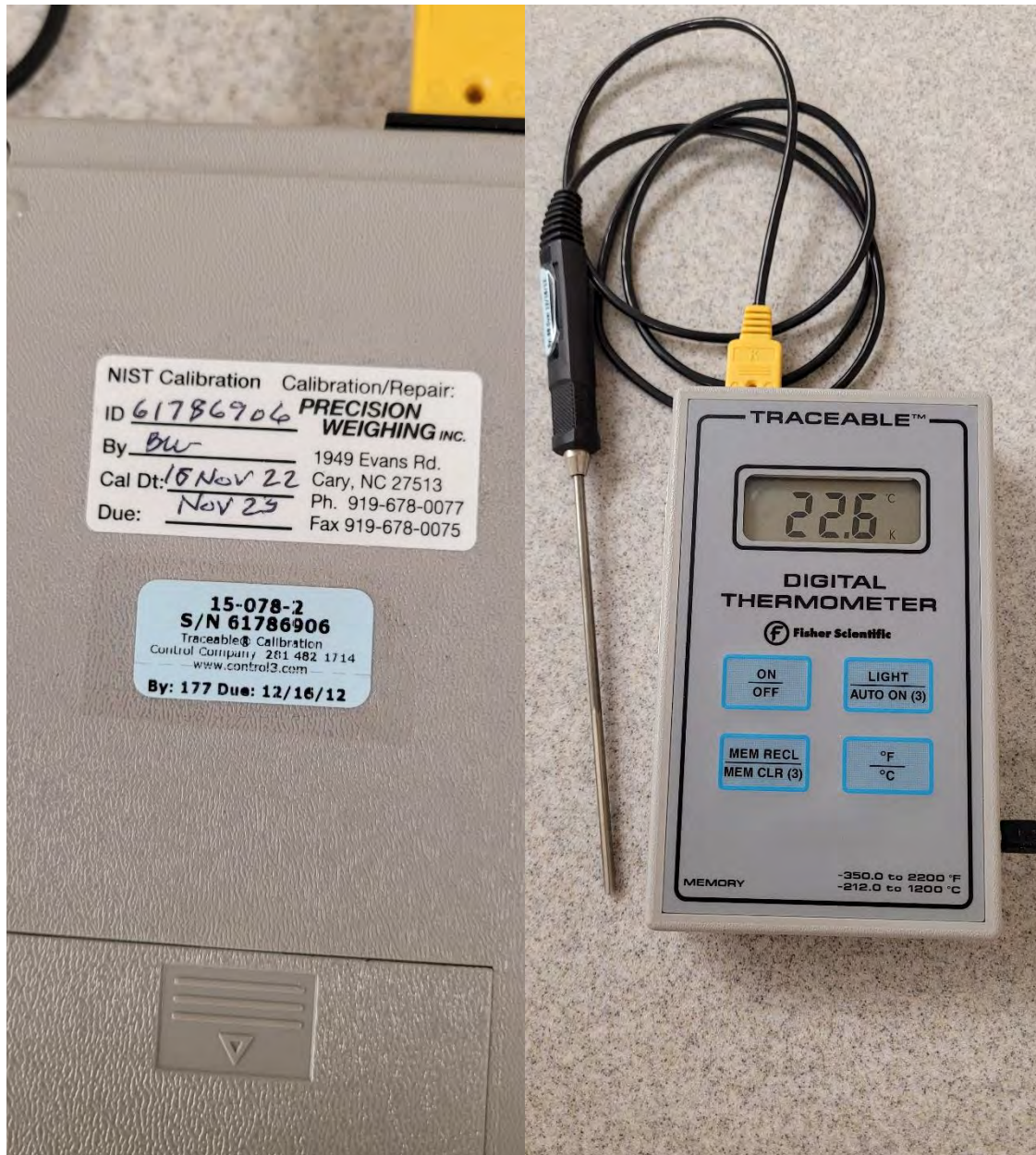
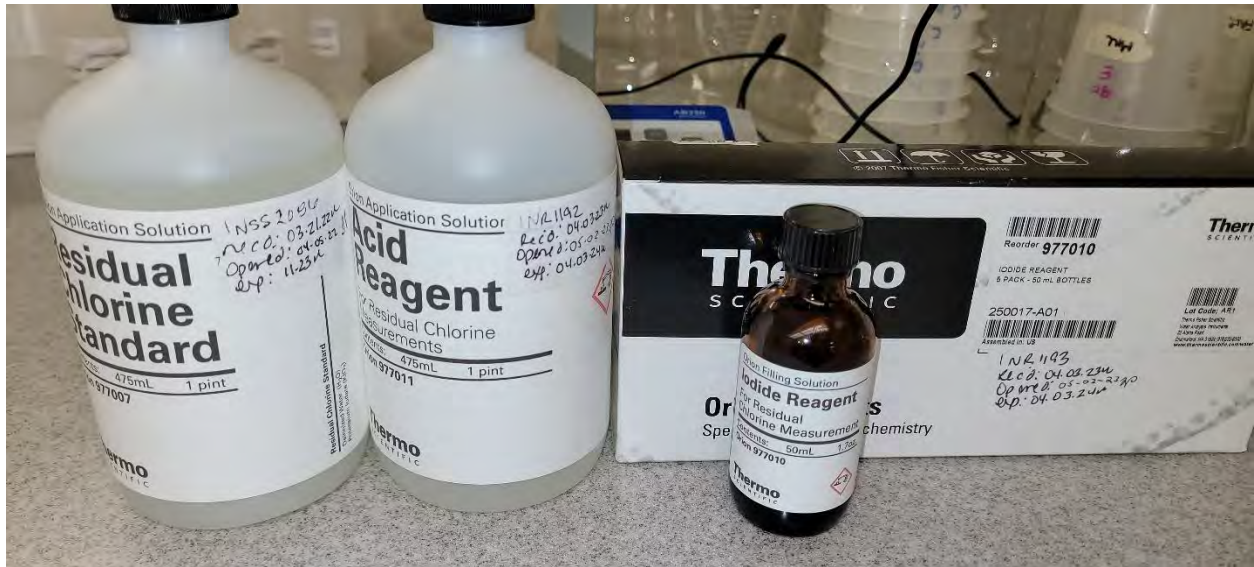


SOP-G12: NIST Thermometer (annual calibration)

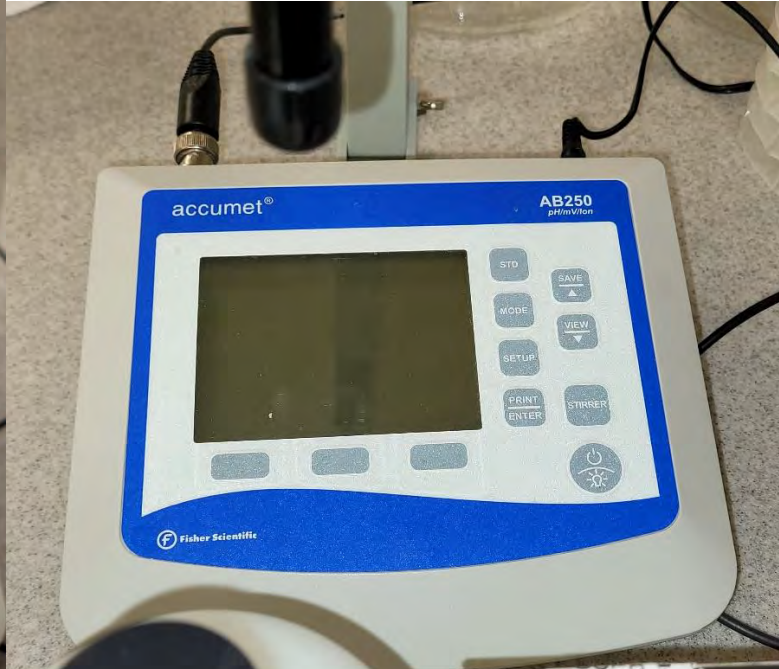


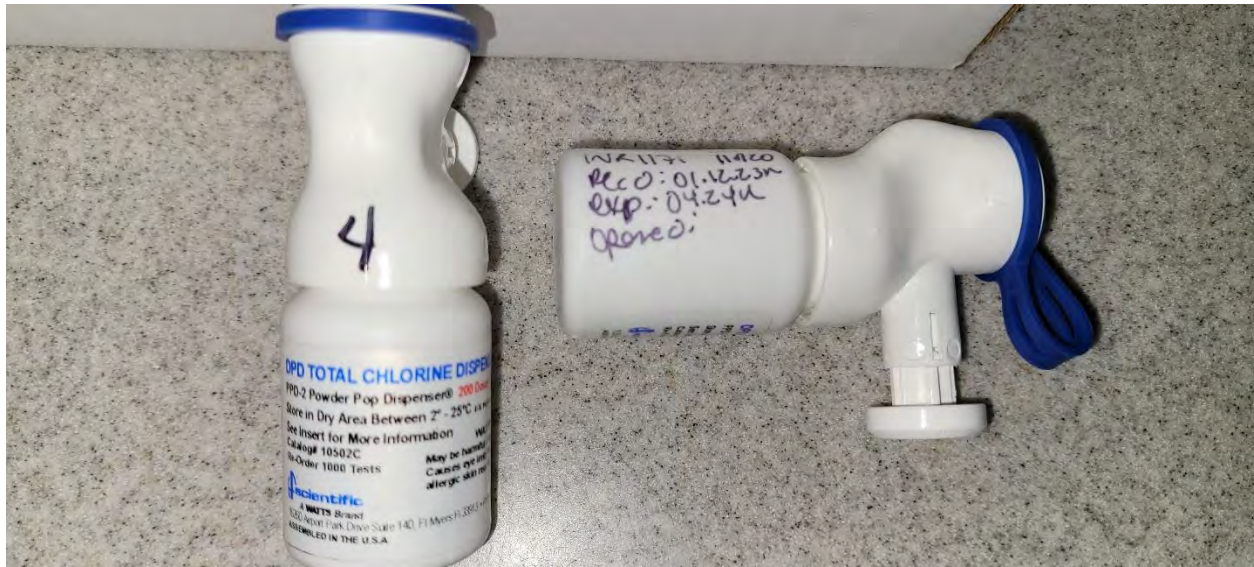
SOP-B1: Autoclave (used for algae media sterilization)





SOP-C8: Total residual chlorine meter/probe and reagents/standards





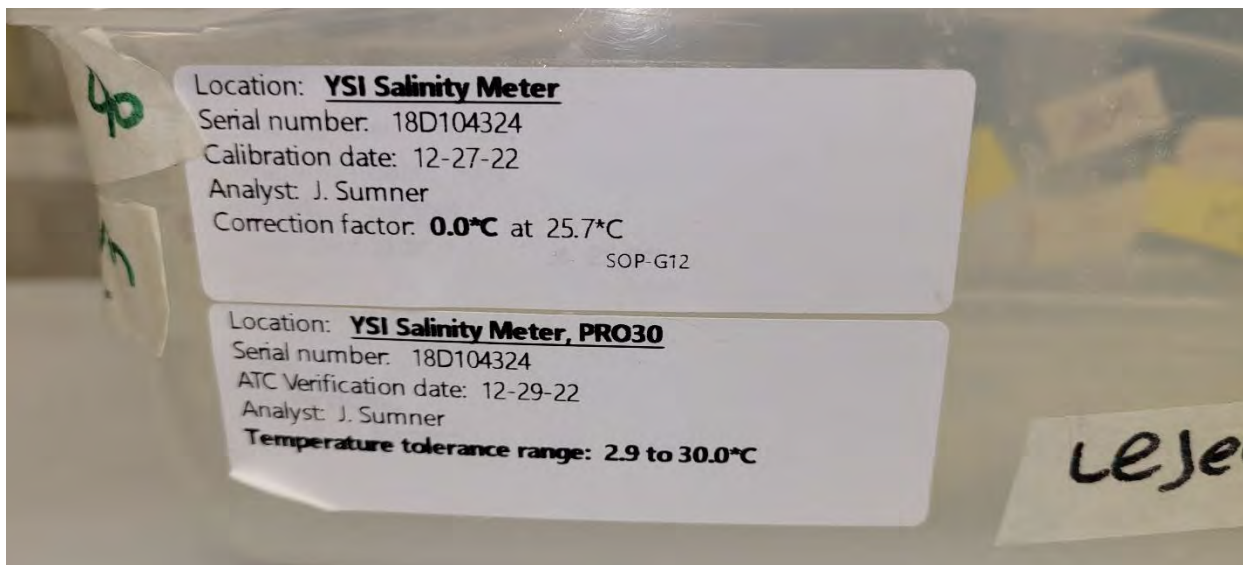
SOP-C8: Total residual chlorine
DPD used for screening



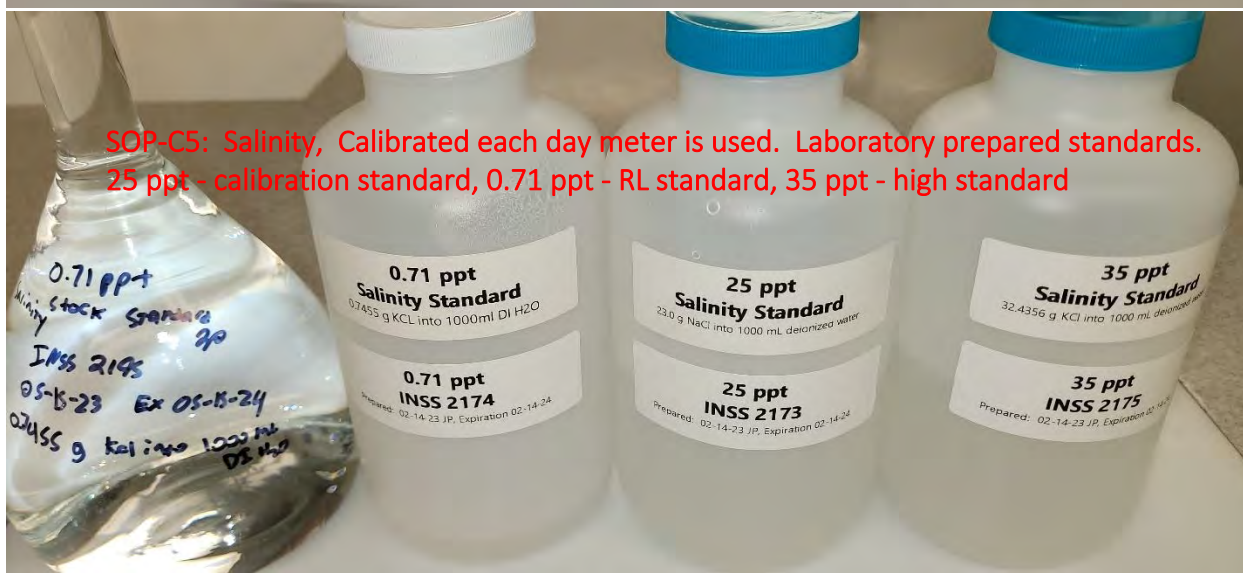
SOP-C5: Salinity

Meter used

SOP-C5: Salinity, ATC verification and temperature sensor calibration (yearly)



SOP-C5: Salinity, Calibrated each day meter is used. Laboratory prepared standards. 25 ppt - calibration standard, 0.71 ppt - RL standard, 35 ppt - high standard



SOP-C5: Salinity, Standards are poured into small bottles to calibrate meter.



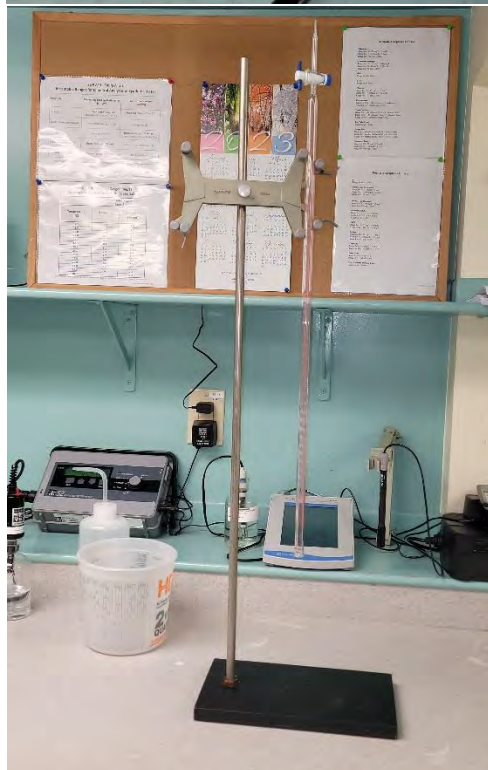
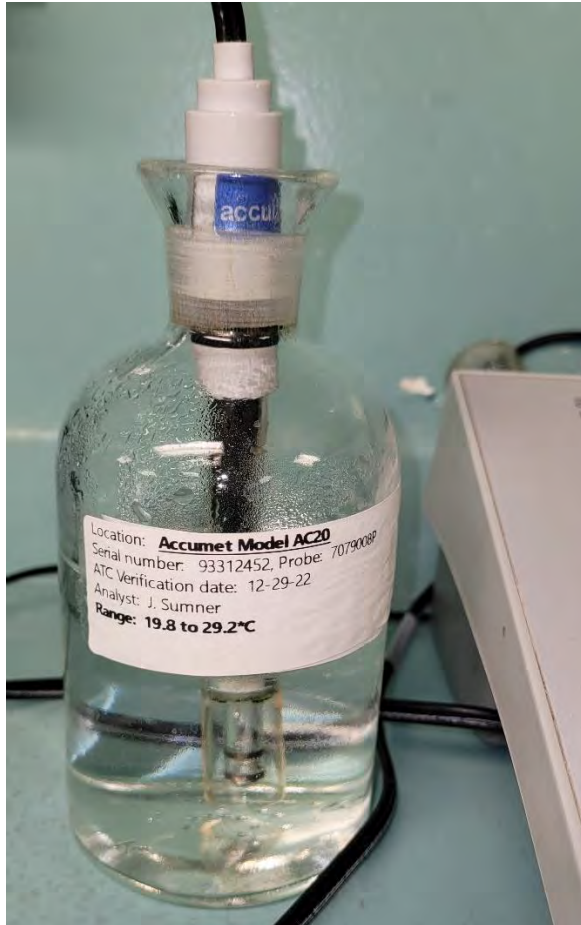
SOP-C2: Dissolved oxygen

Meter and probe. Ambient air calibration each day of use.
Temperature sensor verified quarterly.

SOP-C3: pH
SOP-C4: Conductivity

Combination pH/Conductivity Meter.
Calibration each day of use.

Conductivity ATC verification -
acceptable range verified annually.



SOP-C6: Alkalinity
SOP-C7: Hardness

Burette used for titrations.

SOP-C3: pH

SOP-C7: Alkalinity

Buffers used for pH calibration. Buffers are poured into smaller aliquots for daily use.

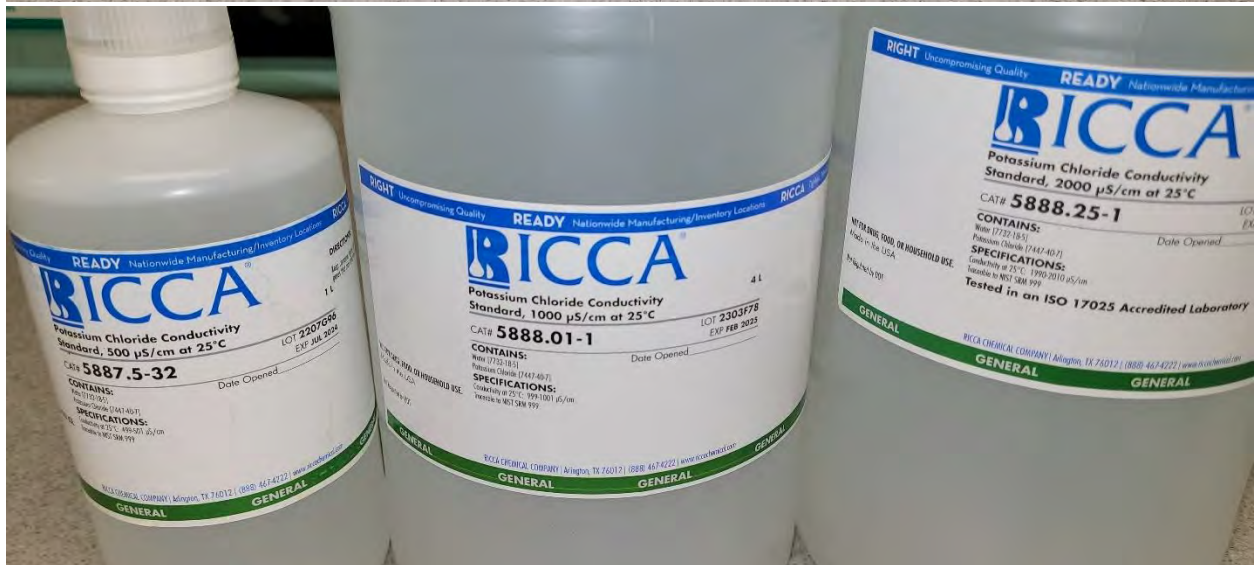


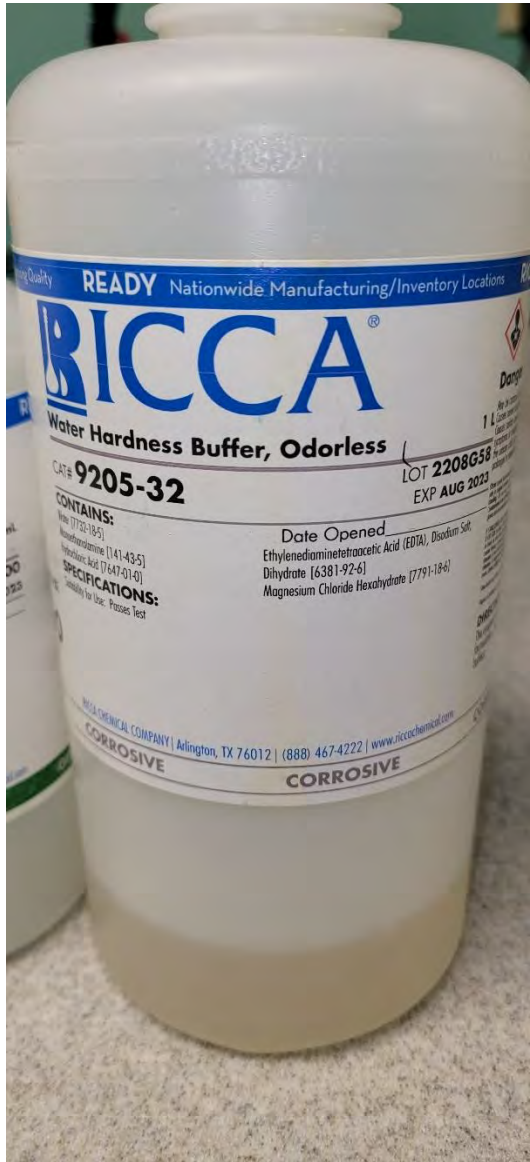
SOP-C4: Conductivity

Standards used for cell constant / verification.

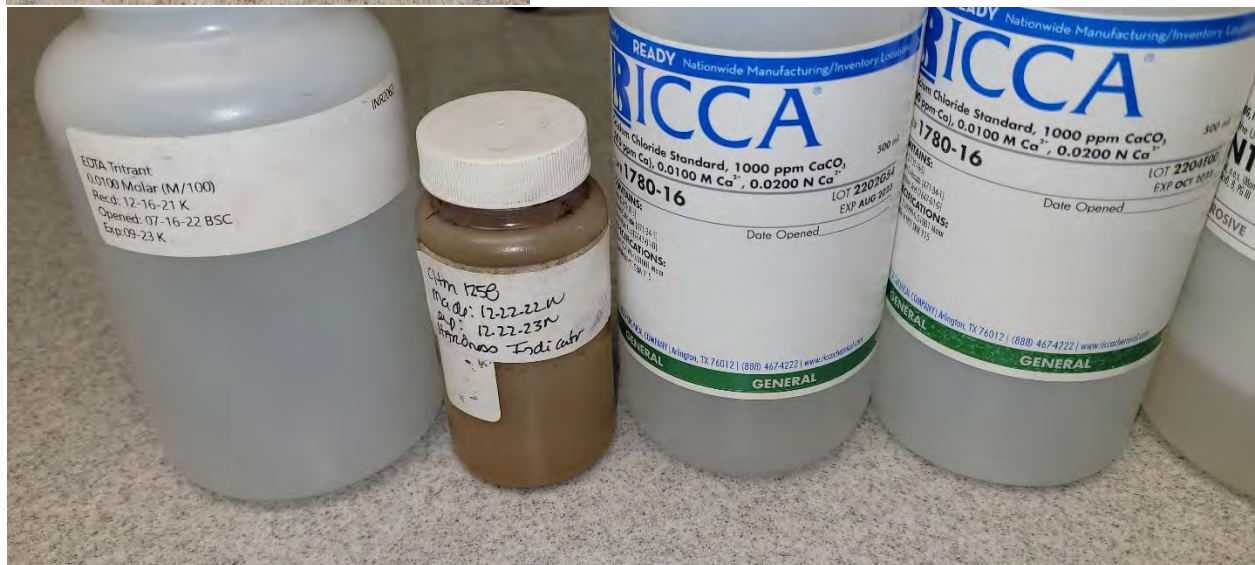
Purchased standards: 500, 1000 (cell constant) and 2000 $\mu\text{mhos/cm}$.

Laboratory prepared standards: 14.9, 146.9, 717.5, 1412, 6667 $\mu\text{mhos/cm}$.





SOP-C7: Hardness
Reagents / Standards used for hardness.





SOP-C7: Hardness (EDTA titrant poured into smaller container for use).

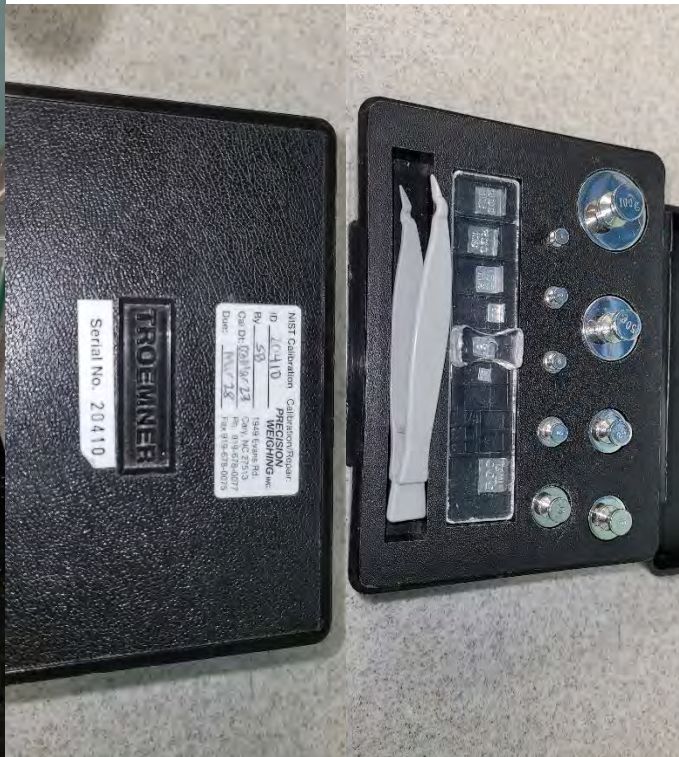
SOP-C6: Alkalinity

Reagents / Standards used for alkalinity (sulfuric acid poured into smaller container for use).



SOP-G10: Balance and Weight Calibration

Mettler Toledo balance used for weighing chemicals / total solids for YWT (balance verified by Laboratory Instruments annually, weight set verified every 5 years by Precision Weighing)



SOP-G10: Balance and Weight Calibration

Balance verified each day of use with at least 2 weights that bracket what is being weighed.



SOP-G10: Balance and Weight Calibration

CAHN 28 balance used for weight determination in minnow/mysid tests (balance verified by Laboratory Instruments annually, balance calibrated each day of use with a 200.00 mg weight and checked with a 5.00 and 50.00 mg weights before and after each use). This range brackets the pans / pans + organisms weights and determines any balance drift.



SOP-G14: Illumination

Light intensity verified quarterly.



SOP-G11: Mechanical pipette

Pipette used to feed *Ceriodaphnia* tests and cultures, verified quarterly.

Reagent Water System Log

Location: Main Laboratory Fish Culture Laboratory

Service Date	Analyst	Activity (type of service performed and comments)
09-07-21	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
11-01-21	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
12-09-21	J	CHANGED CARBON LOT: 04 271 281 DI LOTS: 11 241 242 11 241 242 + PRE + POST FILTERS FLOW = 80690
01-04-22	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
03-01-22	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
05-02-22	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
06-22-22	J	CHANGED CARBON LOT 03 282161 MIXED BED LOTS 06102 141 + 06102 141 + PRE + POST FILTERS. FLOW 83140
07-05-22	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
08-30-22	LSK	CLEANED COURSE WATER FILTER AND CHANGED PRIMARY WATER FILTER IN BASEMENT
12-05-22	K	CHANGED PRE + POST FILTERS CARBON LOT 09 292 161 MIXED BED LOTS 11 292 241 11 292 241
01-01-23	J	CLEANED COARSE FILTER IN BASEMENT + REPLACED PRIMARY FILTER TO BUILDING
04-30-23	J	CLEANED COARSE FILTER IN BASEMENT + REPLACED PRIMARY FILTER TO BUILDING

Reagent Water System Log

 Location: Main Laboratory Fish Culture Laboratory

Service Date	Analyst	Activity (type of service performed and comments)
07-21-20	JH	CHANGED PRE FILTER / POST FILTER ⁰⁷⁻²¹⁻²⁰ CARBON LOT 07-070 241 06 160 181 DI LOTS 07 070 241 + 07 070 241
01-13-21	JH	CHANGED PRE + POST FILTERS CARBON LOT 12 60 181 DI LOTS 11 110 141 / 11 110 141
06-15-21	JH	CHANGED PRE + POST FILTERS CARBON LOT 06-04-241 ⁰⁶⁻¹⁵⁻²¹ 03-291 271 DI LOTS 06 011 241 / 06 011 241
12-09-21	JH	CHANGED PRE + POST FILTERS CARBON LOT 10 101 291 DI LOTS 11 241 242 / 11 301 142
05-17-22	TG	CHANGED FILTERS IN STOCK TANKS ⁰⁵⁻¹⁷⁻²² TG
06-22-22	JH	CHANGED PRE + POST FILTERS CARBON LOT 06-22-22 DI LOTS 06 072 141 + 06 072 141
12-05-22	JH	CHANGED PRE + POST FILTERS CARBON LOT: 16 182 181 DI LOTS: 11 232 142 / 11 232 142
01-08-23	JH	CHANGED MAIN FILTER TO BUILDING
04-30-23	JH	CHANGED MAIN FILTER IN BUILDING

Detergent Residue Check Log (0.04% Bromothymol Blue Indicator)

Date	Analyst	Detergent Residue Check		Indicator CHM #
		Positive (BLUE) Rewash Glassware	Negative (YELLOW/GREEN)	
05-10-23 (H)	JP	————— JP	✓	INR1191
05-11-23 (H)	JP	————— JP	✓	INR1191
05-11-23	BL	————— BL	✓	INR1191
05-14-23	H	————— BL	✓	INR1191
05-15-23	BL	————— BL	✓	INR1191
05-15-23 (b)	H	————— BL	✓	INR1191
05-15-23 (H)	JP	————— JP	✓	INR1191
05-15-23	BL	—————	✓	INR1191
05-19-23 (b)	BL	————— BL	✓	INR1191
05-15-23	H	————— BL	✓	INR1191
05-15-23	BL	————— BL	✓	INR1191
05-15-23	BL	————— BL	✓	INR1191
05-16-23 (b)	BL	————— BL	✓	INR1191
05-16-23	BL	————— BL	✓	INR1191
05-16-23 (b)	BL	————— BL	✓	INR1191
05-18-23	BL	————— BL	✓	INR1191
05-19-23 (H)	JP	————— JP	✓	INR1191
05-22-23 (b)	H	—————	✓	INR1191
05-22-23	BL	—————	✓	INR1191
05-22-23 (b)	H	————— BL	✓	INR1191
05-22-23	H	————— BL	✓	INR1191
05-22-23 (H)	JP	————— JP	✓	INR1191
05-22-23	BL	————— BL	✓	INR1191
05-22-23	BL	————— BL	✓	INR1191
05-23-23	BL	————— BL	✓	INR1191
05-23-23	BL	————— BL	✓	INR1191
05-23-23	BL	————— BL	✓	INR1191
05-23-23 (b)	BL	————— BL	✓	INR1191
05-23-23 (b)	BL	————— BL	✓	INR1191
05-23-23	BL	————— BL	✓	INR1191

Note: B = back dishwasher, H = hand washed, No mark = front dishwasher in dish room.

Mettler-Toledo ME204 Balance Log

Instrument	Serial number	Calibration date	Calibration company
Mettler-Toledo ME204 Balance	C006982938	01-10-23	Laboratory Instrument Services
Certified Weights	20410	03-03-23	Precision Weighing

Date	Internal Cal. (V)	Level (V)	Certified weight (g) and control limits*							Analyt initial	
			0.0102 0.0100-0.0104	0.1005 0.0985-0.1025	1.0000 0.9990-1.0010	10.0001 9.9901-10.0101	49.9999 49.9499-50.0499	99.9999 99.8999-100.0999	149.9998 149.8498-150.1498		
04-19-23		✓		0.1006	1.0000	9.9999					u
04-20-23		✓		0.1006	1.0001	10.0001					u
04-21-23		✓	0.0100	0.1005	1.0001	10.0000	49.9999				u
04-23-23	✓	✓	0.0099	0.1005	1.0003	10.0000	50.0000	100.0002	150.0001		AG
04-25-23		✓	0.0098	0.1007	1.0004	9.9999	49.9998	99.9997			BL
04-26-23		✓	0.0101	0.1006	0.9999	10.0000	49.9996				u
04-27-23		✓		0.1005	1.0000	9.9999	49.9998				u
04-28-23		✓		0.1005	1.0000	9.9999	49.9998				BL
04-30-23	✓	✓	0.0100	0.1007	1.0000	10.0000	49.9999	100.0001	150.0005		AG
05-01-23		✓	0.0100	0.1004		9.9998	49.9999				BL
05-02-23		✓		0.1003	1.0000		49.9998				BL
05-03-23		✓		0.1005	1.0000	9.9999					u
05-04-23		✓		0.1005	1.0000	10.0000		99.9998	149.9996		u
05-06-23		✓						99.9998	149.9996		u
05-07-23	✓	✓	0.0100	0.1002	0.9999	9.9998	50.0002	100.0003	149.9999		AG
05-08-23		✓	0.0100	0.1005		10.0000	50.0000				BL
05-09-23		✓		0.1005	1.0001						BL
05-10-23		✓		0.1005	1.0001	10.0001					u
05-11-23		✓		0.1006	1.0000	10.0000					u
05-12-23		✓		0.1006	1.0001	9.9999					u
05-14-23	✓	✓	0.0101	0.1009	1.0002	10.0001	50.0002	99.9999	150.0000		AG
05-15-23		✓	0.0100	0.1006		9.9999	50.0000				BL
05-16-23		✓		0.1004	0.9998						BL
05-17-23		✓		0.1006	1.0000	10.0001					u
05-18-23		✓		0.1005	1.0001	10.0001					u
05-22-23		✓	0.0100	0.1003	0.9999	9.9998	49.9999				BL
05-23-23		✓		0.1006	1.0000	9.9998					BL

*Certified weights must be within established control limits before measurements are made.

If certified weights exceed control limits, perform balance internal calibration and re-measure certified weights.

Cahn 28 Automatic Electrobalance Log

Instrument	Serial number	Calibration date	Calibration company
Cahn 28 Automatic Electrobalance	41520	01-10-23	Laboratory Instrument Services
Certified Weights (10.05 and 50.04 mg)	20410	03-03-23	Precision Weighing
Certified Weight (200.01 mg)	1000055140	03-03-23	Precision Weighing

Date	Zero Tare (V)	Calibration weight (200.01 mg)		Initial verification weights (mg) (before measurements are taken)		Final verification weights (mg) (after measurements are taken)		Analyst initials
		Initial	Final (calibrated to 200 mg)	10.05	50.04	10.05	50.04	
				Control Limit* (9.85-10.25)	Control Limit* (49.04-51.04)	Control Limit* (9.85-10.25)	Control Limit* (49.04-51.04)	
03-16-23	✓	199.93	200.00	10.03	49.92	10.06	49.95	BL
03-17-23	✓	200.06	200.00	10.03	49.91	10.01	49.90	BL
03-21-23	✓	199.36	200.00	10.05	49.94	10.05	49.94	J
03-22-23	✓	200.06	200.00	10.02	49.91	10.01	49.89	BL
03-22-23	✓	199.99	200.00	10.02	49.91	10.02	49.91	BL
03-22-23	✓	199.91	200.00	10.03	49.94	10.03	49.94	BL
03-23-23	✓	200.00	200.00	10.02	49.93	10.03	49.93	BL
03-24-23	✓	198.35	200.00	10.03	49.94	10.00	49.91	BL
04-13-23	✓	199.92	200.00	10.04	49.93	10.04	49.93	BL
04-13-23	✓	199.98	200.00	10.03	49.93	10.04	49.95	BL
04-17-23	✓	199.38	200.00	10.05	49.93	10.05	49.93	J
04-20-23	✓	198.42	200.00	10.02	49.91	9.99	49.87	BL
04-21-23	✓	198.35	200.00	10.03	49.93	10.02	49.93	BL
04-21-23	✓	199.99	200.00	10.03	49.93	10.03	49.93	BL
05-11-23	✓	198.34	200.00	10.03	49.93	10.04	49.94	BL
05-11-23	✓	200.00	200.00	10.04	49.94	10.08	49.97	BL
05-12-23	✓	198.36	200.00	10.03	49.94	10.04	49.94	BL
05-15-23	✓	198.34	200.00	10.03	49.94	10.05	49.95	J
05-19-23	✓	198.35	200.00	10.03	49.94	10.03	49.93	BL
05-22-23	✓	198.35	200.00	10.03	49.93	10.01	49.91	BL
05-22-23	✓	199.99	200.00	10.03	49.93	10.03	49.94	BL
05-22-23	✓	200.00	200.00	10.03	49.93	10.02	49.92	BL
05-23-23	✓	200.00	200.00	10.03	49.94	10.04	49.94	BL

*Initial and final verification weights must be within established control limits. If verification weights exceed control limits, re-zero and re-calibrate balance and re-analyze samples.

Report of Balance Calibration

Customer: **Environmental Testing Solutions, Inc.**

Date: **2023-01-10** Due: **2024-01-10**

Manufacturer Denver	Model XL-3K	Serial BO 39128	Department/Location
Capacity 3000g	Resolution 0.01g	Tolerance \pm	

Initial Examination

Cornerload test	Front	Back	Left	Right	Set #/Weight ID/Actual Weight
Reading	1000.01	1000.06	1000.07	1000.06	5/dot 1/999.99874 g
Zero return	-0.07	-0.01	0	0	

Reproducibility test

Reading	Zero Return
5/dot 1/999.99874 g	
1000.06	0
1000.06	0
1000.06	0
1000.06	0
1000.06	-0.01

Accuracy/Linearity test

Set #/Weight ID/Actual Weight	Reading	Zero return
6/NA/1.0000016 g	1.00	0
6/NA/100.000118 g	100.01	0
5/dot 2/199.999651 g & 5/dot 3/199.999656 g	400.03	0
5/dot 1/999.99874 g	1000.06	0
5/dot 2/1999.99670 g	2000.06	-0.11
5/dot 2/1999.99670 g & 5/dot 1/999.99874 g	3000.10	-0.14

In tolerance as found? YES NO

Post Calibration Examination

Accuracy/Linearity test

Set #/Weight ID/Actual Weight	Reading	Zero return
6/NA/1.0000016 g	1.00	0
6/NA/100.000118 g	100.01	0
5/dot 2/199.999651 g & 5/dot 3/199.999656 g	400.00	0
5/dot 1/999.99874 g	1000.01	0
5/dot 2/1999.99670 g	2000.02	0
5/dot 2/1999.99670 g & 5/dot 1/999.99874 g	3000.02	-0.02

In tolerance as left? YES NO

Comments

The balance was within tolerance for cornerload and reproducibility tests but out of tolerance for accuracy/linearity. This was corrected by calibrating the balance using traceable weights as listed. The balance was within tolerance once calibration was completed.

Notes on tests performed

Cornerload testing verifies that the instrument delivers similar weight readings, regardless of where on the weighing pan the object being weighed is placed. A significant discrepancy would indicate a structural failure in the load cell.
Reproducibility testing entails repeatedly weighing a given object, recording the results, and analyzing those results by comparing standard deviation against manufacturer's published tolerance.
Accuracy/Linearity testing verifies the accuracy of the instrument at intermediate values of weight.

All weights are given in grams unless otherwise noted

Calibration is traceable to an International Standard - Weight Set Traceability Information

Set#	Traceability#	Serial#	Description	Last Calibrated	Due Next
6	SC090318-1-15	2RCR	Rice Lake Class 1 Set	20191025	20241025
5	SC950626-1-15	67730	Troemner Class 1 Set	20191022	20241022
2	SC910419-1-15	None	Troemner Class S Set	20190326	20240326
7	SC190418-1-19	38435	Troemner Class 1 Set	20190607	20240607

Technician: _____



Matt Lassiter

Report of Balance Calibration

Customer: **Environmental Testing Solutions, Inc.**

Date: **2023-01-10** Due: **2024-01-10**

Manufacturer	Model	Serial	Department/Location
Mettler/Toledo	ME204	C006982938	Lab
Capacity 220g	Resolution 0.1mg	Tolerance ±0.2mg	

Initial Examination

Cornerload test	Front	Back	Left	Right	Set #/Weight ID/Actual Weight
Reading	100.0012	100.0011	100.0008	100.0009	6/NA/100.000118 g
Zero return	0	0	0	0	

Reproducibility test

Reading	Zero Return
6/NA/29.999989 g	
30.0003	0
30.0002	0
30.0002	0
30.0000	0
30.0001	0

Accuracy/Linearity test

Set #/Weight ID/Actual Weight	Reading	Zero return
6/NA/499.9937 mg	0.5000	0
6/NA/4.9999776 g	5.0000	0
6/NA/9.999969 g	10.0002	0
6/NA/20.000054 g	20.0003	0
6/NA/50.000017 g	50.0003	0
2/dot/199.999924 g	200.0026	0

In tolerance as found? YES NO

Post Calibration Examination

Accuracy/Linearity test

Comments
The balance was within tolerance for cornerload and reproducibility tests but out of tolerance for accuracy/linearity. This was corrected by calibrating the balance using traceable weights as listed. The balance was within tolerance once calibration was completed.

Set #/Weight ID/Actual Weight	Reading	Zero return
6/NA/499.9937 mg	0.5000	0
6/NA/4.9999776 g	5.0000	0
6/NA/9.999969 g	10.0000	0
6/NA/20.000054 g	20.0000	0
6/NA/50.000017 g	49.9995	0
2/dot/199.999924 g	199.9998	0

In tolerance as left? YES NO

Notes on tests performed

Cornerload testing verifies that the instrument delivers similar weight readings, regardless of where on the weighing pan the object being weighed is placed. A significant discrepancy would indicate a structural failure in the load cell.
Reproducibility testing entails repeatedly weighing a given object, recording the results, and analyzing those results by comparing standard deviation against manufacturer's published tolerance.
Accuracy/Linearity testing verifies the accuracy of the instrument at intermediate values of weight.

All weights are given in grams unless otherwise noted

Calibration is traceable to an International Standard - Weight Set Traceability Information

Set#	Traceability#	Serial#	Description	Last Calibrated	Due Next
6	SC090318-1-15	2RCR	Rice Lake Class 1 Set	20191025	20241025
5	SC950626-1-15	67730	Troemner Class 1 Set	20191022	20241022
2	SC910419-1-15	None	Troemner Class S Set	20190326	20240326
7	SC190418-1-19	38435	Troemner Class 1 Set	20190607	20240607

Technician: _____



Matt Lassiter

Report of Balance Calibration

Customer: **Environmental Testing Solutions, Inc.**

Date: **2023-01-10** Due: **2024-01-10**

Manufacturer Cahn	Model 21	Serial L55037	Department/Location
Capacity 200/1000mg	Resolution 1µg/10µg	Tolerance ±	

Initial Examination

Cornerload test	Front	Back	Left	Right	Set #/Weight ID/Actual Weight
Reading	NA	NA	NA	NA	NA
Zero return	NA	NA	NA	NA	

Reproducibility test

Reading	Zero Return
100.05	0
100.02	-0.01
100.04	0.01
100.03	0.01
100.03	0.01
99.96	-0.01

Accuracy/Linearity test

Set #/Weight ID/Actual Weight	Reading	Zero return
6/NA/10.00026 mg	9.96	0
6/NA/30.0031 mg	29.99	0
6/NA/50.0030 mg	50.00	0.02
6/NA/100.0048 mg	100.04	0
2/NA/200.000106 g	199.96	0.01

In tolerance as found? YES NO

Post Calibration Examination

Accuracy/Linearity test

Comments
The balance was within tolerance as found. No calibration was required.

Set #/Weight ID/Actual Weight	Reading	Zero return

In tolerance as left? YES NO

Notes on tests performed

Cornerload testing verifies that the instrument delivers similar weight readings, regardless of where on the weighing pan the object being weighed is placed. A significant discrepancy would indicate a structural failure in the load cell.
Reproducibility testing entails repeatedly weighing a given object, recording the results, and analyzing those results by comparing standard deviation against manufacturer's published tolerance.
Accuracy/Linearity testing verifies the accuracy of the instrument at intermediate values of weight.

All weights are given in grams unless otherwise noted

Calibration is traceable to an International Standard - Weight Set Traceability Information

Set#	Traceability#	Serial#	Description	Last Calibrated	Due Next
6	SC090318-1-15	2RCR	Rice Lake Class 1 Set	20191025	20241025
5	SC950626-1-15	67730	Troemner Class 1 Set	20191022	20241022
2	SC910419-1-15	None	Troemner Class S Set	20190326	20240326
7	SC190418-1-19	38435	Troemner Class 1 Set	20190607	20240607

Technician: _____



Matt Lassiter

Report of Balance Calibration

Customer: **Environmental Testing Solutions, Inc.**

Date: **2023-01-10** Due: **2024-01-10**

Manufacturer	Model	Serial	Department/Location
Cahn	C28	41520	
Capacity 200/1000mg	Resolution 1µg/10µg	Tolerance ±	

Initial Examination

Cornerload test	Front	Back	Left	Right	Set #/Weight ID/Actual Weight
Reading	NA	NA	NA	NA	NA
Zero return	NA	NA	NA	NA	

Reproducibility test

Reading	Zero Return
99.996	0.006
99.987	-0.001
99.986	0
99.983	-0.008
99.988	0.002
99.982	-0.001

Accuracy/Linearity test

Set #/Weight ID/Actual Weight	Reading	Zero return
6/NA/10.00026 mg	9.990	-0.008
6/NA/30.0031 mg	30.005	0
6/NA/50.0030 mg	50.002	0
6/NA/100.0048 mg	99.994	0
2/NA/200.000106 g	200.0014	0.004

In tolerance as found? YES NO

Post Calibration Examination

Accuracy/Linearity test

Comments
The balance was within tolerance as found. No calibration was required.

Set #/Weight ID/Actual Weight	Reading	Zero return

In tolerance as left? YES NO

Notes on tests performed

Cornerload testing verifies that the instrument delivers similar weight readings, regardless of where on the weighing pan the object being weighed is placed. A significant discrepancy would indicate a structural failure in the load cell.
Reproducibility testing entails repeatedly weighing a given object, recording the results, and analyzing those results by comparing standard deviation against manufacturer's published tolerance.
Accuracy/Linearity testing verifies the accuracy of the instrument at intermediate values of weight.

All weights are given in grams unless otherwise noted

Calibration is traceable to an International Standard - Weight Set Traceability Information

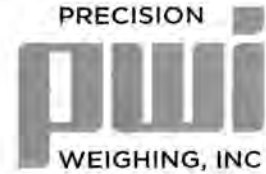
Set#	Traceability#	Serial#	Description	Last Calibrated	Due Next
6	SC090318-1-15	2RCR	Rice Lake Class 1 Set	20191025	20241025
5	SC950626-1-15	67730	Troemner Class 1 Set	20191022	20241022
2	SC910419-1-15	None	Troemner Class S Set	20190326	20240326
7	SC190418-1-19	38435	Troemner Class 1 Set	20190607	20240607

Technician: _____



Matt Lassiter

Precision Weighing
 1949 Evans Road
 Cary, North Carolina 27513
 Phone: (919) 678-0077 * Fax: (919) 678-0075
 Email: pweighing@aol.com



Weight Set Certificate of Calibration

Client:
 Environmental Testing Solutions

Contact:
 Jim Sumner

Department:
 Lab

Description:
 100g - 10mg weight set

Serial Number:
 20410

Calibration Data

Test Weight (g)	Test Weight Value (g)	Standard Weight Value (g)	+/- Difference (g)
0.01	0.01002	0.01000	-0.00002
0.02	0.01998	0.02000	0.00002
0.05	0.04992	0.05000	0.00008
0.1	0.10053	0.10001	-0.00052
0.2	0.20010	0.20000	-0.00010
0.3	0.30004	0.30002	-0.00002
0.5	0.50039	0.50001	-0.00038
1	1.00002	1.00000	-0.00002
2	2.00001	2.00002	0.00001
2*	2.00008	2.00002	-0.00006
5	5.00004	5.00002	-0.00002
10	10.00007	9.99999	-0.00008
20	20.00009	19.99996	-0.00013
20*	20.00005	19.99996	-0.00009
50	49.99986	50.00002	0.00016
100	99.99986	100.00002	0.00016

Verification Date: 03-Mar-23 **Verification Due Date:** Mar-28

Calibration SOP: Metrology 2190

TEST STANDARD(S) INFORMATION:

Standard(s) Used	ID	Expiration Date
Sartorius MCA225S-2S00-I	37602275	04-Mar-23
Class 1 weight set	3DDS	30-Nov-23

Comments:

Technician/Date:

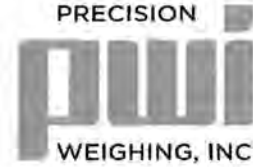
Shawna Brabbe 03-Mar-23

Customer:

[Signature] 03-08-23

Precision Weighing

1949 Evans Road
Cary, North Carolina 27513
Phone: (919) 678-0077 * Fax: (919) 678-0075
Email: pweighing@aol.com



Weight Set Certificate of Calibration

Client:
Environmental Testing Solutions

Contact:
Jim Sumner

Department:
Lab

Description:
200mg

Weight Set ID#:
N/A

Calibration Data

Test Weight (g)	Test Weight Value (g)	Standard Weight Value (g)	+/- Difference (g)	Class 1 +/- Tolerance (mg)	Meets Tolerance	Serial Number
0.200	0.20001	0.20000	0.00001	0.010	YES	100055140

Calibration Date: **03-Mar-23** Calibration Due Date: **Mar-28**

Calibration SOP: Metrology 2190 Rev 1.0

TEST STANDARD(S) INFORMATION:

Standard(s) Used	ID	Expiration Date
Sartorius MCA225S-2S00-1	37602275	04-Mar-23
Class 1 weight set	3DDS	30-Nov-23

Comments:

Technician/Date:

Shauna Bratton 03-Mar-23

Customer:

Jim Sumner 03-08-23

Luminosity Log, Fish Culture Laboratory

Meter:	TACKlife Digital LUX Meter, LM01		Date:	03-02-22
Serial number:	201612033203		Analyst:	TG JL AS
Purchase date:	06-23-17		02-02-22 11	
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	94-189.3	
		Leaton (ft-c)	88.0	
		% Difference	0.07% 1.57% 03-02-22	

Verified photoperiod program (16-hours light and 8-hours dark) and current time.	Analyst:	JL
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Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>	Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>
A	1	74	B	1	70
	2	68		2	62
	3	80		3	77
	4	58		4	88
	5	70		5	68
	6	71		6	86
C	1	73	D	1	73
	2	66		2	68
	3	75		3	65
	4	77		4	71
	5	71		5	65
	6	80		6	85
E	1	81	F	1	61
	2	72		2	68
	3	77		3	63
	4	71		4	74
	5	80		5	61
	6	82		6	62
G	1	64	H	1	60
	2	62		2	59
	3	78		3	65
	4	64		4	84
	5	68		5	70
	6	66		6	85

Stock tank 1: 68 2: 63 3: 77 4: 79 5: 71 6: 60 7: 88 8: 64

Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01	Date:	03-18-21
Serial number:	201612033203	Analyst:	A.S

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c			Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		
Incubator 5 SN: WB60643874	A	< 50 Do not use.			Incubator 6 SN: WB42667925	A	< 50 Do not use.		
	B	61.8		67.3		B	64.8		61.8
		68.5	65.6	69.6			74.1	70.9	72.2
	C	74.8		72.0		C	78.6		77.3
		83.1	82.2	82.7			86.3	86.1	90.0
	D	81.9		77.4		D	87.4		86.6
		70.6	84.4	84.1			96.4	90.8	93.0
E	82.4		79.6	E	92.4	83.3	90.3	78.5	80.1
	93.2	87.3	86.0		96.1	91.2	95.8	92.6	
F	76.7		70.5	F	75.5		77.9		
	86.7	83.5	74.4		86.2	86.5	79.7		
Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.		
Incubator 7 SN: WB42668003	A	< 50 Do not use.			Algae Culture Area	Luminosity (ft-c) at location indicated Acceptable range = 360 – 440 ft-c			
	B	55.8		55.4					
		63.1	56.1	62.5					
	C	64.0		62.1					
		77.4	67.8	67.6					
	D	70.0		67.4					
		77.1	71.5	70.5					
E	74.4		68.1						
	82.0	75.8	72.6						
F	66.8		62.1						
	72.3	70.4	61.7						
Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.							

Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01		Date:	03-18-22
Serial number:	201612033203		Analyst:	A.S
Purchase date:	06-23-17			
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	114.4	
		Leaton (ft-c)	114.2	
		% Difference	0.17%	

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c			Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		
Incubator ② 03-18-22 SN: A.S WB41340472	A	< 50 Do not use.			Incubator ① 03-18-22 SN: A.S WB22114693	A	< 50 Do not use.		
	B	50.1	52.2	50.4		B	62.2	78.2	61.4
		56.2		63.2			88.9		85.3
	C	55.5	60.3	57.8		C	65.1	73.8	64.9
		62.3		67.0			84.1		75.4
	D	60.4	62.6	59.0		D	54.4	66.0	57.3
		66.8		70.3			68.3		58.6
E	57.3	67.4	60.3	E	56.1	62.8	52.2		
	67.4		70.2		70.5		66.6		
F	51.5	56.8	51.2	F	53.6	62.7	55.3		
	59.0		52.2		60.6		56.2		
Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.		
Incubator 3 SN: WB22114719	A	< 50 Do not use.			Incubator 4 SN: WB95219633	A	< 50 Do not use.		
	B					B	52.1	56.3	50.2
	C					C	62.8	91.2	65.8
	D					D	75.0	87.6	68.8
	E					E	77.1	87.1	83.6
	F					F	71.3	87.1	76.3
					80.7		89.0		
Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time.		

Luminosity Log, Fish Culture Laboratory

Meter:	TACKlife Digital LUX Meter, LM01		Date:	06-13-22
Serial number:	201612033203		Analyst:	TG J
Purchase date:	06-23-17			
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	110	
		Leaton (ft-c)	108	
		% Difference	1.87%	

Verified photoperiod program (16-hours light and 8-hours dark) and current time.	Analyst:	J
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Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>	Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>
A	1	69.4	B	1	67.1
	2	74.4		2	81.1
	3	71.7		3	79.2
	4	60.1		4	71.0
	5	63.0		5	73.9
	6	84.8		6	80.6
C	1	89.4	D	1	61.7
	2	73.4		2	73.1
	3	63.1		3	59.0
	4	67.2		4	80.4
	5	71.5		5	64.0
	6	94.7		6	67.3
E	1	76.1	F	1	78.3
	2	74.0		2	81.4
	3	59.4		3	75.5
	4	80.9		4	81.9
	5	73.4		5	86.2
	6	71.3		6	69.2
G	1	77.1	H	1	80.1
	2	90.4		2	80.3
	3	88.1		3	77.1
	4	81.6		4	78.4
	5	69.6		5	76.1
	6	70.9		6	69.3

Stock tank 1: 79.8 2: 71.3 3: 75.4 4: 67.1 5: 70.0 6: 64.27 7: 73.3 8: 79.1

Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01		Date:	06-29-22
Serial number:	201612033203		Analyst:	TG J
Purchase date:	06-23-17			
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	96	
		Leaton (ft-c)	99	
		% Difference	3.17%	

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf <small>Acceptable range = 50 – 100 ft-c</small>			Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf <small>Acceptable range = 50 – 100 ft-c</small>		
Incubator 1 SN: WB41340472	A	< 50 Do not use.			Incubator 2 SN: WB22114693	A	< 50 Do not use.		
	B	54	58	53		B	61	63	59
		59		59			88		61
	C	53	68	62		C	68	69	59
		71		59			94		69
	D	61	70	60		D	70	88	80
		74		69			90		83
	E	55	72	61		E	70	90	80
	71		72		85		88		
F	54	62	52	F	66	77	61		
	60		55		73		72		
Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.				
J				J					
Incubator 3 SN: WB22114719	A	< 50 Do not use.			Incubator 4 SN: WB95219633	A	< 50 Do not use.		
	B					B	68	73	70
							76		78
	C	8				C	63	84	88
							90		88
	D	76 97				D	76	94	85
							91		92
E	06-29-22 1			E	72	96	73		
					95		78		
F				F	68	81	71		
					84		87		
Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.				
				J					

Luminosity Log

7666-29-22

Meter: LM	TACKlife Digital LUX Meter, LM01	Date:	06-29-22
Serial number:	201612033203	Analyst:	TG

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		
Incubator 5 SN: WB60643874	A	< 50 Do not use.		Incubator 6 SN: WB42667925	A	< 50 Do not use.		
	B	52	54		B	73	64	66
		71	64			64	64	64
	C	58	61		C	87	80	84
		77	64			73	83	76
	D	69	70		D	92	83	83
		81	81			77	80	80
E	64	72	E	94	94	89		
	83	81		75	69	69		
F	66	68	F	80	88	74		
	77	66						
Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.			
Incubator 7 SN: WB42668003	A	< 50 Do not use.		Algae Culture Area	Luminosity (ft-c) at location indicated Acceptable range = 360 – 440 ft-c			
	B	59	61					
		81	54					
	C	60	59					
		80	68					
	D	62	61					
		82	70					
E	68	60						
	80	70						
F	61	57						
	67	57						
Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.							

Luminosity Log, Fish Culture Laboratory

Meter:	TACKlife Digital LUX Meter, LM01		Date:	09-02-22
Serial number:	201612033203		Analyst:	TG J
Purchase date:	06-23-17			
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	79	
		Leaton (ft-c)	84	
		% Difference	6.17.	

Verified photoperiod program (16-hours light and 8-hours dark) and current time.	Analyst:	J
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Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>	Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>
A	1	70	B	1	91
	2	71		2	78
	3	78		3	93
	4	64		4	84
	5	61		5	61
	6	70		6	88
C	1	84	D	1	63
	2	80		2	69
	3	79		3	71
	4	73		4	77
	5	78		5	69
	6	81		6	68
E	1	88	F	1	73
	2	73		2	79
	3	77		3	70
	4	74		4	81
	5	81		5	94
	6	84		6	88
G	1	61	H	1	77
	2	69		2	60
	3	80		3	59
	4	73		4	73
	5	64		5	64
	6	88		6	61

Stock tank 1: 66 2: 70 3: 66 4: 61 5: 81 6: 73 7: 68 8: 54

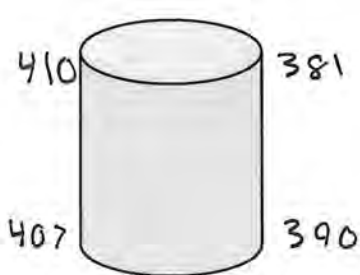
Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01	Date:	09-02-22
Serial number:	201612033203	Analyst:	TG J
Purchase date:	06-23-17		
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	79
		Leaton (ft-c)	84
		% Difference	6.17.

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c	
Incubator ① SN: WB41340472	A	< 50 Do not use.		Incubator ② SN: WB22114693	A	< 50 Do not use.	
	B	70 87	71 86		B	65 78	61 78
	C	66 79	63 80		C	67 82	63 80
	D	65 80	66 82		D	57 71	53 73
	E	55 81	57 79		E	69 90	72 93
	F	62 72	60 71		F	79 88	82 90
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.	
	J				J		
Incubator ③ SN: WB22114719 WB 95219633	A	< 50 Do not use.		Incubator ③ SN: WB95219633	A	< 50 Do not use.	
	B	72 89	75 92		B	81	
	C	70 87	73 90		C	54	
	D	66 83	64 85		D	66	
	E	82 87	79 85		E	62	
	F	66 74	62 76		F	73	
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.			Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.	
	J				J		

Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01	Date:	09-02-22
Serial number:	201612033203	Analyst:	09-02-22 TG (TG) 09-02

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c	
Incubator (5) SN: WB60643874	A	< 50 Do not use.		Incubator (6) SN: WB42667925	A	< 50 Do not use.	
	B	52 68	67 64		B	59 71	62 74
	C	67 78	72 81		C	72 83	70 82
	D	74 93	90 96		D	74 85	79 87
	E	79 86	84 89		E	77 90	79 93
	F	80 89	86 79.		F	78 90	77 89
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time. JK			Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time. JK	
Incubator (7) SN: WB42668003	A	< 50 Do not use.		Algae Culture Area	Luminosity (ft-c) at location indicated Acceptable range = 360 – 440 ft-c		
	B	70 78	74 77				
	C	73 89	81 92				
	D	70 74	68 78				
	E	73 82	79 86				
	F	70 73	67 74				
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time. JK					

Luminosity Log, Fish Culture Laboratory

Meter:	TACKlife Digital LUX Meter, LM01		Date:	12-09-22
Serial number:	201612033203		Analyst:	TG
Purchase date:	06-23-17			
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)		
		Leaton (ft-c)		
		% Difference		

TG-12-09-22

Verified photoperiod program (16-hours light and 8-hours dark) and current time.	Analyst:	TG
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Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>	Breeding Tank Set	ID #	Luminosity (ft-c) at water surface <small>Acceptable range = 50 – 100 ft-c</small>
A	1	71	B	1	72
	2	89		2	71
	3	62		3	56
	4	50		4	73
	5	81		5	62
	6	69		6	75
C	1	89	D	1	83
	2	7		2	64
	3	60		3	94
	4	73		4	71
	5	88		5	61
	6	81		6	95
E	1	70	F	1	81
	2	75		2	94
	3	61		3	74
	4	89		4	96
	5	67		5	77
	6	51		6	78
G	1	68	H	1	97
	2	66		2	87
	3	76		3	65
	4	78		4	73
	5	99		5	81
	6	84		6	72

Stock tank 1: 74 2: 61 3: 78 4: 89 5: 62 6: 83 7: 79 8: 81

Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01	Date:	12-28-22
Serial number:	201612033203	Analyst:	JL
Purchase date:	06-23-17		
Light Meter Verification	Comparison to Leaton L830 Lux Meter SN not provided. (must be ± 10% prior to taking measurements)	TACKlife (ft-c)	95
		Leaton (ft-c)	97
		% Difference	2.1%

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c			Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c		
Incubator 1 SN: WB41340472	A	< 50 Do not use.			Incubator 2 SN: WB22114693	A	< 50 Do not use.		
	B	54	68	52		B			
	C	72		70		C			
	D	66	77	65		D			
	E	81		75		E			
	F	77	88	74		F			
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.				Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.		
Incubator 3 SN: WB22114719 WB22114693	A	< 50 Do not use.			Incubator 4 SN: WB95219633	A	< 50 Do not use.		
	B	56	65	60		B	66	79	63
	C	68		72		C	78		81
	D	60	77	64		D	69	88	70
	E	79		81		E	85		84
	F	70	80	73		F	86	90	83
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.				Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.		
Incubator 4 SN: WB95219633	A	< 50 Do not use.			Incubator 5 SN: WB22114693	A	< 50 Do not use.		
	B	56	64	59		B	86	90	83
	C	66		69		C	95		92
	D	60	77	64		D	85	88	84
	E	79		81		E	86	90	83
	F	70	80	73		F	95		92
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.				Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time.		

Luminosity Log

Meter:	TACKlife Digital LUX Meter, LM01	Date:	12-28-22
Serial number:	201612033203	Analyst:	JL

Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c	Incubator number	Shelf	Luminosity (ft-c) at location indicated on shelf Acceptable range = 50 – 100 ft-c
Incubator 5 SN: WB60643874	A	< 50 Do not use.	Incubator 6 SN: WB42667925	A	< 50 Do not use.
	B	66 65 73 72 70		B	59 57 69 64 67
	C	76 70 85 88 82		C	67 64 85 87 85
	D	82 79 96 91 90		D	70 73 90 90 92
	E	86 84 98 99 95		E	83 80 97 95 98
	F	76 79 87 88 86		F	79 74 85 87 81
	Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time. JL		Initials	Verified photoperiod program (16-hours light and 8-hours dark) and current time. JL
	Incubator 7 SN: WB42668003	A		< 50 Do not use.	Algae Culture Area
B		62 59 78 77 64			
C		67 64 80 79 67			
D		72 70 81 80 76			
E		80 75 92 90 82			
F		64 68 79 75 73			
Initials		Verified photoperiod program (16-hours light and 8-hours dark) and current time. JL			

Logbook Tracking # **AT-470**

***Ceriodaphnia dubia* Taxonomic Identification Logsheet**

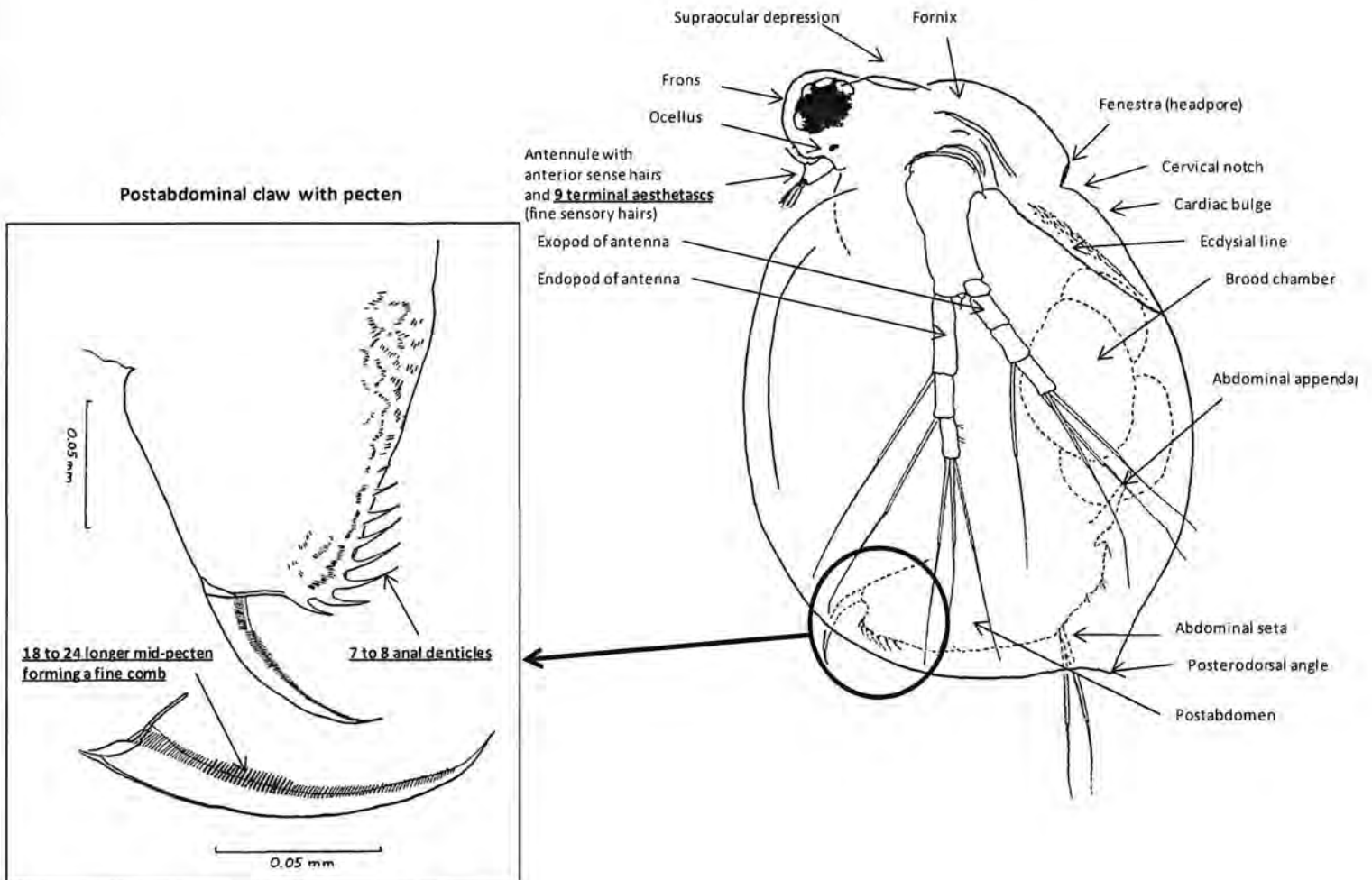
Date identification performed: 03-11-22

Analyst: AS

Culture source: 03-01-22

Key Characteristics	Present (v)	Absent (v)
9 terminal aesthetascs	✓	
7 to 8 denticles	✓	
18 to 24 longer mid-pecten	✓	

Comments:



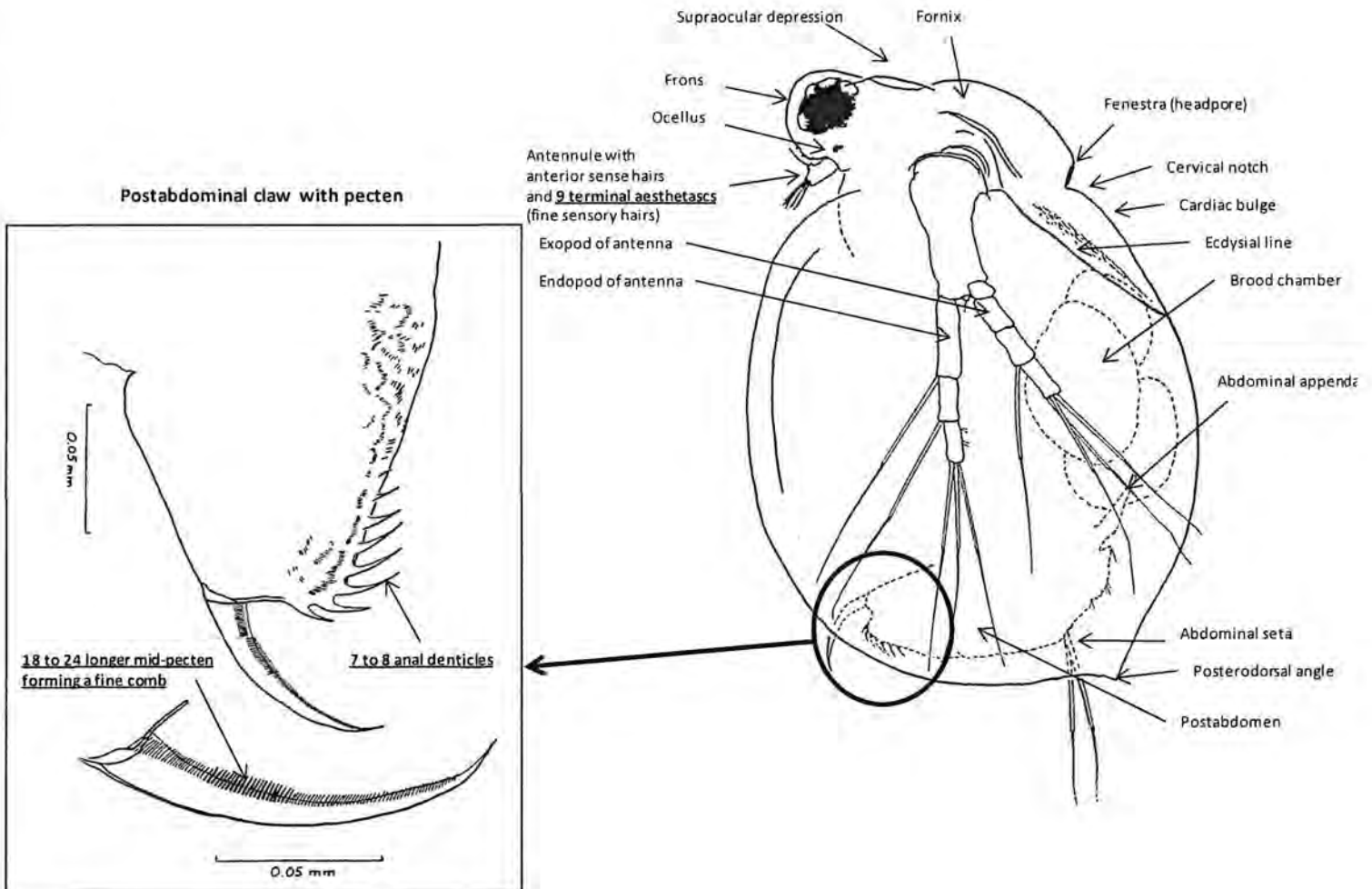
Ceriodaphnia dubia Taxonomic Identification Logsheet

Date identification performed: 06-30-22
 Culture source: 06-21-22

Analyst: JA

Key Characteristics	Present (✓)	Absent (✓)
9 terminal aesthetascs	✓	
7 to 8 denticles	✓	
18 to 24 longer mid-pecten	✓	

Comments:



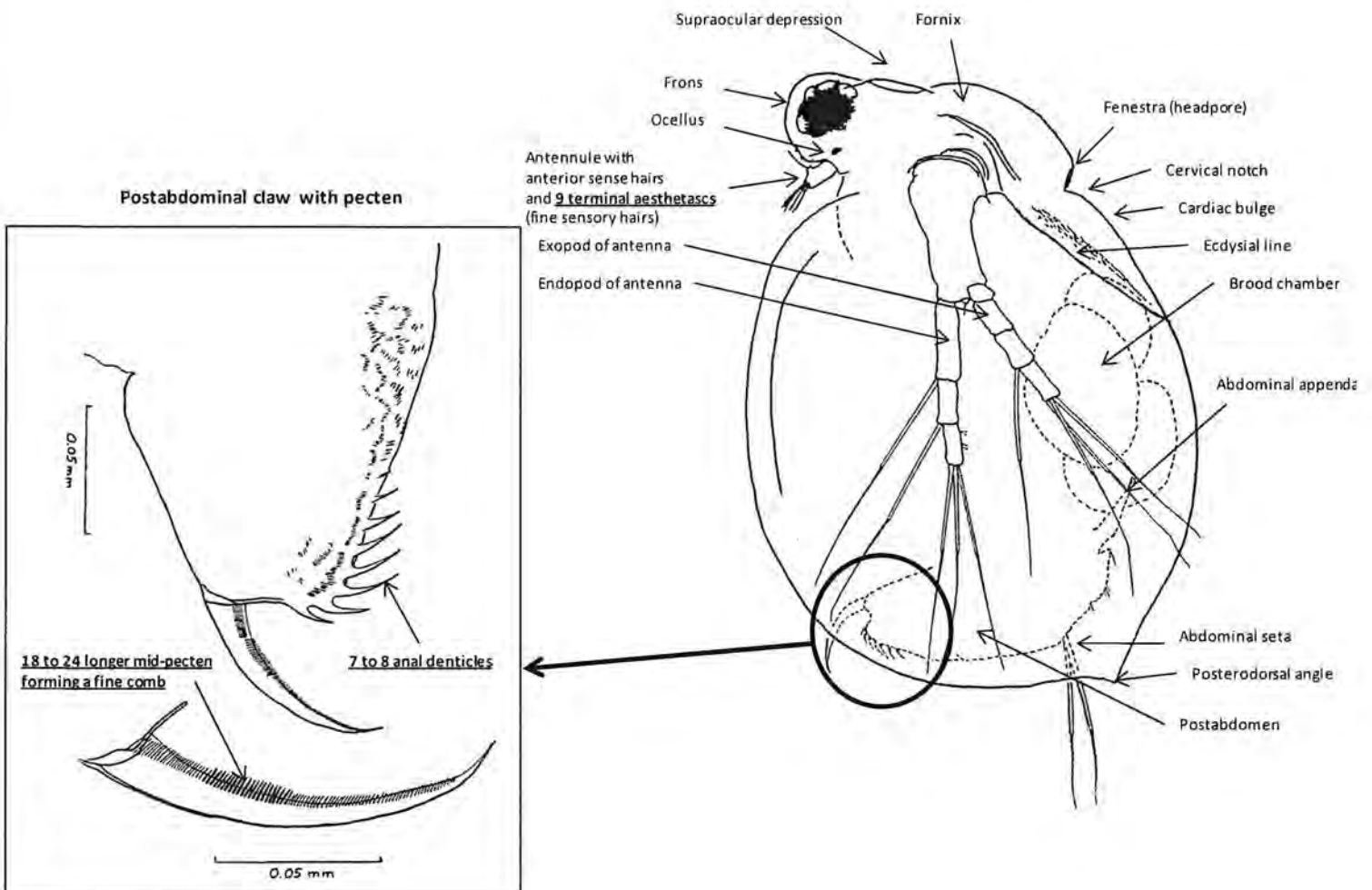
Ceriodaphnia dubia Taxonomic Identification Logsheet

Date identification performed: 09-29-22
 Culture source: 09-20-22

Analyst: JK

Key Characteristics	Present (✓)	Absent (✓)
9 terminal aesthetascs	✓	
7 to 8 denticles	✓	
18 to 24 longer mid-pecten	✓	

Comments:



Ceriodaphnia dubia Taxonomic Identification Logsheet

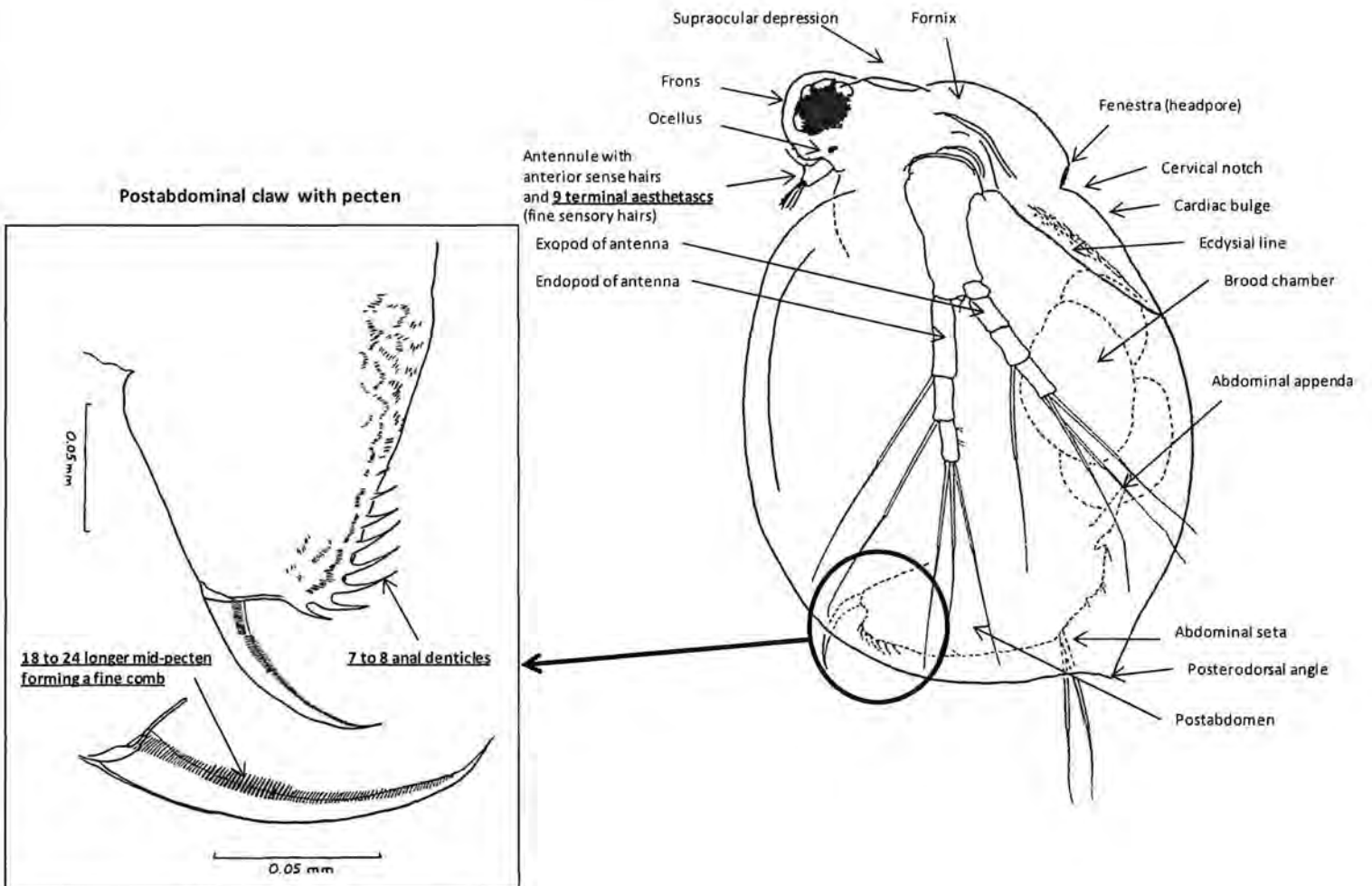
Date identification performed: 12-22-22

Analyst: 

Culture source: 12-13-22

Key Characteristics	Present (✓)	Absent (✓)
9 terminal aesthetascs	✓	
7 to 8 denticles	✓	
18 to 24 longer mid-pecten	✓	

Comments:



Pimephales promelas Taxonomic Identification Log Sheet

Date identification performed: 01-21-22

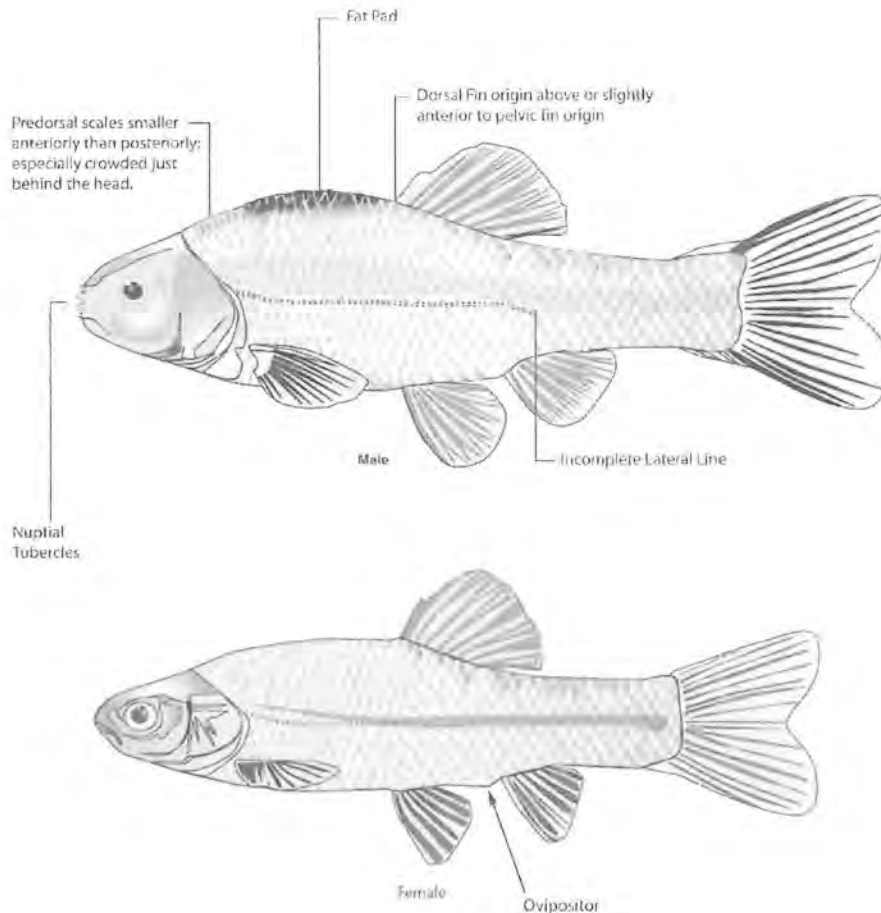
Analyst: A.S

Source: In-house Culture

Specimens preserved from stock organisms in culture system.

Comments: <u>OBTAINED FROM LARGE STOCK # 4</u>

ILLUSTRATION OF FATHEAD MINNOW WITH ANATOMICAL IDENTIFICATIONS



***Pimephales promelas* Taxonomic Identification Log Sheet**

Date identification performed: 04-01-22

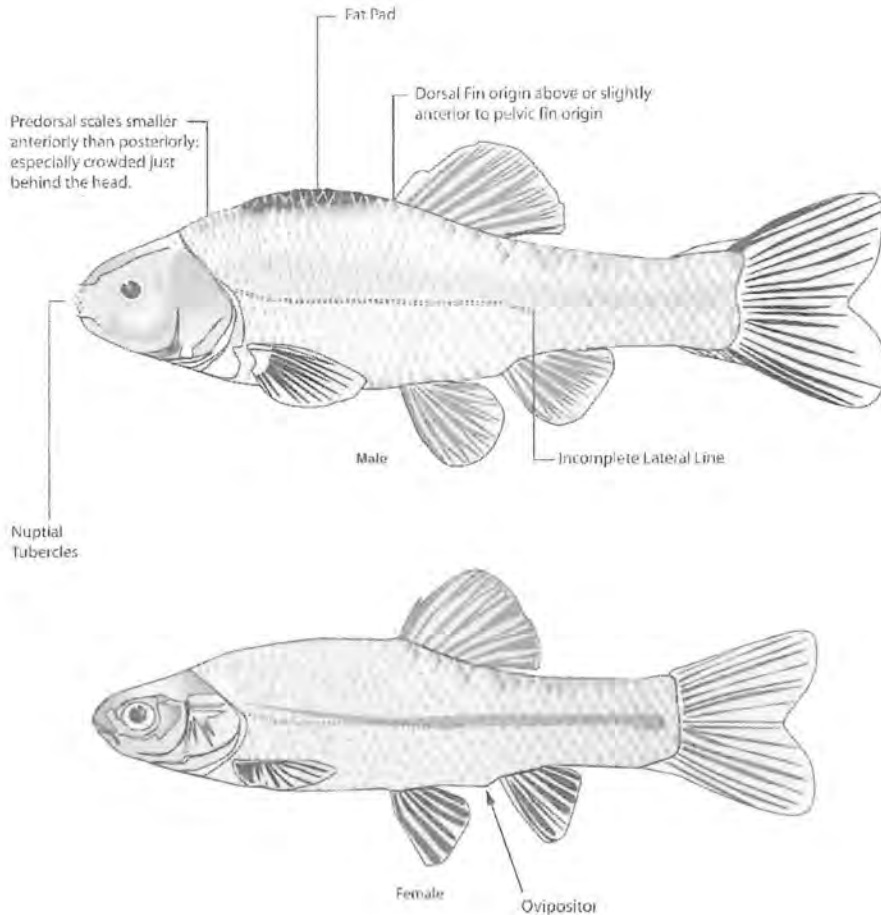
Analyst: A.S

Source: In-house Culture

Specimens preserved from stock organisms in culture system.

Comments:

ILLUSTRATION OF FATHEAD MINNOW WITH ANATOMICAL IDENTIFICATIONS



Pimephales promelas Taxonomic Identification Log Sheet

Date identification performed: 07-31-22

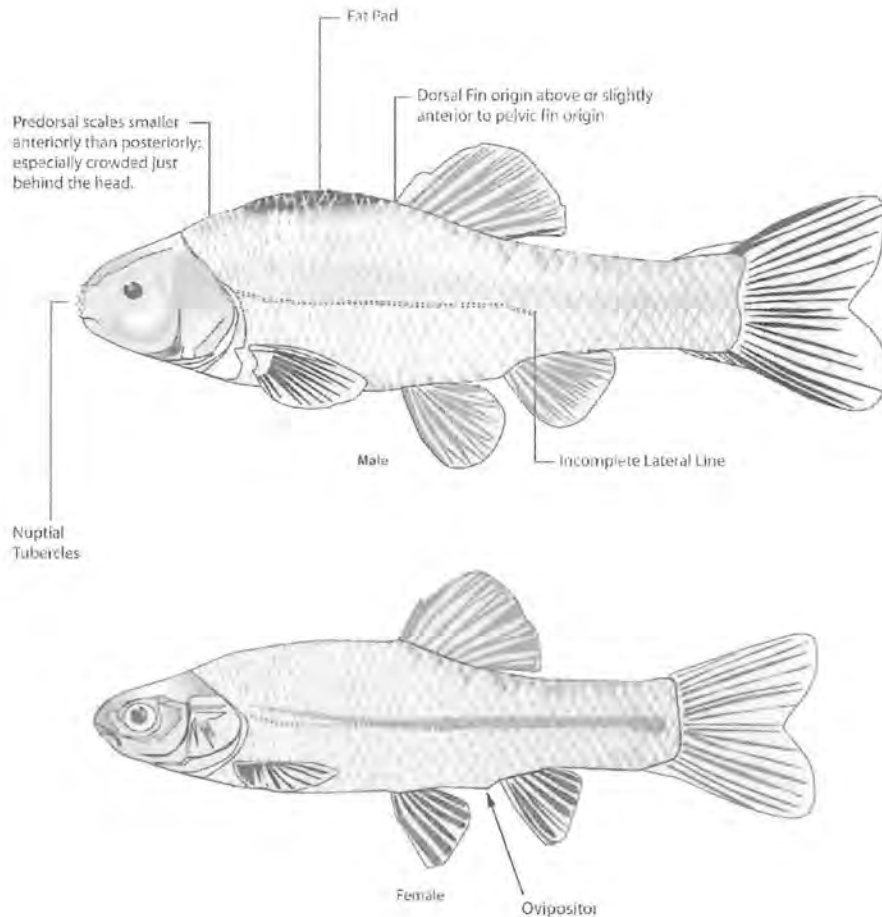
Analyst: ju

Source: In-house Culture

Specimens preserved from stock organisms in culture system.

Comments: <u>OBTAINED FROM STOCK TANKS.</u>

ILLUSTRATION OF FATHEAD MINNOW WITH ANATOMICAL IDENTIFICATIONS



Pimephales promelas Taxonomic Identification Log Sheet

Date identification performed: 10-31-22

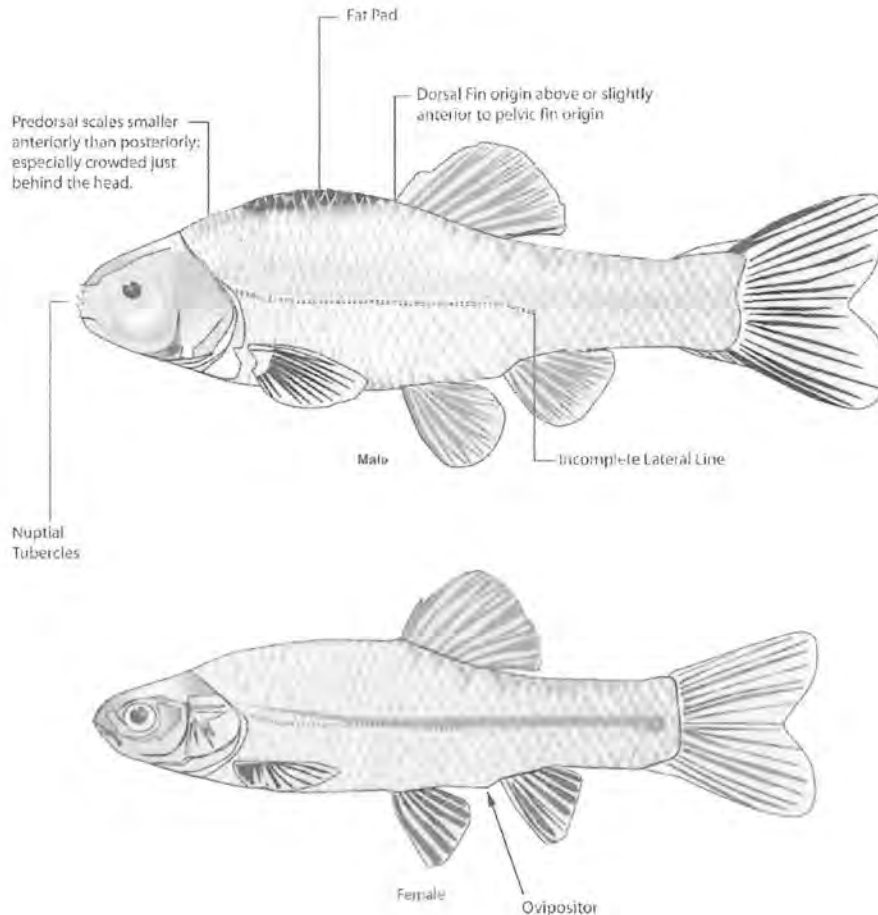
Analyst: *Jh*

Source: In-house Culture

Specimens preserved from stock organisms in culture system.

Comments: <u>LG STOCK TANK #4</u>

ILLUSTRATION OF FATHEAD MINNOW WITH ANATOMICAL IDENTIFICATIONS



Americamysis bahia Taxonomic Identification Logsheet

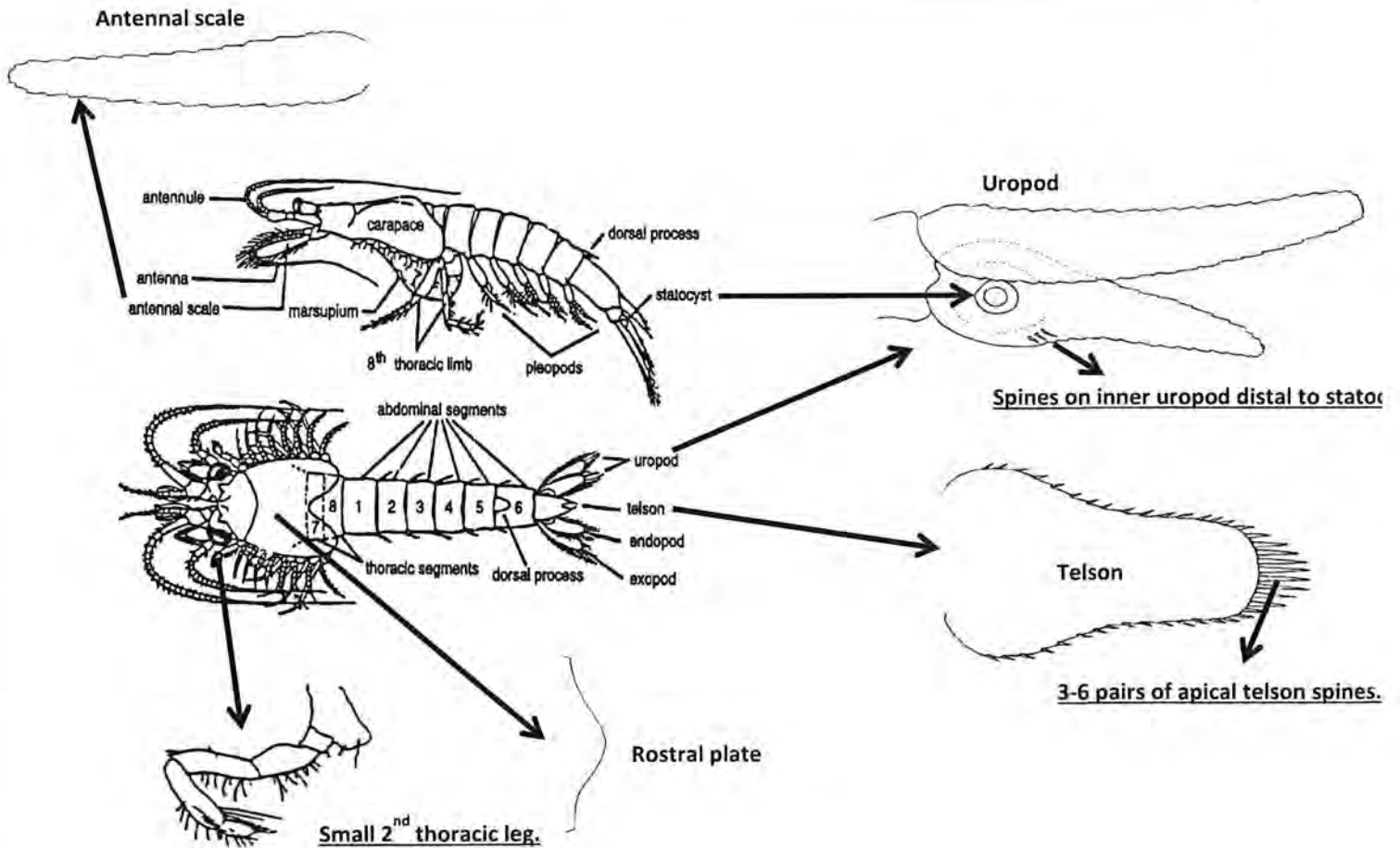
Date identification performed: 04-22-22

Analyst: A.C.

Date specimens received: 04-19-22

Supplier: Aquatic Industries

Comments:



AQUATIC INDICATORS

Date: 4-18-22

Received 04-19-22 1030 A.S

Species:

1. *M. bahia*
- 2.
- 3.

Temp = 20.2°C

pH = 8.23 S.U.

DO = 18.29 mg/L

Salinity = 22.0 ppt

dead / total # = 0/20

organisms appear healthy

Fed 1100
MS

Total Supplied:

1. 200
- 2.
- 3.

Brood Description

1. ESA
- 2.
- 3.

Age:

- 1.
- 2.
- 3.

"Ø" days - collected between 4-17-22 @ Noon & 4-18-22 @ 11:30 A

Environmental Regime

Feeding: Zooplankton
Artemia NH/

Photo: L D
16 8

P.H.: 8.1

Temp: 25°C

Salinity: 20‰

Comments:

Thanks.

RECEIVED 1 ADULT *M. BERTHUNA* & PRESERVED FOR TAXONOMY. JH

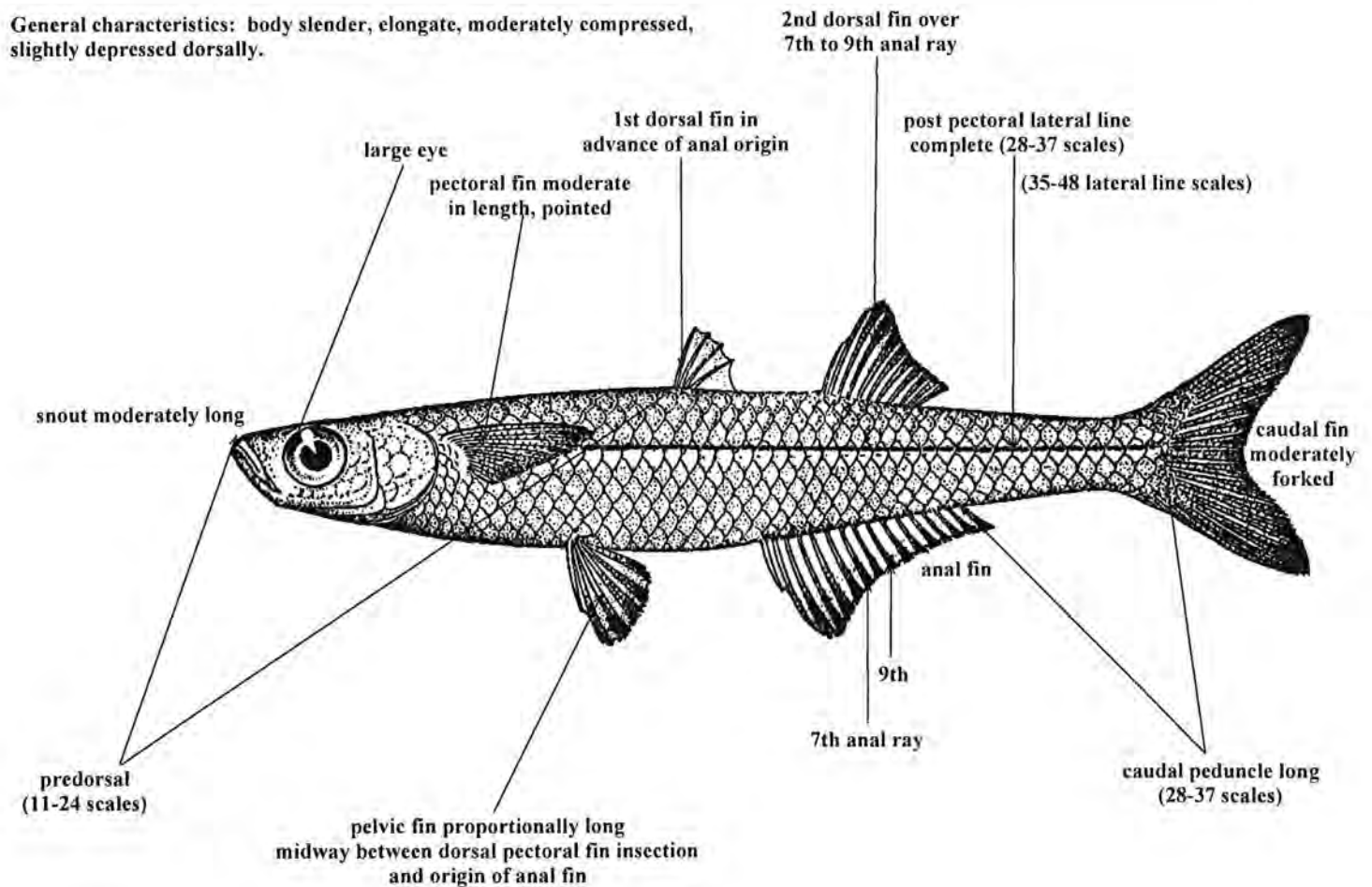
Menidia beryllina Taxonomic Identification Logsheet

Date identification performed: 01-04-22
 Date specimens received: 01-04-22

Analyst: _____
 Supplier: AQUATIC INDICATORS

Comments:

General characteristics: body slender, elongate, moderately compressed, slightly depressed dorsally.



AQUATIC INDICATORS

Date: 1-3-22

Species:

1. *M. bahia*
2. *M. bahia*
- 3.

01-04-22 1040 *jh*
TEMP = 24.3°C

	Ab 12-28-21	Ab 01-03-22
pH s.u.	7.57	7.64
DO μ L	8.9	9.1
SALINITY ppt	22.9	23.0
#DEAD/TOTAL #	0/1000 ⁺	0/1400 ⁺

Total Supplied:

1. 1400
2. 1000
- 3.

Brood Description

1. EPA
2. EBA
- 3.

Organisms appear healthy
Fed at 1045. *jh*

Age:

1. "0" days - dropped 1-2-22 @ Noon to 1-3-22 @ 11:30am
2. 6 days - dropped 12-27-21 @ Noon to 12-28-21 @ 11:30AM
- 3.

Environmental Regime

Feeding: Zooplankton
Artemia NH ✓

Photo: L D
16 8

P.H.: 8.1

Temp: 25°C

Salinity: 20‰

Comments:

Thanks.

* RECEIVED 1 ADULT *M. BERTHINA* & PRESERVED FOR TAXONOMY

jh

***Menidia beryllina* Taxonomic Identification Logsheet**

Date identification performed: 02-18-22

Analyst: JL

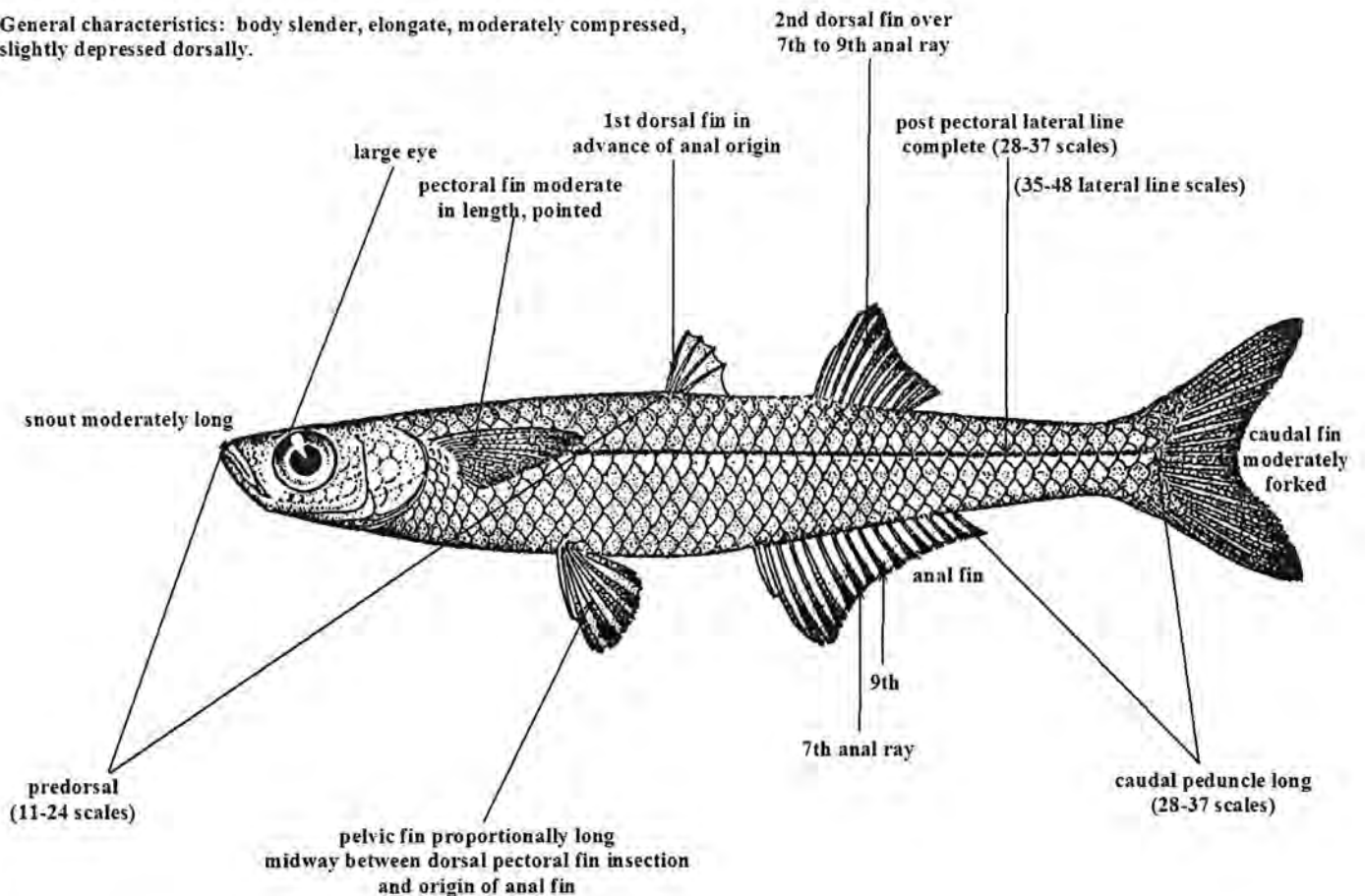
Date specimens received: 02-08-22

Supplier: AQUATIC INDICATORS

BATCH AI Mb 01-31-22

Comments:

General characteristics: body slender, elongate, moderately compressed, slightly depressed dorsally.



AQUATIC INDICATORS

Date: 2-7-22

Species:

1. M. bahia
2. M. bahia
3. M. berglina

Total Supplied:

1. 400
2. 700
3. 400

Brood Description

1. EPA
2. EPA
3. EPA

Age:

1. 0 days - 2-6-22 @ Noon to 2-7-22 @ 11:30 AM dropped
2. 6 days - 1-31-22 @ Noon to 2-1-22 @ 11:30 AM dropped
3. 7 days - 1-30-22 @ Noon to 1-31-22 @ 11:30 AM hatched

Environmental Regime

Feeding: Zooplankton
Artemia NH ✓

Photo: L D
16 8

P.H.: 8.1

Temp: 25°C

Salinity: 20‰

Comments:

Thanks.

* RAISED M. BERGLINA TO JUVENILE & PRESERVED FOR TAXONOMY
02-18-22 fl

* 02-08-22 1155 fl TEMP = 24.6

	Mb 01-31-22	Ab 02-01-22	Ab 02-07
pH. s.u.	7.86	8.06	8.06
DO g/L	11.7	10.9	11.6
SALINITY ppt.	22.9	22.1	22.0
# DEAD / TOTAL #	2 / 400 ⁺	0 / 400 ⁺	0 / 700 ⁺

Organisms appear healthy.
Fed at 1200 fl.

Menidia beryllina Taxonomic Identification Logsheet

Date identification performed: 04-19-22

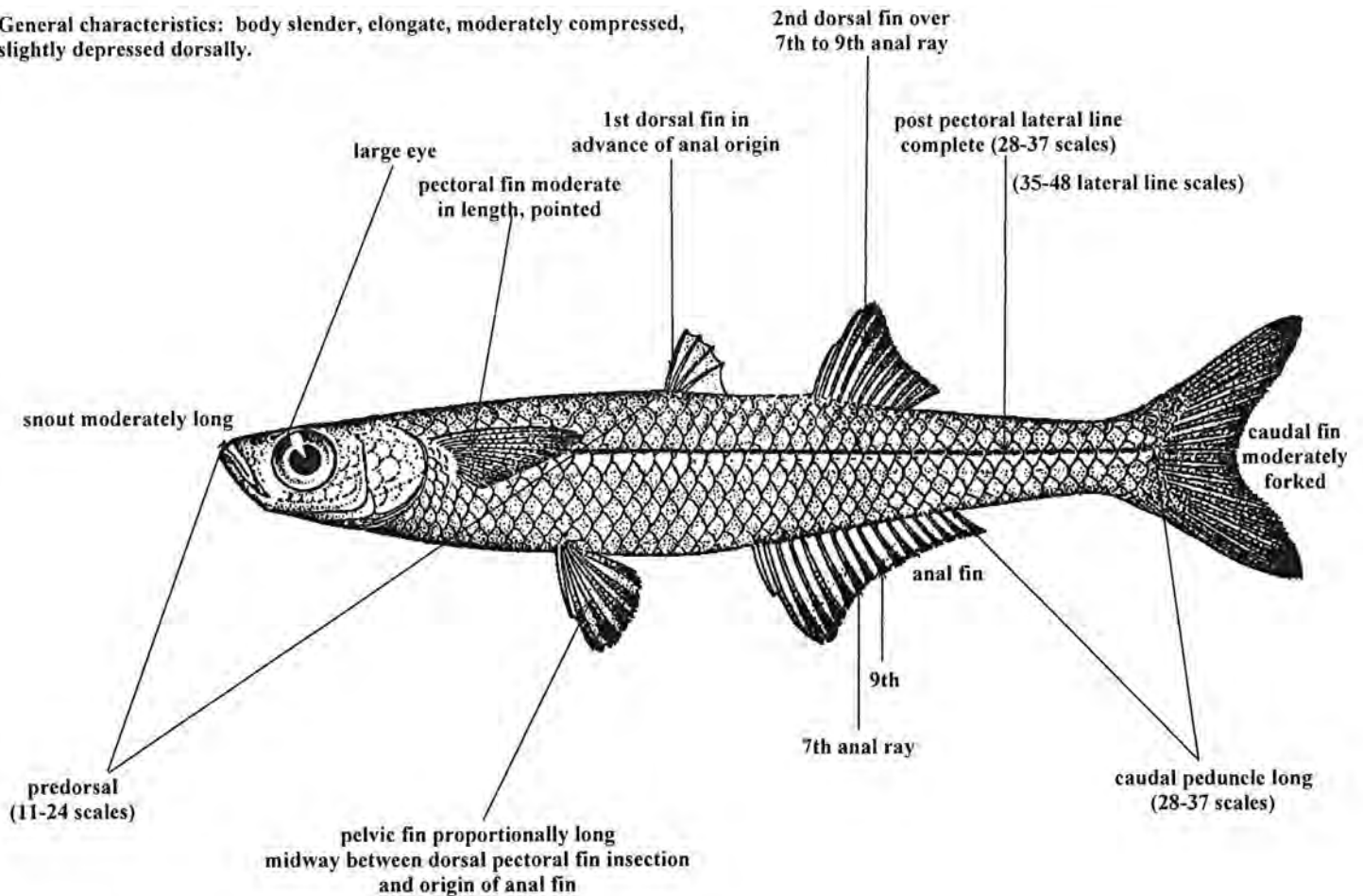
Analyst: A.S.

Date specimens received: 04-19-22

Supplier: Aquatic International

Comments:

General characteristics: body slender, elongate, moderately compressed, slightly depressed dorsally.



AQUATIC INDICATORS

Date: 4-18-22

Received 04-19-22 1030 A.S

Species:

1. *M. bahia*
- 2.
- 3.

Temp = 20.2°C

pH = 8.23 S.U.

DO = 18.29 mg/L

Salinity = 22.0 ppt

dead / total # = 0/25

organisms appear healthy

Fed 1100
ms

Total Supplied:

1. 200
- 2.
- 3.

Brood Description

1. EPA
- 2.
- 3.

Age:

- 1.
- 2.
- 3.

"Ø" days - collected between 4-17-22 @ Noon & 4-18-22 @ 11:30 A

Environmental
Regime

Feeding: Zooplankton
Artemia NH/

Photo: L D
16 8

P.H.: 8.1

Temp: 25°C

Salinity: 20‰

Comments:

Thanks.

RECEIVED 1 ADULT *M. BERTHINA* & PRESERVED FOR TAXONOMY. J

Menidia beryllina Taxonomic Identification Logsheet

Date identification performed: 07.12.22

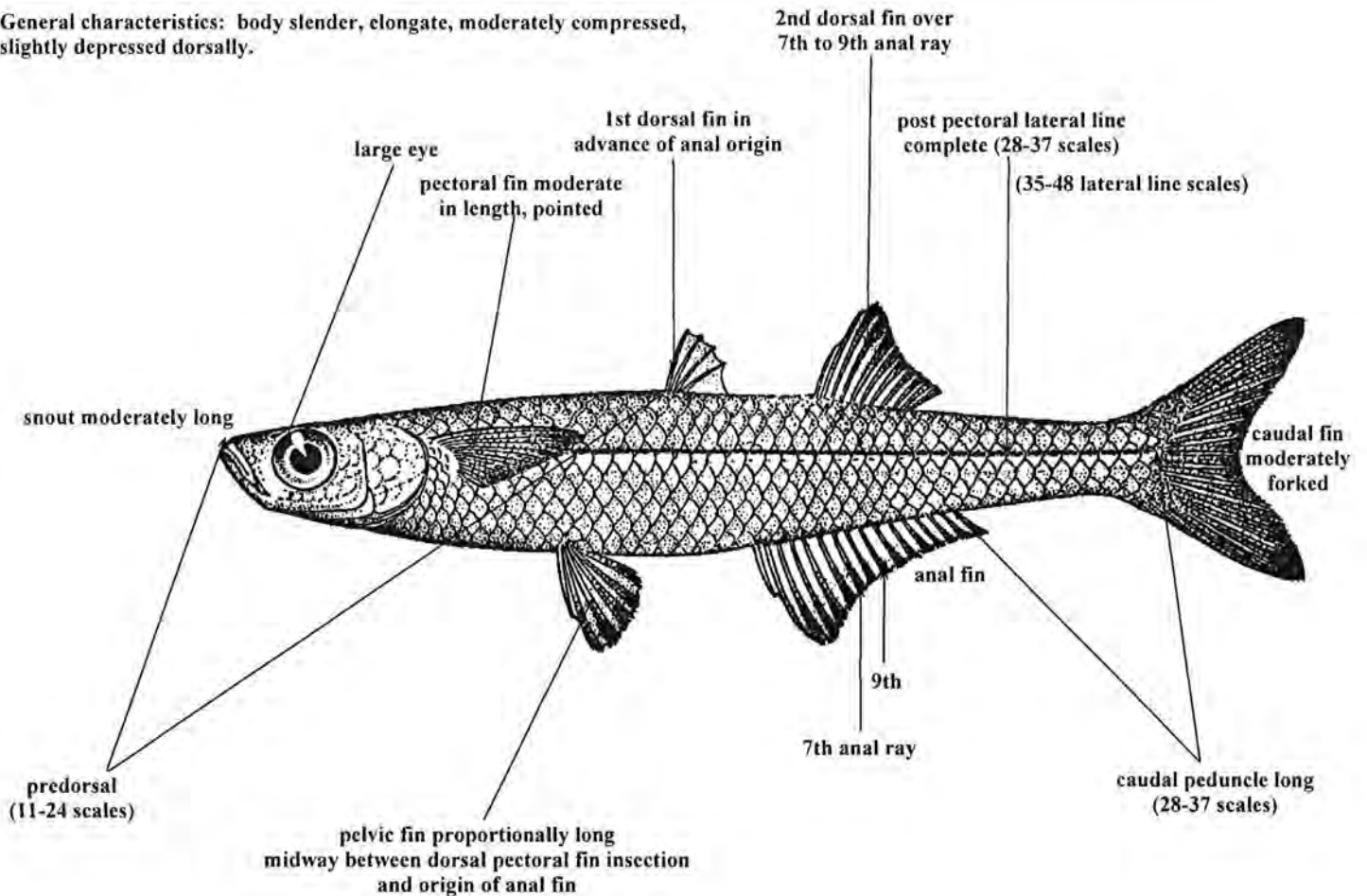
Analyst: [Signature]

Date specimens received: 07.12.22

Supplier: AQUATIC INDICATORS

Comments:

General characteristics: body slender, elongate, moderately compressed, slightly depressed dorsally.



AQUATIC INDICATORS

Date: 7-11-22

Species:

1. *M. bahia*
2. *M. bahia*
- 3.

Total Supplied:

1. 1200 @ 20^g
2. 1200 @ 25^g
- 3.

Brood Description

1. EPA
2. EPA
- 3.

Age:

1. "0" days - collected between 7-10-22 @ Noon and 7-11-22 @ 11:30AM
2. 5 days - collected between 7-5-22 @ Noon and 7-6-22 @ 11:30AM
- 3.

Environmental
Regime

Feeding: Zooplankton
Artemia NH ✓

Photo: L D
16 8

P.H.: 8.1

Temp: 25°C

Salinity: see above

Comments:

Thanks.

* received 1 ADULT *M. bahia* & preserved for taxonomy *JK*

07-12-22 1015 *JK*
TEMP = 25.1°C

	Ab 07-11-22	Ab 07-06-22
PH S.U.	7.84	7.84
DO μ L	11.2	11.0
SALINITY PPT	22.6	25.2
# DEAD / TOTAL #	0 / 1200+	0 / 1200+

Organisms appear healthy
Fed at 1022 *JK*

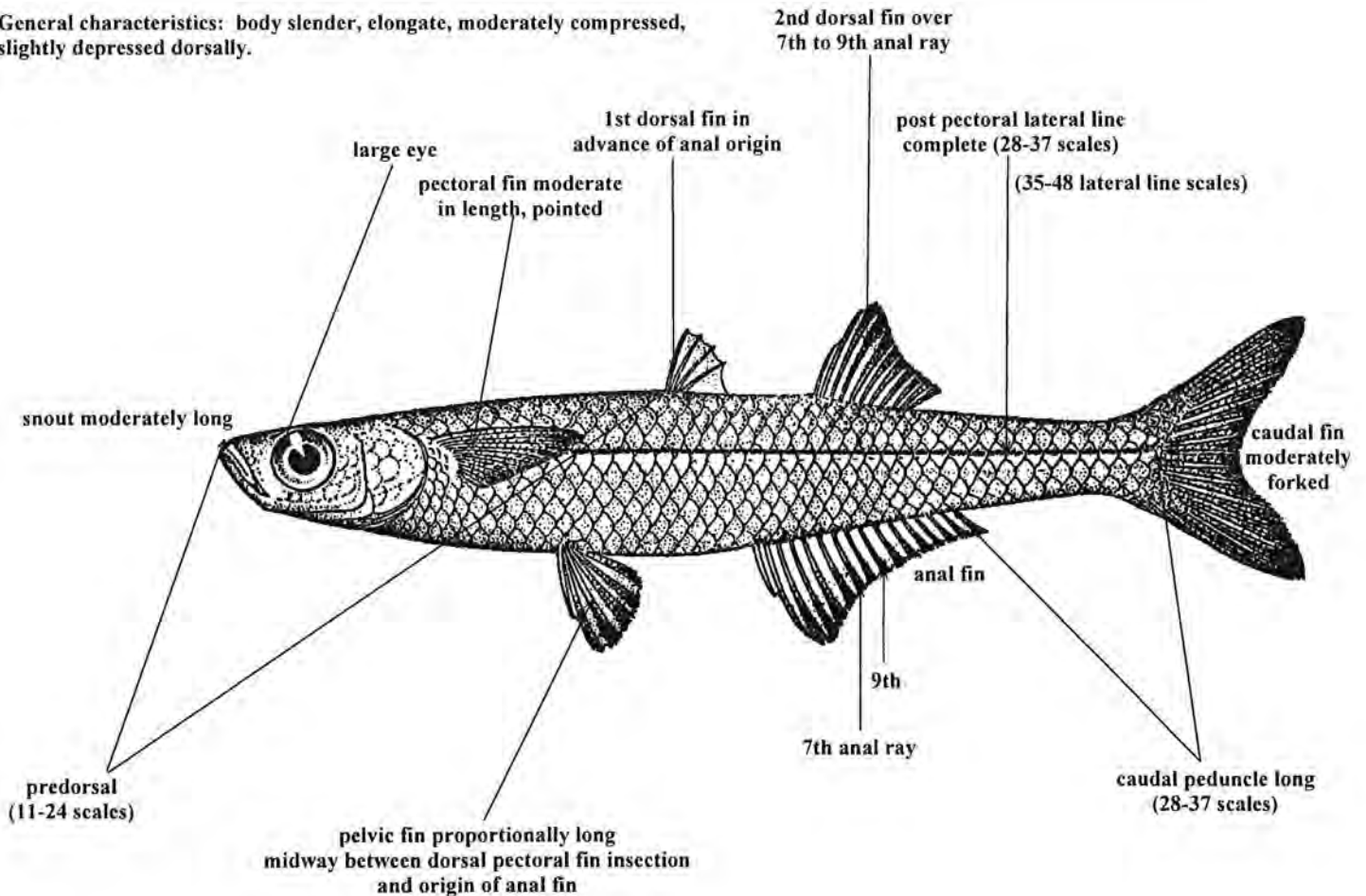
Menidia beryllina Taxonomic Identification Logsheet

Date identification performed: 11-08-22
Date specimens received: 11-08-22

Analyst: Jh
Supplier: AQUATIC INDICATORS

Comments:

General characteristics: body slender, elongate, moderately compressed, slightly depressed dorsally.



AQUATIC INDICATORS

Date: 11-7-22

11-08-22 1010 J
Temp = 24.8°C

Species:

1. *M. bahia*
2. *M. bahia*
3. *M. beryllina*

Total Supplied:

1. 280 @ 20%
2. 600 @ 25%
3. 400 @ 25%

	Ab 11-01-22	Ab 11-02-22	Mb 10-29-22
PH S.U.	7.73	7.94	7.41
DO _{mg/L}	11.1	11.0	9.9
SALINITY ppt	22.2	25.3	24.9
# DEAD / TOTAL #	0 / 280+	0 / 600+	6 / 400+

Organisms appear healthy
Fed at 1015. J

Brood Description

1. EBA
2. EBA
3. EBA

Age:

1. 1 day - 11-6-22 @ Noon to 11-7-22 @ 11:30AM
2. 5 days - 11-1-22 @ Noon to 11-2-22 @ 11:30AM
3. 9 days - 10-28-22 @ Noon to 10-29-22 @ 11:30AM

Environmental Regime

Feeding: Zooplankton
Artemia NH ✓

Photo: L D
16 8

P.H.: 8.1

Temp: 25°C

Salinity: See above

Comments:

Thanks.

* RECEIVED 1 ADULT *M. BERYLLINA* & PRESERVED FOR TAXONOMY.
J

SOP-G12: NIST Thermometer (annual calibration)



Precision Weighing
 1949 Evans Road
 Cary, North Carolina 27513
 Phone: (919) 678-0077 * Fax: (919) 678-0078
 Email: pweighing@aol.com

Client: **ETS Inc.** Contact: **Jim Sumner** Department: **Lab**

Description: **Digital Thermometer** Calibration SOP: **2020 Rev 1.1**
 Instrument ID: **61786906** Serial Number: **61786906**
 Manufacturer: **Fisher Scientific** Operating Range: **0 to 180 °C**
 Model: **15-078-2** Instrument Range: **-350 to 2200 °C**
 Calibration Interval: **Annually** Calibration Tolerance: **+/- 1 deg C**

Calibration Notes: *Nominal Targets are 0,20,25,35,44.5,60,105,150,180*

Calibration Data ("As left" data is identical to "As found" data, if "As left" is blank)

Test Points	Units	Standard	As Found	Error	As Left	Error	Pass/Fail
0	° C	0.080	0.0	-0.080			Pass
20	° C	19.948	19.9	-0.048			Pass
25	° C	24.952	24.9	-0.052			Pass
35	° C	35.064	34.9	-0.164			Pass
44.5	° C	44.373	44.4	0.027			Pass
60	° C	59.768	60.0	0.232			Pass
105	° C	104.739	105.0	0.261			Pass
150	° C	149.836	150.1	0.264			Pass
180	° C	179.773	179.9	0.127			Pass

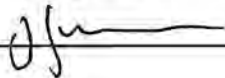
Instrument Found in Tolerance? Yes
 Instrument Left in Tolerance? Yes

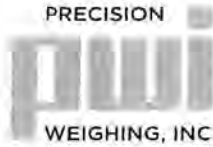
Calibration Date: **12 Nov 21** Calibration Due Date: **November 22**

Test Standards: Standard ID: Expiration Date:
 Digital Thermometer 170431632 May 22

Technicians Remarks: None

Calibration Performed By:
Shauna Brabblo 12 Nov 21

Approved Signature:
 11-23-21



Precision Weighing
 1949 Evans Road
 Cary, North Carolina 27513
 Phone: (919) 678-0077 * Fax: (919) 678-0078
 Email: pweighing@aol.com

Client: **ETS Inc.** Contact: **Jim Sumner** Department: **Lab**

Description: **Digital Thermometer** Calibration SOP: **2020 Rev 1.1**
 Instrument ID: **61786906** Serial Number: **61786906**
 Manufacturer: **Fisher Scientific** Operating Range: **0 to 180 °C**
 Model: **15-078-2** Instrument Range: **-350 to 2200 °C**
 Calibration Interval: **Annually** Calibration Tolerance: **+/- 1 deg C**

Calibration Notes: *Nominal Targets are 0,20,25,35,44.5,60,105,150,180*

Calibration Data ("As left" data is identical to "As found" data, if "As left" is blank)

Test Points	Units	Standard	As Found	Error	As Left	Error	Pass/Fail
0	° C	0.080	0.0	-0.080			Pass
20	° C	19.948	19.9	-0.048			Pass
25	° C	24.952	24.9	-0.052			Pass
35	° C	35.064	34.9	-0.164			Pass
44.5	° C	44.373	44.4	0.027			Pass
60	° C	59.768	60.0	0.232			Pass
105	° C	104.739	105.0	0.261			Pass
150	° C	149.836	150.1	0.264			Pass
180	° C	179.773	179.9	0.127			Pass

Instrument Found in Tolerance? Yes
 Instrument Left in Tolerance? Yes

Calibration Date:	12 Nov 21	Calibration Due Date:	November 22
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Test Standards: Standard ID: Expiration Date:
 Digital Thermometer 170431632 May 22

Technicians Remarks: None

Calibration Performed By:

Shauna Brabble

12 Nov 21

Approved Signature:



Applied Technical Services
Certificate of Calibration
 Certificate #3816306



Customer:
 Precision Weighing - Cary
 1949 Evans Road
 Cary, NC 27513

Calibration Location:
 Applied Technical Services
 1049 Triad Court
 Marietta, GA 30062

Instrument Information:

Manufacturer: Control Company (Traceable)
 Model Number: 15-081-102
 Description: Thermometer, Digital W/Probe
 Asset Number: 170431632
 Serial Number: 170431632
 PO Number: 15405

Calibration Information/Results:

As Found Condition : In Tolerance
 Action Taken / As Left: In Tolerance - No Adjustment
 Temperature: 70° F
 Humidity: 52% RH
 Calibration Date: 20-May-2021
 Calibration Due Date: 31-May-2022
 Calibration Interval: 12 Months

Calib. Procedure: ATS-1007 Rev 2: Calibration of RTD Thermometer as a System

This instrument has been calibrated using primary or secondary standards whose calibration is traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) or applicable ASTM specification number for hardness testing equipment. Some measurements are traceable to natural, physical constants, consensus standards, or ratio type measurements.

The reported expanded measurement uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a confidence level of approximately 95%. This calibration certificate may contain data that is not covered by the Scope of Accreditation. The unaccredited test points, where applicable, are indicated by an asterisk (*), or confined to clearly marked sections. Functional tests are not accredited. The expanded measurement uncertainty is not considered when determining in-tolerance or out-of-tolerance conditions. Results are reviewed, if applicable, to establish where any measurement results exceeded the stated calibration tolerance and to communicate results by means of this certificate.

All calibrations are performed in accordance with the ATS Quality Manual QM1, Rev. 18, dated 10/16/20. Applied Technical Services, Inc.'s Quality System complies with the applicable requirements of ANSI/NCSL Z540-1, ISO 9001:2015, 10CFR50 Appendix B, 10CFR Part 21, and ISO/IEC 17025:2017. The reported data is valid only at the time of the test and related only to the item calibrated. Calibration due dates appearing on this certificate and calibration label are determined by the client and do not imply continued conformance to specifications. This certificate shall not be reproduced except in full, without written permission of Applied Technical Services, Inc.

Technical Remarks:

- Test points are customer specific.
- Tolerances previously widened at -80°C test point as per customer request. POC: S. Brabble (05/19/2020).

Calibrated By: *Wood, Tonya*
Name

Calibration Tech
Title

Calibration Equipment Utilized

Standard I.D.	Mfg.	Model No.	Description	Serial	Cal. Date	Due Date
ATS-05029	Iso-Tech	MILLIK	Thermometry System	32175-4	02/24/2021	05/24/2021
ATS-06573	Fluke	5626	Platinum Resistance Thermometer	3953	12/16/2020	12/16/2021

Calibration Data

FUNCTION TESTED	Nominal Value	CALIBRATION TOLERANCE	As Found	Out of Tol	As Left
Temperature Accuracy	-80.000 °C	-80.500 to -79.500 °C [EMU 0.05 °C]	-79.656		Same
	0.000 °C	-0.050 to 0.050 °C [EMU 0.05 °C]	-0.022		Same
	100.000 °C	99.950 to 100.050 °C [EMU 0.05 °C]	99.952		Same
	200.000 °C	199.900 to 200.100 °C [EMU 0.05 °C]	200.066		Same
	300.000 °C	299.950 to 300.050 °C [EMU 0.05 °C]	300.050		Same

End Of Report

Applied Technical Services
 1049 Triad Court
 Marietta, GA 30062

Phone 770 423-1400 www.atslab.com

SOP-G12: Laboratory thermometer calibrations
(annual calibration, quarterly for digital and incubator thermometers)

Environmental Testing Solutions, Inc.

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	03-30-22
Probe Serial number:	61786906	Analyst:	JL
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-12-21		
Re-calibration due:	Probe and Meter: 11-2022		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
4739715 170755003	GENERAL USE DIGITAL	NA	0.2 24.8	0.2 25.0	0.0 +0.2
160928612			-0.3 24.5	0.2 25.0	+0.5 +0.5
160928646			-0.3 24.7	0.2 25.0	+0.5 +0.3
181656959			0.3 24.7	0.2 25.0	-0.1 +0.3
181656948			-0.7 24.8	0.2 25.0	-0.9 +0.2
170587698			0.2 24.9	0.2 25.0	0.0 +0.1
130664685	TOXICITY GENERAL USE DIGITAL - KANAWOOD		25.1	25.0	-0.1
130664679			25.0	25.0	0.0
122164631	GENERAL USE DIGITAL		0.2 24.7	0.2 25.0	0.0 +0.3
122164697			0.2 24.7	0.2 25.0	0.0 +0.3
18D104324	SALINITY METER	18D104324	25.0	25.0	0.0
08A100271	DO METER	08A100271	23.8	23.8	0.0
PROBE S	FISH CULTURE	PROBE S	23.2	23.5	+0.3

* NO CHANGE IN CORRECTION FACTORS.
REPLACED BATTERIES IN ALL DIGITAL

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	06 29 22
Probe Serial number:	61786906	Analyst:	J
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-12-21		
Re-calibration due:	Probe and Meter: 11-2022		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
170755003	GENERAL USE DIGITAL	170755003	0.7	0.5	-0.2 * CHAN
			24.8	25.0	+0.2
122164697		122164697	0.5	0.5	0.0
			24.7	25.0	+0.3
160928646		160928646	0.0	0.5	+0.5
			24.7	25.0	+0.3
181656959		181656959	0.6	0.5	-0.1
			24.7	25.0	+0.3
122164631		122164631	0.5	0.5	0.0
			25.0	25.0	0.0
160928612		160928612	0.0	0.5	+0.5
			24.5	25.0	+0.5
181656948		181656948	-0.4	0.5	-0.9
			24.8	25.0	+0.2
170587698		170587698	0.5	0.5	0.0
			24.9	25.0	+0.1
130664685	KANGAROO DIGITAL TOXICITY GENERAL USE	130664685	25.1	25.0	-0.1
130664679		130664679	25.0	25.0	0.0
176100540 -PROBE	DO METER VSI MODEL 52	METER OPA100271	22.7	22.7	0.0
METER 18D104324	SALINITY METER	METER 18D104324	25.0	25.0	0.0
PROBES	FISH ROOM MIN/MAX	PROBES	24.2	24.5	+0.3

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	07-28-22
Probe Serial number:	61786906	Analyst:	<i>[Signature]</i>
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-12-21		
Re-calibration due:	Probe and Meter: 11-2022		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
✓ 409048	Blue Ridge Parkway Mercury Therm	409048	0.2 30.0	0.2 30.0	0.0 0.0
✓ HB 107953	CWS - Doug Easy Read - Red Spirit		0.2 35	0.1 35.1	0 0
✓ 15E104403	Whitewater Env. VSI 550 A	15E104403	0.2 35.0	0.2 35.0	0.0 0.0
✓ AB43065	TRESCO	DIGITAL	0.2 35.0	0.2 35.0	0.0 0.0
✓ 210102686		VSI PROZO DO	0.2 35.0	0.2 35.0	0.0 0.0
✓ 5195500 PH 19046 010 - probe		NACH SEASION 1 PH	0.2 35.0	0.2 35.0	0.0 0.0
✓ 170625251	NEG	FISHER BRAND TRACEABLE	0.2 35.0	0.2 35.0	0.0 0.0
✓ 192600208		FISHER BRAND TRACEABLE	0.21 35.11	0.2 35.0	0.0 0.0
✓ T611825070	LAKE WRE	APERA PH60 PH TESTER	1.8 34.9	0.2 35.0	-1.6 +1.1
✓ 210103217		VSI PROZO DO METER	0.1 34.9	0.2 35.0	+0.1 +0.1
✓ 2837 235	CWS - Doug	OAKTON PH50 #1	0.2 35.0	0.2 35.0	0.0 0.0
✓ 2834663		#2	0.2 35.0	0.2 35.0	0.0 0.0

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	11-26-22
Probe Serial number:	61786906	Analyst:	K
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-12-21		
Re-calibration due:	Probe and Meter: 11-2022		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
✓ 2697945	CWS - MIKE	OAKTON PHISO	0.2	0.2	0.0
			35.0	35.0	0.0
✓ 17L102627		YSE PRO 20i	0.2	0.2	0.0
			35.0	35.0	0.0
✓ C16438		EAST READ THERM	0	0.2	0
			35.	35.0	0
NONE	JONES ENV.	DIGITAL TRACEABLE	0.2	0.2	0.0
			35.0	35.0	0.0
		COMARK 300	0.0	0.2	+0.2
			35.0	35.0	0.0
5193500PH 20143007		HACH SENSION 156 PH	0.2	0.2	0.0
			35.0	35.0	0.0
0411009 101		HANNA HI 98193	0.2	0.2	0.0
			35.0	35.0	0.0

Thermometer Calibration

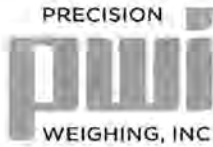
Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	09-01-22
Probe Serial number:	61786906	Analyst:	<i>Jh</i>
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-12-21		
Re-calibration due:	Probe and Meter: 11-2022		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
160928646	GENERAL USE DIGITAL	NA	1.5	1.0	-0.5
			24.7	25.0	+0.3
160928612			0.5	1.0	+0.5
			24.5	25.0	+0.5
122164631			1.0	1.0	0.0
			25.0	25.0	0.0
170587698			1.0	1.0	0.0
			24.9	25.0	+0.1
122164697			1.0	1.0	0.0
			24.7	25.0	+0.3
181656948			1.9	1.0	-0.9
			24.7	25.0	+0.2
170755003			1.2	1.0	-0.2
			24.8	25.0	+0.2
181656959			1.1	1.0	-0.1
			24.7	25.0	+0.3
130664685	TOXICITY GENERAL USE KANGAROO DIGITAL	NA	25.1	25.0	-0.1
130664679			25.0	25.0	0.0
O&A 100271 PROBE 176100540	YSI DO METER	NA	23.4	23.4	0.0

* ALL UNCHANGED FROM PREVIOUS CALIBRATION.

Jh

09-01-22



Precision Weighing
 1949 Evans Road
 Cary, North Carolina 27513
 Phone: (919) 678-0077 * Fax: (919) 678-0078
 Email: pweighing@aol.com

Client:
 ETS Inc.

Contact:
 Jim Sumner

Department:
 Lab

Description: Digital Thermometer
 Instrument ID: 61786906
 Manufacturer: Fisher Scientific
 Model: 15-078-2
 Calibration Interval: Annually

Calibration SOP: 2020 Rev 1.1
 Serial Number: 61786906
 Operating Range: 0 to 180 °C
 Instrument Range: -350 to 2200 °C
 Calibration Tolerance: +/- 1 deg C

Calibration Notes: *Nominal Targets are 0,20,25,35,44.5,60,105,150,180*

Calibration Data ("As left" data is identical to "As found" data, if "As left" is blank)

Test Points	Units	Standard	As Found	Error	As Left	Error	Pass/Fail
0	° C	0.0175	0.4	0.3825			Pass
20	° C	20.0127	20.4	0.3873			Pass
25	° C	25.0011	24.8	-0.2011			Pass
35	° C	35.0233	34.8	-0.2233			Pass
44.5	° C	44.5471	44.3	-0.2471			Pass
60	° C	60.0461	59.8	-0.2461			Pass
105	° C	105.042	105.0	-0.042			Pass
150	° C	148.445	148.5	0.055			Pass
180	° C	179.981	180.0	0.019			Pass


Instrument Found in Tolerance? Yes
 Instrument Left in Tolerance? Yes

Calibration Date: 18 Nov 22	Calibration Due Date: November 23
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Test Standards: Digital Thermometer Standard ID: 170431637 Expiration Date: March 23

Technicians Remarks: Battery replaced (PW80).

Calibration Performed By: Ben Wood 18 Nov 22

Approved Signature: 



Applied Technical Services
Certificate of Calibration
 Certificate #3149506



Customer:

Precision Weighing - Cary
 1949 Evans Road
 Cary, NC 27513

Calibration Location:

Applied Technical Services
 1049 Triad Court
 Marietta, GA 30062

Instrument Information:

Manufacturer: Control Company (Traceable)
Model Number: 15-081-102
Description: Thermometer, Digital W/Probe
Asset Number: 170431637
Serial Number: 170431637
PO Number: 15823

Calibration Information/Results:

As Found Condition : In Tolerance
Action Taken / As Left: In Tolerance - No Adjustment
Temperature: 71° F
Humidity: 40% RH
Calibration Date: 25-Mar-2022
Calibration Due Date: 31-Mar-2023
Calibration Interval: 12 Months

Calib. Procedure: ATS-1007 Rev 2:Calibration of RTD Thermometer as a System

This instrument has been calibrated using primary or secondary standards whose calibration is traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) or applicable ASTM specification number for hardness testing equipment. Some measurements are traceable to natural, physical constants, consensus standards, or ratio type measurements.

The reported expanded measurement uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a confidence level of approximately 95%. This calibration certificate may contain data that is not covered by the Scope of Accreditation. The unaccredited test points, where applicable, are indicated by an asterisk (*), or confined to clearly marked sections. Functional tests are not accredited. The expanded measurement uncertainty is not considered when determining in-tolerance or out-of-tolerance conditions. Results are reviewed, if applicable, to establish where any measurement results exceeded the stated calibration tolerance and to communicate results by means of this certificate.

All calibrations are performed in accordance with the ATS Quality Manual QMI, Rev. 19, dated 03-01-22. Applied Technical Services, Quality System complies with the applicable requirements of ANSI/NCIS, Z540-1, ISO 9001:2015, 10CFR50 Appendix B, 10CFR Part 21, and ISO/IEC 17025:2017. The reported data is valid only at the time of the test and related only to the item calibrated. Calibration due dates appearing on this certificate and calibration label are determined by the client and do not imply continued conformance to specifications. This certificate shall not be reproduced except in full, without written permission of Applied Technical Services.

Technical Remarks:

* Tolerances widened as previous calibration as per customer request, POC: S. Brabble (T: 2773536).

Calibrated By: *Villacruz, Jodson*
Name

Calibration Tech.
Title

Calibration Equipment Utilized

Standard I.D.	Mfg.	Model No.	Description	Serial	Cal. Date	Due Date
ATS-05029	Iso-Tech	MILLI K	Thermometry System	32175-4	03/01/2022	03/31/2022
ATS-07687	Rosemount	162C	Thermometer Probe - SPRT	960	03/03/2022	03/03/2023

Calibration Data

FUNCTION TESTED	Nominal Value	CALIBRATION TOLERANCE	As Found	Out of Tol	As Left
Temperature Accuracy	-80.000 °C	-80.500 to -79.500 °C [EMU 0.05 °C]	-79.943		Same
	0.000 °C	-0.500 to 0.500 °C [EMU 0.05 °C]	-0.041		Same
	100.000 °C	99.500 to 100.500 °C [EMU 0.05 °C]	99.946		Same
	200.000 °C	199.500 to 200.500 °C [EMU 0.05 °C]	199.978		Same
	300.000 °C	299.500 to 300.500 °C [EMU 0.05 °C]	300.029		Same

End Of Report

Applied Technical Services
 1049 Triad Court
 Marietta, GA 30062

Phone 770 423-1400 www.atslab.com

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	12.27-22
Probe Serial number:	61786906	Analyst:	<i>[Signature]</i>
Meter Serial number:	61789314	Ice Point of Traceable Thermometer: <u>0.0°C</u>	
Calibration date:	Probe and Meter: 11-18-22		
Re-calibration due:	Probe and Meter: 11-2023		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
-----	Refrigerator # 1	BA64722418	Not in use.		
✓ 96-01587	Refrigerator # 2	BA65013194	1.1	1.1	0.0
✓ 96-01566	Refrigerator # 3	BA11411547	3.8	3.8	0.0
✓ 6959	Refrigerator # 4 TOP	WA42501619	1.9	1.9	0.0
✓ 6916	Refrigerator # 4 BOTTOM	WA42501619	1.7	1.7	0.0
✓ 4565	Refrigerator # 5 TOP	WA42500397	1.9	1.9	0.0
✓ 6315	Refrigerator # 5 BOTTOM	WA42500397	2.2	2.2	0.0
✓ 95-02120	Refrigerator – Algae/YWT	E2001648367	3.0	3.0	0.0
WB72043714	BOD Incubator # 1	WB72043714	Calibrated to 20.0°C		
✓ 7126	BOD Incubator # 1 Thermometer	WB72043714	20.4	20.4	0.0
WB94157442	BOD Incubator # 2	WB94157442	Calibrated to 20.0°C		
✓ 7049	BOD Incubator # 2 Thermometer	WB94157442	20.7	20.7	0.0
WB22114719	BOD Incubator # 3	WB94157442	Calibrated to 20.0°C		
✓ 8520	BOD Incubator # 3 Thermometer	WB94157442	20.7	20.7	0.0
WB42676093	Reagent Incubator # 1	WB42676093	Calibrated to 25.0°C		
✓ 5030	Reagent Incubator # 1	WB42676093	25.4	25.4	0.0
WB41340472	Toxicity Incubator # 1	WB41340472	Calibrated to 25.0°C		
✓ 160724968	Toxicity Incubator # 1 MIN/MAX	WB41340472	25.1	25.3	+0.2
✓ 6272	Toxicity Incubator # 1 TOP	WB41340472	24.7	24.7	0.0
✓ 4673	Toxicity Incubator # 1 BOTTOM	WB41340472	25.3	25.3	0.0
WB22114693	Toxicity Incubator # 2	WB22114693	Calibrated to 25.0°C		
✓ 130761061	Toxicity Incubator # 2 MIN/MAX	WB22114693	25.2	25.0	-0.2
✓ 4676	Toxicity Incubator # 2 TOP	WB22114693	24.7	24.7	0.0
✓ 4755	Toxicity Incubator # 2 BOTTOM	WB22114693	25.0	25.0	0.0
WB95219633	Toxicity Incubator # 4	WB95219633	Calibrated to 25.0°C		
✓ 160761060	Toxicity Incubator # 4 MIN/MAX	WB95219633	25.6	25.4	-0.2
✓ 4547	Toxicity Incubator # 4 TOP	WB95219633	25.2	25.2	0.0
✓ 6216	Toxicity Incubator # 4 BOTTOM	WB95219633	25.4	25.4	0.0

Note: If correction factor is ≥ 1.0°C, the thermometer must be taken out of service.

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	12-27-22
Probe Serial number:	61786906	Analyst:	H
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-18-22		
Re-calibration due:	Probe and Meter: 11-2023		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
WB60643874	Toxicity Incubator # 5	WB60643874	Calibrated to 25.0°C		
✓ 160761035	Toxicity Incubator # 5 MIN/MAX	WB60643874	26.3	25.8	-0.5
✓ 6406	Toxicity Incubator # 5 TOP	WB60643874	26.1	26.1	0.0
✓ 4595	Toxicity Incubator # 5 BOTTOM	WB60643874	25.8	25.8	0.0
WB42667925	Toxicity Incubator # 6	WB42667925	Calibrated to 25.0°C		
✓ 160761056	Toxicity Incubator # 6 MIN/MAX	WB42667925	24.8	24.8	0.0
✓ 8515	Toxicity Incubator # 6 TOP	WB42667925	24.4	24.4	0.0
✓ 8472	Toxicity Incubator # 6 BOTTOM	WB42667925	24.8	24.8	0.0
WB42668033	Toxicity Incubator # 7	WB42668033	Calibrated to 25.0°C		
✓ 160724990	Toxicity Incubator # 7 MIN/MAX	WB42668033	24.3	24.4	+0.1
✓ 1526	Toxicity Incubator # 7 TOP	WB42668033	24.2	24.2	0.0
✓ 4767	Toxicity Incubator # 7 BOTTOM	WB42668033	24.4	24.4	0.0
✓ 6934	Bacteria Incubator # 1 LEFT	11AX-4	34.8	34.8	0.0
✓ 8490	Bacteria Incubator # 1 RIGHT	11AX-4	35.3	35.3	0.0
✓ 14-98585	60°C Oven	TA180	60 60.1	60.1	0
✓ TSS-1	105°C Oven	1000136	105 104.8	105 104.8	0
✓ 22332	180°C Oven	P-6	180	180.2	0
602111280	Water Bath # 1	602111280	Calibrated to 44.5°C		
✓ 6333	Water Bath # 1 Thermometer	602111280	44.5	44.5	0.0
124602-598	Water Bath # 2	124602-598	Calibrated to 44.5°C		
✓ 8521	Water Bath # 2 Thermometer	124602-598	44.5	44.5	0.0
✓ 920200006723	COD Reactor # 1	920200006723	Calibrated to 150°C		
✓ COD1	COD Reactor # 1 Thermometer	920200006723	150 149.8	150 149.8	0
18D104324, Probe lot: 18C101023	Salinity Meter, YSI PRO30	18D104324	25.7 24.4	25.7 24.4	0.0
Probe: 0655815, Lot 12M 100663	DO Meter, YSI 52CE	08A100271	24.4 25.7	24.4 25.7	0.0

Note: If correction factor is ≥ 1.0°C, the thermometer must be taken out of service.

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	12-27-22
Probe Serial number:	61786906	Analyst:	JH
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-18-22		
Re-calibration due:	Probe and Meter: 11-2023		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
✓ 130664642	Toxicity General Use (Kangaroo Digital)	Not applicable	24.7	25.0	+0.3
✓ 111898405	Toxicity General Use (Kangaroo Digital)	Not applicable	24.5	25.0	+0.5
✓ 111898409	Toxicity General Use (Kangaroo Digital)	Not applicable	24.8	25.0	+0.2
✓ 130664685	Toxicity General Use (Kangaroo Digital)	Not applicable	24.8	25.0	+0.2
✓ 130664705	Toxicity General Use (Kangaroo Digital)	Not applicable	24.7	25.0	+0.3
✓ 130664679	Toxicity General Use (Kangaroo Digital)	Not applicable	24.6	25.0	+0.4
✓ 111898411	Toxicity General Use (Kangaroo Digital)	Not applicable	25.0	25.0	0.0
✓ 160609936	Toxicity General Use (Kangaroo Digital)	Not applicable	24.9	25.0	+0.1
✓ 111898250	Toxicity General Use (Kangaroo Digital)	Not applicable	24.6	25.0 +0.4 ^{11/17/22 JH}	+0.4
✓ 111898404	Toxicity General Use (Kangaroo Digital)	Not applicable	24.5	25.0	+0.5
111898405	Toxicity General Use, Fish Culture (MIN/MAX Digital)	Not applicable		Not in use ¹²⁻²⁷⁻²²	
✓ PROBE1	General Use (Digital)	Not applicable	24.6	25.0 0.0 ^{11/17/22 JH}	+0.4
✓ PROBE2	General Use (Digital)	Not applicable	25.0	25.0	0.0
✓ PROBE3	General Use (Digital)	Not applicable	24.7	25.0	+0.3
✓ PROBE4	General Use (Digital)	Not applicable	24.7	25.0	+0.3
✓ PROBE5	General Use (Digital)	Not applicable	24.6	25.0	+0.4

Note: If correction factor is ≥ 1.0°C, the thermometer must be taken out of service.

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	12-21-22
Probe Serial number:	61786906	Analyst:	J
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-18-22		
Re-calibration due:	Probe and Meter: 11-2023		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
✓ 122164697	General Use (Digital)	Not applicable	0.5	0.5	0.0
			25.6	25.0	-0.6
160928622	General Use (Digital)	Not applicable	Not in use	0.5	0.0
✓ 160928646	General Use (Digital)	Not applicable	0.0	0.5	+0.5
			24.7	25.0	+0.3
✓ 160928612	General Use (Digital)	Not applicable	0.0	0.5	+0.5
			24.7	25.0	+0.3
✓ 170587688	General Use (Digital)	Not applicable	0.5	0.5	0.0
			25.0	25.0	0.0
170754920	General Use (Digital)	Not applicable	Not in use	0.5	0.0
170754975	General Use (Digital)	Not applicable	0.5	0.5	0.0
✓ 170755003	General Use (Digital)	Not applicable.	0.5	0.5	0.0
			25.0	25.0	0.0
✓ 181656959	General Use (Digital)	Not applicable.	0.6	0.5	-0.1
			25.2	25.0	-0.2
✓ 181656948	General Use (Digital)	Not applicable.	1.4	0.5	-0.9
			25.3	25.0	-0.3
181670536	General Use (Digital)	Not applicable.	Not in use	0.5	0.0
181870570	General Use (Digital)	Not applicable.	0.5	0.5	0.0
✓ 122164631	General Use (Digital)	Not applicable.	0.5	0.5	0.0
			25.3	25.0	-0.3

Note: If correction factor is $\geq 1.0^{\circ}\text{C}$, the thermometer must be taken out of service.

Thermometer Calibration

Traceable Thermometer:	Fisher Scientific Digital Thermometer	Date:	12-27-22
Probe Serial number:	61786906	Analyst:	JL
Meter Serial number:	61789314		
Calibration date:	Probe and Meter: 11-18-22		
Re-calibration due:	Probe and Meter: 11-2023		

Thermometer Serial Number	Location	Location Serial Number	Thermometer Temperature (°C)	Traceable Thermometer Temperature (°C)	Correction Factor (°C)
✓ GEN1	General Use (Digital) (serial number assigned)	Not applicable.	- 0.1	0.5	+ 0.6
			24.7	25.0	+ 0.3
✓ GEN2	General Use (Digital) (serial number assigned)	Not applicable.	0.4	0.5	+ 0.1
			24.9	25.0	+ 0.1
✓ GEN3	General Use (Digital) (serial number assigned)	Not applicable.	0.5	0.5	0.0
			25.0	25.0	0.0
✓ GEN4	General Use (Digital) (serial number assigned)	Not applicable.	0.5	0.5	0.0
			25.0	25.0	0.0
✓ GEN5	General Use (Digital) (serial number assigned)	Not applicable.	0.5	0.5	0.0
			25.0	25.0	0.0
✓ GEN6	General Use (Digital) (serial number assigned)	Not applicable.	0.5	0.5	0.0
			25.0	25.0	0.0
✓ 4934	General Use (Mercury)	Not applicable	0.5	0.5	0.0
			25.0	25.0	0.0
✓ 5017	General Use (Mercury)	Not applicable	0.5	0.5	0.0
			25.0	25.0	0.0
✓ 6209	General Use (Mercury)	Not applicable.	0.5	0.5	0.0
			25.0	25.0	0.0
✓ 8503	General Use (Mercury)	Not applicable	0.5	0.5	0.0
			25.0	25.0	0.0

Note: If correction factor is ≥ 1.0°C, the thermometer must be taken out of service.

Conductivity (SM 2510 B-2011, Meter: Accumet Model AR20, SN 93312452)

RL = 14.9 µmhos/cm

Analyst JL
Date analyzed 12.29.22

ATC VERIFICATION
UPPER & LOWER TOLERANCE
RANGE.

Reviewed by JL
Date reviewed 12.29.22

Sample temperature (°C): 25.1°C (Samples must be warmed to 25.0 ± 1.0°C before taking conductivity measurements.)

Calibration:

Reference standard	True value (µmhos/cm)	Internal Cell Constant
INSS 2102	1000	1.0004

Standardization:

Reference standard	True value (TV) (µmhos/cm)	Conductivity corrected to µmhos/cm (C)	% RS = C / TV x 100
INSS 2141	14.9	18.2	122.17.
INSS 2142	146.9	143	97.37.
INSS 2139	500	501	100.27.
INSS 2143	717.5	707	98.57.
INSS 2144	1412	1370	97.07.
INSS 2100	2000	1980	99.07.
INSS 2145	6667	6300	94.57.

Duplicate sample precision:

Sample number	Sample ID	Conductivity corrected to µmhos/cm	%RPD = $\frac{ (S - D) }{[(S+D)/2]} \times 100$ (acceptable range = ± 10%)
		S	
	Duplicate	D	

Sample measurements:

Sample number	Sample ID	Conductivity corrected to µmhos/cm	Reported conductivity (µmhos/cm)
TV = ND	Blank - Deionized water	0.119	< 14.9
INSS 2102 ↓	1000 µmhos/cm @ 19.8°C	904	90.47.
	↓ @ 29.2°C	1100	110.07.
	↓ @ 25.1°C	1000	100.07.

Standardization:

Reference standard	True value (TV) (µmhos/cm)	Conductivity corrected to µmhos/cm (C)	% RS = C / TV x 100
INSS			

Salinity (SM 2520 B-2011, Meter: YSI PRO30, SN 18D104324)
RL = 1.0 ppt

Analyst JK
Date analyzed 12-29-22

ATC VERIFICATION.

Reviewed by JK
Date reviewed 12-29-22

Sample temperature (°C): 25.8°C (Samples must be warmed to 25.0 ± 1.0°C before taking salinity measurements.)

Calibration

Reference standard	Initial Salinity (ppt)	Correction (ppt)	Final Salinity (True value = 25.0) (ppt)
INSS 2153	25.1	-0.1	25.0

Laboratory control standard (LCS)

Reference standard	True value (TV) (ppt)	Salinity ppt (C)	% RS = C / TV x 100
INSS 2152	0.71	0.7	98.6%
INSS 2154	35.0	35.2	100.6%

Duplicate sample precision:

Sample ID	Salinity (ppt)	%RPD = $\frac{ S - D }{[(S+D)/2]} \times 100$ (acceptable range = ± 10%)
<u>S</u>	<u>25.0</u>	
Duplicate <u>D</u>	<u>25.0</u>	<u>h 12-29-22</u>

Sample measurements:

Sample number	Sample ID	Salinity (ppt)	Reported Salinity (ppt)
TV = ND	Blank - Deionized Water	0.0	< 1.0
INSS 2153	25 ppt INSS 2153 @ 25.8°C	25.0	100.0%
↓	↓ @ 2.9°C	25.1	100.4%
↓	↓ @ 30.0°C	24.9	99.6%
<u>h</u>			

Laboratory control standard (LCS)

Reference standard	True value (TV) (ppt)	Salinity (ppt) (C)	% RS = C / TV x 100
INSS	0.71 or 35.0		<u>h 12-29-22</u>

Pipette Volume Verification

Analyst	A-I		
Date	03-18-22		
Verification start time	1451	End time	1458

Pipette	Fisherbrand Handy Step	Serial number	17E59354
Water and ambient temperature (°C)	22.8°C	Digital thermometer SN	130664685
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
0.0500	0.1000
1 0.0494	0.0990
2 0.0508	0.0995
3 0.0491	0.0991
4 0.0485	0.0996
5 0.0496	0.0996
6 0.0505	0.0998
7 0.0500	0.0994
8 0.0498	0.0988
9 0.0496	0.0998
10 0.0498	0.0998

1-minute Leak Check		Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Start time	1502	End time	1503

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	03-18-22
Calibration due date:	09-18-22
Pipet manufacturer:	Fisherbrand HandyStep
Serial/ID number:	17E59354
Nominal Volume:	0.05
Location of use:	Toxicity lab

Test Conditions		Normal
Barometric pressure, kPa or mbar		102.3
Relative Humidity, %		86
Ambient temp., degrees C		22.8
Test liquid temp., degrees C		22.8
Z correction factor	1.0035	

Leak Test	
Time begin:	1502
Time end:	1503
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.05	units:	mL
Time begin:	1451		
Replicate	Mass	Units	Volume (V)
m ₁	0.0494	g	0.04957
m ₂	0.0508	g	0.05098
m ₃	0.0491	g	0.04927
m ₄	0.0485	g	0.04867
m ₅	0.0496	g	0.04977
m ₆	0.0505	g	0.05068
m ₇	0.0500	g	0.05018
m ₈	0.0498	g	0.04997
m ₉	0.0496	g	0.04977
m ₁₀	0.0498	g	0.04997
Mean mass	0.04971		PASS
Time end:	1458		
Mean vol.	0.0499		
s	0.0007		
% CV	1.3190		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	03-18-22
Calibration due date:	09-18-22
Pipet manufacturer:	Fisherbrand HandyStep
Serial/ID number:	17E59354
Nominal Volume:	0.1
Location of use:	Toxicity lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.3
Relative Humidity, %	86
Ambient temp., degrees C	22.8
Test liquid temp., degrees C	22.8
Z correction factor	1.0035

Leak Test	
Time begin:	1502
Time end:	1503
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.1	units:	mL
Time begin:	1451		
Replicate	Mass	Units	Volume (V)
m ₁	0.0990	g	0.09935
m ₂	0.0995	g	0.09985
m ₃	0.0991	g	0.09945
m ₄	0.0996	g	0.09995
m ₅	0.0996	g	0.09995
m ₆	0.0978	g	0.09814
m ₇	0.0994	g	0.09975
m ₈	0.0988	g	0.09915
m ₉	0.0998	g	0.10015
m ₁₀	0.0998	g	0.10015
Mean mass	0.09924	PASS	
Time end:	1458		
Mean vol.	0.0996		
s	0.0006		
% CV	0.6124		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

Pipette Volume Verification

Analyst	A.S		
Date	03-26-22		
Verification start time	1000	End time	1002

Pipette	Finnpipette, 0.25 mL	Serial number	U69775
Water and ambient temperature (°C)	24.9°C	Digital thermometer SN	130664685
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
	0.2500
1	0.2450
2	0.2500
3	0.2499
4	0.2483
5	0.2518
6	0.2491
7	0.2509
8	0.2501
9	0.2502
10	0.2440

1-minute Leak Check		Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Start time	1003	End time	1004

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	03-26-22
Calibration due date:	09-26-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	U69775
Nominal Volume:	0.25
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.6
Relative Humidity, %	37
Ambient temp., degrees C	24.9
Test liquid temp., degrees C	24.9
Z correction factor	1.0040

Leak Test	
Time begin:	1003
Time end:	1004
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.25	units:	mL
Time begin:	1000		
Replicate	Mass	Units	Volume (V)
m ₁	0.2450	g	0.24598
m ₂	0.2500	g	0.25100
m ₃	0.2499	g	0.25090
m ₄	0.2483	g	0.24929
m ₅	0.2518	g	0.25281
m ₆	0.2491	g	0.25010
m ₇	0.2509	g	0.25190
m ₈	0.2501	g	0.25110
m ₉	0.2502	g	0.25120
m ₁₀	0.2440	g	0.24498
Mean mass	0.24893	PASS	
Time end:	1002		
Mean vol.	0.2499		
s	0.0025		
% CV	1.0142		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

Pipette Volume Verification

Analyst	A.S		
Date	03-26-22		
Verification start time	1006	End time	1010

Pipette	Finnpipette, 0.50 mL	Serial number	DH66501
Water and ambient temperature (°C)	24.9°C	Digital thermometer SN	130664685
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
	0.5000
1	0.4914
2	0.5040
3	0.4918
4	0.4941
5	0.4946
6	0.4924
7	0.4950
8	0.4958
9	0.4947
10	0.4930

1-minute Leak Check		Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Start time	1011	End time	1012

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	03-26-22
Calibration due date:	09-26-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	DH66501
Nominal Volume:	0.50
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.6
Relative Humidity, %	37
Ambient temp., degrees C	24.9
Test liquid temp., degrees C	24.9
Z correction factor	1.0040

Leak Test	
Time begin:	1011
Time end:	1012
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.5	units:	mL
Time begin:	1006		
Replicate	Mass	Units	Volume (V)
m ₁	0.4914	g	0.49337
m ₂	0.5040	g	0.50602
m ₃	0.4918	g	0.49377
m ₄	0.4941	g	0.49608
m ₅	0.4946	g	0.49658
m ₆	0.4924	g	0.49437
m ₇	0.4950	g	0.49698
m ₈	0.4958	g	0.49778
m ₉	0.4947	g	0.49668
m ₁₀	0.4930	g	0.49497
Mean mass	0.49468	PASS	
Time end:	1010		
Mean vol.	0.4967		
s	0.0036		
% CV	0.7246		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

Pipette Volume Verification

Analyst	A.S		
Date	03-26-22		
Verification start time	1013	End time	1016

Pipette	Finnpipette, 1.00 mL	Serial number	DH79936
Water and ambient temperature (°C)	24.9°C	Digital thermometer SN	130664685
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
	1.0000
1	0.9895
2	0.9892
3	0.9925
4	0.9943
5	0.9949
6	0.9959
7	0.9940
8	0.9947
9	0.9967
10	0.9935

1-minute Leak Check	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	
Start time	1018	End time	1019

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	03-26-22
Calibration due date:	09-26-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	DH79936
Nominal Volume:	1.00
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.6
Relative Humidity, %	37
Ambient temp., degrees C	24.9
Test liquid temp., degrees C	24.9
Z correction factor	1.0040

Leak Test	
Time begin:	1018
Time end:	1019
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	1.00	units:	mL
Time begin:	1013		
Replicate	Mass	Units	Volume (V)
m ₁	0.9895	g	0.99346
m ₂	0.9892	g	0.99316
m ₃	0.9925	g	0.99647
m ₄	0.9943	g	0.99828
m ₅	0.9949	g	0.99888
m ₆	0.9959	g	0.99988
m ₇	0.9940	g	0.99798
m ₈	0.9947	g	0.99868
m ₉	0.9967	g	1.00069
m ₁₀	0.9935	g	0.99747
Mean mass	0.99352	PASS	
Time end:	1016		
Mean vol.	0.9975		
s	0.0025		
% CV	0.2506		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

Pipette Volume Verification

Date: ~~11-06-22~~ ⁰⁶⁻¹¹⁻²²

Analyst: A.C

1322 062222
1319 1325

Pipette serial number: U69775

Pipette manufacturer: Finnpipette – 0.25 mL

Water and ambient temperature: 22.2°C

*Pipette Volume (mL)
0.2500
0.2517g
0.2471g
0.2473g
0.2472g
0.2492g
0.2482g
0.2481g
0.2485g
0.2485g
0.2489g

*Volume verification performed using ACCU-224 Balance, SN 14107050.

Leak check: Pass Fail

1320 1321

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	6/11/2022
Calibration due date:	12/11/2022
Pipet manufacturer:	Finnpipette
Serial/ID number:	U69775
Nominal Volume:	0.25
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.0
Relative Humidity, %	91
Ambient temp., degrees C	22.2
Test liquid temp., degrees C	22.2
Z correction factor	1.0033

Leak Test	
Time begin:	1320
Time end:	1321
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.25	units:	mL
Time begin:	1322		
Replicate	Mass	Units	Volume (V)
m ₁	0.2517	g	0.24500
m ₂	0.2421	g	0.25000
m ₃	0.2473	g	0.24990
m ₄	0.2472	g	0.24830
m ₅	0.2492	g	0.25180
m ₆	0.2482	g	0.24910
m ₇	0.2481	g	0.25090
m ₈	0.2485	g	0.25010
m ₉	0.2485	g	0.25020
m ₁₀	0.2489	g	0.24400
Mean mass	0.2494	PASS	
Time end:	1325		
Mean vol.	0.2489		
s	0.0025		
% CV	1.0142		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mL, mass should be recorded in gm. If dial setting (volume) is in μ L, mass should be recorded in mg.

Pipette Volume Verification

Date: 06-11-22

Analyst: A.C

1330 1333

Pipette serial number: DH66501

Pipette manufacturer: Finnpipette – 0.50 mL

Water and ambient temperature: 22.2°C

*Pipette Volume (mL)
0.5000
0.5018 g
0.4961 g
0.4960 g
0.4957 g
0.4971 g
0.4961 g
0.4962 g
0.4957 g
0.4973 g
0.4983 g

*Volume verification performed using ACCU-224 Balance, SN 14107050.

Leak check: Pass Fail

1327 1320

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	AS
Date of Calibration:	06-11-22
Calibration due date:	12-11-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	DH66501
Nominal Volume:	0.50
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.0
Relative Humidity, %	91
Ambient temp., degrees C	22.2
Test liquid temp., degrees C	22.2
Z correction factor	1.0033

Leak Test	
Time begin:	1327
Time end:	1328
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.5	units:	mL
Time begin:	1330		
Replicate	Mass	Units	Volume (V)
m ₁	0.5018	g	0.50346
m ₂	0.4961	g	0.49774
m ₃	0.4960	g	0.49764
m ₄	0.4957	g	0.49734
m ₅	0.4971	g	0.49874
m ₆	0.4961	g	0.49774
m ₇	0.4962	g	0.49784
m ₈	0.4957	g	0.49734
m ₉	0.4973	g	0.49894
m ₁₀	0.4983	g	0.49994
Mean mass	0.49703	PASS	
Time end:	1333		
Mean vol.	0.4987		
s	0.0019		
% CV	0.3762		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

Pipette Volume Verification

Analyst	JK		
Date	06-21-22		
Verification start time	1436	End time	1441

Pipette	Finnpipette, 0.01 to 0.10 mL	Serial number	U98294
Water and ambient temperature (°C)	22.9°C	Digital thermometer SN	130664685
Balance	Mettler-Toledo ME204	Serial number	C006982938

	Pipette Volume (mL)		
	0.0100	0.0500	0.1000
1	0.0097	0.0496	0.1001
2	0.0095	0.0496	0.0997
3	0.0099	0.0495	0.0996
4	0.0101	0.0501	0.0996
5	0.0103	0.0500	0.1002
6	0.0096	0.0493	0.1001
7	0.0096	0.0497	0.0996
8	0.0094	0.0495	0.0996
9	0.0102	0.0496	0.1000
10	0.0095	0.0499	0.1002

Humidity = 61%
 Barometer: 30.2
 ↳ 102.4

1-minute Leak Check	Pass <input checked="" type="checkbox"/>		Fail <input type="checkbox"/>
Start time	1440	End time	1441

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	JS
Date of Calibration:	06-21-22
Calibration due date:	12-21-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	U98294
Nominal Volume:	0.01
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.4
Relative Humidity, %	61
Ambient temp., degrees C	22.9
Test liquid temp., degrees C	22.9
Z correction factor	1.0035

Leak Test	
Time begin:	1440
Time end:	1441
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.01	units:	mL
Time begin:	1436		
Replicate	Mass	Units	Volume (V)
m ₁	0.0097	g	0.00973
m ₂	0.0095	g	0.00953
m ₃	0.0099	g	0.00993
m ₄	0.0101	g	0.01014
m ₅	0.0103	g	0.01034
m ₆	0.0096	g	0.00963
m ₇	0.0096	g	0.00963
m ₈	0.0094	g	0.00943
m ₉	0.0102	g	0.01024
m ₁₀	0.0095	g	0.00953
Mean mass	0.00978	PASS	
Time end:	1441		
Mean vol.	0.0098		
s	0.0003		
% CV	3.2974		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in µl, mass should be recorded in mg.

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	JS
Date of Calibration:	06-21-22
Calibration due date:	12-21-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	U98294
Nominal Volume:	0.05
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.4
Relative Humidity, %	61
Ambient temp., degrees C	22.9
Test liquid temp., degrees C	22.9
Z correction factor	1.0035

Leak Test	
Time begin:	1440
Time end:	1441
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.05	units:	mL
Time begin:	1436		
Replicate	Mass	Units	Volume (V)
m ₁	0.0496	g	0.04977
m ₂	0.0496	g	0.04977
m ₃	0.0495	g	0.04967
m ₄	0.0501	g	0.05028
m ₅	0.0500	g	0.05018
m ₆	0.0493	g	0.04947
m ₇	0.0497	g	0.04987
m ₈	0.0495	g	0.04967
m ₉	0.0496	g	0.04977
m ₁₀	0.0499	g	0.05007
Mean mass	0.04968	PASS	
Time end:	1441		
Mean vol.	0.0499		
s	0.0002		
% CV	0.5003		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in μ l, mass should be recorded in mg.

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	JS
Date of Calibration:	06-21-22
Calibration due date:	12-21-22
Pipet manufacturer:	Finnpipette
Serial/ID number:	U98294
Nominal Volume:	0.10
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.4
Relative Humidity, %	61
Ambient temp., degrees C	22.9
Test liquid temp., degrees C	22.9
Z correction factor	1.0035

Leak Test	
Time begin:	1440
Time end:	1441
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.10	units:	mL
Time begin:	1436		
Replicate	Mass	Units	Volume (V)
m ₁	0.1001	g	0.10045
m ₂	0.0997	g	0.10005
m ₃	0.0996	g	0.09995
m ₄	0.0996	g	0.09995
m ₅	0.1002	g	0.10055
m ₆	0.1001	g	0.10045
m ₇	0.0996	g	0.09995
m ₈	0.0996	g	0.09995
m ₉	0.1000	g	0.10035
m ₁₀	0.1002	g	0.10055
Mean mass	0.09987	PASS	
Time end:	1441		
Mean vol.	0.1002		
s	0.0003		
% CV	0.2714		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mL, mass should be recorded in gm. If dial setting (volume) is in μ L, mass should be recorded in mg.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date	Level verification (v)	Certified weight (g) (control limits*)			Analyst initials
		50.0001	100.0001	200.0002	
		(47.5001 - 52.50001)	(95.0001 - 105.0001)	(190.0002 - 210.0002)	
06-29-22	✓	51.36	100.01	197.79	JL

Date: 06-29-22

Analyst: JL JR

Water and ambient temperature: 22.1 °C

Z factor: 1.0032 (SOP G11 – Table G11.2)

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
100 mL	1	100 mL	98	
100 mL	2	100 mL	97	
100 mL	3	100 mL	97	
100 mL	4	100 mL	99	
100 mL	5	100 mL	99	
100 mL	6	100 mL	97	
100 mL	7	100 mL	98	
100 mL	8	100 mL	98	
100 mL	9	100 mL	96	
100 mL	10	100 mL	99	
100 mL	11	100 mL	99	
100 mL	12	100 mL	99	
100 mL	13	100 mL	97	
100 mL	14	100 mL	99	
100 mL	15	100 mL	99	
100 mL	16	100 mL		
100 mL	17	100 mL	100	
100 mL	18	100 mL	98	
100 mL	19	100 mL	98	
100 mL	20	100 mL	99	
100 mL	21	100 mL	98	
100 mL	22	100 mL	99	
100 mL	24	100 mL	99	

JL JR
06-29-22

*The corrected volume for each cylinder must be within ±5% of the true volume or volume verified (100 mL volume acceptance limit = 95 – 105 mL, 250 mL volume acceptance limit = 237.5 – 262.5 mL). If a cylinder exceeds these limits, it must be taken out of service.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	8039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date: 06-29-22
 Analyst: JR/JS
 Water and ambient
 temperature: 22.1°C
 Z Factor: 1.0032

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
100 mL	1	100 mL	98	98
100 mL	2	100 mL	97	97
100 mL	3	100 mL	97	97
100 mL	4	100 mL	99	99
100 mL	5	100 mL	99	99
100 mL	6	100 mL	97	97
100 mL	7	100 mL	98	98
100 mL	8	100 mL	98	98
100 mL	9	100 mL	96	96
100 mL	10	100 mL	99	99
100 mL	11	100 mL	99	99
100 mL	12	100 mL	99	99
100 mL	13	100 mL	97	97
100 mL	14	100 mL	99	99
100 mL	15	100 mL	99	99
100 mL	16	100 mL		
100 mL	17	100 mL	100	100
100 mL	18	100 mL	98	98
100 mL	19	100 mL	98	98
100 mL	20	100 mL	99	99
100 mL	21	100 mL	98	98
100 mL	22	100 mL	99	99
100 mL	23	100 mL	97	97
100 mL	24	100 mL	99	99

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date	Level verification (v)	Certified weight (g) (control limits*)			Analyst initials
		50.0001	100.0001	200.0002	
		(47.5001 - 52.50001)	(95.0001 - 105.0001)	(190.0002 - 210.0002)	
06-29-22	✓	51.36	100.01	197.29	JR

Date: 06-29-22

Analyst: JR

Water and ambient temperature: 22.1°C

Z factor: 1.0032 (SOP G11 – Table G11.2)

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
250 mL	1	100 mL	98	
250 mL	2	100 mL	98	
250 mL	3	100 mL	98	
250 mL	4	100 mL	98	
250 mL	5	100 mL	98	
250 mL	6	100 mL	98	
250 mL	7	100 mL	99	
250 mL	8	100 mL	98	
250 mL	9	100 mL	98	
250 mL	10	100 mL	99	
250 mL	11	100 mL	97	
250 mL	12	100 mL	99	
250 mL	13	100 mL	98	
250 mL	14	100 mL	99	
250 mL	15	100 mL	98	
250 mL	16	100 mL	98	
250 mL	17	100 mL	98	
250 mL	18	100 mL	98	
250 mL	19	100 mL	98	
250 mL	20	100 mL	99	
250 mL	21	100 mL	98	
250 mL	22	100 mL	99	
250 mL	23	100 mL	98	

*The corrected volume for each cylinder must be within ±5% of the true volume or volume verified (100 mL volume acceptance limit = 95 – 105 mL, 250 mL volume acceptance limit = 237.5 – 262.5 mL). If a cylinder exceeds these limits, it must be taken out of service.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date	Level verification (V)	Certified weight (g) (control limits*)			Analyst initials
		50.0001	100.0001	200.0002	
		(47.5001 - 52.50001)	(95.0001 - 105.0001)	(190.0002 - 210.0002)	
06-29-22	✓	51.36	100.01	197.29	JR

Date: 06-29-22

Analyst: JR JR

Water and ambient temperature: 22.1°C

Z factor: 1.0032 (SOP G11 – Table G11.2)

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
250 mL	24	100 mL	98	
250 mL	25	100 mL	99	
250 mL	26	100 mL	98	
250 mL	27	100 mL	98	
250 mL	28	100 mL	98	
250 mL	29	100 mL	98	
250 mL	30	100 mL	99	
250 mL	31	100 mL	98	
250 mL	32	100 mL	98	
250 mL	33	100 mL	99	
250 mL	34	100 mL	99	
250 mL	35	100 mL	98	
250 mL	36	100 mL	98	
250 mL	37	100 mL	98	
250 mL	38	100 mL	99	
250 mL	39	100 mL	98	
250 mL	40	100 mL	99	
250 mL	41	100 mL	99	
250 mL	42	100 mL	98	
250 mL	43	100 mL	98	
250 mL	44	100 mL	98	
250 mL				
250 mL				

JR 06-29-22

*The corrected volume for each cylinder must be within ±5% of the true volume or volume verified (100 mL volume acceptance limit = 95 – 105 mL, 250 mL volume acceptance limit = 237.5 – 262.5 mL). If a cylinder exceeds these limits, it must be taken out of service.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date: 06-29-22
 Analyst: JR/JS
 Water and ambient temperature: 22.1°C
 Z Factor: 1.0032

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder × Z-factor)</small>
250 mL	1	100 mL	98	98
250 mL	2	100 mL	98	98
250 mL	3	100 mL	98	98
250 mL	4	100 mL	98	98
250 mL	5	100 mL	98	98
250 mL	6	100 mL	98	98
250 mL	7	100 mL	99	99
250 mL	8	100 mL	98	98
250 mL	9	100 mL	98	98
250 mL	10	100 mL	99	99
250 mL	11	100 mL	97	97
250 mL	12	100 mL	99	99
250 mL	13	100 mL	98	98
250 mL	14	100 mL	99	99
250 mL	15	100 mL	98	98
250 mL	16	100 mL	98	98
250 mL	17	100 mL	98	98
250 mL	18	100 mL	98	98
250 mL	19	100 mL	98	98
250 mL	20	100 mL	99	99
250 mL	21	100 mL	98	98
250 mL	22	100 mL	99	99
250 mL	23	100 mL	98	98
250 mL	24	100 mL	98	98
250 mL	25	100 mL	99	99
250 mL	26	100 mL	98	98
250 mL	27	100 mL	98	98
250 mL	28	100 mL	98	98
250 mL	29	100 mL	98	98
250 mL	30	100 mL	99	99
250 mL	31	100 mL	98	98
250 mL	32	100 mL	98	98
250 mL	33	100 mL	99	99
250 mL	34	100 mL	99	99
250 mL	35	100 mL	98	98
250 mL	36	100 mL	98	98
250 mL	37	100 mL	98	98
250 mL	38	100 mL	99	99
250 mL	39	100 mL	98	98
250 mL	40	100 mL	99	99
250 mL	41	100 mL	99	99
250 mL	42	100 mL	98	98
250 mL	43	100 mL	98	98
250 mL	44	100 mL	98	98

Pipette Volume Verification

Analyst	TG 81		
Date	09-06-22		
Verification start time	1455	End time	1459

Pipette	Fisherbrand Handy Step	Serial number	17E59354
Water and ambient temperature (°C)	23.0°C	Digital thermometer SN	13064645
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
0.0500	0.1000
1 0.0501	0.0996 0.0996
2 0.0498	0.0996 0.0996
3 0.0499	0.0994
4 0.0502	0.0994
5 0.0497	0.0992
6 0.0497	0.0988
7 0.0494	0.0998
8 0.0492	0.0989
9 0.0500	0.1007
10 0.0494	0.1004

1-minute Leak Check	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	
Start time	1458	End time	1459

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	09-06-22
Calibration due date:	03-06-23
Pipet manufacturer:	Fisherbrand HandyStep
Serial/ID number:	17E59354
Nominal Volume:	0.05
Location of use:	Toxicity lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.7
Relative Humidity, %	95
Ambient temp., degrees C	23.0
Test liquid temp., degrees C	23.0
Z correction factor	1.0035

Leak Test	
Time begin:	1458
Time end:	1459
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.05	units:	mL
Time begin:	1455		
Replicate	Mass	Units	Volume (V)
m ₁	0.0501	g	0.05028
m ₂	0.0498	g	0.04997
m ₃	0.0499	g	0.05007
m ₄	0.0502	g	0.05038
m ₅	0.0497	g	0.04987
m ₆	0.0497	g	0.04987
m ₇	0.0494	g	0.04957
m ₈	0.0492	g	0.04937
m ₉	0.0500	g	0.05018
m ₁₀	0.0494	g	0.04957
Mean mass	0.04974	PASS	
Time end:	1459		
Mean vol.	0.0499		
s	0.0003		
% CV	0.6580		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in μ l, mass should be recorded in mg.

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	09-06-22
Calibration due date:	03-06-23
Pipet manufacturer:	Fisherbrand HandyStep
Serial/ID number:	17E59354
Nominal Volume:	0.1
Location of use:	Toxicity lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.7
Relative Humidity, %	95
Ambient temp., degrees C	23.0
Test liquid temp., degrees C	23.0
Z correction factor	1.0035

Leak Test	
Time begin:	1458
Time end:	1459
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.1	units:	mL
Time begin:	1455		
Replicate	Mass	Units	Volume (V)
m ₁	0.0996	g	0.09995
m ₂	0.0996	g	0.09995
m ₃	0.0994	g	0.09975
m ₄	0.0994	g	0.09975
m ₅	0.0992	g	0.09955
m ₆	0.0988	g	0.09915
m ₇	0.0998	g	0.10015
m ₈	0.0989	g	0.09925
m ₉	0.1007	g	0.10105
m ₁₀	0.1004	g	0.10075
Mean mass	0.09958	PASS	
Time end:	1459		
Mean vol.	0.0999		
s	0.0006		
% CV	0.6040		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in µl, mass should be recorded in mg.

Pipette Volume Verification

Analyst	TG M		
Date	09-06-22		
Verification start time	1523	End time	1527

Pipette	Finnpipette, 0.50 mL	Serial number	DH66501
Water and ambient temperature (°C)	23.0°C	Digital thermometer SN	130646PS
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
	0.5000
1	0.5007
2	0.5011
3	0.5003
4	0.5012
5	0.5014
6	0.5008
7	0.5008
8	0.5001
9	0.4998
10	0.4995

1-minute Leak Check	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	
Start time	1526	End time	1527

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	09-06-22
Calibration due date:	03-06-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	DH66501
Nominal Volume:	0.50
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.7
Relative Humidity, %	95
Ambient temp., degrees C	23.0
Test liquid temp., degrees C	23.0
Z correction factor	1.0035

Leak Test	
Time begin:	1526
Time end:	1527
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.5	units:	mL
Time begin:	1523		
Replicate	Mass	Units	Volume (V)
m ₁	0.5007	g	0.50245
m ₂	0.5011	g	0.50285
m ₃	0.5033	g	0.50506
m ₄	0.5012	g	0.50295
m ₅	0.5014	g	0.50315
m ₆	0.5008	g	0.50255
m ₇	0.5008	g	0.50255
m ₈	0.5001	g	0.50185
m ₉	0.4998	g	0.50155
m ₁₀	0.4995	g	0.50125
Mean mass	0.50087	PASS	
Time end:	1527		
Mean vol.	0.5026		
s	0.0011		
% CV	0.2105		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in µl, mass should be recorded in mg.

Pipette Volume Verification

Analyst	TG JA		
Date	09-06-22		
Verification start time	1528	End time	1531

Pipette	Finnpipette, 1.00 mL	Serial number	DH79936
Water and ambient temperature (°C)	23.0°C	Digital thermometer SN	130664685
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
	1.0000
1	0.9995
2	0.9978
3	0.9969
4	0.9984
5	0.9969
6	0.9974
7	0.9988
8	0.9990
9	0.9971
10	0.9988

1-minute Leak Check	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	
Start time	1530	End time	1531

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	09-06-22
Calibration due date:	03-06-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	DH79936
Nominal Volume:	1.00
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	101.7
Relative Humidity, %	95
Ambient temp., degrees C	23.0
Test liquid temp., degrees C	23.0
Z correction factor	1.0035

Leak Test	
Time begin:	1530
Time end:	1531
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	1.00	units:	mL
Time begin:	1528		
Replicate	Mass	Units	Volume (V)
m ₁	0.9995	g	1.00300
m ₂	0.9978	g	1.00129
m ₃	0.9969	g	1.00039
m ₄	0.9984	g	1.00189
m ₅	0.9969	g	1.00039
m ₆	0.9974	g	1.00089
m ₇	0.9988	g	1.00230
m ₈	0.9998	g	1.00330
m ₉	0.9971	g	1.00059
m ₁₀	0.9988	g	1.00230
Mean mass	0.99814	PASS	
Time end:	1531		
Mean vol.	1.0016		
s	0.0011		
% CV	0.1075		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in µl, mass should be recorded in mg.

Pipette Volume Verification

Analyst	TG <i>8</i>		
Date	12-09-22		
Verification start time	12:20	End time	12:35

Pipette	Fisherbrand Handy Step	Serial number	17E59354
Water and ambient temperature (°C)	23.3°C, 23.7°C <i>12-09-22</i>	Digital thermometer SN	130664679
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)		
0.0500	0.1000	
1	0.0493	0.0999
2	0.0497	0.1001
3	0.0501	0.1001
4	0.0507	0.0995
5	0.0491	0.1003
6	0.0506	0.0994
7	0.0501	0.0998
8	0.0503	0.1007
9	0.0492	0.0996
10	0.0498	0.1006

1-minute Leak Check	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	
Start time	12:30	End time	12:31

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Fisherbrand HandyStep
Serial/ID number:	17E59354
Nominal Volume:	0.05
Location of use:	Toxicity lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1230
Time end:	1231
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.05	units:	mL
Time begin:	1220		
Replicate	Mass	Units	Volume (V)
m ₁	0.0493	g	0.04948
m ₂	0.0497	g	0.04988
m ₃	0.0501	g	0.05028
m ₄	0.0507	g	0.05088
m ₅	0.0491	g	0.04928
m ₆	0.0506	g	0.05078
m ₇	0.0501	g	0.05028
m ₈	0.0503	g	0.05048
m ₉	0.0492	g	0.04938
m ₁₀	0.0498	g	0.04998
Mean mass	0.04989	PASS	
Time end:	1235		
Mean vol.	0.0501		
s	0.0006		
% CV	1.1396		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mL, mass should be recorded in gm. If dial setting (volume) is in μ L, mass should be recorded in mg.

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Fisherbrand HandyStep
Serial/ID number:	17E59354
Nominal Volume:	0.1
Location of use:	Toxicity lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1230
Time end:	1231
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.1	units:	mL
Time begin:	1220		
Replicate	Mass	Units	Volume (V)
m ₁	0.0999	g	0.10026
m ₂	0.1001	g	0.10046
m ₃	0.1001	g	0.10046
m ₄	0.0995	g	0.09986
m ₅	0.1003	g	0.10066
m ₆	0.0994	g	0.09976
m ₇	0.0998	g	0.10016
m ₈	0.1007	g	0.10106
m ₉	0.0996	g	0.09996
m ₁₀	0.1006	g	0.10096
Mean mass	0.1	PASS	
Time end:	1231		
Mean vol.	0.1004		
s	0.0004		
% CV	0.4447		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mL, mass should be recorded in gm. If dial setting (volume) is in µL, mass should be recorded in mg.

Pipette Volume Verification

Analyst	TG		
Date	120922		
Verification start time	1245	End time	1250

Pipette	Finnpipette, 0.25 mL	Serial number	U69775
Water and ambient temperature (°C)	23.3°C 23.7°C	Digital thermometer SN	130664679
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
0.2500	
1	0.2506
2	0.2481
3	0.2474
4	0.2507
5	0.2467
6	0.2490
7	0.2489
8	0.2520
9	0.2521
10	0.2550

1-minute Leak Check		Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Start time	1249	End time	1250

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	U69775
Nominal Volume:	0.25
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1249
Time end:	1250
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.25	units:	mL
Time begin:	1245		
Replicate	Mass	Units	Volume (V)
m ₁	0.2506	g	0.25150
m ₂	0.2481	g	0.24899
m ₃	0.2474	g	0.24829
m ₄	0.2507	g	0.25160
m ₅	0.2467	g	0.24759
m ₆	0.2490	g	0.24990
m ₇	0.2489	g	0.24980
m ₈	0.2520	g	0.25291
m ₉	0.2521	g	0.25301
m ₁₀	0.2550	g	0.25592
Mean mass	0.25005	PASS	
Time end:	1250		
Mean vol.	0.2510		
s	0.0025		
% CV	1.0126		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mL, mass should be recorded in gm. If dial setting (volume) is in μ L, mass should be recorded in mg.

Pipette Volume Verification

Analyst	TG		
Date	12-09-22		
Verification start time	12:51	End time	12:54

Pipette	Finnpipette, 0.50 mL	Serial number	DH66501
Water and ambient temperature (°C)	23.3°C 23.7°C	Digital thermometer SN	130664679
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)	
	0.5000
1	0.5077
2	0.5041
3	0.4973
4	0.4981
5	0.5016
6	0.4961
7	0.5007
8	0.4979
9	0.5041
10	0.5013

1-minute Leak Check	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Start time	12:53	End time 12:54

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	DH66501
Nominal Volume:	0.50
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1253
Time end:	1254
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.5	units:	mL
Time begin:	1251		
Replicate	Mass	Units	Volume (V)
m ₁	0.5077	g	0.50953
m ₂	0.5041	g	0.50591
m ₃	0.4973	g	0.49909
m ₄	0.4981	g	0.49989
m ₅	0.5016	g	0.50341
m ₆	0.4961	g	0.49789
m ₇	0.5007	g	0.50250
m ₈	0.4979	g	0.49969
m ₉	0.5041	g	0.50591
m ₁₀	0.5013	g	0.50310
Mean mass	0.50089	PASS	
Time end:	1254		
Mean vol.	0.5027		
s	0.0037		
% CV	0.7298		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in μ l, mass should be recorded in mg.

Pipette Volume Verification

Analyst	TG		
Date	12-09-22		
Verification start time	1235	End time	1238

Pipette	Finnpipette, 0.01 to 0.10 mL	Serial number	U98294
Water and ambient temperature (°C)	23.3°C 23.7°C ¹²⁻⁰⁹⁻²² 23.7°C	Digital thermometer SN	130664679
Balance	Mettler-Toledo ME204	Serial number	C006982938

Pipette Volume (mL)			
	0.0100	0.0500	0.1000
1	0.0104	0.0505	0.1006
2	0.0104	0.0491	0.1007
3	0.0097	0.0506	0.0993
4	0.0096	0.0511	0.1001
5	0.0104	0.0492	0.0992
6	0.0093	0.0506	0.1009
7	0.0097	0.0496	0.0991
8	0.0094	0.0491	0.1004
9	0.0100	0.0500	0.1009
10	0.0101	0.0509	0.1007

1-minute Leak Check		Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>
Start time	1237	End time	1238

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	U98294
Nominal Volume:	0.01
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1237
Time end:	1238
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.01	units:	mL
Time begin:	1235		
Replicate	Mass	Units	Volume (V)
m ₁	0.0104	g	0.01044
m ₂	0.0104	g	0.01044
m ₃	0.0097	g	0.00973
m ₄	0.0096	g	0.00963
m ₅	0.0104	g	0.01044
m ₆	0.0093	g	0.00933
m ₇	0.0097	g	0.00973
m ₈	0.0094	g	0.00943
m ₉	0.0100	g	0.01004
m ₁₀	0.0101	g	0.01014
Mean mass	0.0099		PASS
Time end:	1238		
Mean vol.	0.0099		
s	0.0004		
% CV	4.2323		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in µl, mass should be recorded in mg.

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	U98294
Nominal Volume:	0.05
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1237
Time end:	1238
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.05	units:	mL
Time begin:	1235		
Replicate	Mass	Units	Volume (V)
m ₁	0.0505	g	0.05068
m ₂	0.0491	g	0.04928
m ₃	0.0506	g	0.05078
m ₄	0.0511	g	0.05128
m ₅	0.0492	g	0.04938
m ₆	0.0506	g	0.05078
m ₇	0.0496	g	0.04978
m ₈	0.0491	g	0.04928
m ₉	0.0500	g	0.05018
m ₁₀	0.0509	g	0.05108
Mean mass	0.05007	PASS	
Time end:	1238		
Mean vol.	0.0503		
s	0.0008		
% CV	1.5414		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A leak test may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mls, mass should be recorded in gm. If dial setting (volume) is in μ l, mass should be recorded in mg.

Fixed-Volume Pipette Calibration

Reference: ISO 8655-6:2002 (E)

Analyst:	TG
Date of Calibration:	12-09-22
Calibration due date:	06-09-23
Pipet manufacturer:	Finnpipette
Serial/ID number:	U98294
Nominal Volume:	0.10
Location of use:	Chemistry lab

Test Conditions	Normal
Barometric pressure, kPa or mbar	102.1
Relative Humidity, %	98
Ambient temp., degrees C	23.3
Test liquid temp., degrees C	23.7
Z correction factor	1.0036

Leak Test	
Time begin:	1237
Time end:	1238
Pass/Fail	Pass

Balance check	
Balance manufacturer	Mettler Toledo
Serial Number	C006982938
Location of use	Chemistry lab
Weight set serial #	20410

Pipet Calibration

Dial setting:	0.10	units:	mL
Time begin:	1235		
Replicate	Mass	Units	Volume (V)
m ₁	0.1006	g	0.10096
m ₂	0.1007	g	0.10106
m ₃	0.0993	g	0.09966
m ₄	0.1001	g	0.10046
m ₅	0.0992	g	0.09956
m ₆	0.1009	g	0.10126
m ₇	0.0991	g	0.09946
m ₈	0.1004	g	0.10076
m ₉	0.1009	g	0.10126
m ₁₀	0.1007	g	0.10106
Mean mass	0.10019	PASS	
Time end:	1238		
Mean vol.	0.1006		
s	0.0007		
% CV	0.7220		
CV Tolerance	PASS		
PASS/FAIL	PASS		

COMMENTS/CORRECTIVE ACTION:

A **leak test** may be performed by filling the pipette tip with distilled or deionized water to the maximum nominal volume and placing the pipette on a vibration-free stand. Observe the meniscus in the tip for 1 minute. After 1 minute, there should be no visible droplet formation at the tip. If there are no signs of droplet formation, proceed with the calibration check. If droplet formation is observed, successful maintenance and corrective action must be taken or the pipette must not be used.

Complete green-shaded cells only (obtain Z Corr. Factor from Table 1 on Sheet 2). The spreadsheet will populate all unshaded cells for you.

Obtain RE and CV tolerances from the pipettor manufacturer's specifications.

Use appropriate ASTM 1 or 2 tolerances for the balance checks (refer to sheet 3).

If dial setting (volume) is in mL, mass should be recorded in gm. If dial setting (volume) is in μ L, mass should be recorded in mg.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date	Level verification (v)	Certified weight (g) (control limits*)			Analyst initials
		50.0001	100.0001	200.0002	
		(47.5001 - 52.50001)	(95.0001 - 105.0001)	(190.0002 - 210.0002)	
12.20.22	✓	50.00	99.98	199.97	fl

 Date: 12.20.22

 Analyst: Aln fl

 Water and ambient temperature: 23.1° C

 Z factor: 1.0034 (SOP G11 – Table G11.2)

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
100 mL	1	100 mL	98	
100 mL	2	100 mL	98	
100 mL	3	100 mL	96	
100 mL	4	100 mL	99	
100 mL	5	100 mL	97	
100 mL	6	100 mL	98	
100 mL	7	100 mL	98	
100 mL	8	100 mL	99	
100 mL	9	100 mL	100	
100 mL	10	100 mL	99	
100 mL	11	100 mL	99	
100 mL	12	100 mL	98	
100 mL	13	100 mL	98	
100 mL	14	100 mL	99	
100 mL	15	100 mL	97	
100 mL	16	100 mL	97	
100 mL	17	100 mL	99	
100 mL	18	100 mL		
100 mL	19	100 mL	98	
100 mL	20	100 mL	98	
100 mL	21	100 mL	99	
100 mL	22	100 mL	98	
100 mL	23	100 mL	97	

*The corrected volume for each cylinder must be within ±5% of the true volume or volume verified (100 mL volume acceptance limit = 95 – 105 mL, 250 mL volume acceptance limit = 237.5 – 262.5 mL). If a cylinder exceeds these limits, it must be taken out of service.

100 mL

24

100 mL

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	8039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date: 12-20-22
 Analyst: AG/JS
 Water and ambient
 temperature: 23.1°C
 Z Factor: 1.0034

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
100 mL	1	100 mL	98	98
100 mL	2	100 mL	98	98
100 mL	3	100 mL	96	96
100 mL	4	100 mL	99	99
100 mL	5	100 mL	97	97
100 mL	6	100 mL	98	98
100 mL	7	100 mL	98	98
100 mL	8	100 mL	99	99
100 mL	9	100 mL	100	100
100 mL	10	100 mL	99	99
100 mL	11	100 mL	99	99
100 mL	12	100 mL	98	98
100 mL	13	100 mL	98	98
100 mL	14	100 mL	99	99
100 mL	15	100 mL	97	97
100 mL	16	100 mL	97	97
100 mL	17	100 mL	99	99
100 mL	18	100 mL		
100 mL	19	100 mL	98	98
100 mL	20	100 mL	98	98
100 mL	21	100 mL	99	99
100 mL	22	100 mL	98	98
100 mL	23	100 mL	97	97
100 mL	24	100 mL	99	99

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date	Level verification (v)	Certified weight (g) (control limits*)			Analyst initials
		50.0001 (47.5001 - 52.50001)	100.0001 (95.0001 - 105.0001)	200.0002 (190.0002 - 210.0002)	
12.20.22	✓	50.01	100.02	200.02	Ab

Date: 12.20.22

Analyst: Ab

Water and ambient temperature: 23.1°C

Z factor: 1.0034 (SOP G11 – Table G11.2)

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder x Z-factor)</small>
250 mL	1	100 mL	150	<i>23.102</i>
250 mL	2	100 mL	99	
250 mL	3	100 mL	99	
250 mL	4	100 mL	98	
250 mL	5	100 mL	98	
250 mL	6	100 mL	99	
250 mL	7	100 mL	99	
250 mL	8	100 mL	150	
250 mL	9	100 mL	99	
250 mL	10	100 mL	99	
250 mL	11	100 mL	99	
250 mL	12	100 mL	100	
250 mL	13	100 mL	99	
250 mL	14	100 mL	99	
250 mL	15	100 mL	99	
250 mL	16	100 mL	99	
250 mL	17	100 mL	100	
250 mL	18	100 mL	99	
250 mL	19	100 mL	99	
250 mL	20	100 mL	99	
250 mL	21	100 mL	99	
250 mL	22	100 mL	98	
250 mL	23	100 mL	98	

*The corrected volume for each cylinder must be within ±5% of the true volume or volume verified (100 mL volume acceptance limit = 95 – 105 mL, 250 mL volume acceptance limit = 237.5 – 262.5 mL). If a cylinder exceeds these limits, it must be taken out of service.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date	Level verification (V)	Certified weight (g) (control limits*)			Analyst initials
		50.0001 (47.5001 - 52.50001)	100.0001 (95.0001 - 105.0001)	200.0002 (190.0002 - 210.0002)	
12.20.22	✓	50.01	100.02	200.02	AL

Date: 12-20-22

Analyst: AL

Water and ambient temperature: 23.1°C

Z factor: 1.0034 (SOP G11 – Table G11.2)

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) (weight of volume in cylinder x Z-factor)
250 mL	24	100 mL	98	 12.20.22 12.20.22
250 mL	25	100 mL	100	
250 mL	26	100 mL	99	
250 mL	27	100 mL	99	
250 mL	28	100 mL	99	
250 mL	29	100 mL	99	
250 mL	30	100 mL	100	
250 mL	31	100 mL	99	
250 mL	32	100 mL	99	
250 mL	33	100 mL	98	
250 mL	34	100 mL	100	
250 mL	35	100 mL	99	
250 mL	36	100 mL	100	
250 mL	37	100 mL	99	
250 mL	38	100 mL	100	
250 mL	39	100 mL	99	
250 mL	40	100 mL	99	
250 mL	41	100 mL	100	
250 mL	42	100 mL	99	
250 mL	43	100 mL	99	
250 mL	44	100 mL	100	
250 mL				
250 mL				

*The corrected volume for each cylinder must be within ±5% of the true volume or volume verified (100 mL volume acceptance limit = 95 – 105 mL, 250 mL volume acceptance limit = 237.5 – 262.5 mL). If a cylinder exceeds these limits, it must be taken out of service.

Polypropylene Graduated Cylinder Volume Verification

Pan balance calibration:

Instrument	Serial number	Calibration company
Denver Instruments Company XL-3K	B039128	Laboratory Instrument Services
Certified Weights	20410	Precision Weighting

Date: 12-20-22
 Analyst: AG/JS
 Water and ambient temperature: 23.1°C
 Z Factor: 1.0034

Cylinder type	Cylinder identification number	Volume Verified (mL)	Weight of volume in cylinder (g)	Corrected Volume* (mL) <small>(weight of volume in cylinder × Z-factor)</small>
250 mL	1	100 mL	100	100
250 mL	2	100 mL	99	99
250 mL	3	100 mL	99	99
250 mL	4	100 mL	98	98
250 mL	5	100 mL	98	98
250 mL	6	100 mL	99	99
250 mL	7	100 mL	99	99
250 mL	8	100 mL	100	100
250 mL	9	100 mL	99	99
250 mL	10	100 mL	99	99
250 mL	11	100 mL	99	99
250 mL	12	100 mL	100	100
250 mL	13	100 mL	99	99
250 mL	14	100 mL	99	99
250 mL	15	100 mL	99	99
250 mL	16	100 mL	99	99
250 mL	17	100 mL	100	100
250 mL	18	100 mL	99	99
250 mL	19	100 mL	99	99
250 mL	20	100 mL	99	99
250 mL	21	100 mL	99	99
250 mL	22	100 mL	98	98
250 mL	23	100 mL	98	98
250 mL	24	100 mL	98	98
250 mL	25	100 mL	100	100
250 mL	26	100 mL	99	99
250 mL	27	100 mL	99	99
250 mL	28	100 mL	99	99
250 mL	29	100 mL	99	99
250 mL	30	100 mL	100	100
250 mL	31	100 mL	99	99
250 mL	32	100 mL	99	99
250 mL	33	100 mL	98	98
250 mL	34	100 mL	100	100
250 mL	35	100 mL	99	99
250 mL	36	100 mL	100	100
250 mL	37	100 mL	99	99
250 mL	38	100 mL	100	100
250 mL	39	100 mL	99	99
250 mL	40	100 mL	99	99
250 mL	41	100 mL	100	100
250 mL	42	100 mL	99	99
250 mL	43	100 mL	99	99
250 mL	44	100 mL	100	100

Chemical Log

Chemical number: CHM 1262

Analyst: [Signature]

Date: 12-29-22

Chemical name: FREEZE DRIED MYSIS SHRIMP

Test or application used for: FISH CULTURE

Material type: Consumable Chemical

Toxicity Testing:

Quality Control required? Yes No

Manufacturer: BRINE SHRIMP DIRECT

Lot number: NA

Chemical concentration: NA

Number and/or volume: 80Z

Date received: 12-29-22

Expiration date: 12-29-27
Dry Chemicals = 5 years from receipt, if not assigned by manufacturer
Wet Chemicals = 1 year from receipt, if not assigned by manufacturer
Consumables = no expiration date, unless assigned by manufacturer

The Chemical identified on this form was discarded on or before the expiration date listed above.

Received by: [Signature]

Comments:

Storage: FISH CULTURE FREEZER

Hazards: NONE

Personal hygiene: Health: 0
Fire: 0
Reactivity: 0
Personal equipment: A



Reagent Log

Reagent number: INR 1181Analyst: TGDate: 01-22-23Reagent name: MicroNutrientsTest or application used for: Algae mediaType: Purchased Laboratory preparedManufacturer: NALot number: NAReagent concentration: 0.1196 g Na₂SeO₄ / 100ml DI H₂ONumber and/or volume: 100mlDate received/prepared: 01-22-23Expiration date: 01-22-24 (1 year from preparation/receipt, if not assigned by manufacturer)

The Reagent identified on this form was discarded on or before the expiration date listed above.

Received/prepared by: TG

Directions for preparing reagent:

0.1196 g Na₂SeO₄ in 100ml DI H₂OReagent prepared from: CHM 1139 (CHM # or INR #)Storage: Algae media refrigeratorHazards: NA

Personal hygiene:	Health:	<u>0</u>
	Fire:	<u>0</u>
	Reactivity:	<u>0</u>
	Personal equipment:	<u>A</u>



Stock Standard Log

Stock standard number: INSS 2194

Analyst: JP

Date: 05-15-23

Standard name: NaCl Stock Standard

Test or application used for: Toxicity

Type: Purchased Laboratory prepared

Manufacturer: NA

Lot number: NA

Stock concentration: 100 g/L NaCl

Number and/or volume: 250 mL

Date received/prepared: 05-15-23

Expiration date: 05-15-24 (1 year from preparation/receipt, if not assigned by manufacturer)

The Stock Standard identified on this form was discarded on or before the expiration date listed above.

Received/prepared by: JP

Directions for preparing stock:

25g NaCl into 250 mL DI water

Stock standard prepared from: 1248 (CHM #)

Storage: Toxicity Lab

Hazards: IF contact, flush with H₂O for 15 minutes

Personal hygiene:	Health:	<u>0</u>
	Fire:	<u>0</u>
	Reactivity:	<u>0</u>
	Personal equipment:	<u>A</u>

Multiple weigh analysis of minnow pans performed 02-15-22 to verify drying time is adequate.

Multiple weigh of final pans for growth determinations in chronic toxicity tests.

Test type: P. promelas Chronic Reference Toxicant Test
 Test dates: JANUARY 04-11, 2022
 Associated test: Pp KCICR # 85

1st Weight = Pans were dried for 24-hours at $60 \pm 2^\circ\text{C}$, desiccated, and weighed following standard operating procedures.

2nd Weight = The same pans used for determining the 1st weight measurements were dried for an additional 24-hours at $60 \pm 2^\circ\text{C}$, desiccated, and weighed following standard operating procedures.

	1st Weight	2nd Weight	Difference (mg)	Percent Difference from 1st Weight (%)
Analyst:		J		
Tray color code:		GREEN		
Date:		02-15-22		
A		20.78		
B		23.76		
C		21.20		
D		23.44		
E		23.64		
F		21.64		
G		22.86		
H		22.37		
I		23.28		
J		23.80		
K		23.61		
L		22.70		
M		23.13		
N		21.15		
O		22.33		
P		20.89		
Q		19.79		
R		20.52		
S		20.52		
T		19.30		
U		15.86		
V		15.68		
W		17.34		
X		16.29		
Y		14.56		
Z		13.91		
AA		15.48		
BB		15.00		

Average

Multiple weigh of final pans for growth determinations in chronic toxicity tests.

Test type: P. promelas Chronic Reference Toxicant Test
 Test dates: January 04-11, 2022
 Associated test: PpKCICR # 85

1st Weight = Pans were dried for 24-hours at $60 \pm 2^{\circ}\text{C}$, desiccated, and weighed following standard operating procedures.

2nd Weight = The same pans used for determining the 1st weight measurements were dried for an additional 24-hours at $60 \pm 2^{\circ}\text{C}$, desiccated, and weighed following standard operating procedures.

Analyst: Tray color code: Date:	1st Weight	2nd Weight	Difference (mg)	Percent Difference from 1st Weight (%)
	JW	JS		
	Grey	Grey		
Date:	01-13-22	02-15-22		
A	20.81	20.78	-0.03	-0.14
B	23.79	23.76	-0.03	-0.13
C	24.24	24.20	-0.04	-0.17
D	23.50	23.44	-0.06	-0.26
E	23.69	23.64	-0.05	-0.21
F	24.68	24.64	-0.04	-0.16
G	22.92	22.86	-0.06	-0.26
H	22.43	22.37	-0.06	-0.27
I	23.34	23.28	-0.06	-0.26
J	23.84	23.80	-0.04	-0.17
K	23.68	23.61	-0.07	-0.30
L	22.78	22.70	-0.08	-0.35
M	23.15	23.13	-0.02	-0.09
N	21.22	21.15	-0.07	-0.33
O	22.39	22.33	-0.06	-0.27
P	20.95	20.89	-0.06	-0.29
Q	19.84	19.79	-0.05	-0.25
R	20.57	20.52	-0.05	-0.24
S	20.58	20.52	-0.06	-0.29
T	19.34	19.30	-0.04	-0.21
U	15.87	15.86	-0.01	-0.06
V	15.71	15.68	-0.03	-0.19
W	17.37	17.34	-0.03	-0.17
X	16.31	16.29	-0.02	-0.12
Y	14.57	14.56	-0.01	-0.07
Z	13.92	13.91	-0.01	-0.07
AA	15.47	15.48	0.01	0.06
BB	15.01	15.00	-0.01	-0.07
	Average		-0.04	-0.19



Larval Fish Transfer Volume

Analyst: JH Species: P. promelas
 Date: 02-11-22 Source / Batch: Spawn date: 02-01-22
 Ambient temperature: 24.3°C Wet Weight of 10 Larvae (g): 0.0544

Estimate transfer volume, where minnows are allowed to swim from the pipette into the test vessel.

- Numerically label 10 medicine cups.
- Add 10 mL MHSW to each of the 10 cups.
- Measure and record the weight of each cup containing MHSW.
- Transfer 10 larvae to each cup, following procedures identified in SOP-AT18, AT47, or AT53 for vertebrate acute toxicity tests.
- Transfer the larvae in a manner that allows them to swim from the pipette into the MHSW contained in each cup.
- Measure and record the weight of each cup containing MHSW with 10 larvae.
- Determine each transfer volume and average transfer volume.

Replicate Number	Initial Weight Medicine cup + 10 mL MHSW (g)	Final Weight Medicine cup + 10 mL MHSW + 10 Larval Fish transferred (g)	Transfer Volume Final - Initial Weight (g = mL)
1	11.3065	11.4001	/ JH 02-11-22
2	11.2288	11.0371	
3	11.1993	11.2007	
4	11.3109	11.3200	
5	11.2632	11.2497	
6	11.1505	11.1806	
7	11.1573	11.1594	
8	11.2564	11.2019	
9	11.3283	11.3403	
10	11.2347	11.2552	

Average volume to transfer 10 organisms (mL):

-negative values removed, attributed to releasing minnows and removing a slight amount of water in the process.

Estimate transfer volume, where the minnows are transferred with MHSW into the test vessels.

- Numerically label 10 medicine cups.
- Measure and record the weight of each cup.
- Add approximately 10 mL MHSW to each of the 10 cups.
- Transfer 10 larvae to each cup, following procedures identified in SOP-AT18, AT47, or AT53 for vertebrate acute toxicity tests.
- Transfer the larvae in a manner that allows them to swim from the pipette into the MHSW contained in each cup.
- Measure and record the weight of each cup containing MHSW with 10 larvae.
- Determine each transfer volume and average transfer volume.

Replicate Number	Initial Weight Medicine cup (g)	Final Weight Medicine cup + 10 mL MHSW + 10 Larval Fish transferred (g)	Transfer Volume Final - Initial Weight (g = mL)
1	1.3865	11.4001	/ JH 02-11-22
2	1.4154	11.0371	
3	1.4093	11.2007	
4	1.4337	11.3206	
5	1.4069	11.2697	
6	1.3819	11.1806	
7	1.4142	11.1594	
8	1.4231	11.2099	
9	1.4161	11.3403	
10	1.4196	11.2552	

Average volume to transfer 10 organisms (mL):



Larval Fish Transfer Volume

Analyst: J. Sumner Species: *P. promelas*
 Date: 02-16-22 Source / Batch: Spawn date: 02-01-22
 Ambient temperature: 24.3°C Wet Weight of 10 Larvae (g): 0.0544

Estimate transfer volume, where minnows are allowed to swim from the pipette into the test vessel.

- Numerically label 10 medicine cups.
- Add 10 mL MHSW to each of the 10 cups.
- Measure and record the weight of each cup containing MHSW.
- Transfer 10 larvae to each cup, following procedures identified in SOP-AT18, AT47, or AT53 for vertebrate acute toxicity tests.
- Transfer the larvae in a manner that allows them to swim from the pipette into the MHSW contained in each cup.
- Measure and record the weight of each cup containing MHSW with 10 larvae.
- Determine each transfer volume and average transfer volume.

Replicate Number	Initial Weight Medicine cup + 10 mL MHSW (g)	Final Weight Medicine cup + 10 mL MHSW + 10 Larval Fish transferred (g)	Transfer Volume Final - Initial Weight (g = mL)
1	11.3665	11.4001	0.0336
2	11.2288	11.0371	-0.1917
3	11.1993	11.2007	0.0014
4	11.3109	11.3200	0.0091
5	11.2632	11.2697	0.0065
6	11.1505	11.1806	0.0301
7	11.1573	11.1594	0.0021
8	11.2564	11.2099	-0.0465
9	11.3383	11.3403	0.0020
10	11.2347	11.2552	0.0205

Average volume to transfer 10 organisms (mL): 0.0132

-negative values removed, attributed to releasing minnows and removing a slight amount of water in the process.

Estimate transfer volume, where the minnows are transferred with MHSW into the test vessels.

- Numerically label 10 medicine cups.
- Measure and record the weight of each cup.
- Add approximately 10 mL MHSW to each of the 10 cups.
- Transfer 10 larvae to each cup, following procedures identified in SOP-AT18, AT47, or AT53 for vertebrate acute toxicity tests.
- Transfer the larvae in a manner that allows them to swim from the pipette into the MHSW contained in each cup.
- Measure and record the weight of each cup containing MHSW with 10 larvae.
- Determine each transfer volume and average transfer volume.

Replicate Number	Initial Weight Medicine cup (g)	Final Weight Medicine cup + 10 mL MHSW + 10 Larval Fish transferred (g)	Transfer Volume Final - Initial Weight (g = mL)
1	1.3865	11.4001	10.0136
2	1.4154	11.0371	9.6217
3	1.4093	11.2007	9.7914
4	1.4337	11.3200	9.8863
5	1.4069	11.2697	9.8628
6	1.3819	11.1806	9.7987
7	1.4142	11.1594	9.7452
8	1.4231	11.2099	9.7868
9	1.4161	11.3403	9.9242
10	1.4196	11.2552	9.8356

Average volume to transfer 10 organisms (mL): 9.8266

Ceriodaphnia dubia Transfer Volume

Analyst: J. Sumner
 Date: 02-16-22
 Ambient temperature: 24.9°C

Numerically label 10 medicine cups.
 Add 15 mL MHSW to each of the 10 cups.
 Measure and record the weight of each cup containing MHSW.
 Transfer 5 *Ceriodaphnia* to each cup, following procedures identified in SOP-AT9 for Daphnid acute toxicity tests.
 Measure and record the weight of each cup containing MHSW with 5 *Ceriodaphnia*.
 Determine each transfer volume, average transfer volume, and estimated volume to transfer 1 *Ceriodaphnia*.

Replicate Number	Initial Weight Medicine cup + 15 mL MHSW (g)	Final Weight Medicine cup + 15 mL MHSW + 5 <i>Ceriodaphnia</i> transferred (g)	Transfer Volume Final - Initial Weight (g = mL)
1	16.2748	16.3531	0.0783
2	16.0180	16.1525	0.1345
3	16.4562	16.5982	0.1420
4	15.9717	16.0994	0.1277
5	16.2753	16.3058	0.0305
6	16.0769	16.1203	0.0434
7	16.3632	16.4334	0.0702
8	16.1149	16.1440	0.0291
9	16.3503	16.3961	0.0458
10	15.9764	16.0144	0.0380

Average volume to transfer 5 organisms (mL): 0.0740
 Estimated volume to transfer 1 organism (mL): 0.0148

Artemia lot used for testing

Artemia Shipment Log

Shipment receipt: CHM 1149

Source:	Brine Shrimp Direct
Lot number:	011429
Date received:	06-05-20
Expiration date:	06-05-2025
Received by (initials):	JL
Analytical submitted:	07-30-20
Reference testing performed:	07-07-20

Artemia count verification:

contained in 1 drop or 50 μ L

1 drop should contain approximately 350 to 500 nauplii

Replicate	# Hatched Artemia	# of Cysts	% Hatch-out
1	371	11	97.17.
2	396	5	98.87.
3	383	17	95.87.
4	351	8	97.87.
5	409	19	95.67.
Average:	382	12	97.07.



Environmental Chemists, Inc.

6602 Windmill Way, Wilmington, NC 28405 • 910.392.0223 Lab • 910.392.4424 Fax
 710 Bowsertown Road, Manteo, NC 27954 • 252.473.5702 Lab/Fax
 255-A Wilmington Highway, Jacksonville, NC 28540 • 910.347.5843 Lab/Fax

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

Environmental Testing Solutions, Inc.

Post Office Box 7565

Asheville NC 28802

Attention: Kelley Keenan (ETS)

Date of Report: Mar 28, 2022

Customer PO #:

Customer ID: 08100055

Report #: 2022-04354

Project ID: ETS, Inc

Lab ID	Sample ID:	Collect Date/Time	Matrix	Sampled by
22-10421	Site: MHSW030722	3/8/2022 8:30 AM	Water	Client

Test	Method	Results	Date Analyzed
Iron	EPA 200.7, Rev 4.4, 1994	<0.01 mg/L	03/14/2022
Aluminum	EPA 200.7, Rev. 4.4, 1994	<0.01 mg/L	03/14/2022
Arsenic	EPA 200.8, Rev. 5.4, 1994	<0.091 J µg/L	03/15/2022
Cadmium	EPA 200.8, Rev. 5.4, 1994	<0.091 J µg/L	03/15/2022
Chromium	EPA 200.8, Rev. 5.4, 1994	0.353 J µg/L	03/15/2022
Cobalt	EPA 200.8, Rev. 5.4, 1994	<0.142 J µg/L	03/15/2022
Copper	EPA 200.8, Rev. 5.4, 1994	<0.159 J µg/L	03/15/2022
Lead	EPA 200.8, Rev. 5.4, 1994	<0.096 J µg/L	03/15/2022
Nickel	EPA 200.8, Rev. 5.4, 1994	<0.119 J µg/L	03/15/2022
Silver	EPA 200.8, Rev. 5.4, 1994	<0.084 J µg/L	03/15/2022
Zinc	EPA 200.8, Rev. 5.4, 1994	0.007 mg/L	03/15/2022
Mercury	EPA 245.1, Rev. 3.0, 1994	<0.0002 mg/L	03/25/2022
4,4'-DDD	SW-846 8081 B	<0.00001 mg/L	03/14/2022
4,4'-DDE	SW-846 8081 B	<0.00001 mg/L	03/14/2022
4,4'-DDT	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Aldrin	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Alpha - BHC	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Beta-BHC	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Chlordane	SW-846 8081 B	<0.001 mg/L	03/14/2022
Delta-BHC	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Dieldrin	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Endosulfan I	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Endosulfan II	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Endosulfan sulfate	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Endrin	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Endrin Aldehyde	SW-846 8081 B	<0.00001 mg/L	03/14/2022



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710 Bowsertown Road, Manteo, NC 27954 • 252.473.5702 Lab/Fax
255-A Wilmington Highway, Jacksonville, NC 28540 • 910.347.5843 Lab/Fax

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

Environmental Testing Solutions, Inc.

Post Office Box 7565
Asheville NC 28802
Attention: Kelley Keenan (ETS)

Date of Report: Mar 28, 2022

Customer PO #:

Customer ID: 08100055

Report #: 2022-04354

Project ID: ETS, Inc

Endrin ketone	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Gamma-BHC	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Heptachlor	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Heptachlor epoxide	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Hexachlorobenzene	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Hexachlorocyclopentadiene	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Methoxychlor	SW-846 8081 B	<0.00001 mg/L	03/14/2022
Toxaphene	SW-846 8081 B	<0.001 mg/L	03/14/2022
Aroclor 1016	SW-846 8082 A	<0.001 mg/L	03/14/2022
Aroclor 1221	SW-846 8082 A	<0.001 mg/L	03/14/2022
Aroclor 1232	SW-846 8082 A	<0.001 mg/L	03/14/2022
Aroclor 1242	SW-846 8082 A	<0.001 mg/L	03/14/2022
Aroclor 1248	SW-846 8082 A	<0.001 mg/L	03/14/2022
Aroclor 1254	SW-846 8082 A	<0.001 mg/L	03/14/2022
Aroclor 1260	SW-846 8082 A	<0.001 mg/L	03/14/2022

Comment: Revised to amend units for "J" values.

Reviewed by: _____

Environmental Chemist
 Level 2 QC
 8082 Summary
 Batch # 22-072

Report # 2022-04354
 Sample # 22-10421

MB Summary

Compound	(ug/ml)
Aroclor 1016	<0.0001
Aroclor 1260	<0.0001

Environmental Chemist
 8081 LCS/LCSD Recovery Summary

Column 1

Compound	LCS					LCSD					%RPD			
	Spk Amt. (ug/ml)	Calc. Amt. (ug/ml)	% REC.	QC Limits		*	Spk Amt. (ug/ml)	Calc. Amt. (ug/ml)	% REC.	QC Limits		*	40%	**
AR1016														
1	2.0	2.2018					4.0	4.3559						
2	2.0	2.5951					4.0	4.9246						
3	2.0	2.2047					4.0	4.1768						
4	2.0	2.2603					4.0	4.3972						
5	2.0	2.3460					4.0	4.2194						
Average	2.0	2.3216	116	50	-	150	4.0	4.4148	110	50	-	150	5	1
AR1260														
1	2.0	2.3406					4.0	4.4765						
2	2.0	2.3918					4.0	4.7353						
3	2.0	2.9926					4.0	5.8708						
4	2.0	2.2777					4.0	4.3662						
5	2.0	2.3602					4.0	4.5603						
Average	2.0	2.4726	124	50	-	150	4.0	4.8018	120	50	-	150	3	1

Column 2

Compound	LCS					LCSD					%RPD			
	Spk Amt. (ug/ml)	Calc. Amt. (ug/ml)	% REC.	QC Limits		*	Spk Amt. (ug/ml)	Calc. Amt. (ug/ml)	% REC.	QC Limits		*	40%	**
AR1016														
1	2.0	2.3088					4.0	4.8112						
2	2.0	2.2425					4.0	4.6820						
3	2.0	2.2200					4.0	4.5843						
4	2.0	2.2927					4.0	4.7177						
5	2.0	2.1035					4.0	4.4339						
Average	2.0	2.2335	112	50	-	150	4.0	4.6458	116	50	-	150	4	1
AR1260														
1	2.0	2.3711					4.0	4.8594						
2	2.0	2.3967					4.0	4.8999						
3	2.0	2.3594					4.0	4.9655						
4	2.0	2.4136					4.0	4.9028						
5	2.0	2.4135					4.0	4.9313						
Average	2.0	2.3908	120	50	-	150	4.0	4.9118	123	50	-	150	3	1

1 - LCFB was spiked at x2 (4ppm) % recovery was used to evaluate RPDs.



Environmental Chemist
Level 2 QC
8081 Summary
Batch # 22-073

Report # 2022-04354

Sample # 22-10421

MB Summary

Compound	(ug/ml)
HCCPD	<0.00001
Hexachlorobenzene	<0.00001
a-BHC	<0.00001
g-BHC	<0.00001
b-BHC	<0.00001
d-BHC	<0.00001
Heptachlor	<0.00001
Aldin	<0.00001
Heptachlor Epoxide	<0.00001
trans-Chlordane	<0.0002
cis-Chlordane	<0.0002
Endosulfan 1	<0.00001
4,4-DDE	<0.00001
Dieldrin	<0.00001
Endrin	<0.00001
4,4-DDD	<0.00001
Endosulfan 2	<0.00001
4,4-DDT	<0.00001
Endrin Aldehyde	<0.00001
Endosulfan Sulfate	<0.00001
Methoxychlor	<0.00001
Endrin Ketone	<0.00001
Chlordane	<0.001
Toxaphene	<0.001

Environmental Chemist
8081 LCS Recovery Summary
Batch # 22-073

Report # 2022-04354
 Sample #22-10421

Column 1

Compound	LCS					LCSD					%RPD	
	(ug/ml)	(ug/ml)	% REC.	QC Limits	*	(ug/ml)	% REC.	QC Limits	*	40%	**	
HCCPD	0.10	0.0707	71	14 - 143		0.0777	78	14 - 143		9		
TCMX (SS)	0.20	0.1296	65	19 - 109		0.1507	75	19 - 109		15		
Hexachlorobenzene	0.10	0.0710	71	29 - 129		0.0821	82	29 - 129		14		
a-BHC	0.10	0.0801	80	45 - 122		0.0935	93	45 - 122		15		
g-BHC	0.10	0.0874	87	54 - 127		0.0997	100	54 - 127		13		
b-BHC	0.10	0.0970	97	56 - 135		0.1133	113	56 - 135		15		
d-BHC	0.10	0.0935	94	54 - 130		0.1092	109	54 - 130		15		
Heptachlor	0.10	0.0871	87	59 - 125		0.1020	102	59 - 125		16		
Aldrin	0.10	0.0674	67	49 - 110		0.0766	77	49 - 110		13		
Heptachlor Epoxide	0.10	0.0939	94	60 - 126		0.1068	107	60 - 126		13		
trans (g) Chlordane	0.10	0.0969	97	59 - 148		0.1080	108	59 - 148		11		
cis (a) Chlordane	0.10	0.0831	83	57 - 120		0.0961	96	57 - 120		14		
4,4-DDE	0.10		0	61 - 124	*	0	0	61 - 124	*	0	S	
Endosulfan I	0.10		0	30 - 133	*	0	0	30 - 133	*	0	S	
4,4-DDE/Endo I	0.20	0.1851	93	30 - 133		0.2114	106	30 - 133		13		
Dieldrin	0.10	0.0895	89	60 - 131		0.1029	103	60 - 131		14		
Endrin	0.10	0.1009	101	62 - 138		0.1149	115	62 - 138		13		
4,4-DDD	0.10	0.1116	112	66 - 136		0.1273	127	66 - 136		13		
Endosulfan II	0.10	0.0884	88	36 - 147		0.1014	101	36 - 147		14		
4,4-DDT	0.10	0.1180	118	68 - 144		0.1348	135	68 - 144		13		
Endrin Aldehyde	0.10	0.0806	81	27 - 188		0.0932	93	27 - 188		15		
Methoxychlor	0.10	0.1322	132	68 - 155		0.1473	147	68 - 155		11		
Endosulfan Sulfate	0.10	0.1060	106	65 - 146		0.1187	119	65 - 146		11		
Endrin Ketone	0.10	0.1134	113	57 - 151		0.1259	126	57 - 151		10		
DBCP (SS)	0.20	0.1903	95	18 - 150		0.2004	100	18 - 150		5		

Column 2

Compound	LCS					LCSD					%RPD	
	(ug/ml)	(ug/ml)	% REC.	QC Limits	*	(ug/ml)	% REC.	QC Limits	*	40%	**	
HCCPD	0.10	0.0671	67	18 - 123		0.0804	80	18 - 123		18		
TCMX (SS)	0.20	0.1382	69	6 - 110		0.1588	79	6 - 110		14		
Hexachlorobenzene	0.10	0.0763	76	21 - 129		0.0885	88	21 - 129		15		
a-BHC	0.10	0.0978	98	31 - 129		0.1128	113	31 - 129		14		
g-BHC	0.10	0.1111	111	50 - 118		0.1357	136	50 - 118	*	20		
b-BHC	0.10	0.1208	121	46 - 132		0.1382	138	46 - 132	*	13		
d-BHC	0.10	0.1195	119	32 - 132		0.1395	139	32 - 132	*	15		
Heptachlor	0.10	0.0774	77	38 - 112		0.0863	86	38 - 112		11		
Aldrin	0.10	0.0785	78	34 - 114		0.0879	88	34 - 114		11		
Heptachlor Epoxide	0.10	0.1094	109	53 - 120		0.1295	129	53 - 120	*	17		
trans (g) Chlordane	0.10	0.1003	100	42 - 124		0.1147	115	42 - 124		13		
cis (a) Chlordane	0.10	0.0972	97	43 - 124		0.1123	112	43 - 124		14		
Endosulfan I	0.10	0.1099	110	22 - 130		0.1254	125	22 - 130		13		
4,4-DDE	0.10	0.1162	116	43 - 128		0.1332	133	43 - 128	*	14		
Dieldrin	0.10	0.0998	100	53 - 127		0.1157	116	53 - 127		15		
Endrin	0.10	0.1074	107	54 - 133		0.1245	125	54 - 133		15		
4,4-DDD	0.10	0.1214	121	55 - 141		0.1367	137	55 - 141		12		
Endosulfan II	0.10	0.1099	110	39 - 130		0.1256	126	39 - 130		13		
4,4-DDT	0.10	0.1184	118	60 - 154		0.1322	132	60 - 154		11		
Endrin Aldehyde	0.10	0.1015	101	30 - 124		0.1194	119	30 - 124		16		
Endosulfan Sulfate	0.10	0.1249	125	40 - 158		0.1425	143	40 - 158		13		
Methoxychlor	0.10	0.1544	154	70 - 192		0.1355	135	70 - 192		13		
Endrin Ketone	0.10	0.1199	120	63 - 138		0.1394	139	63 - 138	*	15		
DBCP (SS)	0.20	0.2154	108	12 - 155		0.2264	113	12 - 155		5		

Control Charts Used for control limits. Est 11/2021

5 - Coeluting
 6 - Separated



Environmental Chemists, Inc.

6602 Windmill Way, Wilmington, NC 28405 • 910.392.0223 Lab • 910.392.4424 Fax
 710 Bowsertown Road, Manteo, NC 27954 • 252.473.5702 Lab/Fax
 255-A Wilmington Highway, Jacksonville, NC 28540 • 910.347.5843 Lab/Fax

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

QC ETS- 2022-04354

LCS

Parameter	True Value mg/L	Result mg/L	% True Value	Limits %
Aluminum	1.00	1.00	100	90-110
Arsenic	0.0020	0.0021	105	90-110
Cadmium	0.0020	0.0020	100	90-110
Chromium	0.0020	0.0019	95	90-110
Cobalt	0.0020	0.0020	100	90-110
Copper	0.0020	0.0020	100	90-110
Mercury	0.0050	0.0052	104	90-110
Iron	2.00	1.96	98	90-110
Lead	0.0020	0.0019	95	90-110
Nickel	0.0020	0.0020	100	90-110
Silver	0.0020	0.0019	95	90-110
Zinc	0.0050	0.0052	104	90-110

MS/MSD

Parameter	True Value mg/L	Recovery mg/L	% Recovery	% Difference	Limits % Recovery	Limits % Difference
Aluminum	0.100	0.098/0.100	98/100	2	80-120	≤ 20
Arsenic	0.0100	0.0103/0.0106	103/106	3	80-120	≤ 20
Cadmium	0.0100	0.0098/0.0102	98/102	4	80-120	≤ 20
Chromium	0.0100	0.0095/0.0099	95/99	4	80-120	≤ 20
Cobalt	0.010	0.0095/0.0097	95/97	2	80-120	≤ 20
Copper	0.0100	0.0093/0.0096	93/96	3	80-120	≤ 20
Mercury	0.0020	0.0021/0.0021	105/105	0	80-120	≤ 20
Iron	1.00	1.01/1.03	101/103	2	80-120	≤ 20
Lead	0.0100	0.0095/0.0100	95/100	5	80-120	≤ 20
Nickel	0.0100	0.0096/0.0100	96/100	4	80-120	≤ 20
Silver	0.0100	0.0090/0.0094	90/94	4	80-120	≤ 20
Zinc	0.0100	0.0097/0.0102	97/102	5	80-120	≤ 20



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ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

BLANKS

<i>Parameter</i>	<i>Results mg/L</i>	<i>Limit mg/L</i>
Aluminum	<0.005	0.005
Arsenic	<0.00025	0.00025
Cadmium	<0.00025	0.00025
Chromium	<0.00025	0.00025
Cobalt	<0.00025	0.00025
Lead	<0.00025	0.00025
Mercury	<0.0001	0.0001
Iron	<0.005	0.005
Lead	<0.00025	0.00025
Nickel	<0.00025	0.00025
Silver	<0.00025	0.00025
Zinc	<0.0025	0.0025

Sample Receipt Checklist

Client: ETS, ETS, Inc Date: 3/9/22 Report Number: 2022-4354

Receipt of sample:		ECEM Pickup <input checked="" type="checkbox"/>	Client Delivery <input type="checkbox"/>	UPS <input type="checkbox"/>	FedEx <input type="checkbox"/>	Other <input type="checkbox"/>
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> N/A	1. Were custody seals present on the cooler?			
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> N/A	2. If custody seals were present, were they intact/unbroken?			
Original temperature upon receipt		<u>1.0</u> °C	Corrected temperature upon receipt		_____ °C	
How temperature taken:		<input type="checkbox"/> Temperature Blank	<input checked="" type="checkbox"/> Against Bottles			
IR Gun ID: Thomas Traceable S/N: 210835468			IR Gun Correction Factor °C: 0.0			
<input type="checkbox"/> YES	<input type="checkbox"/> NO	3. If temperature of cooler exceeded 6°C, was Project Mgr./QA notified?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	4. Were proper custody procedures (relinquished/received) followed?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	5. Were sample ID's listed on the COC?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	6. Were samples ID's listed on sample containers?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	7. Were collection date and time listed on the COC?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	8. Were tests to be performed listed on the COC?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	9. Did samples arrive in proper containers for each test?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	10. Did samples arrive in good condition for each test?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	11. Was adequate sample volume available?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	12. Were samples received within proper holding time for requested tests?				
<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	13. Were acid preserved samples received at a pH of <2? *				
<input type="checkbox"/> YES	<input type="checkbox"/> NO	14. Were cyanide samples received at a pH >12?				
<input type="checkbox"/> YES	<input type="checkbox"/> NO	15. Were sulfide samples received at a pH >9?				
<input type="checkbox"/> YES	<input type="checkbox"/> NO	16. Were NH ₃ /TKN/Phenol received at a chlorine residual of <0.5 m/L? **				
<input type="checkbox"/> YES	<input type="checkbox"/> NO	17. Were Sulfide/Cyanide received at a chlorine residual of <0.5 m/L?				
<input type="checkbox"/> YES	<input type="checkbox"/> NO	18. Were orthophosphate samples filtered in the field within 15 minutes?				

* TOC/Volatiles are pH checked at time of analysis and recorded on the benchsheet.

** Bacteria samples are checked for Chlorine at time of analysis and recorded on the benchsheet.

Sample Preservation: (Must be completed for any sample(s) incorrectly preserved or with headspace)
 Sample(s) _____ were received incorrectly preserved and were adjusted accordingly
 by adding (circle one): H₂SO₄ HNO₃ HCl NaOH
 Time of preservation: _____ If more than one preservative is needed, notate in comments below

Note: Notify customer service immediately for incorrectly preserved samples. Obtain a new sample or
 notify the state lab if directed to analyzed by the customer. Who was notified, date and time: _____

Volatiles Sample(s) _____ were received with headspace

COMMENTS:



Analytical & Consulting Chemists

ENVIRONMENTAL CHEMISTS, INC

NC DENR: DWQ CERTIFICATION # 94 NCDHHS: DLS CERTIFICATION # 37729

6602 Windmill Way Wilmington, NC 28405

OFFICE: 910-392-0223 FAX 910-392-4424

Info@environmentalchemists.com

COLLECTION AND CHAIN OF CUSTODY

Client: <u>ETS, INC</u>	PROJECT NAME: <u>ETS, INC</u>	REPORT NO: <u>22-4354</u>
ADDRESS:	CONTACT NAME:	PO NO:
	REPORT TO:	PHONE/FAX:
	COPY TO:	email:

Sampled By: See Doc

SAMPLE TYPE: I = Influent, E = Effluent, W = Well, ST = Stream, SO = Soil, SL = Sludge, Other:

Sample Identification	Collection			Sample Type	Composite or Grab	Container (P or G)	Chlorine mg/L	pH of bottle	LAB ID NUMBER	PRESERVATION								ANALYSIS REQUESTED	
	Date	Time	Temp							NONE	HCL	H2SO4	HNO3	NAOH	THIO	FILTERED	OTHER		
Mtsw 030722	03/07/22	0830			C	P			1021										Exp. 8002 P.H.S. Cd. Cr. Co. Cu. Fe. Pb. Ni. Ag. Zn. Hg
					G	P													
					G	G													
					C	P													
					G	G													
					C	P													
					G	G													
					C	P													
					G	G													
					C	P													
					G	G													

OC level 2
 200.0
 J-Flag

NOTICE - DECHLORINATION: Samples for Ammonia, TKN, Cyanide, Phenol and Bacteria must be dechlorinated (0.5 ppm or less) in the field at the time of collection. See reverse for instructions

Transfer	Relinquished By:	Date/Time	Received By:	Date/Time
1.	<u>K. EIS</u>	<u>030922</u>	<u>Echem Cowner</u>	<u>030922</u>
2.	<u>Echem Cowner</u>	<u>030922</u>		

Temperature when Received °C: 1.0°C Accepted: [Signature] Rejected: _____ Resample Requested: _____
 Delivered By: K. Turriage Received By: [Signature] Date: 3/9/22 Time: 1430
 Comments: _____ TURNAROUND: _____



Environmental Testing Solutions, Inc.

PO Box 7565, Asheville, NC 28802

Phone: (828) 350-9364, Fax: (828) 350-9368

CHAIN-OF-CUSTODY / Analytical Request

Client Name: ETS, INC.

Address: _____

Report to: _____

Phone: _____ Fax: _____

PO Number: _____

Project Name: LAB QC

Project Number: 220380305

Item Number	Sample Identification	G = Grab, C = Composite	Sample Number ETS Use Only	Water, Solid, Liquid	Date Collected (MM/DD/YY)	Time Collected (HH:MM)	# Containers	Preservatives					Requested Analyses							Field Temp. (°C)	Comments																		
								Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH + Ascorbic	Na ₂ S ₂ O ₃	80&1	80&2	Al, As, Ca, Cr, Co, Cu	Fe, Pb, Ni, Ag, Zn, Hg																						
1	MHSW <i>03-07-22</i> <i>03-08-22</i>	G	221209	W	03-08-22	0830	54							X	X	X	X																						
2																																							
3																																							
4																																							
5																																							
6																																							
Sample Condition Upon Receipt		Relinquished By		Company		Date		Time		Accepted By		Company		Date		Time																							
Temperature (°C)		MA		ETS		03-08-22		0835		K		ETS		03-08-22		0835																							
Received on Ice:		Y / <u>(N)</u>																																					
Sealed Cooler:		Y / <u>(N)</u>																																					
Samples Intact:		<u>(Y)</u> / N																																					
Additional Comments:										Sampler Name and Signature							Date																						
										Printed Name of Sampler: <u>J. Sumner</u>							03-08-22																						
										Signature of Sampler:																													



Environmental Chemists, Inc.

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710 Bowsertown Road, Manteo, NC 27954 • 252.473.5702 Lab/Fax
255-A Wilmington Highway, Jacksonville, NC 28540 • 910.347.5843 Lab/Fax

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

Environmental Testing Solutions, Inc.
Post Office Box 7565
Asheville NC 28802
Attention: Kelley Keenan (ETS)

Date of Report: May 12, 2022
Customer PO #:
Customer ID: 08100055
Report #: 2022-07905
Project ID: ETS, Inc

Lab ID	Sample ID:	Collect Date/Time	Matrix	Sampled by
22-19098	Site: MHSW 04-26-22	4/27/2022 11:55 AM	Water	Client

Test	Method	Results	Date Analyzed
Zinc	EPA 200.8, Rev. 5.4, 1994	1.733 J µg/L	05/09/2022

Comment: J= J-value

Reviewed by: Mauiolo Olijas



Environmental Chemists, Inc.

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 710 Bowsertown Road, Manteo, NC 27954 • 252.473.5702 Lab/Fax
 255-A Wilmington Highway, Jacksonville, NC 28540 • 910.347.5843 Lab/Fax

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

QC ETS- 2022-07905

LCS

<i>Parameter</i>	<i>True Value mg/L</i>	<i>Result mg/L</i>	<i>% True Value</i>	<i>Limits %</i>
Zinc	0.0050	0.0050	100	90-110

MS/MSD

<i>Parameter</i>	<i>True Value mg/L</i>	<i>Recovery mg/L</i>	<i>% Recovery</i>	<i>% Difference</i>	<i>Limits % Recovery</i>	<i>Limits % Difference</i>
Zinc	0.0100	0.0089/0.0087	89/87	2	80-120	≤ 20

BLANKS

<i>Parameter</i>	<i>Results mg/L</i>	<i>Limit mg/L</i>
Zinc	<0.0025	0.0025

Sample Receipt Checklist

Client: ETS - ETS Inc Date: 5/3/22 Report Number: 2022-7905

Receipt of sample:	ECHM Pickup <input type="checkbox"/>	Client Delivery <input type="checkbox"/>	UPS <input type="checkbox"/>	FedEx <input checked="" type="checkbox"/>	Other <input type="checkbox"/>
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	1. Were custody seals present on the cooler?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	2. If custody seals were present, were they intact/unbroken?				
Original temperature upon receipt <u>13</u> °C		Corrected temperature upon receipt _____ °C			
How temperature taken:		<input type="checkbox"/> Temperature Blank <input checked="" type="checkbox"/> Against Bottles			
IR Gun ID: Thomas Traceable S/N 192511657		IR Gun Correction Factor °C: 0.0			
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	3. If temperature of cooler exceeded 6°C, was Project Mgr./QA notified?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	4. Were proper custody procedures (relinquished/received) followed?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	5. Were sample ID's listed on the COC?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	6. Were samples ID's listed on sample containers?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	7. Were collection date and time listed on the COC?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	8. Were tests to be performed listed on the COC?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	9. Did samples arrive in proper containers for each test?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	10. Did samples arrive in good condition for each test?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	11. Was adequate sample volume available?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	12. Were samples received within proper holding time for requested tests?				
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	13. Were acid preserved samples received at a pH of <2? *				
<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	14. Were cyanide samples received at a pH >12?				
<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	15. Were sulfide samples received at a pH >9?				
<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	16. Were NH ₃ /TKN/Phenol received at a chlorine residual of <0.5 m/L? **				
<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	17. Were Sulfide/Cyanide received at a chlorine residual of <0.5 m/L?				
<input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	18. Were orthophosphate samples filtered in the field within 15 minutes?				

* TOC/Volatiles are pH checked at time of analysis and recorded on the benchsheet.

** Bacteria samples are checked for Chlorine at time of analysis and recorded on the benchsheet.

Sample Preservation: (Must be completed for any sample(s) incorrectly preserved or with headspace)
 Sample(s) _____ were received incorrectly preserved and were adjusted accordingly
 by adding (circle one): H₂SO₄ HNO₃ HCl NaOH
 Time of preservation: _____ If more than one preservative is needed, notate in comments below

Note: Notify customer service immediately for incorrectly preserved samples. Obtain a new sample or
 notify the state lab if directed to analyzed by the customer. Who was notified, date and time: _____

Volatiles Sample(s) _____ were received with headspace

COMMENTS:



Analytical & Consulting Chemists

ENVIRONMENTAL CHEMISTS, INC

NC DENR: DWQ CERTIFICATION # 94 NCDHHS: DLS CERTIFICATION # 37729

6602 Windmill Way Wilmington, NC 28405
OFFICE: 910-392-0223 FAX 910-392-4424
info@environmentalchemists.com

COLLECTION AND CHAIN OF CUSTODY

Client: <u>ETS, INC</u>	PROJECT NAME: <u>ETS, INC</u>	REPORT NO: <u>22-7905</u>
ADDRESS:	CONTACT NAME:	PO NO:
	REPORT TO:	PHONE/FAX:
	COPY TO:	email:

Sampled By: SEAL

SAMPLE TYPE: I = Influent, E = Effluent, W = Well, ST = Stream, SO = Soil, SL = Sludge, Other:

Sample Identification	Collection			Sample Type	Composite or Grab	Container (P or G)	Chlorine mg/L	pH of bottle	LAB ID NUMBER	PRESERVATION								ANALYSIS REQUESTED
	Date	Time	Temp							NONE	HCL	H2SO4	HNO3	NAOH	THIO	FILTERED	OTHER	
MHSW 042622	<u>05/04/22</u>	<u>1155</u>			C	P			<u>1098</u>									<u>Zn</u>
	<u>042722</u>				G	G												
					C	P												
					G	G												
					C	P												
					G	G												
					C	P												
					G	G												
					C	P												
					G	G												
					C	P												
					G	G												
					C	P												
					G	G												

200.8
OC level 2
J-Flag

NOTICE - DECHLORINATION: Samples for Ammonia, TKN, Cyanide, Phenol and Bacteria must be dechlorinated (0.5 ppm or less) in the field at the time of collection. See reverse for instructions

Transfer	Relinquished By:	Date/Time	Received By:	Date/Time
1.	<u>V OJ</u>	<u>050222</u>	<u>FedEx</u>	<u>050222</u>
2.	<u>FedEx</u>			

Temperature when Received °C: 13°C Accepted: Rejected: Resample Requested: _____
 Delivered By: FedEx Received By: R. Konecny Date: 5/3/22 Time: 1430
 Comments: _____ TURNAROUND: _____



Environmental Testing Solutions, Inc.

PO Box 7565, Asheville, NC 28802

Phone: (828) 350-9364, Fax: (828) 350-9368

CHAIN-OF-CUSTODY / Analytical Request

Client Name: ETS, INC.

Address: _____

Report to: _____

Phone: _____ Fax: _____

PO Number: _____

Project Name: LAB QC

Project Number: _____

Item Number	Sample Identification	G = Grab, C = Composite	Sample Number ETS Use Only	Matrix: Water, Solid, Liquid	Date Collected (MM/DD/YY)	Time Collected (HH:MM)	# Containers	Preservatives					Requested Analyses					Field Temp. (°C)	Comments			
								Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH + Ascorbic	Na ₂ S ₂ O ₃									
1	MHSW 04-26-22	G		W	04-27-22	1155	1		✓													
2																						
3																						
4																						
5																						
6																						

Sample Condition Upon Receipt	Relinquished By	Company	Date	Time	Accepted By	Company	Date	Time
Temperature (°C)	NA		ETS	04-27-22	1156		ETS	042722 1130
Received on Ice:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N							
Sealed Cooler:	<input type="checkbox"/> Y / <input checked="" type="checkbox"/> N							
Samples Intact:	<input checked="" type="checkbox"/> Y / <input type="checkbox"/> N							

Additional Comments: <u>* JFLAG</u>	Sampler Name and Signature	Date
	Printed Name of Sampler: <u>JSumpster</u>	<u>04-27-22</u>
	Signature of Sampler:	

pH Checked Upon Receipt
Cl₂ < 0.2 mg/l Upon Receipt



Laboratory Report

Client Environmental Testing Solutions
Kelley E. Keenan
351 Depot St.
Asheville, NC 28801-4310

Project: ETS, Inc.
Work Order: 0071549
Received: 07/31/2020 09:55

Dear Client:

Rogers and Callcott appreciates the opportunity to be of service to you. The attached laboratory services report includes analytical results and chain of custody for samples that were received on July 31, 2020. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements for the TN1 standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty is available upon request.

Privileged / Confidential information may be contained in this report and is intended only for the use of the addressee. If you are not the addressee, or the person responsible for delivering to the person addressed, you may not copy or deliver this message to anyone else. If you receive this message by mistake, please notify Rogers and Callcott immediately.

We strive to provide excellent service to our clients. Please contact Lauren Hollister, your Project Manager, at lhollister@rcenviro.com, (864)-232-1556 if you have any questions about this report.

Report Approved By:

Lauren Hollister
Project Manager

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PO Box 5655 Greenville, SC 29606 426 Fairforest Way Greenville, SC 29607 main 864.232.1556 fax 864.232.6140 rogersandcallcott.com
an employee-owned company



South Carolina Greenville Laboratory Identification 23105
 South Carolina Columbia Laboratory Identification 40572
 North Carolina Laboratory Certification Number 27
 North Carolina Drinking Water Lab Number 45710
 NELAP Utah Certificate Number SC000042014-1
 Georgia Drinking Water Lab ID 880

Certificate of Analysis

Client Environmental Testing Solutions
 Kelley E. Keenan
 351 Depot St.
 Asheville, NC 28801-4310

Project: ETS, Inc.
Work Order: 0071549
Received: 07/31/2020 09:55

Sample Number	Sample Description	Matrix	Sampled	Type
0071549-01	ETS Artemia CHM 1149 - Grab	Wastewater	07/30/20 13:30	Grab
0071549-02	ETS Artemia CHM 1149 - Grab	Wastewater	07/30/20 13:30	Grab

Environmental Testing Solutions
351 Depot St.
Asheville, NC 28801-4310

Project: ETS, Inc.
Work Order: 0071549
Reported: 08/19/20 08:34

Sample Data

Sample Number 0071549-01
Sample Description ETS Artemia CHM 1149 - Grab collected on 07/30/20 13:30

Parameter	Result	Reporting Limit	Units	DF	Analyzed	Method	Flag	Analyst	Batch
Total Metals									
Mercury	0.00031	0.00020	mg/L	1.00	08/13/20 11:43	EPA 245.1		TLT	B0H0528
Aluminum	ND	0.050	mg/L	1.00	08/05/20 23:04	EPA 200.7		MLR	B0H0087
Arsenic	0.090	0.003	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060
Cadmium	0.0001	0.0001	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060
Chromium	0.001	0.002	mg/L	1.00	08/05/20 01:03	EPA 200.8	J	TLT	B0H0060
Cobalt	0.003	0.001	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060
Copper	0.030	0.002	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060
Iron	0.70	0.050	mg/L	1.00	08/05/20 23:04	EPA 200.7		MLR	B0H0087
Lead	ND	0.002	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060
Nickel	ND	0.005	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060
Silver	ND	0.005	mg/L	1.00	08/11/20 13:41	EPA 200.8		TLT	B0H0269
Zinc	0.452	0.005	mg/L	1.00	08/05/20 01:03	EPA 200.8		TLT	B0H0060

Sample Number 0071549-02
Sample Description ETS Artemia CHM 1149 - Grab collected on 07/30/20 13:30

Parameter	Result	Reporting Limit	Units	DF	Analyzed	Method	Flag	Analyst	Batch
Organochlorine Pesticides									
Aldrin	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
alpha-BHC	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
beta-BHC	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
delta-BHC	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Gamma-BHC (Lindane)	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Chlordane	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
4,4'-DDD	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
4,4'-DDE	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
4,4'-DDT	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Dieldrin	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Endosulfan I	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Endosulfan II	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Endosulfan sulfate	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Endrin	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Endrin aldehyde	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Heptachlor	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107



Environmental Testing Solutions 351 Depot St. Asheville, NC 28801-4310	Project: ETS, Inc. Work Order: 0071549 Reported: 08/19/20 08:34
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Sample Number 0071549-02
Sample Description ETS Artemia CHM 1149 - Grab collected on 07/30/20 13:30

Parameter	Result	Reporting Limit	Units	DF	Analyzed	Method	Flag	Analyst	Batch
Organochlorine Pesticides									
Heptachlor epoxide	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Toxaphene	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Methoxychlor	ND	0.050	ug/L	1.00	08/15/20 06:38	EPA 8081B		RKH	B0H0107
Surrogates									
				%REC	%REC Limits		Flag		
<i>2,4,5,6-Tetrachloro-m-xylene</i>				88	60-130				
<i>Decachlorobiphenyl</i>				32	30-150				
PCBs									
PCB-1016	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
PCB-1221	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
PCB-1232	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
PCB-1242	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
PCB-1248	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
PCB-1254	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
PCB-1260	ND	0.500	ug/L	1.00	08/15/20 06:38	EPA 8082A		RKH	B0H0107
Surrogates									
				%REC	%REC Limits		Flag		
<i>2,4,5,6-Tetrachloro-m-xylene</i>				88	60-130				
<i>Decachlorobiphenyl</i>				32	30-150				

Environmental Testing Solutions
351 Depot St.
Asheville, NC 28801-4310

Project: ETS, Inc.
Work Order: 0071549
Reported: 08/19/20 08:34

Total Metals
Quality Control Summary

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch B0H0060 - EPA 200.8

Blank (B0H0060-BLK1)

Arsenic	ND	0.003	mg/L							
Cadmium	ND	0.0001	mg/L							
Chromium	ND	0.002	mg/L							
Cobalt	ND	0.001	mg/L							
Copper	ND	0.002	mg/L							
Lead	ND	0.002	mg/L							
Nickel	ND	0.005	mg/L							
Zinc	ND	0.005	mg/L							

LCS (B0H0060-BS1)

Arsenic	0.209	0.003	mg/L	0.200		104	85-115			
Cadmium	0.203	0.0001	mg/L	0.200		101	85-115			
Chromium	0.216	0.002	mg/L	0.200		108	85-115			
Cobalt	0.214	0.001	mg/L	0.200		107	85-115			
Copper	0.221	0.002	mg/L	0.200		111	85-115			
Lead	0.199	0.002	mg/L	0.200		99	85-115			
Nickel	0.213	0.005	mg/L	0.200		107	85-115			
Zinc	0.214	0.005	mg/L	0.200		107	85-115			

LCS Dup (B0H0060-BSD1)

Arsenic	0.209	0.003	mg/L	0.200		104	85-115	0.04	200	
Cadmium	0.200	0.0001	mg/L	0.200		100	85-115	1	200	
Chromium	0.217	0.002	mg/L	0.200		109	85-115	0.9	200	
Cobalt	0.218	0.001	mg/L	0.200		109	85-115	2	200	
Copper	0.221	0.002	mg/L	0.200		110	85-115	0.1	200	
Lead	0.198	0.002	mg/L	0.200		99	85-115	0.08	200	
Nickel	0.216	0.005	mg/L	0.200		108	85-115	1	200	
Zinc	0.214	0.005	mg/L	0.200		107	85-115	0.3	200	

Batch B0H0087 - EPA 200.7 Mod

Blank (B0H0087-BLK1)

Aluminum	ND	0.050	mg/L							
Iron	ND	0.050	mg/L							

Environmental Testing Solutions 351 Depot St. Asheville, NC 28801-4310	Project: ETS, Inc. Work Order: 0071549 Reported: 08/19/20 08:34
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**Total Metals
Quality Control Summary**

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch B0H0087 - EPA 200.7 Mod

LCS (B0H0087-BS1)

Aluminum	0.48	0.050	mg/L	0.500		95	85-115			
Iron	0.492	0.050	mg/L	0.500		98	85-115			

LCS Dup (B0H0087-BSD1)

Aluminum	0.49	0.050	mg/L	0.500		98	85-115	2	20	
Iron	0.501	0.050	mg/L	0.500		100	85-115	2	20	

Batch B0H0269 - EPA 200.8

Blank (B0H0269-BLK1)

Silver	ND	0.005	mg/L							
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LCS (B0H0269-BS1)

Silver	0.060	0.005	mg/L	0.0600		100	85-115			
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LCS Dup (B0H0269-BSD1)

Silver	0.061	0.005	mg/L	0.0600		101	85-115	1	20	
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Batch B0H0528 - EPA 245.1

Blank (B0H0528-BLK1)

Mercury	ND	0.00020	mg/L							
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LCS (B0H0528-BS1)

Mercury	0.0049	0.00020	mg/L	0.00500		99	85-115			
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LCS Dup (B0H0528-BSD1)

Mercury	0.0050	0.00020	mg/L	0.00500		101	85-115	2	20	
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Environmental Testing Solutions 351 Depot St. Asheville, NC 28801-4310	Project: ETS, Inc. Work Order: 0071549 Reported: 08/19/20 08:34
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**Organochlorine Pesticides
Quality Control Summary**

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch B0H0107 - EPA 3510C - GC

Blank (B0H0107-BLK1)

Aldrin	ND	0.050	ug/L							
alpha-BHC	ND	0.050	ug/L							
beta-BHC	ND	0.050	ug/L							
delta-BHC	ND	0.050	ug/L							
Gamma-BHC (Lindane)	ND	0.050	ug/L							
Chlordane	ND	0.500	ug/L							
4,4'-DDD	ND	0.050	ug/L							
4,4'-DDE	ND	0.050	ug/L							
4,4'-DDT	ND	0.050	ug/L							
Dieldrin	ND	0.050	ug/L							
Endosulfan I	ND	0.050	ug/L							
Endosulfan II	ND	0.050	ug/L							
Endosulfan sulfate	ND	0.050	ug/L							
Endrin	ND	0.050	ug/L							
Endrin aldehyde	ND	0.050	ug/L							
Heptachlor	ND	0.050	ug/L							
Heptachlor epoxide	ND	0.050	ug/L							
Toxaphene	ND	0.500	ug/L							
Methoxychlor	ND	0.050	ug/L							

Surrogate: 2,4,5,6-Tetrachloro-m-xylene

68 60-130

Surrogate: Decachlorobiphenyl

63 30-150

LCS (B0H0107-BS1)

Aldrin	0.292	0.050	ug/L	0.400		73	70-130
alpha-BHC	0.306	0.050	ug/L	0.400		77	70-130
beta-BHC	0.306	0.050	ug/L	0.400		76	70-130
delta-BHC	0.348	0.050	ug/L	0.400		87	70-130
Gamma-BHC (Lindane)	0.312	0.050	ug/L	0.400		78	70-130
4,4'-DDD	0.320	0.050	ug/L	0.400		80	70-130
4,4'-DDE	0.308	0.050	ug/L	0.400		77	70-130
4,4'-DDT	0.342	0.050	ug/L	0.400		86	70-130
Dieldrin	0.334	0.050	ug/L	0.400		84	70-130
Endosulfan I	0.296	0.050	ug/L	0.400		74	70-130
Endosulfan II	0.326	0.050	ug/L	0.400		82	70-130
Endosulfan sulfate	0.384	0.050	ug/L	0.400		96	70-130
Endrin	0.338	0.050	ug/L	0.400		84	70-130



Environmental Testing Solutions 351 Depot St. Asheville, NC 28801-4310	Project: ETS, Inc. Work Order: 0071549 Reported: 08/19/20 08:34
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**Organochlorine Pesticides
Quality Control Summary**

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch B0H0107 - EPA 3510C - GC

LCS (B0H0107-BS1)

Endrin aldehyde	0.341	0.050	ug/L	0.400		85	70-130			
Heptachlor	0.306	0.050	ug/L	0.400		76	70-130			
Heptachlor epoxide	0.326	0.050	ug/L	0.400		82	70-130			
Methoxychlor	0.372	0.050	ug/L	0.400		93	70-130			
<i>Surrogate: 2,4,5,6-Tetrachloro-m-xylene</i>						70	60-130			
<i>Surrogate: Decachlorobiphenyl</i>						72	30-150			

Environmental Testing Solutions 351 Depot St. Asheville, NC 28801-4310	Project: ETS, Inc. Work Order: 0071549 Reported: 08/19/20 08:34
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PCBs
Quality Control Summary

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch B0H0107 - EPA 3510C - GC

Blank (B0H0107-BLK1)

PCB-1016	ND	0.500	ug/L							
PCB-1221	ND	0.500	ug/L							
PCB-1232	ND	0.500	ug/L							
PCB-1242	ND	0.500	ug/L							
PCB-1248	ND	0.500	ug/L							
PCB-1254	ND	0.500	ug/L							
PCB-1260	ND	0.500	ug/L							
<i>Surrogate: 2,4,5,6-Tetrachloro-m-xylene</i>						68	60-130			
<i>Surrogate: Decachlorobiphenyl</i>						63	30-150			

Sample Preparation Data

Parameter	Batch	Sample ID	Prepared	Analyst
EPA 200.7 M Digestion				
EPA 200.7 Mod	B0H0087	0071549-01	08/04/2020 09:05	MLR
EPA 200.8 Metal Digestion				
EPA 200.8	B0H0060	0071549-01	08/03/2020 15:17	MLR
EPA 200.8	B0H0269	0071549-01	08/06/2020 14:44	TLT
EPA 245.1 Mercury Digestion				
EPA 245.1	B0H0528	0071549-01	08/12/2020 09:48	TLT
EPA 3510 Extraction				
EPA 3510C - GC	B0H0107	0071549-02	08/04/2020 08:30	DBB

Environmental Testing Solutions
351 Depot St.
Asheville, NC 28801-4310

Project: ETS, Inc.
Work Order: 0071549
Reported: 08/19/20 08:34

Data Qualifiers and Definitions

ND Analyte NOT DETECTED at or above the reporting limit

NR Not reported

RPD Relative Percent Difference

J The reported J value is between the laboratory's MRL and MDL. Constituents detected in this range, have a higher degree of uncertainty and a lower level of precision. The J value was reported at the client's request or as a regulatory requirement.



Rogers & Callcott CHAIN OF CUSTODY RECORD

ENVIRONMENTAL

WORK ORDER 0071549

Mailing Address: PO Box 5655, Greenville, SC 29606, Phone (864) 232-1556
 Shipping Address: 426 Fairforest Way, Greenville, SC 29607, Fax (864) 232-6140
 2158 Stoneridge Drive, Columbia, SC 29210, Phone (803) 509-8999

Client Name _____
 Address _____
 Report To: _____
 Email Address _____
 Telephone # _____
 PO # _____ Project # _____

ETS, INC

Total Number of Containers	Parameter(s) ↓								Filtered (Yes/No) <u>()</u>	
									Cooled (Yes/No) <u>()</u>	
										Container Type <u>(Plastic/Glass)</u>
										Container Volume (mL) <u>1L, 50</u>
										Sample Type <u>(Grab/Composite)</u>
										Sample Source <u>(WW)</u> GW, DW, SW, S, Other)
										Preservation Code(s) A - None E - HCl I - Zn Acetate B - HNO ₃ F - Na ₂ S ₂ O ₃ J - H ₃ PO ₄ C - H ₂ SO ₄ G - Boric Acid K - MCAA D - NaOH H - Ascorbic Acid L - _____

R & C WORK ORDER	YR DATE	TIME	SAMPLE DESCRIPTION	Total Number of Containers
-01, -02	07/30/20	1330	Artemia Chlor 149 grab	4

0001
0002
Al, As, Cd, Cr, Cu, Fe, Pb
N: Ag, Zn
Hg

X X X X

COMMENTS
ETS, INC
J Plag X

SAMPLER - RELINQUISHED BY: 1. <u>ETS</u>	DATE/TIME: <u>07/31/20</u>	RECEIVED BY: <u>ETS</u>	DATE/TIME: <u>07-31-20</u>	Composite Start Date: _____ Composite Start Time: _____ Time or Flow (Circle one) Initials: _____
RELINQUISHED BY: 3. <u>ETS</u>	DATE/TIME: <u>07-31-20</u>	RECEIVED BY: <u>ETS</u>	DATE/TIME: <u>7-31-20 0955</u>	
RELINQUISHED BY: 5. _____	DATE/TIME: _____	RECEIVED BY: 6. _____	DATE/TIME: _____	Temperature of blank or representative sample At time of collection _____ °C At time of lab receipt <u>2.0</u> °C
RELINQUISHED BY: 7. _____	DATE/TIME: _____	RECEIVED BY: 8. _____	DATE/TIME: _____	



Sample Receipt Verification

Client: ETS Date Received: 7-31-20 Work Order: 0671549

Carrier Name: Client FedEx UPS US Mail Courier Field Services Other: _____
Tracking Number: _____

Receipt Criteria	Y e s	N o	N A	Comments
Shipping container / cooler intact?	X			Damaged Leaking Other:
Custody seals intact?	X		X	NEW 7-31-20
COC included with samples?	X			
COC signed when relinquished and received?	X			
Sample bottles intact?	X			Damaged Leaking Other:
Sample ID on COC agree with label on bottle(s)?	X			
Date / time on COC agree with label on bottle(s)?	X			
Number of bottles on COC agrees with number of bottles received?	X			
Samples received within holding time?	X			
Sample volume sufficient for analysis?	X			
VOA vials free of headspace (<6mm bubble)?			X	
Samples cooled? Temp at receipt recorded on COC Temp measured with IR thermometer - SN: 97050067	X			<u>Ice</u> Cold Packs Dry Ice None
Samples requiring pH preservation at proper pH? Note: Samples for metals analysis may be preserved upon receipt in the lab. ..	X			
Samples dechlorinated for parameters requiring chlorine removal at the time of sample collection?			X	

If in-house preservation used - record Lot #			
HCL		H ₃ PO ₄	
H ₂ SO ₄		NaOH	
HNO ₃		Other	

Comments:

Were non-conformance issues noted at sample receipt? Yes or No
Non-Conformance issue other than noted above:

Analyte (µg/L)	Artemia Lot: CHM 444		Artemia Lot: CHM 511		Artemia Lot: CHM 593		Artemia Lot: CHM 652		Artemia Lot: CHM 652		Artemia Lot: CHM 720		Artemia Lot: CHM 780		Artemia Lot: CHM 836		Artemia Lot: CHM 882	
	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate
Ag	0.046	0.000276	0.077	0.0000462	0.077	0.0000462	0.077	0.0000462	0.077	0.0000462	0.017	0.0000102	0	0	0	0	0	0
Al	12	0.0072	10	0.006	13	0.0078	0.00001	0.000000006	0.00001	0.000000006	16	0.0096	10	0.006	0	0	10	0.006
As	130	0.078	71	0.0426	66	0.0396	65	0.039	65	0.039	52	0.0312	111	0.0666	53	0.0318	92	0.0552
Cd	0.042	0.0000252	0.37	0.000222	0.16	0.000096	0.16	0.000096	0.16	0.000096	0.025	0.000015	0.03	0.000018	0.06	0.000036	0.02	0.000012
Cr	1	0.0006	0.13	0.000078	1.1	0.00066	1.2	0.00072	1.2	0.00072	0.12	0.000072	4.0	0.0024	1.0	0.0006	3.0	0.0018
Co	1.6	0.00096	0.75	0.00045	2.7	0.00162	0.064	0.0000384	0.064	0.0000384	0.77	0.000462	1.0	0.0006	2.0	0.0012	3.0	0.0018
Cu	44	0.0264	30	0.018	28	0.0168	23	0.0138	23	0.0138	18	0.0108	31	0.0186	17	0.0102	30	0.018
Fe	870	0.522	310	0.186	540	0.324	370	0.222	370	0.222	290	0.174	280	0.168	420	0.252	640	0.384
Hg	0.019	0.0000114	0.0033	0.00000198	0.035	0.000021	0.013	0.0000078	0.013	0.0000078	0.027	0.0000162	0.32	0.000192	0.37	0.000222	0	0
Pb	0.43	0.000258	0.33	0.000198	0.34	0.000204	0.14	0.000084	0.14	0.000084	0.23	0.000138	0.3	0.00018	0.1	0.00006	0.2	0.00012
Ni	1.3	0.00078	0.58	0.000348	0.43	0.000258	0.16	0.000096	0.16	0.000096	0.64	0.000384	0	0	0	0	0.7	0.00042
Zn	580	0.348	480	0.288	420	0.252	330	0.198	330	0.198	240	0.144	474	0.2844	260	0.156	386	0.2316

Total metal **1640.44** **0.98** **903.24** **0.54** **1071.84** **0.64** **789.81** **0.47** **789.81** **0.47** **617.83** **0.37** **911.65** **0.55** **753.53** **0.45** **1164.92** **0.70**

Analyte (µg/L)	Artemia Lot: CHM 914, 11-29-16		Artemia Lot: CHM 984, 12-19-17		Artemia Lot: CHM 1048, 08-27-19		Artemia Lot: CHM 1149, 07-30-20		Artemia Lot: CHM 1222, 12-27-22		Measured concentration in artemia nauplii mixture from previous batches			
	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Measured concentration in artemia nauplii mixture	Estimated concentration at feeding rate	Mean	SD	Mean - SD	Mean + SD
Ag	0	0	0.07	0.000042	0	0	0	0	0	0	0.03	0.04	-0.01	0.06
Al	11	0.0066	10	0.006	0	0	0	0	38	0.0228	10.00	10.14	-0.14	20.14
As	58	0.0348	69	0.0414	81	0.0486	90	0.054	91	0.0546	79.15	23.16	55.99	102.32
Cd	0.02	0.000012	0	0	0	0	0.1	0.00006	0.264	0.0001584	0.10	0.11	-0.02	0.21
Cr	0.2	0.00012	2.0	0.0012	2.0	0.0012	1.0	0.0006	0.5	0.0003114	1.33	1.16	0.17	2.48
Co	0.7	0.00042	2.0	0.0012	1.0	0.0006	3.0	0.0018	4.0	0.0024	1.74	1.16	0.57	2.90
Cu	17	0.0102	24	0.0144	22	0.0132	30	0.018	36	0.0216	26.92	7.88	19.04	34.80
Fe	330	0.198	790	0.474	250	0.15	700	0.42	1300	0.78	545.38	308.05	237.34	853.43
Hg	0.21	0.000126	0.15	0.00009	0.44	0.000264	0.31	0.000186	0	0	0.15	0.16	-0.02	0.31
Pb	0.2	0.00012	0.5	0.0003	0	0	0	0	0	0	0.21	0.16	0.05	0.38
Ni	0.4	0.00024	0	0	0	0	0	0	0.558	0.0003348	0.37	0.39	-0.03	0.76
Zn	257	0.1542	309	0.1854	381	0.2286	452	0.2712	437	0.2622	385.08	102.16	282.92	487.24

Total metal **674.73** **0.40** **1206.72** **0.72** **737.44** **0.44** **1276.41** **0.77** **1907.34** **1.14**



Environmental

6602 Windmill Way, Wilmington, NC 28403
 710 Bowsertown Road, Manteo, NC 28550
 255-A Wilmington Highway, Jacksonville, NC 28586

Logbook Tracking # **AT-464**

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchem.com

Environmental Testing Solutions, Inc.
 Post Office Box 7565
 Asheville NC 28802
 Attention: Kelley Keenan (ETS)

Date of Report: Oct 21, 2021
Customer PO #:
Customer ID: 08100055
Report #: 2021-17126
Project ID: YWT

Lab ID	Sample ID:	Collect Date/Time	Matrix	Sampled by
21-43040	Site: Wastewater	9/27/2021 1:30 PM	Water	Client

Test	Method	Results	Date Analyzed
Iron	EPA 200.7, Rev. 4.4, 1994	0.245 mg/L	10/09/2021
Zinc	EPA 200.7, Rev. 4.4, 1994	0.335 mg/L	10/09/2021
Aluminum	EPA 200.7, Rev. 4.4, 1994	0.032 mg/L	10/09/2021
Arsenic	EPA 200.8, Rev. 5.4, 1994	0.004 mg/L	10/05/2021
Cadmium J Flag = 0.000194 mg/L.	EPA 200.8, Rev. 5.4, 1994	<0.001 mg/L	10/05/2021
Chromium J Flag = 0.000366 mg/L.	EPA 200.8, Rev. 5.4, 1994	<0.001 mg/L	10/05/2021
Cobalt	EPA 200.8, Rev. 5.4, 1994	0.002 mg/L	10/15/2021
Copper	EPA 200.8, Rev. 5.4, 1994	0.027 mg/L	10/05/2021
Lead J Flag = 0.000115 mg/L.	EPA 200.8, Rev. 5.4, 1994	<0.001 mg/L	10/05/2021
Nickel	EPA 200.8, Rev. 5.4, 1994	0.001 mg/L	10/05/2021
Silver J Flag = -0.000025 mg/L.	EPA 200.8, Rev. 5.4, 1994	<0.001 mg/L	10/05/2021
Mercury	EPA 245.1, Rev. 3.0, 1994	0.0003 mg/L	10/19/2021

Comment:

Reviewed by: Jammy Duran

Environmental Chemists, Inc.

6602 Windmill Way, Wilmington, NC 28405 * 910.392.0223 Lab * 910.392.4424 Fax
 710 Bowsertown Road, Manteo, NC 27954 * 252.473.5702 Lab/Fax
 255-A Wilmington Highway, Jacksonville, NC 28540 * 910.347.5843 Lab/fax

SM

ANALYTICAL & CONSULTING CHEMISTS

info@environmentalchemists.com

QC ETS- 2021-17126

LCS

<i>Parameter</i>	<i>True Value mg/L</i>	<i>Result mg/L</i>	<i>% True Value</i>	<i>Limits %</i>
Aluminum	1.00	0.96	96	90-110
Arsenic	0.0020	0.0022	110	90-110
Cadmium	0.0020	0.0020	105	90-110
Chromium	0.0020	0.0021	105	90-110
Copper	0.0020	0.0020	100	90-110
Cobalt	0.002	0.002	100	90-110
Lead	0.0020	0.0019	95	90-110
Iron	2.00	1.94	97	90-110
Mercury	0.0050	0.0050	100	90-110
Nickel	0.0020	0.0021	105	90-110
Silver	0.0020	0.0020	100	90-110
Zinc	1.00	0.98	98	90-110

MS/MSD

<i>Parameter</i>	<i>True mg/L</i>	<i>Recovery mg/L</i>	<i>% Recovery</i>	<i>% Difference</i>	<i>Limits % Recovery</i>	<i>Limits % Difference</i>
Aluminum	0.100	0.095/0.099	95/99	4	80-120	≤ 20
Arsenic	0.0050	0.0052/0.0050	104/100	4	80-120	≤ 20
Cadmium	0.0050	0.0051/0.0049	102/98	4	80-120	≤ 20
Chromium	0.0050	0.0050/0.0048	100/96	4	80-120	≤ 20
Copper	0.0050	0.0050/0.0047	100/94	6	80-120	≤ 20
Cobalt	0.005	0.0058/0.0052	116/104	11	80-120	≤ 20
Lead	0.0050	0.0047/0.0045	94/90	4	80-120	≤ 20
Iron	1.00	0.96/0.97	96/97	1	80-120	≤ 20
Mercury	0.0010	0.0010/0.0010	100/100	0	80-120	≤ 20
Nickel	0.0050	0.0050/0.0048	100/96	4	80-120	≤ 20
Silver	0.0050	0.0046/0.0045	92/90	2	80-120	≤ 20
Zinc	0.100	0.099/0.099	99/99	0	80-120	≤ 20



Rogers & Callcott
ENVIRONMENTAL



Laboratory Report

Client
Environmental Testing Solutions
Kelley E. Keenan
351 Depot St.
Asheville, NC 28801-4310

Project: ETS Inc
Work Order: 1091445
Received: 09/29/2021 09:30

Dear Client:

Rogers and Callcott appreciates the opportunity to be of service to you. The attached laboratory services report includes analytical results and chain of custody for samples that were received on September 29, 2021. Rogers and Callcott maintains a formal QA/QC program. Unless otherwise noted, all analyses performed under NELAP certification have complied with all the requirements for the TN1 standard. The analyses met the QA/QC confidence interval for each test method unless otherwise qualified. Estimated uncertainty is available upon request.

Privileged / Confidential information may be contained in this report and is intended only for the use of the addressee. If you are not the addressee, or the person responsible for delivering to the person addressed, you may not copy or deliver this message to anyone else. If you receive this message by mistake, please notify Rogers and Callcott immediately.

We strive to provide excellent service to our clients. Please contact Lauren Hollister, your Project Manager, at lhollister@rcenviro.com, (864)-232-1556 if you have any questions about this report.

Report Approved By:

Lauren Hollister
Project Manager

This report may not be reproduced, except in full, without written permission from Rogers & Callcott, Inc.

PO Box 5655 Greenville, SC 29606 426 Fairforest Way Greenville, SC 29607 **main** 864.232.1556 **fax** 864.232.6140

rogersandcallcott.com
an employee-owned company



*South Carolina Greenville Laboratory Identification 23105
 South Carolina Columbia Laboratory Identification 40572
 North Carolina Laboratory Certification Number 27
 North Carolina Drinking Water Lab Number 45710
 NELAP Utah Certificate Number SC000042014-1
 Georgia Drinking Water Lab ID 880*

Certificate of Analysis

Client Environmental Testing Solutions
 Kelley E. Keenan
 351 Depot St.
 Asheville, NC 28801-4310

Project: ETS Inc
Work Order: 1091445
Received: 09/29/2021 09:30

Sample Number	Sample Description	Matrix	Sampled	Type
1091445-01	YWT 092721 -Grab	Ground Water	09/27/21 12:30	Grab

Environmental Testing Solutions
 351 Depot St.
 Asheville, NC 28801-4310

 Project: ETS Inc
 Work Order: 1091445
 Reported: 10/14/21 16:52

Sample Data

 Sample Number 1091445-01
 Sample Description YWT 092721 -Grab collected on 09/27/21 12:30

Parameter	Result	Reporting Limit	Units	DF	Analyzed	Method	Flag	Analyst	Batch
Organochlorine Pesticides							X		
Aldrin	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
alpha-BHC	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
beta-BHC	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
delta-BHC	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Gamma-BHC (Lindane)	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Chlordane	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8081B		RKH	B1J0048
4,4'-DDD	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
4,4'-DDE	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
4,4'-DDT	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Dieldrin	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Endosulfan II	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Endosulfan sulfate	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Endrin	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Endrin aldehyde	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Heptachlor	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Heptachlor epoxide	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Toxaphene	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8081B		RKH	B1J0048
Methoxychlor	ND	0.500	ug/L	10.0	10/08/21 22:51	EPA 8081B		RKH	B1J0048
Endosulfan I	ND	0.500	ug/L	10.0	10/07/21 17:10	EPA 8081B		RKH	B1J0048
Surrogates				%REC	%REC Limits		Flag		
<i>2,4,5,6-Tetrachloro-m-xylene</i>				61	60-130				
<i>Decachlorobiphenyl</i>				38	30-150				
PCBs							X		
PCB-1016	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
PCB-1221	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
PCB-1232	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
PCB-1242	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
PCB-1248	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
PCB-1254	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
PCB-1260	ND	5.00	ug/L	10.0	10/07/21 17:10	EPA 8082A		RKH	B1J0048
Surrogates				%REC	%REC Limits		Flag		
<i>2,4,5,6-Tetrachloro-m-xylene</i>				61	60-130				
<i>Decachlorobiphenyl</i>				38	30-150				



Environmental Testing Solutions
351 Depot St.
Asheville, NC 28801-4310

Project: ETS Inc
Work Order: 1091445
Reported: 10/14/21 16:52

**Organochlorine Pesticides
Quality Control Summary**

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch BIJ0048 - EPA 3510C - GC

Blank (BIJ0048-BLK1)

Aldrin	ND	0.050	ug/L							
alpha-BHC	ND	0.050	ug/L							
beta-BHC	ND	0.050	ug/L							
delta-BHC	ND	0.050	ug/L							
Gamma-BHC (Lindane)	ND	0.050	ug/L							
Chlordane	ND	0.500	ug/L							
4,4'-DDD	ND	0.050	ug/L							
4,4'-DDE	ND	0.050	ug/L							
4,4'-DDT	ND	0.050	ug/L							
Dieldrin	ND	0.050	ug/L							
Endosulfan II	ND	0.050	ug/L							
Endosulfan sulfate	ND	0.050	ug/L							
Endrin	ND	0.050	ug/L							
Endrin aldehyde	ND	0.050	ug/L							
Heptachlor	ND	0.050	ug/L							
Heptachlor epoxide	ND	0.050	ug/L							
Toxaphene	ND	0.500	ug/L							
Methoxychlor	ND	0.050	ug/L							
Endosulfan I	ND	0.050	ug/L							

Surrogate: 2,4,5,6-Tetrachloro-m-xylene

92 60-130

Surrogate: Decachlorobiphenyl

78 30-150

LCS (BIJ0048-BS1)

Aldrin	0.314	0.050	ug/L	0.400	78	70-130
alpha-BHC	0.316	0.050	ug/L	0.400	79	70-130
beta-BHC	0.328	0.050	ug/L	0.400	82	70-130
delta-BHC	0.340	0.050	ug/L	0.400	85	70-130
Gamma-BHC (Lindane)	0.320	0.050	ug/L	0.400	80	70-130
4,4'-DDD	0.328	0.050	ug/L	0.400	82	70-130
4,4'-DDE	0.326	0.050	ug/L	0.400	82	70-130
4,4'-DDT	0.330	0.050	ug/L	0.400	82	70-130
Dieldrin	0.324	0.050	ug/L	0.400	81	70-130
Endosulfan II	0.284	0.050	ug/L	0.400	71	70-130
Endosulfan sulfate	0.334	0.050	ug/L	0.400	83	70-130
Endrin	0.371	0.050	ug/L	0.400	93	70-130
Endrin aldehyde	0.316	0.050	ug/L	0.400	79	70-130



Environmental Testing Solutions
351 Depot St.
Asheville, NC 28801-4310

Project: ETS Inc
Work Order: 1091445
Reported: 10/14/21 16:52

**Organochlorine Pesticides
Quality Control Summary**

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch BIJ0048 - EPA 3510C - GC

LCS (BIJ0048-BS1)

Heptachlor	0.326	0.050	ug/L	0.400		82	70-130			
Heptachlor epoxide	0.328	0.050	ug/L	0.400		82	70-130			
Methoxychlor	0.346	0.050	ug/L	0.400		86	70-130			
Endosulfan I	0.288	0.050	ug/L	0.400		72	70-130			
<i>Surrogate: 2,4,5,6-Tetrachloro-m-xylene</i>						78	60-130			
<i>Surrogate: Decachlorobiphenyl</i>						68	30-150			

LCS Dup (BIJ0048-BSD1)

Aldrin	0.354	0.050	ug/L	0.400		88	70-130	12	20	
alpha-BHC	0.353	0.050	ug/L	0.400		88	70-130	11	20	
beta-BHC	0.356	0.050	ug/L	0.400		89	70-130	8	20	
delta-BHC	0.376	0.050	ug/L	0.400		94	70-130	10	20	
Gamma-BHC (Lindane)	0.356	0.050	ug/L	0.400		89	70-130	11	20	
4,4'-DDD	0.365	0.050	ug/L	0.400		91	70-130	11	20	
4,4'-DDE	0.364	0.050	ug/L	0.400		91	70-130	11	20	
4,4'-DDT	0.370	0.050	ug/L	0.400		92	70-130	12	20	
Dieldrin	0.362	0.050	ug/L	0.400		90	70-130	11	20	
Endosulfan II	0.316	0.050	ug/L	0.400		79	70-130	10	20	
Endosulfan sulfate	0.368	0.050	ug/L	0.400		92	70-130	10	20	
Endrin	0.414	0.050	ug/L	0.400		103	70-130	11	20	
Endrin aldehyde	0.352	0.050	ug/L	0.400		88	70-130	11	20	
Heptachlor	0.363	0.050	ug/L	0.400		91	70-130	11	20	
Heptachlor epoxide	0.362	0.050	ug/L	0.400		90	70-130	10	20	
Methoxychlor	0.368	0.050	ug/L	0.400		92	70-130	6	20	
Endosulfan I	0.305	0.050	ug/L	0.400		76	70-130	6	20	
<i>Surrogate: 2,4,5,6-Tetrachloro-m-xylene</i>						86	60-130			
<i>Surrogate: Decachlorobiphenyl</i>						76	30-150			



Environmental Testing Solutions 351 Depot St. Asheville, NC 28801-4310	Project: ETS Inc Work Order: 1091445 Reported: 10/14/21 16:52
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PCBs
Quality Control Summary

Parameter	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Flags
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Batch B1J0048 - EPA 3510C - GC

Blank (B1J0048-BLK1)

PCB-1016	ND	0.500	ug/L							
PCB-1221	ND	0.500	ug/L							
PCB-1232	ND	0.500	ug/L							
PCB-1242	ND	0.500	ug/L							
PCB-1248	ND	0.500	ug/L							
PCB-1254	ND	0.500	ug/L							
PCB-1260	ND	0.500	ug/L							
<i>Surrogate: 2,4,5,6-Tetrachloro-m-xylene</i>						92	60-130			
<i>Surrogate: Decachlorobiphenyl</i>						78	30-150			

Sample Preparation Data

Parameter	Batch	Sample ID	Prepared	Analyst
EPA 3510 Extraction EPA 3510C - GC	B1J0048	1091445-01	10/04/2021 09:00	DBB

Environmental Testing Solutions
351 Depot St.
Asheville, NC 28801-4310

Project: ETS Inc
Work Order: 1091445
Reported: 10/14/21 16:52

Data Qualifiers and Definitions

ND Analyte NOT DETECTED at or above the reporting limit
NR Not reported
RPD Relative Percent Difference
X Result subject to sample matrix interference. Reporting limit has been adjusted where applicable.



Rogers & Callcott ENVIRONMENTAL

CHAIN OF CUSTODY RECORD

WORK ORDER 1091445

Mailing Address: PO Box 5655, Greenville, SC 29606, Phone (864) 232-1556
 Shipping Address: 426 Fairforest Way, Greenville, SC 29607, Fax (864) 232-6140
 215B Stoneridge Drive, Columbia, SC 29210, Phone (803) 509-8999

Client Name _____

Address _____

ETS, INC

Report To: _____

Email Address _____

Telephone # _____

PO # _____ Project # _____

Total Number of Containers	Parameter(s) ↓						Filtered (Yes/No) <u>(No)</u>
							Cooled (Yes/No) <u>(No)</u>
							Container Type (Plastic/Glass) <u>(Glass)</u>
							Container Volume (mL) <u>1L</u>
							Sample Type (Grab/Composite) <u>(Grab)</u>
							Sample Source (WW, GW, DW, SW, S, Other) <u>(WW)</u>
							Preservation Code(s) A - None E - HCl I - Zn Acetate B - HNO ₃ F - Na ₂ S ₂ O ₃ J - H ₃ PO ₄ C - H ₂ SO ₄ G - Boric Acid K - MCAA D - NaOH H - Ascorbic Acid L - _____
							COMMENTS
							<u>ETS, INC</u>
							<u>JFlag</u>

R & C WORK ORDER	YR DATE	TIME	SAMPLE DESCRIPTION	Total Number of Containers	Parameter(s) ↓
<u>-01</u>	<u>092721</u>	<u>1230</u>	<u>4WT 092721 -9raw</u>	<u>4</u>	<u>B001</u> <u>B002</u>

SAMPLER - RELINQUISHED BY: 1. <u>KETS</u>	DATE/TIME: <u>092921</u>	RECEIVED BY: 2. <u>ETS Winner</u>	DATE/TIME: <u>092921</u>	Composite Start Date: _____
RELINQUISHED BY: 3. <u>ETS Winner</u>	DATE/TIME: <u>092921</u>	RECEIVED BY: 4. <u>Wendy BA</u>	DATE/TIME: <u>9/29/21 0930</u>	Composite Start Time: _____
RELINQUISHED BY: 5. _____	DATE/TIME: _____	RECEIVED BY: 6. _____	DATE/TIME: _____	Time or Flow (Circle one) Initials: _____
RELINQUISHED BY: 7. _____	DATE/TIME: _____	RECEIVED BY: 8. _____	DATE/TIME: _____	Temperature of blank or representative sample At time of collection _____ °C At time of lab receipt <u>16</u> °C

Sample Receipt Verification

Client: ETS - ETS Inc Date Received: 09/29/2021 Work Order: 1091445

Carrier Name: Client FedEx UPS US Mail Courier Field Services Other: _____
 Tracking Number: _____

Receipt Criteria	Y	N	N	Comments
	e	o	A	
	s			
Shipping container / cooler intact?	X			Damaged Leaking Other:
Custody seals intact?	X			
COC included with samples?	X			
COC signed when relinquished and received?	X			
Sample bottles intact?	X			Damaged Leaking Other:
Sample ID on COC agree with label on bottle(s)?	X			
Date / time on COC agree with label on bottle(s)?	X			
Number of bottles on COC agrees with number of bottles received?	X			
Samples received within holding time?	X			
Sample volume sufficient for analysis?	X			
VOA vials free of headspace (<6mm bubble)?			X	
Samples cooled? <small>Temp at receipt recorded on COC Temp measured with IR thermometer - SN: 97050067</small>	X			<u>Ice</u> Cold Packs Dry Ice None
Samples requiring pH preservation at proper pH? <small>Note: Samples for metals analysis may be preserved upon receipt in the lab. Note: Samples for O&G and VOA analysis - preservation checked at bench.</small>			X	
Samples dechlorinated for parameters requiring chlorine removal at the time of sample collection? <small>Note: Chlorine checked at bench for samples requiring Bacterial, VOA, and HAA analysis.</small>			X	

If in-house preservation used - record Lot #			
HCL		H ₃ PO ₄	
H ₂ SO ₄		NaOH	
HNO ₃		Other	

Comments: _____

Were non-conformance issues noted at sample receipt? Yes or No
 Non-Conformance issue other than noted above: _____

Analyte (µg/L)	YWT Lot: 10-25-07		YWT Lot: 05-20-09		YWT Lot: 03-31-11		YWT Lot: 03-20-12		YWT Lot: 04-04-13		YWT Lot: 02-29-14		YWT Lot: 06-02-16		YWT Lot: 10-23-17		YWT Lot: 11-26-18		Measured concentration in artemia nauplii mixture from previous batches			
	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Mean	SD	Mean - SD	Mean + SD
Ag	0.11	0.0007	0.19	0.0013	0.088	0.0006	0.077	0.0005	0.045	0.0003	5.00	0.0333	0.00	0.0000	0.00	0.0000	10.00	0.0667	1.72	3.51	-1.78	5.23
Al	160	1.0667	42	0.2800	22	0.1467	48	0.3200	51	0.3400	36	0.2400	35	0.2333	37	0.2467	44.00	0.2933	52.78	41.09	11.68	93.87
As	2.9	0.0193	2.6	0.0173	3.2	0.0213	4.2	0.0280	2.9	0.0193	3.00	0.0200	4.00	0.0267	4.00	0.0267	10.00	0.0667	4.09	2.29	1.80	6.38
Cd	0.36	0.0024	0.28	0.0019	0.16	0.0011	0.16	0.0011	0.18	0.0012	0.20	0.0013	0.20	0.0013	0.30	0.0020	10.00	0.0667	1.32	3.26	-1.94	4.57
Cr	1.3	0.0087	2.3	0.0153	2.4	0.0160	1.3	0.0087	0.12	0.0008	3.00	0.0200	3.00	0.0200	2.00	0.0133	10.00	0.0667	2.82	2.84	-0.02	5.67
Co	4.8	0.0320	4.9	0.0327	0.75	0.0050	0.69	0.0046	0.77	0.0051	5.00	0.0333	2.00	0.0133	0.80	0.0053	10.00	0.0667	3.30	3.17	0.13	6.47
Cu	42	0.2800	27	0.1800	39	0.2600	2.9	0.0193	33	0.2200	33	0.2200	33	0.2200	33	0.2200	18.00	0.1200	28.99	11.93	17.06	40.92
Fe	510	3.4000	390	2.6000	260	1.7333	270	1.8000	300	2.0000	270	1.8000	320	2.1333	270	1.8000	206.00	1.3733	310.67	89.94	220.73	400.61
Hg	0.035	0.0002	0.0085	0.0001	0.044	0.0003	0.016	0.0001	0.014	0.0001	0.20	0.0013	0.08	0.0005	0.12	0.0008	10.00	0.0667	1.17	3.31	-2.14	4.48
Pb	1.1	0.0073	0.28	0.0019	0.28	0.0019	0.31	0.0021	0.81	0.0054	0.30	0.0020	0.90	0.0060	0.20	0.0013	10.00	0.0667	1.58	3.18	-1.60	4.75
Ni	4.1	0.0273	4.7	0.0313	2.4	0.0160	2.7	0.0180	3.6	0.0240	3.00	0.0200	2.00	0.0133	2.00	0.0133	10.00	0.0667	3.83	2.49	1.34	6.32
Zn	520	3.4667	300	2.0000	220	1.4667	210	1.4000	230	1.5333	291	1.9400	330	2.2000	390	2.6000	318.00	2.1200	312.11	97.39	214.72	409.51

Total metal 1246.71 8.31 774.26 5.16 550.32 3.67 540.35 3.60 622.44 4.15 649.70 4.33 730.18 4.87 739.42 4.93 666.00 4.44

Analyte (µg/L)	YWT Lot: 02-26-20		YWT Lot: 09-27-21		YWT Lot: 12-05-22		Measured concentration in artemia nauplii mixture from previous batches			
	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Measured concentration in YWT mixture	Estimated concentration at feeding rate	Mean	SD	Mean - SD	Mean + SD
Ag	0	0.0000	0	0.0000	0	0.0000	0.00	0.00	0.00	0.00
Al	26	0.1733	32	0.2133	69	0.4600	42.33	23.29	19.05	65.62
As	5	0.0333	4	0.0267	4	0.0267	4.33	0.58	3.76	4.91
Cd	0.1	0.0007	0	0.0000	0	0.0000	0.03	0.06	-0.02	0.09
Cr	5	0.0333	0	0.0000	0	0.0000	1.67	2.89	-1.22	4.55
Co	1	0.0067	2	0.0133	2	0.0133	1.67	0.58	1.09	2.24
Cu	25	0.1667	27	0.1800	18	0.1200	23.33	4.73	18.61	28.06
Fe	240	1.6000	245	1.6333	2800	18.6667	1095.00	1476.58	-381.58	2571.58
Hg	0	0.0000	0.3	0.0020	0	0.0000	0.10	0.17	-0.07	0.27
Pb	0	0.0000	0	0.0000	0	0.0000	0.00	0.00	0.00	0.00
Ni	0	0.0000	1	0.0067	2	0.0133	1.00	1.00	0.00	2.00
Zn	350	2.3333	335	2.2333	305	2.0333	330.00	22.91	307.09	352.91

Total metal 652.10 4.35 646.30 4.31 3200.00 21.33



Pimephales promelas Culture Feeding Log, Month: May 2023

Day	AM Time	Food Type (check)		Analyst	Mid-day Time	Food Type (check)		Analyst	PM Time	Food Type (check)		Analyst
		Artemia nauplii	Frozen or Freeze Dried Brine Shrimp			Artemia nauplii	Frozen or Freeze Dried Brine Shrimp			Artemia nauplii	Frozen or Freeze Dried Brine Shrimp	
1	0828	0820 AP		AP	1141			AP	1411	1435 AP		AP
2	0835	0805 M		AP	1232			AP	1609	1620 AP		AP
3	0823	0818 AP		AP	1156			AP	1540	1533 AP		AP
4	0500			AP	1054			AP	1426	1416 AP		AP
5	0809	0500 M		AP	1210	0955 M		AP	1447			AP
6	0805	0600 M		AV	1010	1120 M		AV	1155			AV
7	0810	0600 Y		AV	1005	0900 M		AV	1130			AV
8	0805	0600 M		AP	1315			AP	1510	1505 AP		AP
9	0815	0800 AP		AP	1133			AP	1551	1546 AP		AP
10	0823			AP	1203			AP	1553	1553 AP		AP
11	0825			AP	1112			AP	1423			AP
12	0815			AP	1202			AP	1456			AP
13	0810			AV	1000			AV	1140			AV
14	0810			AV	1020			AV	1130			AV
15	0822			AP	1137			AP	1511			AP
16	0808			AP	1009			AP	1527			AP
17	0808			AP	1222			AP	1527			AP
18	0830			AP	1150			AP	1455			AP
19	0830			AP	1118			AP	1420			AP
20	0810			AV	1000			AV	1146			AV
21	0800			AV	1000			AV	1135			AV
22	0830			DH AP	1402			DH AP	1507			DH
23	0816			DH AP	1107			DH	1553			AP
24												
25												
26												
27												
28												
29												
30												
31												

Artemia nauplii: Brine Shrimp Eggs (Brine Shrimp Direct), Frozen Brine Shrimp: Flat Packs (Brine Shrimp Direct), Freeze Dried Brine Shrimp: Cubes (Brine Shrimp Direct), Flake Food: Aquatox Fish Diet (Zeigler)

Pimephales promelas Daily Culture Maintenance, Week of April 23, 2023
(Initial Each Task Completed)

Note: Wash hands/arms prior to placing hands into tanks.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
System Maintenance							
Temperature (°C), Acceptable range = 25.0 ± 2.0°C	24.0	24.0	24.2	24.0	24.2	24.2	23.9
Check and repair: leaks, water flow / aeration in all tanks, amber alarms?, all pumps flowing	AG	SP	SP	SP	SP	SP	AG
Backwash sand filter, add DI water to system, add chemicals		SP					
Larvae Maintenance							
If larvae are hatching: move unhatched larvae on tiles to next spawn date, record end hatch time for this spawn date in egg collection log	04-25-23 AG	SP	AG	SP	SP	SP	AG
Remove tiles completely hatched and soak in bleach solution. Ensure all tiles are upright, remove fugus from tiles and tiles containing unfertilized eggs in all trays.		SP	AG	SP	SP		AG
If there are no empty larval tanks, remove and discard oldest larvae batch		SP	04-25-23 AG	04-26-23 SP	SP	SP	04-29
Transfer hatched larvae to a new tank and place into culture system		SP	AG	SP	SP	SP	AG
Remove any dead larvae or food in all larval tanks		SP	AG	SP	SP	SP	AG
Feed larvae artemia (if 3 or more larval tanks, have 2 artemia separatory funnels.), remake artemia if necessary, record time in feeding log		SP	AG	SP	SP	SP	AG
Egg Collection and Maintenance							
Check all tanks for eggs, remove tiles with eggs, clean back of each tile, rinse with tap water and place in new tray with HSW, label with today's date	AG	SP	SP	SP			
Record the spawn date/time and tank ID's where eggs were collected, replace missing tiles in tanks	AG	SP	SP	SP			
Make 1 tray for next day	AG						
Adult Minnow Maintenance							
Feed adults (AM feeding): flake food, if collecting tiles: feed frozen food to breeder tanks, record time in feeding log	AG	SP	SP	SP	SP	SP	AG
Remove and replace (using black stock tanks) any dead or unhealthy minnows. Verify 5 females and 1 male in each breeder tank, 25 females and 5 males in large stock tanks.	04-25-23 AG	SP	SP	SP	SP	SP	04-29
Mid-Day							
Feed adults (MID-DAY feeding): flake food, record feeding time in feeding log	AG	SP	SP	SP	SP	SP	AG
Check if larvae are starting to hatch in tray with oldest spawn date, record start hatch time for this spawn date in egg collection log	AG	SP	SP	SP	SP	SP	AG
End-of-Day							
Remove any dead larvae or food in all larval tanks	04-25-23 AG	SP	SP	SP	SP	SP	AG
Feed larvae artemia and remake artemia, record feeding time in feeding log		SP	SP	SP	SP	SP	AG
Feed adults (PM feeding): flake food, record feeding time in feeding log	AG	SP	SP	SP	SP	SP	AG
Check and repair: leaks, water flow / aeration in all tanks, amber alarms?, all pumps flowing	AG	SP	SP	SP	SP	SP	AG
DI system valve and garden hose valves off	AG	SP	SP	SP	SP	SP	AG
Temperature (°C), Acceptable range = 25.0 ± 2.0°C	24.1	24.1	24.1	24.1	24.2	24.1	24.0
Front and metal doors locked	AG	SP	SP	SP	SP	SP	AG
Comments							

Pimephales promelas Culture Maintenance

	April 2023	May 2023	June 2023
Breeder Tanks (replace tank, air stone/weight, clean air line/white shelving and PVC drain pipes)			
Breeder tanks: A 1-6, verify 1 male to 5 females per tank	04-14-23 AP	05-15-23 AP	
Breeder tanks: B 1-6, verify 1 male to 5 females per tank	↓	05-16-23	
Breeder tanks: C 1-6, verify 1 male to 5 females per tank	04-14-23 AP	05-16-23 AP	
Breeder tanks: D 1-6, verify 1 male to 5 females per tank	04-10-23 AP	05-15-23 AP	
Breeder tanks: E 1-6, verify 1 male to 5 females per tank	07-31-23 AP	05-15-23 AP	
Breeder tanks: F 1-6, verify 1 male to 5 females per tank	04-05-23 AP	↓	
Breeder tanks: G 1-3, H 1-3, verify 1 male to 5 females per tank	03-31-23 AP	05-15-23 AP	
Larval tanks: G 4-6 and H 4-6	04-21-23 AP	05-15-23 AP	
Stock tanks: 1-2, verify 4-5 males to 14-20 females per tank	04-14-23 AP	05-15-23 AP	
Stock tanks: 3-4, verify 4-5 males to 14-20 females per tank	↓	04-15-23	
Stock tanks: 5-6, verify 4-5 males to 14-20 females per tank	↓	↓	
Stock tanks: 7-8, verify 4-5 males to 14-20 females per tank	04-10-23 AP	↓	
Black Stock Tanks (clean sides, replace standpipes/air bars and weights, clean airline tubing)			
Black stock tank: 1	04-06-23 AP	05-03-23 AP	
Black stock tank: 2	↓	↓	
Black stock tank: 3	↓	↓	
Black stock tank: 4	↓	↓	
Black stock tank: 5	↓	↓	
Black stock tank: 6	↓	↓	
Sumps			
Clean filters in sumps (remove and spray with hose to remove solids)	04-17-23 AP	05-15-23 AP	
Replace filters in sumps	↓	↓	
Clean sides of sumps and sump covers	↓	↓	
Vacuum solids out of sumps	↓	↓	
Clean screens to pump intakes	↓	↓	
Clean floats	↓	↓	
Treatment System			
Clean UV lights and verify lights are on	04-20-23 AP	05-16-23 AP	
Bio-Tank (clean sides/airline tubing, replace air stones/weights)	X		
Carbon Tank (clean sides/airline tubing, replace air stones/weights)			
Carbon tube: replace carbon, clean PVC pipe (inside and outside), clean tubing and resecure coupling to PVC pipe			05-22-23
Clean water delivery gutters in bio-tank			05-14-23 AP
Flush drainpipes			
Pumps			
Rotate pump order	04-17-23 AP	05-15-23 AP	
Oil pumps (4-5 drops vacuum pump oil to each side)	↓	↓	
General Housekeeping			
Stock bathroom (toilet paper, paper towels)	04-25-23 AP	05-06-23	
Make bleach	04-26-23 AP	05-15-23	
Clean bathroom	04-25-23 AP		
Refill soap dispensers	04-23-23 AP	05-06-23 AP	
Clean counters, artemia table and light table	04-25-23 AP	05-15-23 AP	
Clean top and bottom shelves of culture system	04-26-23 AP	05-16-23 AP	
Sweep and vacuum	04-25-23 AP		

Comments:

