None

Disposal
None

Other Hazards
Not identified



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

Specific Concentration Limits

The values listed below represent the percentages of ingredients of unknown toxicity

Acute oral toxicity	<5%
Acute dermal toxicity	<5%
Acute inhalation toxicity	<5%
Acute aquatic toxicity	<5%

3. COMPOSITION / INFORMATION ON INGREDIENTS

This product is a mixture

Component	CAS Number	Concentration
Water	7732-18-5	94-98%
Potassium Chloride	7447-40-7	<2%
Sodium Benzoate	532-32-1	<1%
Potassium Sorbate	24634-61-5	<1%
Xanthan Gum	11138-66-2	<2%
Hydroxypropyl Methylcellulose	9904-65-3	<1%
Diutan Gum	125005-87-0	<1%
Triethanolamine-99%	102-71-6	<1%

4. FIRST-AID MEASURES

Description of necessary 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.

Eyes

Immediately flood the eye with plenty of water for at least 15 minutes, holding the eye open. Obtain medical attention if irritation persists.

Skin

Wash skin thoroughly with soap and water. Launder clothing before re-use.

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



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

unconscious person. Seek medical attention.

Most important symptoms/effects, acute and delayed

Aside from the information found under Description of necessary first-aid measures (above) and indication of immediate medical attention and special treatment needed, no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

None

Notes to Physicians

Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

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

Specific hazards arising from the chemical

None known

Specific protective actions for fire-fighters

None

6. ACCIDENTIAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

NOTE: Review FIRE-FIGHTING MEASURES and HANDLING (Personnel) sections before proceeding with clean-up. Use appropriate Personal Protective Equipment during clean-up. Exercise caution, surfaces may be slippery.

Environmental Precautions

Stop flow if possible. Dilute with water to meet existing water quality standards. Flush area with water.

Methods and materials for containment and clean-up

Contain and absorb using appropriate inert materials and transfer into suitable containers for recovery or disposal in accordance with federal, state and local regulations.

7. HANDLING AND STORAGE

Precautions for safe handling

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

Conditions for safe storage

Store in original containers or tanks designed for product storage, between 35°F and 120°F (2°C and 49°C). Storage area should be cool, dry, under cover and out of direct sunlight.



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PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Appropriate engineering controls

Special ventilation is not required.

Individual protection measures

Respiratory Protection

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State	Liquid
Color	Water White
Odor	Bland
Odor Threshold	No data available
pH	6.6 – 8.0
Specific Gravity	1.00 – 1.02 @ 20 deg. C
Boiling Range/Point (°C/F)	84.4 C, 185 F
Melting Point	4.4 C, 24 F
Flash Point	n/a - water based liquid
Vapor Pressure	No data available
Evaporation Rate (BuAc=1)	<1
Solubility in Water	Soluble (100%) – requires physical agitation
Vapor Density (Air = 0)	n/a
VOC %	No data available
Partition coefficient (n-octanol/water)	No data available
Viscosity (centipoise)	200 – 8000 cps*
Auto-Ignition Temperature	n/a
Decomposition Temperature	No data available
Upper explosive limit	n/a
Lower explosive limit	n/a
Flammability (solid, gas)	n/a

* Non-Newtonian shear sensitive liquid. Viscosity varies with shear rate.

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical Stability

Stable

Possibility of Hazardous Reactions

Hazardous polymerization will not occur

Conditions to Avoid

Contact with incompatible materials

Incompatible Materials

Water reactive materials- burning metals – electrically energized equipment

Hazardous Decomposition Products

None

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

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

Specific Target Organ Toxicity (STOT) – single exposure

No data available

Specific Target Organ Toxicity (STOT) – repeat exposure

No data available

Serious Eye Damage/Irritation

No data available

Respiratory or Skin Sensitization

No data available

Carcinogenicity

No data available

Germ Cell Mutagenicity

No data available

Reproductive Toxicity

No data available

Aspiration Hazard

No data available



SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

12. ECOLOGICAL INFORMATION

Ecotoxicity

See Ecotoxicological Information Aquatic Toxicity below.

Mobility in Soil

No relevant studies identified

Persistence/Degradability

See Environmental Fate below

No relevant studies identified

Bioaccumulative Potential

Other Adverse Effects

No relevant studies identified

Ecotoxicological Information Aquatic Toxicity

The acute toxicity of Planit Safe™ 3SFF SP-100 Surrogate Test Liquid has been studied and determined to have no adverse effects when evaluated in a 96-hour dilution series test using Fathead Minnows, *Pimephales promelas*, as a test specimen. This testing protocol was performed in accordance with EPA Method 2000.0. The 96-hour EC₅₀/LC₅₀ was determined to be >66,000 mg/L. This was the highest concentration tested in the dilution series, and it is unlikely that Planit Safe in the environment would approach this concentration.

Environmental Fate

	Method	As shipped (mg/L)	As proportioned (diluted) at 3% with water (mg/L)	At 6% with water (mg/L)
BOD ₅	SM 5210 B	13,933	418	836
COD	EPA 410.4	25,433	763	1,526

13. DISPOSAL CONSIDERATIONS

Planit Safe™ 3SFF- ARK Surrogate 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 and local authorities having jurisdiction regarding the proper regulations or concerns encompassed within your site disposal plan.

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SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

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Shipping information

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Hazard Class: Not Regulated

UN Number: None

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SARA Title III Sect. 302/304

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This material does not contain any components subject to Sections 311 and 312 reporting requirements.

SARA Title III Sect. 313

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SAFETY DATA SHEET
PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

16. OTHER INFORMATION

NFPA Ratings

NFPA Code for Health - 0

NFPA Code for Flammability - 0

NFPA Code for Reactivity - 0

NFPA Code for Special Hazards – None

State Regulations

Pennsylvania Right-To-Know Hazardous Substance List

PA Hazardous Substance present at levels greater than 1%

None

16. OTHER INFORMATION

Legend

ACGIH: American Conference of Governmental Industrial Hygienists

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CAS#: Chemical Abstracts Service Number

COD: Chemical Oxygen Demand

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IARC: International Agency for Research on Cancer

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

N/A: Denotes no applicable information found or available

OSHA: Occupational Safety and Health Administration

PEL: Permissible Exposure Limit

RQ: Reportable Quantity

STEL: Short Term Exposure Limit

TLV: Threshold Limit Value

TSCA: Toxic Substance Control Act

Release Date: Apr. 24, 2025

Replaces: March 25, 2025

Changes made: Updated to include most recent environmental fate (BOD₅ and COD) data.



SAFETY DATA SHEET

PLANIT SAFE™ 3SFF-ARK SURROGATE TEST LIQUID

Information Source and References

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APPENDIX B

Chain of Custody

CHAIN OF CUSTODY



EcoAnalysts, Inc.
4770 NE View Dr., Port Gamble, WA. 98364
Tel: (360) 297-6040

Destination: EcoAnalysts PG		Sample Originator (Organization): Vector Fire Technology, Inc.		Report Results To: Vector Fire Technology, Inc.		Phone: 610-662-3055	
Destination Contact: Michelle Bennett		PERSON WHO COLLECTED SAMPLE: Fay Purvis		Contact Name: Fay Purvis		Fax: N/A	
Date: 3/31/2025		Address: 1017 Charles St. Unit B, Coatesville, PA 19320		Address: 1017 Charles St. Unit B, Coatesville, PA 19320		Email: fpurvis@vectorfire.net	
Turn-Around-Time: Standard							
Project Name: Product Testing		Phone: 610-466-1717		Analyses:		Invoicing To: Rob Parker, e-mail: rparker@vectorfire.net	
		Fax: N/A				Comments or Special Instructions:	
Contract/PO: Ref #PG2195, Vector Fire Technology, Inc. P.O F032625-01		E-mail: fpurvis@vectorfire.net					

No.	Sample ID	Secondary ID: Replicate, X of Y, etc.	Matrix	Volume/Mass	Date	Time							Preservation	Sample Temp Upon Receipt	LAB ID
1	3SFF-ARK batch #F032425-03X		Gel	IL	03/24/25	4:45PM							None	16.2	P250328.06
2	3SFF SP-100 batch #F032425-02X		Gel	IL	03/24/25	5:30PM							None	16.2	P250328.07
3	3SFF-USP batch #F032425-01X		Gel	IL	03/24/25	3:10PM							None	13.2	P250328.08
4															
5															
6															
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20															

Relinquished by:		Received by:		Relinquished by:		Received by:		Matrix Codes FW = Fresh Water SB = Salt & Brackish Water SS = Soil & Sediment TS = Tissue
Name: Fay Purvis		Print Name: Nicole Lundgren		Print Name:		Print Name:		
Signature: Fay Purvis		Signature:		Signature:		Signature:		
Affiliation: Vector Fire Technology, Inc.		Affiliation: EcoAnalysts		Affiliation:		Affiliation:		
Date/Time: 3/31/25 10:53 AM		Date/Time: 3/28/25 12:20PM		Date/Time:		Date/Time:		