

Effluent Quality Assessment

Tampa Bay Water Desalination Facility

Hillsborough County

NPDES #FL0186813

Sampled August 20, 2012

December 2012

Biology Section
Bureau of Laboratories
Division of Environmental Assessment and Restoration

Quality Manual No. 870346G
NELAC Certification No. E31780

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Tampa Bay Water Desalination Facility, 13041 Wyandotte Road, Gibsonton, Hillsborough County, Florida, 33534. NPDES #FL0186813. Effluent grab samples for bioassays, biological and chemical analyses were collected on August 20, 2012.

Introduction

Tampa Bay Water Desalination Facility is a drinking water facility that produces potable water by desalination of marine water. (See Appendix F for detailed facility information provided by Pete Wenner of FDEP Southwest District.)

Methods

Samples were collected from a metered flow PVC spigot for Outfall D-001 by Pete Wenner (FDEP Southwest District) following DEP-SOP-001/01 FS 2400 Wastewater Sampling. All DEP SOPs are available on the web at: http://www.dep.state.fl.us/water/sas/sop/index.htm.

See Appendix A for the completed chain of custody form.

The 96-hour acute definitive toxicity tests and algal growth potential test were performed following internal DEP SOPs TA07_03, TA07_04, and TA08_01 through TA08_09. All internal DEP SOPs are available on the web at: http://www.floridadep.org/labs/cgi-bin/sop/biosop.asp.

The sample used in the bioassay tests was a blended sample consisting of 1 part RO concentrate and 20 parts cooling water resulting in a RO concentrate concentration of 4.8%. The blended sample was prepared at the facility. For definitive bioassay test purposes, undiluted blended sample is considered 100% sample.

Results and Discussion

- **Toxicity Test Results**
  Tests were performed August 21 - 25, 2012.

Americamysis bahia 96-hour acute definitive bioassay –	LC_{50}: > 100%, 0%* mortality in 100% sample at 96 hours
Menidia beryllina 96-hour acute definitive bioassay –	LC_{50}: > 100%, 10%* mortality in 100% sample at 96 hours

  *NOTE: In a 96-hour acute definitive test of 100% effluent, mortality of <20% provides confidence that the effluent meets the acute toxicity criterion of Florida's Surface Water Quality Standards (Rule 62-302.500 (1) (a) 4, F.A.C.). Mortality between 20-50% indicates low to moderate levels of toxicity, and further action may be required. Mortality of >50% indicates that the effluent fails to meet the minimum requirement to discharge to waters of the state (Rule 62-4.244(3) (a), F.A.C.).

  The bioassay samples were not acutely toxic to the *Americamysis bahia* or the *Menidia beryllina* test organisms.

  See Appendix B for bioassay bench sheets. See Appendix C for results of the last 20 standard reference toxicant (SRT) tests and the bench sheets and statistical analyses of the SRT tests that correspond to these facility tests. See Appendix D for test organism receipts.

- **Algal Growth Potential**
  The effluent Algal Growth Potential (AGP) was 3.9 A mg dry wt/L of the saltwater species *Dunaliella tertiolecta.* Raschke and Schultz determined that AGP values above 10.0 mg dry weight/L represent a "problem" threshold for marine receiving waters, implying nutrient enrichment (personal communication,

Marshall Faircloth, et. al. FDEP, with Ron Raschke USEPA Region 4, 1987). The ratio (5.1:1) of total nitrogen to total phosphorus suggests that the effluent is nitrogen-limited (Maloney et al. 1978).

See Table 1 for AGP results and qualifiers.

- **Chemistry Results**
  Total residual chlorine was not detected in the bioassay sample in the bioassay laboratory. The sample was held beyond the normal holding time for this measurement (Q qualifier). Total ammonia (0.078 mg N/L) was detected in the bioassay sample in the bioassay laboratory. The total ammonia concentration in the sample collected and preserved for chemical analysis on August 20, 2012, was 0.06 I mg N/L. Based on the pH, salinity, and temperature of the effluent as collected, the calculated unionized ammonia concentration was ≤ 0.02 mg/L.

  The effluent copper concentration (6.01 µg/L) exceeded both the Surface Water Quality Criteria for Class III marine waters ((≤ 3.7 µg/L 62-302.530) (23) F.A.C.) and the facilities' permitted limit (≤ 3.7 µg/L NPDES # FL0186813). Aluminum, arsenic, nickel, Total Alpha particles, and Radium 226 + Radium 228 were detected in the effluent at levels that comply with Class III marine surface water quality criteria (62-302.530, F.A.C.) and/or permit limits. The annual average flow complied with permit limits. Salinity (46.19 ppth) exceeds the permit limit (≤ 35.8 ppth) but was measured in a sample from the RO spigot and not the actual Outfall. The bioassay sample was collected from the Outfall, and the salinity (24.8 ppth) from that sample complied with the effluent permit limit. Other physical-chemical parameters such as dissolved oxygen (D.O.) and pH complied with water quality criteria and permit limits. Insufficient data was collected to determine compliance for chlorides. Selenium was detected between the MDL and PQL and complied with Class III marine water quality criteria.

  See Table 2 for results of analytes detected in the effluent, corresponding limits, and qualifiers. See Appendix E for a complete list of chemical analyses performed. See Appendix B for bioassay lab equipment.

Conclusion

The blended sample consisting of RO concentrate and effluent collected from the EFF-3 NPDES sampling point for Outfall D-001 for this facility on August 20, 2012 was not acutely toxic to the *Americamysis bahia* and *Menidia beryllina* test organisms during the 96-hour acute definitive bioassays. The effluent algal growth potential (AGP) was less than the "problem" threshold for marine waters. The effluent copper concentration (6.01 µg/L) exceeded both the Surface Water Quality Criteria for Class III marine waters (≤ 3.7 µg / L 62-302.530) (23) F.A.C.) and the facilities' permitted limit (≤ 3.7 µg / L NPDES # FL0186813).

Literature Cited

Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

Maloney, T. E., W. E. Miller, and D. T. Specht. 1974. The Marine Algal Assay Procedure: Bottle Test. National Environmental Research Center Office of Research and Development. U. S. EPA, Corvallis, Oregon. 43 p.

Table 1. Measured algal growth potential (AGP; mg dry weight/L) of the saltwater species *Dunaliella tertiolecta* and ratios of nitrogen to phosphorus in samples collected from the Tampa Bay Water Desalination Facility on August 20, 2012.

Tampa Bay Water Desalination Facility			
Location	AGP (measured)	Inorganic N:P ratio	Total N:P ratio
D-001	3.9 A	0.7	5.1

A - Value reported is the mean of two or more determinations

Table 2. Effluent limits, Class III Criteria for predominantly marine waters and chemical data for samples collected from the Tampa Bay Water Desalination Facility on August 20, 2012.

Tampa Bay Water Desalination Facility NPDES# FL0186813	Class III Criteria	Effluent Limits	D-001	
Organic Constituents (µg/L)				
None Detected	-	-	None Detected	
Metals (µg/L unless otherwise noted)				
Aluminum	≤ 1500	-	36	
Arsenic	≤ 50	-	2.19	
Cadmium	≤ 8.8	-	0.05	U
Calcium (mg/L)	-	-	696	
Chromium-III	-	-	2.3	
Copper	≤ 3.7	≤ 3.7	6.01	
Iron	≤ 300	Report	90	U
Lead	≤ 8.5	-	0.2	U
Magnesium (mg/L)	-	-	2030	
Mercury	≤ 0.025	-	-	
Nickel	≤ 8.3	≤ 8.3	2.68	
Selenium	≤ 71	-	0.61	I
Silver	≤ 2.3	-	0.025	U
Zinc	≤ 86	-	20	U
Nutrients (mg/L)				
Ortho-phosphate	-	-	0.15	
Total Phosphorus	-	-	0.2	
Total Ammonia	-	-	0.06	I
Un-ionized Ammonia	-	-	≤ 0.02	c
Nitrate and Nitrite	-	-	0.05	
Total Kjeldahl Nitrogen	-	-	0.96	
Organic Nitrogen	-	-	0.9	c
Total Nitrogen	-	-	1.01	c
General Physical and Chemical Parameters				
Dissolved Oxygen (mg/L)	≥ 4.0	≥ 4.0	4.0	
pH (SU)	6.5 - 8.5	6.5 - 8.5	6.6	
Conductivity (µmhos/cm)	-	Report	68500*	
Temperature (°C)	-	-	38.9	
Salinity (ppt)	-	≤ 35.8	46.19*	
Total Residual Chlorine (mg/L)	≤ 0.01	-	< 0.03	UQ£
Chlorophyll *a* (µg/L) - Corrected	-	-	1.6	I
Phaeophytin (µg/L)	-	-	0.4	U
Total Suspended Solids (mg/L)	-	-	6	I
Chloride (mg/L)	-	≤ 10% Above Intake	30000	¥
Alpha, Total (pCi/L)	≤ 15	≤ 15	3	
Alpha-Counting Error (pCi/L)	-	-	1.4	
Radium 226 (pCi/L)	-	-	2.5	
Radium 226-Counting Error (pCi/L)	-	-	0.3	
Radium 228 (pCi/L)	-	-	1.3	
Radium 228-Counting Error (pCi/L)	-	-	0.6	
Radium 226 + 228 (pCi/L)	≤ 5	≤ 5	3.8	c
Flow (MGD)	-	≤ 22.8 a	6.3	a
Hardness (mg $CaCO_3$)	-	-	10097.45	c

Value exceeds the Class III Water Quality Criteria or permit limits

a - Annual average

c - Value is calculated

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

Q - Sample held beyond normal holding time

U - Material analyzed for but not detected; value reported is the method detection limit

£ - measurement taken in the FDEP laboratory

* - measured in sample from RO spigot not actual Outfall. Bioassay sample salinity was within limits.

¥ - insufficient data to determine compliance; 24 hour composite samples for the two intake samples points were not taken during this survey.

Florida Department of Environmental Protection

Central Laboratory Sample Submittal Form

Request Number: RQ-2012-08-06-11
FYI3 Tampa Bay Water Sampling Inspection

Event ID *

Customer: SW-DIST
Project ID: FYI3
PMAS: 1143

Requester: Michelle Fish
Collected By: PETE WENNER
Sampling Agency: FDEP-SWD

Field Report Prepared By: PETE WENNER
Send Final Report To: Ilia Balcom
PETE WENNER

Lab ID *	Location	Collection (comp begin or grab) Eastern Central	Composite end Eastern Central	Bottle Group(s)**
	D-001	☐ Comp ☑ Grab Date 8/20/12 Time 0945	Date Time	A
	Field ID: 40213	Tot Res Chlorine (mg/L)	Diss Oxygen (mg/L): 4.00	Storet Station Number
	Matrix (include type e.g. Salt, Fresh, etc): RO CONCENTRATE; Temp (C): 38.87; pH: 6.56	Sample Depth ☐ m ☐ ft: 46.19	☑ Salinity (PPTh) ☐ Sp Conductance (umho/cm)	NPDES Number
	Latitude ☐ dd ☐ dms	Longitude ☐ dd ☐ dms	Comments	

Lab ID *	Location	Collection (comp begin or grab) Eastern Central	Composite end Eastern Central	Bottle Group(s)**
	FIELD BLANK	☐ Comp ☑ Grab Date 8/20/12 Time 1015	Date Time	B
	Field ID: 40214	Tot Res Chlorine (mg/L)	Diss Oxygen (mg/L)	Storet Station Number
	Matrix (include type e.g. Salt, Fresh, etc): DI H2O; Temp (C); pH	Sample Depth ☐ m ☐ ft	☐ Salinity (PPTh) ☐ Sp Conductance (umho/cm)	NPDES Number
	Latitude ☐ dd ☐ dms	Longitude ☐ dd ☐ dms	Comments	

Lab ID *	Location	Collection (comp begin or grab) Eastern Central	Composite end Eastern Central	Bottle Group(s)**
		☐ Comp ☐ Grab Date Time	Date Time	
	Field ID	Tot Res Chlorine (mg/L)	Diss Oxygen (mg/L)	Storet Station Number
	Matrix (include type e.g. Salt, Fresh, etc); Temp (C); pH	Sample Depth ☐ m ☐ ft	☐ Salinity (PPTh) ☐ Sp Conductance (umho/cm)	NPDES Number
	Latitude ☐ dd ☐ dms	Longitude ☐ dd ☐ dms	Comments	

Lab ID *	Location	Collection (comp begin or grab) Eastern Central	Composite end Eastern Central	Bottle Group(s)**
		☐ Comp ☐ Grab Date Time	Date Time	
	Field ID	Tot Res Chlorine (mg/L)	Diss Oxygen (mg/L)	Storet Station Number
	Matrix (include type e.g. Salt, Fresh, etc); Temp (C); pH	Sample Depth ☐ m ☐ ft	☐ Salinity (PPTh) ☐ Sp Conductance (umho/cm)	NPDES Number
	Latitude ☐ dd ☐ dms	Longitude ☐ dd ☐ dms	Comments: 4 Glassy Rec'd in Tact by J.D. 10:14 8.21.12	

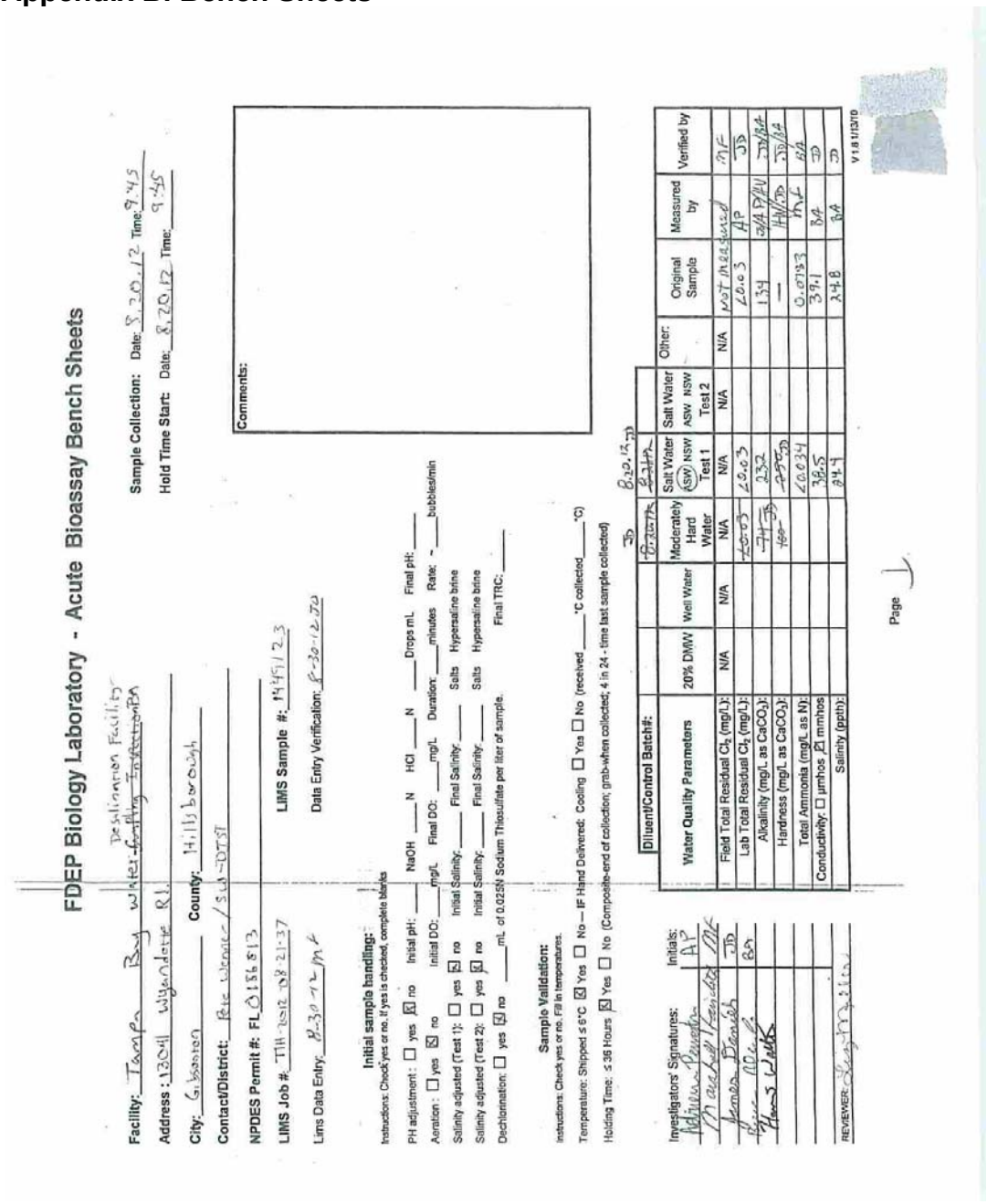
Relinquished By:	Date/Time	Shipping Method:	Received By:	Date/Time	Relinquished By:	Date/Time	Received By:	Date/Time
	8/20/12 1600	FEDEX		08/21/12 09:55				

* Shaded Areas for Lab use only

** Please see reverse side for Bottle Group information.

last revised October 1, 2003

Appendix B. Bench Sheets



FDEP Biology Laboratory - Acute Bioassay Bench Sheets

Facility: Tampa Bay Water Desalination Facility — Sample Collection: Date: 8.20.12 Time: 9:45

Address: 13611 Wigmore Rd. — Hold Time Start: Date: 8.20.12 Time: 9:45

City: Gibsonton County: Hillsborough

Contact/District: Pete Vlandis / SWD-DMST

NPDES Permit #: FL0156813

LIMS Job #: TH-test 08 21-37 — LIMS Sample #: 194912.3

Lims Data Entry: B.30.12 JMK — Data Entry Verification: B-30-12 JD

Comments:

Initial sample handlings:

Instructions: Check yes or no. If yes is checked, complete blanks

PH adjustment: ☐ yes ☒ no Initial pH: ____ NaOH ____ N HCl ____ N ____ Drops mL Final pH: ____

Aeration: ☐ yes ☒ no Initial DO: ____ mg/L Final DO: ____ mg/L Duration: ____ minutes Rate: ____ bubbles/min

Salinity adjusted (Test 1): ☐ yes ☒ no Initial Salinity: ____ Final Salinity: ____ Salts Hypersaline brine

Salinity adjusted (Test 2): ☐ yes ☒ no Initial Salinity: ____ Final Salinity: ____ Salts Hypersaline brine

Dechlorination: ☐ yes ☒ no ____ mL of 0.025N Sodium Thiosulfate per liter of sample. Final TRC: ____

Sample Validation:

Instructions: Check yes or no. Fill in temperatures.

Temperature: Shipped ≤ 6°C ☒ Yes ☐ No — IF Hand Delivered: Cooling ☐ Yes ☐ No (received ____ °C collected ____ °C)

Holding Time: ≤ 36 Hours ☒ Yes ☐ No (Composite-end of collection; grab-when collected; 4 in 24 - time last sample collected)

JD 8.20.12 JD

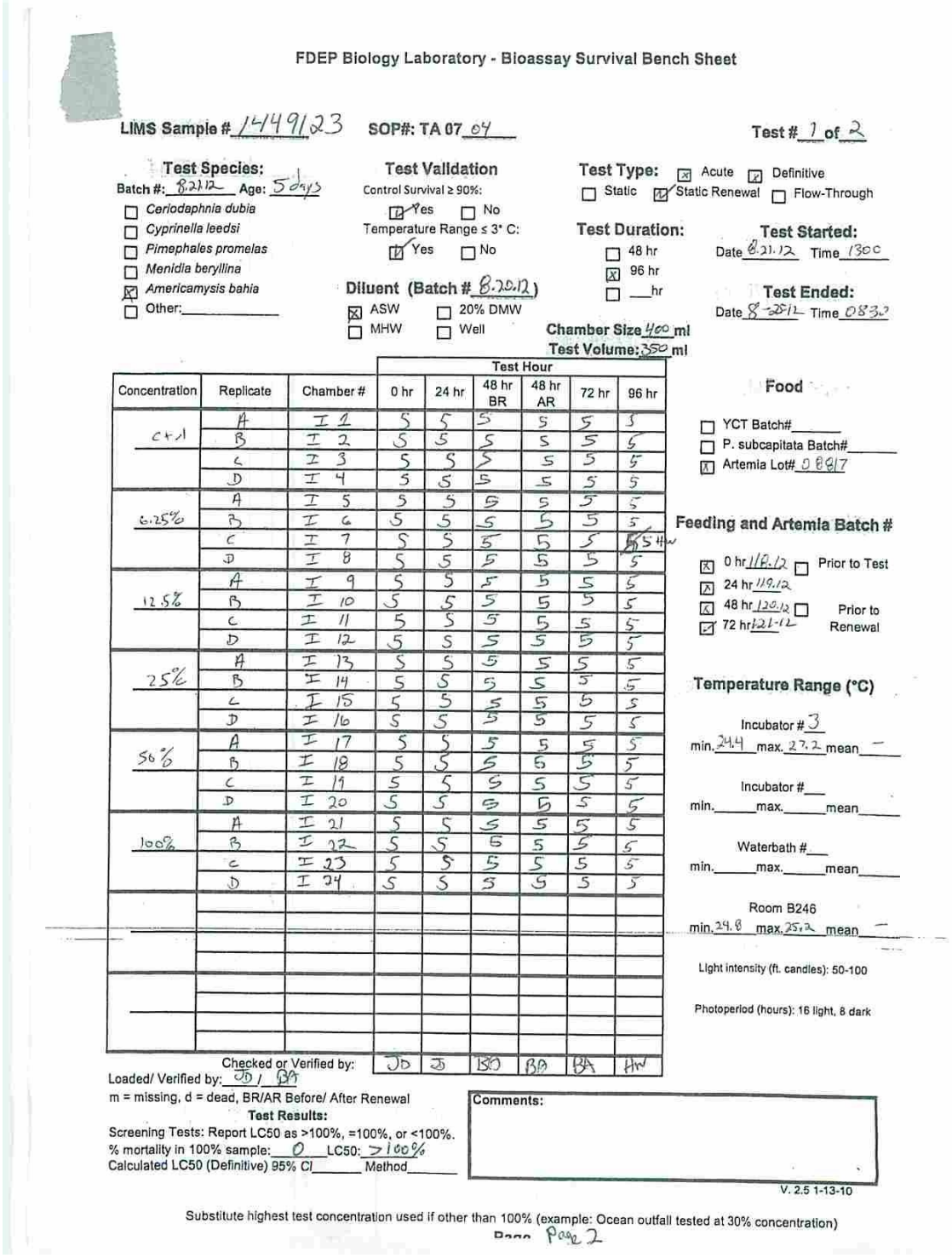
Investigators' Signatures:	Initials:
Michael Kennedy	MK
Jennifer Brandt	JB
Peter Vlandis	PV
Thomas Lubbers	TL
REVIEWER:	

Diluent/Control Batch#:				Salt Water (SW) NSW Test 1	Salt Water ASW NSW Test 2	Other:			
Water Quality Parameters	20% DMW	Well Water	Moderately Hard Water				Original Sample	Measured by	Verified by
Field Total Residual Cl_2 (mg/L):	N/A	N/A	N/A	N/A	N/A	N/A	not measured	MK	MK
Lab Total Residual Cl_2 (mg/L):			20.03	20.03			20.03	AP	JB
Alkalinity (mg/L as $CaCO_3$):			134	232			134	8/4 B/PW	JB/BA
Hardness (mg/L as $CaCO_3$):			134 JB 130	2050 JB			—	HW/JD	JB/BA
Total Ammonia (mg/L as N):				0.0034			0.0033	MK	BA
Conductivity: ☐ µmhos ☒ mmhos				38.5			39.1	BA	JD
Salinity (ppth):				34.9			34.8	BA	JD

V 1.8 1/13/10

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Appendix B. (continued)



FDEP Biology Laboratory - Bioassay Survival Bench Sheet

LIMS Sample # 1449123 SOP#: TA 07 04 Test # 1 of 2

Test Species:
Batch #: 8.2112 Age: 5 days
- ☐ *Ceriodaphnia dubia*
- ☐ *Cyprinella leedsi*
- ☐ *Pimephales promelas*
- ☐ *Menidia beryllina*
- ☒ *Americamysis bahia*
- ☐ Other:_____

Test Validation
Control Survival ≥ 90%: ☒ Yes ☐ No
Temperature Range ≤ 3° C: ☒ Yes ☐ No

Diluent (Batch # 8.20.12)
☒ ASW ☐ 20% DMW ☐ MHW ☐ Well

Test Type: ☒ Acute ☒ Definitive ☐ Static ☒ Static Renewal ☐ Flow-Through

Test Duration: ☐ 48 hr ☒ 96 hr ☐ ___hr

Test Started: Date 8.21.12 Time 1300

Test Ended: Date 8-25-12 Time 0830

Chamber Size 400 ml
Test Volume: 350 ml

Concentration	Replicate	Chamber #	Test Hour 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
C+1	A	I 1	5	5	5	5	5	5
	B	I 2	5	5	5	5	5	5
	C	I 3	5	5	5	5	5	5
	D	I 4	5	5	5	5	5	5
6.25%	A	I 5	5	5	5	5	5	5
	B	I 6	5	5	5	5	5	5
	C	I 7	5	5	5	5	5	5 HW
	D	I 8	5	5	5	5	5	5
12.5%	A	I 9	5	5	5	5	5	5
	B	I 10	5	5	5	5	5	5
	C	I 11	5	5	5	5	5	5
	D	I 12	5	5	5	5	5	5
25%	A	I 13	5	5	5	5	5	5
	B	I 14	5	5	5	5	5	5
	C	I 15	5	5	5	5	5	5
	D	I 16	5	5	5	5	5	5
50%	A	I 17	5	5	5	5	5	5
	B	I 18	5	5	5	5	5	5
	C	I 19	5	5	5	5	5	5
	D	I 20	5	5	5	5	5	5
100%	A	I 21	5	5	5	5	5	5
	B	I 22	5	5	5	5	5	5
	C	I 23	5	5	5	5	5	5
	D	I 24	5	5	5	5	5	5
Checked or Verified by:			JD	JD	BD	BA	BA	HW

Food
- ☐ YCT Batch#_____
- ☐ P. subcapitata Batch#_____
- ☒ Artemia Lot# 08817

Feeding and Artemia Batch #
- ☒ 0 hr 11.8.12 ☐ Prior to Test
- ☒ 24 hr 11.9.12
- ☒ 48 hr 11.10.12 ☐ Prior to Renewal
- ☑ 72 hr 11.11.12

Temperature Range (°C)
Incubator # 3
min. 24.4 max. 27.2 mean ___
Incubator #___
min.___ max.___ mean___
Waterbath #___
min.___ max.___ mean___
Room B246
min. 24.8 max. 25.2 mean ___
Light intensity (ft. candles): 50-100
Photoperiod (hours): 16 light, 8 dark

Loaded/ Verified by: JD / BA
m = missing, d = dead, BR/AR Before/ After Renewal

Test Results:
Screening Tests: Report LC50 as >100%, =100%, or <100%.
% mortality in 100% sample: 0 LC50: >100%
Calculated LC50 (Definitive) 95% CI_____ Method_____

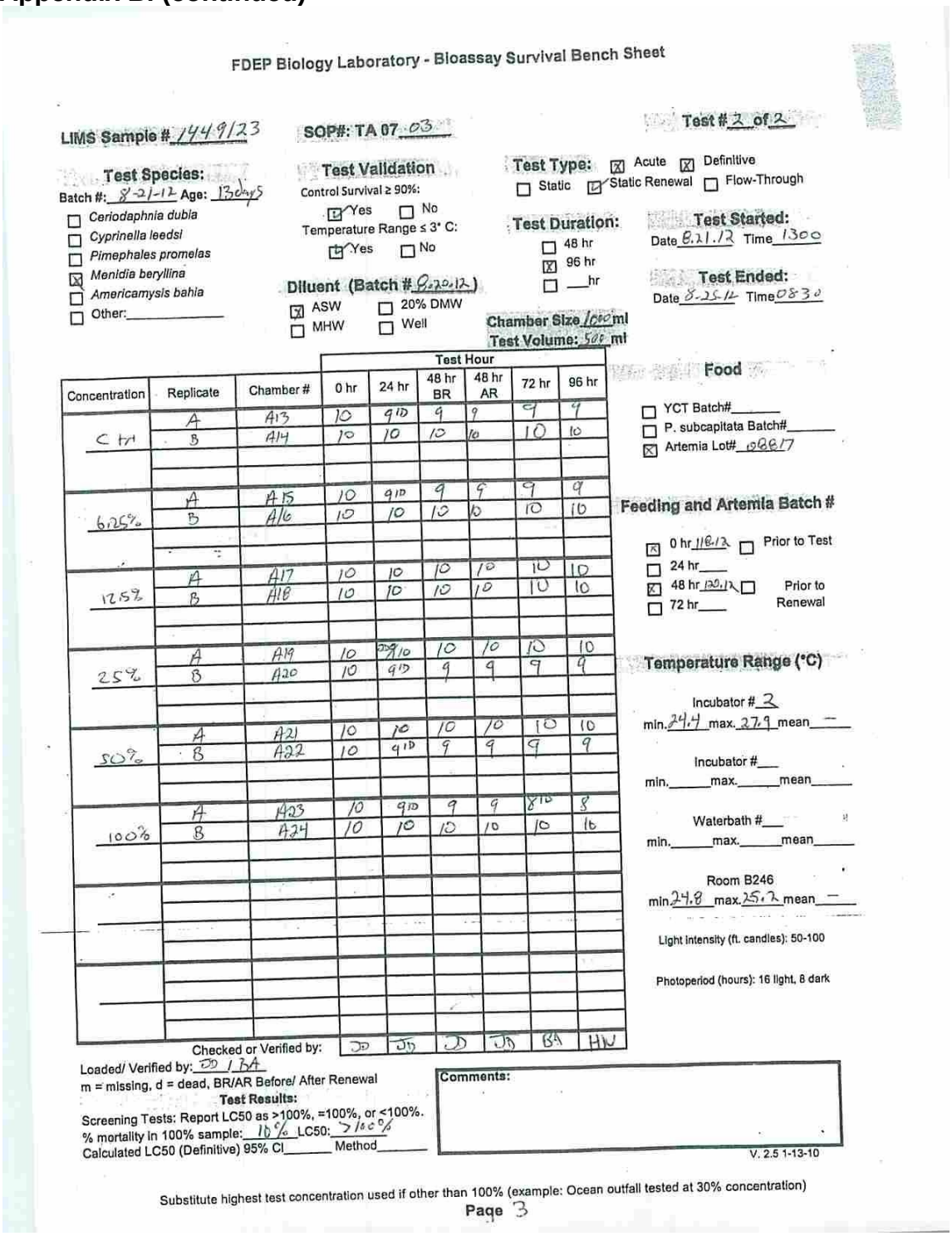
Comments:

V. 2.5 1-13-10

Substitute highest test concentration used if other than 100% (example: Ocean outfall tested at 30% concentration)

Page Page 2

Appendix B. (continued)



FDEP Biology Laboratory - Bioassay Survival Bench Sheet

LIMS Sample # 1449123 SOP#: TA 07-03 Test # 2 of 2

Test Species:
Batch #: 8-21-12 Age: 13d+5
- ☐ *Ceriodaphnia dubia*
- ☐ *Cyprinella leedsi*
- ☐ *Pimephales promelas*
- ☒ *Menidia beryllina*
- ☐ *Americamysis bahia*
- ☐ Other:_____

Test Validation
Control Survival ≥ 90%: ☒ Yes ☐ No
Temperature Range ≤ 3° C: ☒ Yes ☐ No

Diluent (Batch # 8.20.12)
☒ ASW ☐ 20% DMW ☐ MHW ☐ Well

Test Type: ☒ Acute ☒ Definitive ☐ Static ☒ Static Renewal ☐ Flow-Through

Test Duration: ☐ 48 hr ☒ 96 hr ☐ ___hr

Test Started: Date 8.21.12 Time 1300

Test Ended: Date 8.25.12 Time 0830

Chamber Size 1000 ml
Test Volume: 500 ml

Concentration	Replicate	Chamber #	Test Hour 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
C Ht	A	A13	10	9 D	9	9	9	9
	B	A14	10	10	10	10	10	10
6.25%	A	A15	10	9 D	9	9	9	9
	B	A16	10	10	10	10	10	10
12.5%	A	A17	10	10	10	10	10	10
	B	A18	10	10	10	10	10	10
25%	A	A19	10	9 D 10	10	10	10	10
	B	A20	10	9 D	9	9	9	9
50%	A	A21	10	10	10	10	10	10
	B	A22	10	9 D	9	9	9	9
100%	A	A23	10	9 D	9	9	8 D	8
	B	A24	10	10	10	10	10	10
Checked or Verified by:			DD	JD	D	JB	BA	HN

Food
- ☐ YCT Batch#_____
- ☐ P. subcapitata Batch#_____
- ☒ Artemia Lot# 08817

Feeding and Artemia Batch #
- ☒ 0 hr 118.13 ☐ Prior to Test
- ☐ 24 hr___
- ☒ 48 hr 120.12 ☐ Prior to Renewal
- ☐ 72 hr___

Temperature Range (°C)
Incubator # 2
min. 24.4 max. 27.9 mean ___
Incubator #___
min.___ max.___ mean___
Waterbath #___
min.___ max.___ mean___
Room B246
min. 24.8 max. 25.2 mean ___
Light intensity (ft. candles): 50-100
Photoperiod (hours): 16 light, 8 dark

Loaded/ Verified by: DD / BA
m = missing, d = dead, BR/AR Before/ After Renewal

Test Results:
Screening Tests: Report LC50 as >100%, =100%, or <100%.
% mortality in 100% sample: 10% LC50: >100%
Calculated LC50 (Definitive) 95% CI_____ Method_____

Comments:

V. 2.5 1-13-10

Substitute highest test concentration used if other than 100% (example: Ocean outfall tested at 30% concentration)

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Appendix B. (continued)

FDEP Biology Laboratory - Bioassay Parameter Sheet

LIMS Sample #144923 Test # 1 of 3

Test Species:
☐ *Ceriodaphnia dubia* ☐ *Pimephales promelas* ☒ *Americamysis bahia*
☐ *Cyprinella leedsi* ☐ *Menidia beryllina* ☐ Other:_____

Test aerated: (if DO is < 4.0 mg/L) ☐ Yes ☒ No

Concentration	Replicate	Test Hour	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity ☐ µmhos ☒ mmhos	Salinity* (ppth)
ctrl	A	0 hr	8.3	24.5	6.4	38.3	24.3
	B	24 hr	8.2	24.8	6.9	39.1	24.3
	C	48 hr BR	8.1	24.3	6.5	39.9	24.6
	c	48 hr AR	8.1	24.4	6.9	39.2	24.5
	D	72 hr	7.9	24.6	6.8	40.0	25.3
	A	96 hr	8.1	25.1	6.6	40.5	25.3
6.25%	A	0 hr	8.3	25.0	6.5	38.5	24.5
	B	24 hr	8.2	24.1	6.8	39.0	24.7
	C	48 hr BR	8.0	24.8	6.0	39.8	24.5
	c	48 hr AR	8.2	24.5	6.6	38.4	24.1
	D	72 hr	8.0	25.4	6.7	39.8	25.0
	A	96 hr	8.1	24.9	6.2	39.7	24.7
12.5%	A	0 hr	8.3	25.2	6.4	38.7	24.6
	B	24 hr	8.2	24.1	6.6	39.0	24.3
	C	48 hr BR	8.0	24.8	5.7	39.4	24.3
	c	48 hr AR	8.2	24.7	6.4	37.8	23.7
	D	72 hr	8.0	25.2	6.2	39.7	25.1
	A	96 hr	8.1	24.8	6.2	39.3	24.4
25%	A	0 hr	8.3	25.4	6.5	38.8	24.7
	B	24 hr	8.1	24.2	6.6	39.0	24.4
	C	48 hr BR	8.0	24.9	5.7	39.7	24.6
	c	48 hr AR	8.1	24.6	6.3	39.0	24.3
	D	72 hr	8.0	25.2	5.9	40.2	25.4
	A	96 hr	8.0	24.7 BA	6.2	40.8	25.5
50%	A	0 hr	8.2	25.6	6.5	38.7	24.6
	B	24 hr	8.1	24.3	6.6	38.9	24.4
	C	48 hr BR	7.9	25.0	5.7	39.8	24.7
	c	48 hr AR	8.0	24.7	6.2	38.8	24.3
	D	72 hr	7.8	25.2	5.9	40.1	25.4
	A	96 hr	8.0	24.7	6.3	40.3	25.2
100%	A	0 hr	8.0	26.0	7.6	39.5	25.0
	B	24 hr	8.0	24.2	6.7	39.1	24.5
	C	48 hr BR	7.9	24.6	5.7	39.9	24.8
	c	48 hr AR	8.0	24.6	6.2	38.4	24.1
	D	72 hr	7.8	25.1	5.8	40.2	25.5
	A	96 hr	8.0	25.4	6.3	40.6	25.5
		0 hr					
		24 hr					
		48 hr BR					
		48 hr AR					
		72 hr					
		96 hr					
		0 hr					
		24 hr					
		48 hr BR					
		48 hr AR					
		72 hr					
		96 hr					

*Measure/ record salinity for marine tests

Comments:

Measured By:
0 hr: BB
24 hr: HW/AP
48 hr BR: HW/AP
48 hr AR: JD
72 hr: HW/AP
96 hr: AP/HW

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Appendix B. (continued)

FDEP Biology Laboratory - Bioassay Parameter Sheet

LIMS Sample # 1449123 Test # 2 of 2

Test Species:

☐ *Ceriodaphnia dubia* ☐ *Pimephales promelas* ☐ *Americamysis bahia*

☐ *Cyprinella leedsi* ☒ *Menidia beryllina* ☐ Other:_____

Test aerated: (if DO is < 4.0 mg/L) ☐ Yes ☒ No

Concentration	Replicate	Test Hour	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity ☐ µmhos ☒ mmhos	Salinity* (ppth)
	A	0 hr	8.3	25.2	6.6	38.5	~~25.0~~ BA 24H,pas
	B	24 hr	8.1	24.2-6.0	6.5	39.0	25.2
Ctrl	A	48 hr BR	7.9	24.8	6.5	39.5	~~39.0~~ 25.3 AP
	A	48 hr AR	8.0	24.1	6.4	39.0	24.8
	B	72 hr	7.9	24.1	6.5	40.1	25.4
	A	96 hr	8.0	24.4	6.4	40.2	25.6
	A	0 hr	8.3	25.2	6.5	38.7	24.7
	B	24 hr	8.1	~~24.5~~ 24.5	6.4	39.2	25.2
6.25%	A	48 hr BR	8.0	24.6	6.2	39.8	25.3
	A	48 hr AR	8.2	24.1	6.2	37.9	24.0
	B	72 hr	8.0	24.0	6.5	39.0	24.8
	A	96 hr	8.1	25.0	6.5	39.3	24.7
	A	0 hr	8.3	25.2	6.5	38.8	24.6
	B	24 hr	8.0	24.4	6.2	39.2	25.2
12.5%	A	48 hr BR	7.9	24.5	6.2	39.9	25.3
	A	48 hr AR	8.2	24.3	6.3	37.8	24.0
	B	72 hr	8.0	24.7	6.4	39.2	25.0
	A	96 hr	8.1	24.7	6.2	39.8	25.0
	A	0 hr	8.3	25.4	6.5	39.0	24.7
	B	24 hr	8.0	24.1	6.3	39.4	25.3
25%	A	48 hr BR	7.9	24.3	6.0	40.1	25.5
	A	48 hr AR	8.1	24.8	6.3	39.1	24.8
	B	72 hr	7.9	24.6	6.4	40.2	25.6
	A	96 hr	8.0	25.5	6.1	40.5	25.7
	A	0 hr	8.2	25.5	6.6	38.6	24.5
	B	24 hr	8.0	24.1	6.3	38.8	24.9
50%	A	48 hr BR	7.9	24.3	5.9	39.7	25.2
	A	48 hr AR	8.1	25.0	6.3	38.8	24.4
	B	72 hr	7.9	24.2	6.3	39.3	25.4
	A	96 hr	8.0	25.1	6.0	40.2	25.5
	A	0 hr	8.0	26.0	7.3	39.1	24.8
	B	24 hr	7.8	24.2	6.2	39.1	25.0
100%	A	48 hr BR	7.9	24.3	6.0	39.8	25.3
	A	48 hr AR	8.0	24.9	6.2	38.8	24.0
	B	72 hr	8.1	24.7	6.2	40.2	25.7
	A	96 hr	7.9	25.1	6.1	40.7	25.8
		0 hr					
		24 hr					
		48 hr BR					
		48 hr AR					
		72 hr					
		96 hr					
		0 hr					
		24 hr					
		48 hr BR					
		48 hr AR					
		72 hr					
		96 hr					

*Measure/ record salinity for marine tests

Comments:

Measured By:
0 hr: BA
24 hr: HW/AP
48 hr BR: BA
48 hr AR: BA
72 hr: HW/AP
96 hr: AP/HW

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Appendix B. (continued)

Test ID: Tampa Bay Water Dates: 8.21.12 - 8.25.12

METER / DEVICE	ID	SOP	Parameter	Method	v used
YSI Model 58 Dissolved Oxygen Meter	90H018262	TA06_04	Dissolved Oxygen	SM 4500 O G	J
YSI DO Probe	5905	TA06_04	Dissolved Oxygen	SM 4500 O G	J
Accumet AR-10 pH Meter	93312105	TA06_23	pH	SM 4500 H+	J
Mettler-Toledo SevenMulti Conductivity Meter	SN 1225117049 Probe H04257	TA06_25	Conductivity Salinity	SM 2510 B SM 2520 B	J
Denver Model 225 ISE with ammonia probe	SN K01377	TA06_17	Ammonia	SM 4500 NH3 F	J
Traceable Thermometer	#1-SN101686412 #2-SN221295527 #3-SN240116020 #4-SN80361795 #5 SN61990624	TA06_05	Temperature	SM-2530B modified DEP SOP-001/01 FT1400	J #5
Hach Pocket Colorimeter II	05050C026378	TA06_22	Total Residual Chlorine	EPA 330.5 SM 4500 CL G	J
Alkalinity (Hach Kit)	No SN	TA06_08	Alkalinity	SM 2320 B	J
Hardness (Hach Kit)	No SN	TA06_09	Hardness	SM 2340 C	J
OHAUS Balance 250D	1125481084	TA06_21 TA06_27	Weight	-	—
S-Weights	BIO-S-WEIGHTS-01	NA	Balance check	-	—

SM-2530B modified to allow use of electronic and non-mercury filled thermometers.

Insert other device information in blank spaces(if used). Test ID = Facility or SRTs (acute SRT--Chronic SRT)

JD 8.27.12

V 1.1 9/21/10 MF/jd

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Appendix C. SRT Bench Sheets and Statistical Analysis

Florida Department of Environmental Protection
Bureau of Laboratories

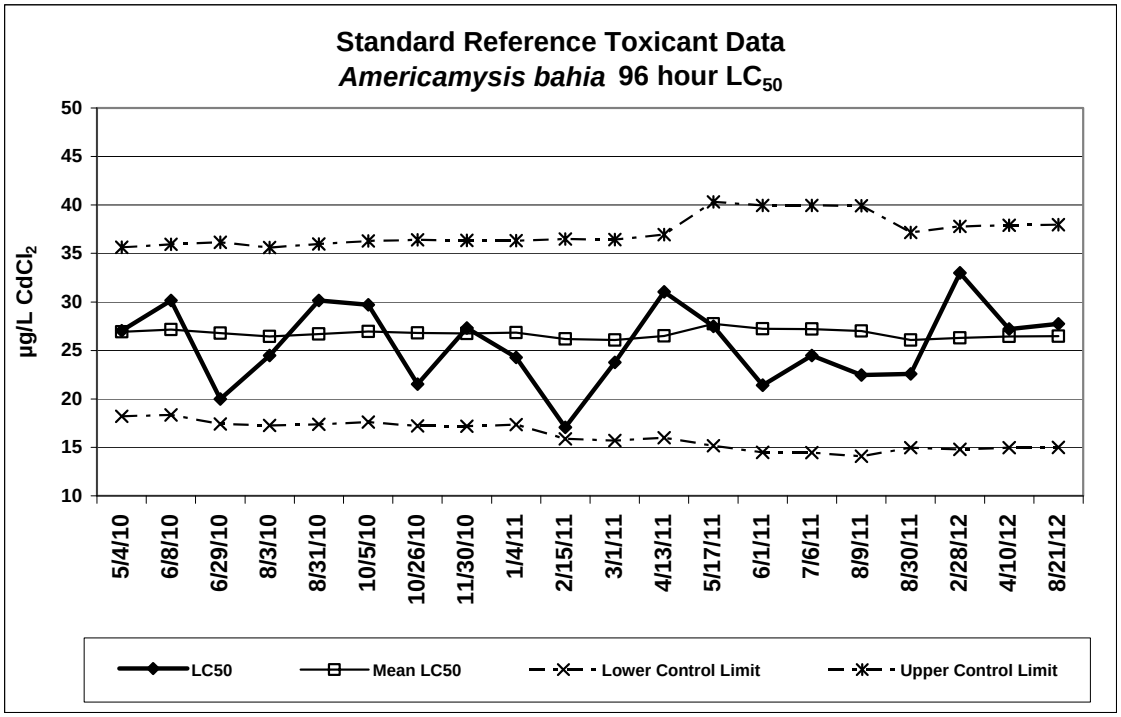
Standard Reference Toxicant (SRT) Test Data - 96-hour Acute Toxicity
Americamysis bahia (mysid shrimp) - Cadmium Chloride ($CdCl_2$)

Date	LC50	Mean LC50	Std Dev	Lower Control Limit	Upper Control Limit
5/4/10	27.02	26.91	4.36	18.20	35.63
6/8/10	30.17	27.15	4.40	18.34	35.95
6/29/10	20.00	26.78	4.68	17.42	36.15
8/3/10	24.49	26.45	4.59	17.27	35.62
8/31/10	30.17	26.68	4.66	17.37	35.99
10/5/10	29.70	26.94	4.67	17.60	36.29
10/26/10	21.53	26.80	4.80	17.20	36.39
11/30/10	27.31	26.76	4.79	17.18	36.35
1/4/11	24.29	26.83	4.74	17.35	36.32
2/15/11	17.08	26.19	5.15	15.88	36.49
3/1/11	23.78	26.07	5.18	15.71	36.43
4/13/11	31.04	26.48	5.24	16.00	36.95
5/17/11	27.50	27.75	6.29	15.16	40.33
6/1/11	21.40	27.22	6.36	14.49	39.95
7/6/11	24.49	27.20	6.37	14.45	39.94
8/9/11	22.46	27.01	6.46	14.09	39.93
8/30/11	22.59	26.07	5.55	14.96	37.17
2/28/12	32.99	26.30	5.75	14.80	37.80
4/10/12	27.19	26.44	5.73	14.97	37.90
8/21/12	27.74	26.47	5.74	14.99	37.95

CV = 21.69

Lower Confidence Limit = mean - 2 * Std Dev
Upper Confidence Limit = mean + 2 * Std Dev

EPA reference 75th quartile CV = 26%



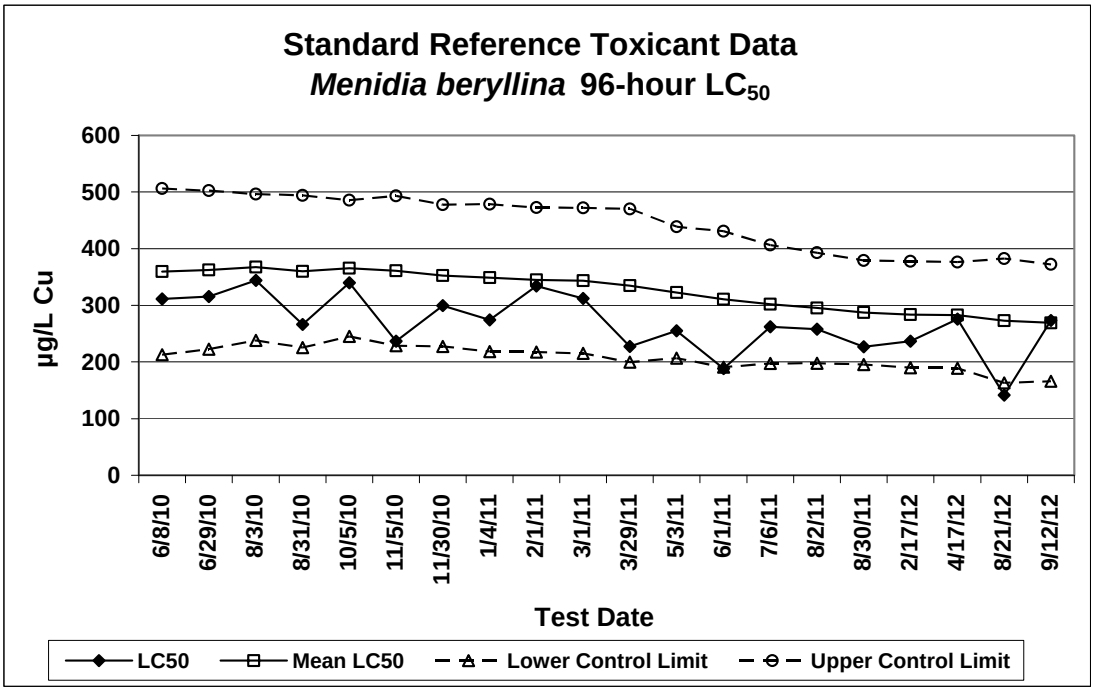
Appendix C. (continued)

Florida Department of Environmental Protection
Bureau of Laboratories

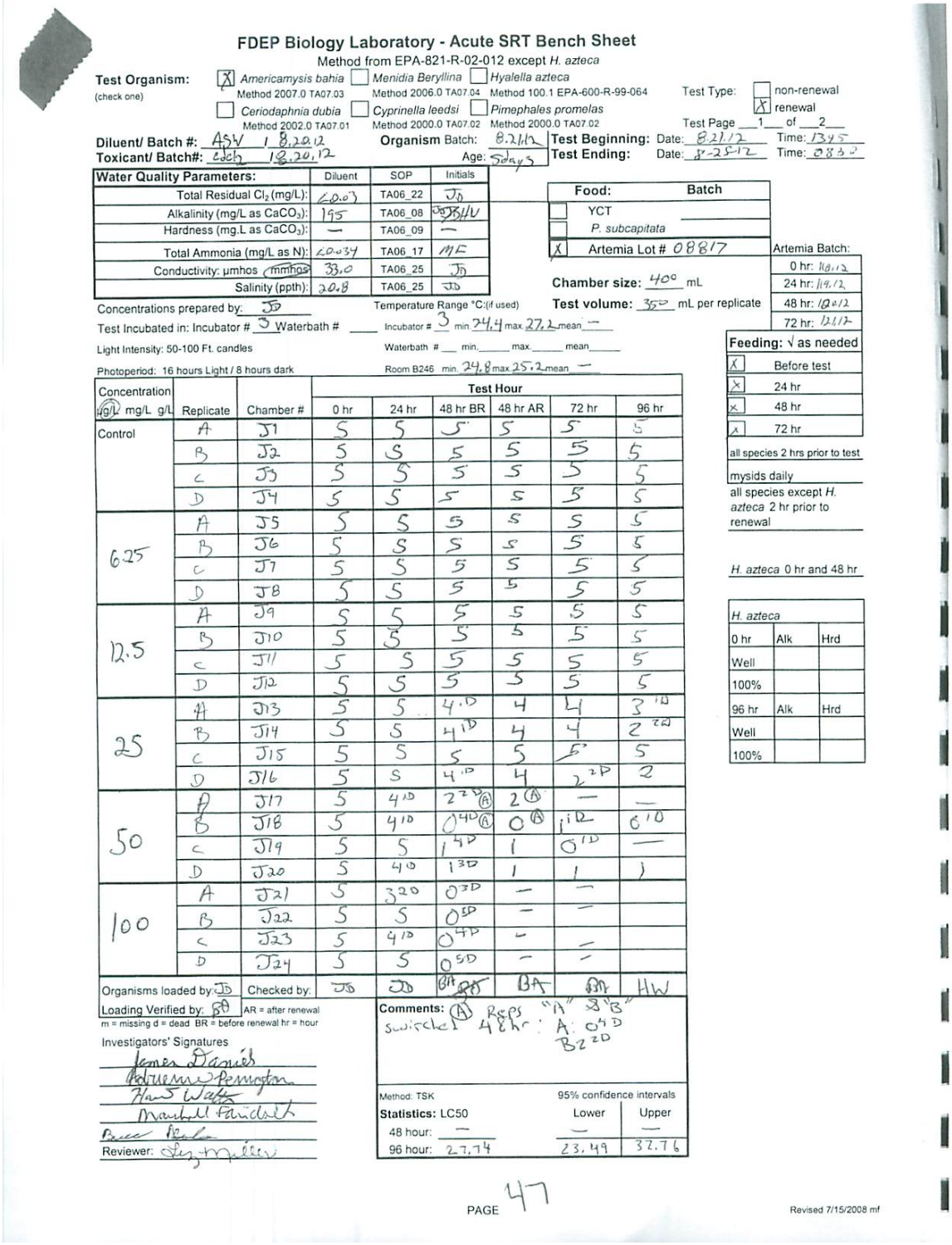
Standard Reference Toxicant (SRT) Test Data - 96-hour Acute Toxicity
Menidia beryllina (inland silverside) - Copper Chloride ($CuCl_2$) as Cu

Date	LC50	Mean LC50	Std Dev	Lower Control Limit	Upper Control Limit
6/8/10	311.45	359.36	73.38	212.59	506.13
6/29/10	315.29	362.43	69.94	222.56	502.31
8/3/10	344.21	367.37	64.53	238.31	496.42
8/31/10	266.23	359.85	67.19	225.46	494.23
10/5/10	340.06	365.40	60.01	245.39	485.42
11/5/10	236.68	360.93	66.11	228.71	493.15
11/30/10	299.75	352.65	62.62	227.41	477.89
1/4/11	274.39	348.59	65.00	218.58	478.60
2/1/11	334.16	345.13	63.77	217.60	472.66
3/1/11	312.31	343.58	64.19	215.20	471.96
3/29/11	227.2	334.81	67.59	199.62	470.00
5/3/11	255.03	322.69	57.93	206.82	438.55
6/1/11	188.24	310.77	59.92	190.93	430.62
7/6/11	261.89	301.82	52.33	197.15	406.48
8/2/11	257.93	295.20	48.81	197.58	392.81
8/30/11	226.9	287.16	45.93	195.30	379.02
2/17/12	236.77	283.69	47.03	189.63	377.76
4/17/12	275.73	282.54	46.92	188.69	376.38
8/21/12	141.42	272.92	54.90	163.12	382.71
9/12/12	273.15	268.94	51.60	165.74	372.14
				CV = 19.19	

EPA reference 75th quartile CV = 21%



Appendix C. (continued)



FDEP Biology Laboratory - Acute SRT Bench Sheet

Method from EPA-821-R-02-012 except *H. azteca*

Test Organism: (check one) [X] *Americamysis bahia* Method 2007.0 TA07.03; [ ] *Menidia Beryllina* Method 2006.0 TA07.04; [ ] *Hyalella azteca* Method 100.1 EPA-600-R-99-064; [ ] *Ceriodaphnia dubia* Method 2002.0 TA07.01; [ ] *Cyprinella leedsi* Method 2000.0 TA07.02; [ ] *Pimephales promelas* Method 2000.0 TA07.02

Test Type: [ ] non-renewal [X] renewal

Test Page 1 of 2

Diluent/ Batch #: ASW / 8.2012 — Organism Batch: 8.2112 — Test Beginning: Date: 8.21.12 Time: 1345

Toxicant/ Batch#: EDTA / 8.20.12 — Age: 5days — Test Ending: Date: 8-25-12 Time: 0830

Water Quality Parameters:	Diluent	SOP	Initials
Total Residual Cl_2 (mg/L):	<0.03	TA06_22	JD
Alkalinity (mg/L as $CaCO_3$):	195	TA06_08	JD/HW
Hardness (mg.L as $CaCO_3$):	—	TA06_09	—
Total Ammonia (mg/L as N):	<0.034	TA06_17	ML
Conductivity: µmhos ~~mmhos~~	33.0	TA06_25	JD
Salinity (ppth):	30.8	TA06_25	JD

Food:	Batch
[ ] YCT	
[ ] *P. subcapitata*	
[X] Artemia Lot # 08817	Artemia Batch:

0 hr: 8.21.12
24 hr: 8.22.12
48 hr: 8.23.12
72 hr: 8.24.12

Concentrations prepared by: JD

Test Incubated in: Incubator # 3 Waterbath # ____

Light Intensity: 50-100 Ft. candles

Photoperiod: 16 hours Light / 8 hours dark

Temperature Range °C:(if used)

Incubator # 3 min 24.4 max 27.2 mean —

Waterbath # ___ min.____ max.____ mean____

Room B246 min. 24.8 max 25.2 mean —

Chamber size: 400 mL

Test volume: 350 mL per replicate

Feeding: √ as needed

- [X] Before test
- [X] 24 hr
- [X] 48 hr
- [X] 72 hr

all species 2 hrs prior to test

mysids daily

all species except *H. azteca* 2 hr prior to renewal

H. azteca 0 hr and 48 hr

Concentration µg/L mg/L g/L	Replicate	Chamber #	Test Hour 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
Control	A	J1	5	5	5	5	5	5
	B	J2	5	5	5	5	5	5
	C	J3	5	5	5	5	5	5
	D	J4	5	5	5	5	5	5
6.25	A	J5	5	5	5	5	5	5
	B	J6	5	5	5	5	5	5
	C	J7	5	5	5	5	5	5
	D	J8	5	5	5	5	5	5
12.5	A	J9	5	5	5	5	5	5
	B	J10	5	5	5	5	5	5
	C	J11	5	5	5	5	5	5
	D	J12	5	5	5	5	5	5
25	A	J13	5	5	4 1D	4	4	3 1D
	B	J14	5	5	4 1D	4	4	2 2D
	C	J15	5	5	5	5	5	5
	D	J16	5	5	4 1D	4	2 2D	2
50	A	J17	5	4 1D	2 2D (A)	2 (A)	—	—
	B	J18	5	4 1D	0 1D (A)	0 (A)	jar	0 1D
	C	J19	5	5	1 1D	1	0 1D	—
	D	J20	5	4 0	1 3D	1	1	1
100	A	J21	5	3 2D	0 3D	—	—	
	B	J22	5	5	0 5D	—	—	
	C	J23	5	4 1D	0 4D	—	—	
	D	J24	5	5	0 5D	—	—	

H. azteca		
0 hr	Alk	Hrd
Well		
100%		
96 hr	Alk	Hrd
Well		
100%		

Organisms loaded by: JD Checked by: JD JD BA BA HW

Loading Verified by: BA

AR = after renewal

m = missing d = dead BR = before renewal hr = hour

Comments: (A) Reps "A" & "B" switched 48hr: A: 0 1D B: 2 2D

Investigators' Signatures

James Daniels
Adrienne Pemperton
Hans Watts
Marshall Faircloth
Bruce Parker

Reviewer: Lizy Miller

Method: TSK — 95% confidence intervals

Statistics: LC50		Lower	Upper
48 hour:	—	—	—
96 hour:	27.74	23.49	32.76

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Revised 7/15/2008 mf

Appendix C. (continued)

FDEP Biology Laboratory - Acute SRT Bench Sheet
0-96 hour parameters

Methods from EPA-821-R-02-012 except *H. azteca*

Test Page 2 of 2

Test Organism: (check one)
- [X] *Americamysis bahia* Method 2007.0 TA07.03
- [ ] *Ceriodaphnia dubia* Method 2002.0 TA07.01
- [ ] *Menidia Beryllina* Method 2006.0 TA07.04
- [ ] *Cyprinella leedsi* Method 2000.0 TA07.02
- [ ] *Hyalella azteca* Method 100.1 EPA-600-R-99-064
- [ ] *Pimephales promelas* Method 2000.0 TA07.02

Test Beginning: Date: 8.21.12 Time: 1345
Test Ending: Date: 8-25-12 Time: @ 830

Test Type: [ ] non-renewal [X] renewal

hr = hour AR = after renewal BR = before renewal

Concentration (mg/L g/L)	Replicate	Test Hour	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity [ ] µmhos [X] mmhos	Salinity (ppth)
Control	A	0 hr	8.3	24.8	6.9	33.0	20.8
	B	24 hr	8.3	25.4	6.7	33.0	21.3
	C	48 hr BR	8.3	24.8	6.6	34.4	21.3
	C	48 hr AR	8.3	24.5	6.7	33.9	20.6
	D	72 hr	8.2	24.1	6.8	34.6	20.7
	A	96 hr	8.2	23.9	6.6	33.7	21.5
6.25	A	0 hr	8.3	24.8	6.9	33.1	20.8
	B	24 hr	8.3	25.0	6.7	33.7	21.4
	C	48 hr BR	8.3	25.1	6.6	34.8	21.6
	C	48 hr AR	8.3	24.4	6.4	34.1	20.6
	D	72 hr	8.2	24.2	6.9	34.6	21.0
	A	96 hr	8.3	23.8	6.6	33.9	21.6
12.5	A	0 hr	8.3	24.8	6.9	33.1	20.8
	B	24 hr	8.3	25.3	6.7	33.5	21.6
	C	48 hr BR	8.3	25.1	6.5	34.7	21.5
	C	48 hr AR	8.3	24.5	6.5	34.2	20.9
	D	72 hr	8.2	24.5	7.0	34.6	21.1
	A	96 hr	8.3	24.1	6.6	34.0	22.0
25	A	0 hr	8.3	24.8	7.0	33.1	20.8
	B	24 hr	8.3	25.2	6.7	33.5	21.6
	C	48 hr BR	8.2	25.7	5.8	35.1	21.8
	C	48 hr AR	8.3	24.6	6.6	34.0	20.8
	D	72 hr	8.2	24.8	7.0	34.7	21.2
	A	96 hr	8.2	23.9	6.5	33.9	21.9
50	A	0 hr	8.3	24.8	7.0	33.1	20.8
	B	24 hr	8.3	25.9	6.6	33.5	21.5
	C	48 hr BR	8.2	25.5	5.7	34.7	21.6
	C	48 hr AR	8.3	24.4	6.7	33.9	20.7
	D	72 hr	8.2	24.4	6.9	34.7	21.0
	B	96 hr	8.3	24.5	6.6	34.3	22.1
100	A	0 hr	8.3	24.8	7.1	33.1	20.8
	B	24 hr	8.3	25.8	6.4	33.7	21.6
	C	48 hr BR	8.2	25.3	5.7	34.5	21.4
	C	48 hr AR					
	D	72 hr					
		96 hr					

Investigators Signatures
James Daniel
Hans Webb
Adrienne Pennington
Marshall Faircloth
Bruce Akridge
Reviewed By: Leigh Mercer

Measured by:
0 hr: JD
24 hr: HW/AP
48 hr BR: HW/AP
48 hr AR: ~~JD~~
72 hr: HW/AP
96 hr: AP

Measure/record salinity for marine tests

Comments:

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Revised 07/15/2008 MF

Appendix C. (continued)

FDEP Biology Laboratory - Acute SRT Bench Sheet

Method from EPA-821-R-02-012 except *H. azteca*

Test Organism: (check one)
- ☐ *Americamysis bahia* Method 2007.0 TA07.03
- ☒ *Menidia Beryllina* Method 2006.0 TA07.04
- ☐ *Hyalella azteca* Method 100.1 EPA-600-R-99-064
- ☐ *Ceriodaphnia dubia* Method 2002.0 TA07.01
- ☐ *Cyprinella leedsi* Method 2000.0 TA07.02
- ☐ *Pimephales promelas* Method 2000.0 TA07.02

Test Type: ☐ non-renewal ☒ renewal

Test Page 1 of 2

Diluent/ Batch #: ASW 1 8.20.12
Toxicant/ Batch#: CuSO4 1 9.10.12
Organism Batch: 9.11.12 Age: 13days
Test Beginning: Date: 9.11.12 Time: 13:30
Test Ending: Date: 9-13-12 Time: 10:15

Water Quality Parameters:	Diluent	SOP	Initials
Total Residual Cl_2 (mg/L):	<0.03	TA06_22	JD
Alkalinity (mg/L as $CaCO_3$):	195	TA06_08	HV
Hardness (mg.L as $CaCO_3$):	—	TA06_09	—
Total Ammonia (mg/L as N):	<0.054	TA06_17	MF
Conductivity: µmhos (mmhos)	33.5	TA06_25	JD
Salinity (ppth):	20.8	TA06_25	JD

Food:	Batch
☐ YCT	
☐ *P. subcapitata*	
☒ Artemia Lot #	08812

Artemia Batch:
0 hr: 129-12
24 hr: —
48 hr: 125-12
72 hr: —

Chamber size: 1000 mL
Test volume: 400 mL per replicate

Concentrations prepared by: JD
Temperature Range °C:(if used)
Test Incubated in: Incubator # 3 Waterbath # ____ Incubator # 3 min. 24.5 max. 26.5 mean —
Light Intensity: 50-100 Ft candles Waterbath # ___ min.____ max.____ mean____
Photoperiod: 16 hours Light / 8 hours dark Room B246 min. 24.5 max. 25.1 mean —

Feeding: √ as needed
- ☒ Before test
- ☐ 24 hr
- ☒ 48 hr
- ☐ 72 hr

all species 2 hrs prior to test
mysids daily
all species except *H. azteca* 2 hr prior to renewal
H. azteca 0 hr and 48 hr

Concentration µg/L mg/L (circle)	Replicate	Chamber #	Test Hour 0 hr	24 hr	48 hr BR	48 hr AR	72 hr	96 hr
Control	A	D1	10	10	10	10	10	10
	B	D2	10	9 1D	9	9	8 2D	8
100	A	D3	10	9 1D	9	9	9	9
	B	D4	10	9 1D	9	9	9	9
200	A	D5	10	8 2D	8	8	8	8
	B	D6	10	7 3D	7	7	6 1D	6
300	A	D7	10	8 2D	6 2D	6	6	6
	B	D8	10	4 1D	7 2D	7	6 1D	6
400	A	D9	10	2 8D	0 2D	—	—	
	B	D10	10	4 6D	0 4D	—	—	
500	A	D11	10	0 10D				
	B	D12	10	1 9D	0 1D			
Organisms loaded by: JD		Checked by:	BA	JD	JD	JD	JD	MF

H. azteca		
0 hr	Alk	Hrd
Well		
100%		
96 hr	Alk	Hrd
Well		
100%		

Loading Verified by: RK AR = after renewal
m = missing d = dead BR = before renewal hr = hour

Investigators' Signatures
James Daniels
Bike ADL
Maryball Faircloth
Hans Walk

Reviewer: Lisa Miller

Comments:

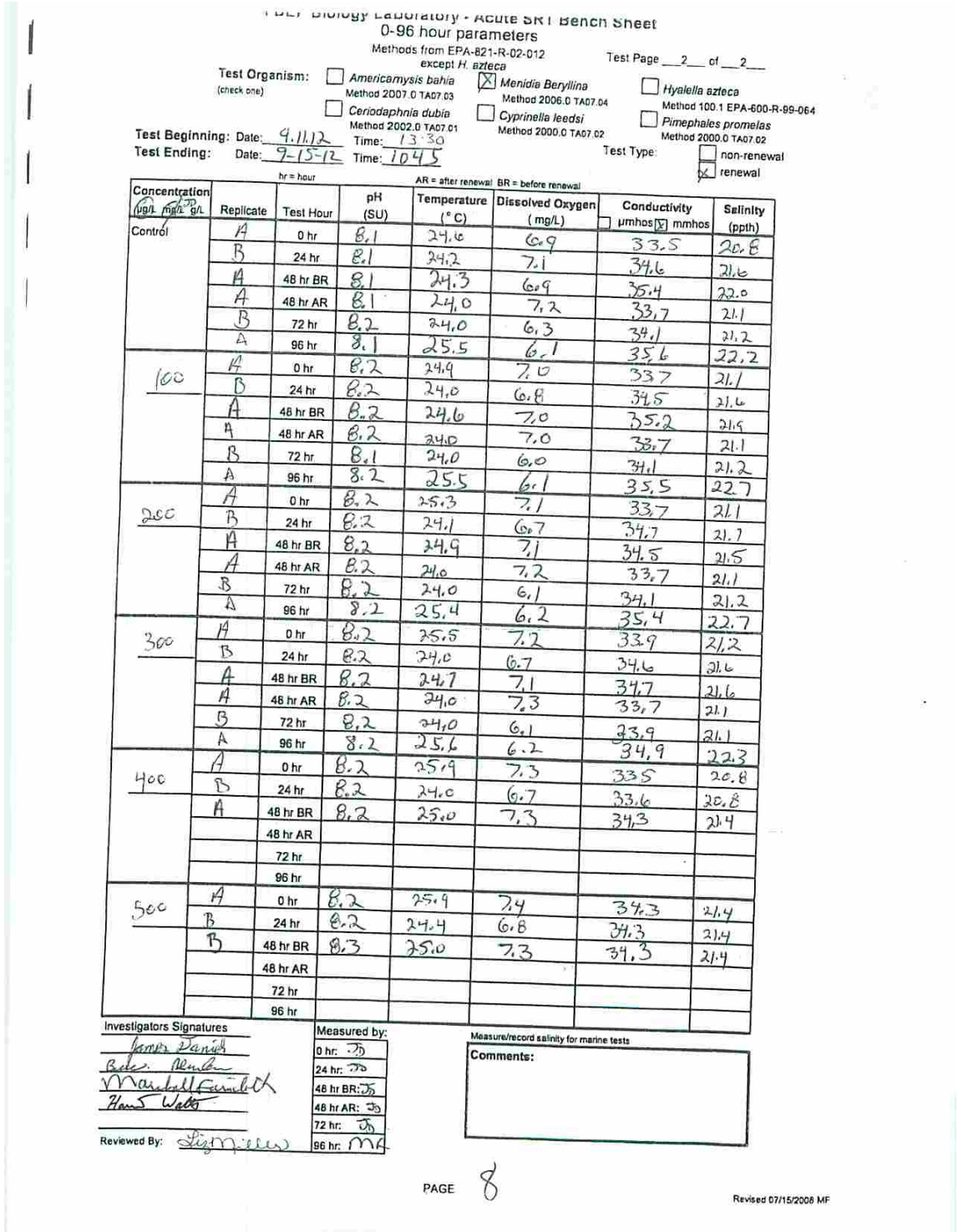
Method: TSK

Statistics: LC50	95% confidence intervals Lower	Upper
48 hour: —	—	—
96 hour: 273.15	240.92	309.70

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Revised 7/15/2008 mf

Appendix C. (continued)



FDEP Biology Laboratory - Acute SRT Bench Sheet
0-96 hour parameters
Methods from EPA-821-R-02-012
except *H. azteca*

Test Page 2 of 2

Test Organism: (check one)
- ☐ *Americamysis bahia* Method 2007.0 TA07.03
- ☒ *Menidia Beryllina* Method 2006.0 TA07.04
- ☐ *Hyalella azteca* Method 100.1 EPA-600-R-99-064
- ☐ *Ceriodaphnia dubia* Method 2002.0 TA07.01
- ☐ *Cyprinella leedsi* Method 2000.0 TA07.02
- ☐ *Pimephales promelas* Method 2000.0 TA07.02

Test Beginning: Date: 4.11.12 Time: 13:30
Test Ending: Date: 4-15-12 Time: 1045
Test Type: ☐ non-renewal ☒ renewal

hr = hour AR = after renewal BR = before renewal

Concentration (µg/L mg/L g/L)	Replicate	Test Hour	pH (SU)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity ☐ µmhos ☒ mmhos	Salinity (ppth)
Control	A	0 hr	8.1	24.6	6.9	33.5	20.8
	B	24 hr	8.1	24.2	7.1	34.6	21.6
	A	48 hr BR	8.1	24.3	6.9	35.4	22.0
	A	48 hr AR	8.1	24.0	7.2	33.7	21.1
	B	72 hr	8.2	24.0	6.3	34.1	21.2
	A	96 hr	8.1	25.5	6.1	35.6	22.2
100	A	0 hr	8.2	24.9	7.0	33.7	21.1
	B	24 hr	8.2	24.0	6.8	34.5	21.6
	A	48 hr BR	8.2	24.6	7.0	35.2	21.9
	A	48 hr AR	8.2	24.0	7.0	33.7	21.1
	B	72 hr	8.1	24.0	6.0	34.1	21.2
	A	96 hr	8.2	25.5	6.1	35.5	22.7
200	A	0 hr	8.2	25.3	7.1	33.7	21.1
	B	24 hr	8.2	24.1	6.7	34.7	21.7
	A	48 hr BR	8.2	24.9	7.1	34.5	21.5
	A	48 hr AR	8.2	24.0	7.2	33.7	21.1
	B	72 hr	8.2	24.0	6.1	34.1	21.2
	A	96 hr	8.2	25.4	6.2	35.4	22.7
300	A	0 hr	8.2	25.5	7.2	33.9	21.2
	B	24 hr	8.2	24.0	6.7	34.6	21.6
	A	48 hr BR	8.2	24.7	7.1	34.7	21.6
	A	48 hr AR	8.2	24.0	7.3	33.7	21.1
	B	72 hr	8.2	24.0	6.1	33.9	21.1
	A	96 hr	8.2	25.6	6.2	34.9	22.3
400	A	0 hr	8.2	25.9	7.3	335	20.8
	B	24 hr	8.2	24.0	6.7	33.6	20.8
	A	48 hr BR	8.2	25.0	7.3	34.3	21.4
		48 hr AR					
		72 hr					
		96 hr					
500	A	0 hr	8.2	25.9	7.4	34.3	21.4
	B	24 hr	8.2	24.4	6.8	34.3	21.4
	B	48 hr BR	8.3	25.0	7.3	34.3	21.4
		48 hr AR					
		72 hr					
		96 hr					

Investigators Signatures
James Daniels
Beka Newton
Marshall Faircloth
Hans Walter

Reviewed By: Liz Miller

Measured by:
0 hr: JD
24 hr: JD
48 hr BR: JD
48 hr AR: JD
72 hr: JD
96 hr: MA

Measure/record salinity for marine tests

Comments:

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Revised 07/15/2008 MF

Appendix C. (continued)

DATE: 8-21-12 DURATION: 96 H TOXICANT : CdCl2
SPECIES: *Americamysis bahia*

RAW DATA: Concentration (ug/L)	Number Exposed	Mortalities
.00	20	0
6.25	20	0
12.50	20	0
25.00	20	8
50.00	20	19
100.00	20	20

SPEARMAN-KARBER TRIM: .00%

SPEARMAN-KARBER ESTIMATES: **LC50: 27.74**
95% LOWER CONFIDENCE: 23.49
95% UPPER CONFIDENCE: 32.76

DATE: 9/11/12 DURATION: 96 H TOXICANT : CuCl2

SPECIES: Menidia beryllina

RAW DATA: Concentration (ug/L)	Number Exposed	Mortalities
.00	20	2
100.00	20	2
200.00	20	6
300.00	20	8
400.00	20	20
500.00	20	20

SPEARMAN-KARBER TRIM: .00%

SPEARMAN-KARBER ESTIMATES: **LC50:273.15**
95% LOWER CONFIDENCE: 240.92
95% UPPER CONFIDENCE: 309.70

Appendix D. Test Organism Receipt

MARINCO BIOASSAY LABORATORY
The Aquatic Toxicology Specialists

NELAP Certification # E84191

Shipment Record

State of Florida Aquaculture Certificate Number AQ0668007

Shipping Date: 8/20/12

Ship to: FDEP

P.O. No: _____

Species	Quantity	Age	Brood/Lot Number	Temp. (°C)	pH (S.U.)	Salinity (‰)
Mysidopsis bahia	300 ac	4 DAYS	MS120816	25	7.9	20
Menidia beryllina	300 ac	12 DAYS	SS120808	25	7.9	20
						Hardness mg/L
Cyprinella leedsi						
Pimephales promelas	300	< 24 HRS	FM120814-1630	25	7.8	80
Ceriodaphnia dubia						
Daphnia magna						
YCT						
P. subcapitata						

Packed by: PM

Shipped Via: Fed Ex

Notes: _____

Thank you for your order.

4569 Samuel Street · Sarasota, FL 34233 · Tel: 941-925-3594 · Fax: 941-922-3874 · Web: www.biologylab.com

Appendix D. Continued

MARINCO BIOASSAY LABORATORY
The Aquatic Toxicology Specialists

NELAP Certification # E84191

Shipment Record

State of Florida Aquaculture Certificate Number AQ0668007

Shipping Date: 9/10/12

Ship to: FDEP

P.O. No: _____

Species	Quantity	Age	Brood/Lot Number	Temp. (°C)	pH (S.U.)	Salinity (‰)
Mysidopsis bahia						
Menidia beryllina	150 ac	12 DAYS	SSI2 0829	25	7.9	20
						Hardness mg/L
Cyprinella leedsi	150	11 DAYS	CL 120830	25	7.8	80
Pimephales promelas	250 ac	6 DAYS	FM 120904	25	7.8	80
Ceriodaphnia dubia						
Daphnia magna						
YCT						
P. subcapitata						

Packed by: PM

Shipped Via: Fed Ex

Notes: _____

Thank you for your order.

4569 Samuel Street · Sarasota, FL 34233 · Tel: 941-925-3594 · Fax: 941-922-3874 · Web: www.biologylab.com

Appendix E. Chemical Analyses performed on the effluent from the Tampa Bay Water Desalination facility EFF-1 NPDES sampling point for Outfall D-001, sampled on August 20, 2012.

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 9:45	D-001	AGP/LN	Algal Growth Potential	3.87	A	mg DryWt/L	3	3
8/20/2012 9:45	D-001	Chlorophyll/Grain Size/BOD	Chlorophyll-a, Corrected	1.6	I	ug/L	0.55	1.7
8/20/2012 9:45	D-001	Chlorophyll/Grain Size/BOD	Phaeophytin-a	0.4	U	ug/L	0.4	1.2
8/20/2012 9:45	D-001	Toxicology	Bioassay-Acute-Def-SW-Fish, LC50	100	L	LC50		
8/20/2012 9:45	D-001	Toxicology	Bioassay-Acute-Def-SW-Mysid, LC50	100	L	LC50		
8/20/2012 9:45	D-001	Metals	Beryllium	0.075	U	ug/L	0.075	0.3
8/20/2012 9:45	D-001	Metals	Calcium	696		mg/L	3.8	15
8/20/2012 9:45	D-001	Metals	Nickel	2.68		ug/L	0.25	1
8/20/2012 9:45	D-001	Metals	Copper	6.01		ug/L	0.5	1
8/20/2012 9:45	D-001	Metals	Antimony	1.05		ug/L	0.25	1
8/20/2012 9:45	D-001	Metals	Chromium	2.3		ug/L	0.3	1.2
8/20/2012 9:45	D-001	Metals	Lead	0.2	U	ug/L	0.2	0.8
8/20/2012 9:45	D-001	Metals	Arsenic	2.19		ug/L	0.25	1
8/20/2012 9:45	D-001	Metals	Magnesium	2030		mg/L	2	8
8/20/2012 9:45	D-001	Metals	Zinc	20	U	ug/L	20	80
8/20/2012 9:45	D-001	Metals	Silver	0.025	U	ug/L	0.025	0.1
8/20/2012 9:45	D-001	Metals	Selenium	0.61	I	ug/L	0.2	0.8
8/20/2012 9:45	D-001	Metals	Cadmium	0.05	U	ug/L	0.05	0.2
8/20/2012 9:45	D-001	Metals	Aluminum	36		ug/L	5	20
8/20/2012 9:45	D-001	Metals	Iron	90	U	ug/L	90	360
8/20/2012 9:45	D-001	Nutrients	Kjeldahl Nitrogen	0.96		mg N/L	0.16	0.4
8/20/2012 9:45	D-001	Nutrients	O-Phosphate-P	0.15		mg P/L	0.004	0.01
8/20/2012 9:45	D-001	Nutrients	Chloride	30000		mg Cl/L	100	250
8/20/2012 9:45	D-001	Nutrients	NO2NO3-N	0.05		mg N/L	0.004	0.01
8/20/2012 9:45	D-001	Nutrients	TSS	6	I	mg/L	3	10
8/20/2012 9:45	D-001	Nutrients	Ammonia-N	0.06	I	mg N/L	0.05	0.1
8/20/2012 9:45	D-001	Nutrients	Total-P	0.2		mg P/L	0.005	0.05
8/20/2012 9:45	D-001	Overflow	Radium 228-Counting Error	0.6		pCi/L		
8/20/2012 9:45	D-001	Overflow	Radium 226	2.5		pCi/L		
8/20/2012 9:45	D-001	Overflow	Radium 228	1.3		pCi/L		
8/20/2012 9:45	D-001	Overflow	Radium 226-Counting Error	0.3		pCi/L		
8/20/2012 9:45	D-001	Overflow	Alpha, Total	3		pCi/L		

Appendix E. Continued

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 9:45	D-001	Overflow	Alpha-Counting Error	1.4		pCi/L		
8/20/2012 9:45	D-001	Pesticides	Parathion Ethyl	0.096	UJ	ug/L	0.096	0.38
8/20/2012 9:45	D-001	Pesticides	Simazine	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Fonofos	0.048	UJ	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Diazinon	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Fenamiphos	0.14	U	ug/L	0.14	0.58
8/20/2012 9:45	D-001	Pesticides	Malathion	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Mevinphos	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Phorate	0.024	U	ug/L	0.024	0.096
8/20/2012 9:45	D-001	Pesticides	Chlorpyrifos Ethyl	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Butylate	0.096	U	ug/L	0.096	0.38
8/20/2012 9:45	D-001	Pesticides	Metalaxyl	0.19	U	ug/L	0.19	0.77
8/20/2012 9:45	D-001	Pesticides	Ametryn	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Parathion Methyl	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Alachlor	0.29	U	ug/L	0.29	1.2
8/20/2012 9:45	D-001	Pesticides	Bromacil	0.19	U	ug/L	0.19	0.77
8/20/2012 9:45	D-001	Pesticides	Hexazinone	0.14	U	ug/L	0.14	0.58
8/20/2012 9:45	D-001	Pesticides	Prometryn	0.096	U	ug/L	0.096	0.38
8/20/2012 9:45	D-001	Pesticides	Norflurazon	0.14	U	ug/L	0.14	0.58
8/20/2012 9:45	D-001	Pesticides	Naled	0.19	U	ug/L	0.19	0.77
8/20/2012 9:45	D-001	Pesticides	Azinphos Methyl	0.096	U	ug/L	0.096	0.38
8/20/2012 9:45	D-001	Pesticides	Metribuzin	0.096	U	ug/L	0.096	0.38
8/20/2012 9:45	D-001	Pesticides	Metolachlor	0.29	U	ug/L	0.29	1.2
8/20/2012 9:45	D-001	Pesticides	Chlorpyrifos Methyl	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Atrazine	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Ethion	0.048	U	ug/L	0.048	0.19
8/20/2012 9:45	D-001	Pesticides	Ethoprop	0.024	U	ug/L	0.024	0.096
8/20/2012 9:45	D-001	Priority Organic Pollutants	4-Chlorophenyl phenyl ether	1.9	U	ug/L	1.9	7.6
8/20/2012 9:45	D-001	Priority Organic Pollutants	Benzo(b)fluoranthene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	1,2,4-Trichlorobenzene	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2,4-Dimethylphenol	9.5	U	ug/L	9.5	38
8/20/2012 9:45	D-001	Priority Organic Pollutants	3,3'-Dichlorobenzidine	38	U	ug/L	38	150
8/20/2012 9:45	D-001	Priority Organic Pollutants	Anthracene	0.19	U	ug/L	0.19	0.76

Appendix E. Continued

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 9:45	D-001	Priority Organic Pollutants	Benzo(k)fluoranthene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Di-n-octyl phthalate	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Isophorone	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2,4-Dinitrotoluene	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2-Chlorophenol	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2-Methyl-4,6-dinitrophenol	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	4-Nitrophenol	14	U	ug/L	14	57
8/20/2012 9:45	D-001	Priority Organic Pollutants	Bis(2-chloroethyl)ether	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Bis(2-chloroisopropyl)ether	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	Naphthalene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Nitrobenzene	1.9	U	ug/L	1.9	7.6
8/20/2012 9:45	D-001	Priority Organic Pollutants	2,4,6-Trichlorophenol	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Chrysene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Dibenzo(a,h)anthracene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Hexachlorocyclopentadiene	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	Phenanthrene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Pyrene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Benzo(g,h,i)perylene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Hexachlorobutadiene	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	Indeno(1,2,3-cd)pyrene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	N-Nitrosodiphenylamine/ Diphenylamine	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	Phenol	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2,4-Dinitrophenol	14	U	ug/L	14	57
8/20/2012 9:45	D-001	Priority Organic Pollutants	4-Chloro-3-methylphenol	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Bis(2-ethylhexyl)phthalate	14	U	ug/L	14	57
8/20/2012 9:45	D-001	Priority Organic Pollutants	Butyl benzyl phthalate	4.8	U	ug/L	4.8	19
8/20/2012 9:45	D-001	Priority Organic Pollutants	Fluorene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Pentachlorophenol	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	2,4-Dichlorophenol	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2,6-Dinitrotoluene	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	4-Bromophenyl phenyl ether	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Acenaphthene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Benzidine	95	U	ug/L	95	380

Appendix E. Continued

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 9:45	D-001	Priority Organic Pollutants	Benzo(a)anthracene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Benzo(a)pyrene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Bis(2-chloroethoxy)methane	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Di-n-butyl phthalate	4.8	U	ug/L	4.8	19
8/20/2012 9:45	D-001	Priority Organic Pollutants	Hexachlorobenzene	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Hexachloroethane	2.9	U	ug/L	2.9	11
8/20/2012 9:45	D-001	Priority Organic Pollutants	N-Nitrosodimethylamine	1.9	U	ug/L	1.9	7.6
8/20/2012 9:45	D-001	Priority Organic Pollutants	2-Chloronaphthalene	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	2-Nitrophenol	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Acenaphthylene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	Diethyl phthalate	0.95	U	ug/L	0.95	3.8
8/20/2012 9:45	D-001	Priority Organic Pollutants	Dimethyl phthalate	9.5	U	ug/L	9.5	38
8/20/2012 9:45	D-001	Priority Organic Pollutants	Fluoranthene	0.19	U	ug/L	0.19	0.76
8/20/2012 9:45	D-001	Priority Organic Pollutants	N-Nitrosodi-n-propylamine	1.9	U	ug/L	1.9	7.6
8/20/2012 9:45	D-001	Field Parameter	Salinity	46.19		PPTh		
8/20/2012 9:45	D-001	Field Parameter	Dissolved Oxygen	4		mg/L		
8/20/2012 9:45	D-001	Field Parameter	pH	6.56				
8/20/2012 9:45	D-001	Field Parameter	Temperature	38.87		C		
8/20/2012 10:15	Field Blank	Metals	Calcium	0.075	U	mg/L	0.075	0.3
8/20/2012 10:15	Field Blank	Metals	Chromium	0.3	U	ug/L	0.3	1.2
8/20/2012 10:15	Field Blank	Metals	Antimony	0.25	U	ug/L	0.25	1
8/20/2012 10:15	Field Blank	Metals	Zinc	5	U	ug/L	5	20
8/20/2012 10:15	Field Blank	Metals	Beryllium	0.025	U	ug/L	0.025	0.1
8/20/2012 10:15	Field Blank	Metals	Arsenic	0.25	U	ug/L	0.25	1
8/20/2012 10:15	Field Blank	Metals	Aluminum	5	U	ug/L	5	20
8/20/2012 10:15	Field Blank	Metals	Lead	0.2	U	ug/L	0.2	0.8
8/20/2012 10:15	Field Blank	Metals	Iron	30	U	ug/L	30	120
8/20/2012 10:15	Field Blank	Metals	Silver	0.025	U	ug/L	0.025	0.1
8/20/2012 10:15	Field Blank	Metals	Copper	0.5	U	ug/L	0.5	1
8/20/2012 10:15	Field Blank	Metals	Selenium	0.2	U	ug/L	0.2	0.8
8/20/2012 10:15	Field Blank	Metals	Cadmium	0.05	U	ug/L	0.05	0.2
8/20/2012 10:15	Field Blank	Metals	Magnesium	0.04	U	mg/L	0.04	0.16
8/20/2012 10:15	Field Blank	Metals	Nickel	0.25	U	ug/L	0.25	1

Appendix E. Continued

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 10:15	Field Blank	Nutrients	Kjeldahl Nitrogen	0.08	U	mg N/L	0.08	0.2
8/20/2012 10:15	Field Blank	Nutrients	O-Phosphate-P	0.004	U	mg P/L	0.004	0.01
8/20/2012 10:15	Field Blank	Nutrients	Chloride	0.2	U	mg Cl/L	0.2	0.5
8/20/2012 10:15	Field Blank	Nutrients	Ammonia-N	0.01	U	mg N/L	0.01	0.02
8/20/2012 10:15	Field Blank	Nutrients	NO2NO3-N	0.004	U	mg N/L	0.004	0.01
8/20/2012 10:15	Field Blank	Nutrients	Total-P	0.004	U	mg P/L	0.004	0.01
8/20/2012 10:15	Field Blank	Overflow	Radium 228	0.7	U	pCi/L		
8/20/2012 10:15	Field Blank	Overflow	Radium 226	0.2	U	pCi/L		
8/20/2012 10:15	Field Blank	Overflow	Alpha, Total	0.6	U	pCi/L		
8/20/2012 10:15	Field Blank	Overflow	Radium 228-Counting Error	0.5		pCi/L		
8/20/2012 10:15	Field Blank	Overflow	Radium 226-Counting Error	0.1		pCi/L		
8/20/2012 10:15	Field Blank	Overflow	Alpha-Counting Error	0.3		pCi/L		
8/20/2012 10:15	Field Blank	Pesticides	Bromacil	0.2	U	ug/L	0.2	0.79
8/20/2012 10:15	Field Blank	Pesticides	Fenamiphos	0.15	U	ug/L	0.15	0.59
8/20/2012 10:15	Field Blank	Pesticides	Fonofos	0.049	UJ	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Metolachlor	0.3	U	ug/L	0.3	1.2
8/20/2012 10:15	Field Blank	Pesticides	Metribuzin	0.099	U	ug/L	0.099	0.39
8/20/2012 10:15	Field Blank	Pesticides	Ametryn	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Parathion Methyl	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Phorate	0.025	U	ug/L	0.025	0.099
8/20/2012 10:15	Field Blank	Pesticides	Norflurazon	0.15	U	ug/L	0.15	0.59
8/20/2012 10:15	Field Blank	Pesticides	Metalaxyl	0.2	U	ug/L	0.2	0.79
8/20/2012 10:15	Field Blank	Pesticides	Parathion Ethyl	0.099	UJ	ug/L	0.099	0.39
8/20/2012 10:15	Field Blank	Pesticides	Alachlor	0.3	U	ug/L	0.3	1.2
8/20/2012 10:15	Field Blank	Pesticides	Naled	0.2	U	ug/L	0.2	0.79
8/20/2012 10:15	Field Blank	Pesticides	Mevinphos	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Hexazinone	0.15	U	ug/L	0.15	0.59
8/20/2012 10:15	Field Blank	Pesticides	Diazinon	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Butylate	0.099	U	ug/L	0.099	0.39
8/20/2012 10:15	Field Blank	Pesticides	Atrazine	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Chlorpyrifos Methyl	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Simazine	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Malathion	0.049	U	ug/L	0.049	0.2

Appendix E. Continued

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 10:15	Field Blank	Pesticides	Ethion	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Chlorpyrifos Ethyl	0.049	U	ug/L	0.049	0.2
8/20/2012 10:15	Field Blank	Pesticides	Prometryn	0.099	U	ug/L	0.099	0.39
8/20/2012 10:15	Field Blank	Pesticides	Azinphos Methyl	0.099	U	ug/L	0.099	0.39
8/20/2012 10:15	Field Blank	Pesticides	Ethoprop	0.025	U	ug/L	0.025	0.099
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2,6-Dinitrotoluene	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Benzo(a)pyrene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Benzo(k)fluoranthene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Dibenzo(a,h)anthracene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Fluoranthene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Fluorene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	N-Nitrosodi-n-propylamine	1.9	U	ug/L	1.9	7.7
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2,4,6-Trichlorophenol	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2,4-Dinitrophenol	14	U	ug/L	14	58
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Anthracene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Bis(2-chloroethyl)ether	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Diethyl phthalate	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Dimethyl phthalate	9.6	U	ug/L	9.6	38
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Naphthalene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Nitrobenzene	1.9	U	ug/L	1.9	7.7
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Phenol	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2,4-Dinitrotoluene	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	3,3'-Dichlorobenzidine	38	U	ug/L	38	150
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Acenaphthene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Acenaphthylene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Benzo(b)fluoranthene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Benzo(g,h,i)perylene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Bis(2-chloroisopropyl)ether	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Di-n-octyl phthalate	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Hexachlorobutadiene	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Indeno(1,2,3-cd)pyrene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Pyrene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	1,2,4-Trichlorobenzene	0.96	U	ug/L	0.96	3.8

Appendix E. Continued

Date	Field ID	Analysis	Component	Results	Qualifier	Units	MDL	PQL
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	4-Chloro-3-methylphenol	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Isophorone	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	4-Nitrophenol	14	U	ug/L	14	58
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Bis(2-ethylhexyl)phthalate	14	U	ug/L	14	58
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Phenanthrene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2,4-Dichlorophenol	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2-Chlorophenol	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2-Methyl-4,6-dinitrophenol	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	4-Chlorophenyl phenyl ether	1.9	U	ug/L	1.9	7.7
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Hexachloroethane	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	N-Nitrosodiphenylamine/ Diphenylamine	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2,4-Dimethylphenol	9.6	U	ug/L	9.6	38
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2-Chloronaphthalene	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	2-Nitrophenol	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	4-Bromophenyl phenyl ether	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Benzo(a)anthracene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Bis(2-chloroethoxy)methane	0.96	U	ug/L	0.96	3.8
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Butyl benzyl phthalate	4.8	U	ug/L	4.8	19
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Hexachlorocyclopentadiene	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	N-Nitrosodimethylamine	1.9	U	ug/L	1.9	7.7
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Pentachlorophenol	2.9	U	ug/L	2.9	12
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Benzidine	96	U	ug/L	96	380
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Chrysene	0.19	U	ug/L	0.19	0.77
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Di-n-butyl phthalate	4.8	U	ug/L	4.8	19
8/20/2012 10:15	Field Blank	Priority Organic Pollutants	Hexachlorobenzene	0.96	U	ug/L	0.96	3.8

Appendix F. Facility Summary, Effluent Limits, and Permit Violations Recorded on Discharge Monitoring Report

State of Florida
Department of Environmental Protection
Facility Introduction & Summary

PART I: Information gathered prior to sampling event	
Prepared By: Peter Wenner	**Contact Number:** 813-632-7600 x442
Facility Name (as it appears on permit): Tampa Bay Water Desalination Facility	**Former Names:**
NPDES Permit Number: FL0186813	**Permit Expiration Date:** September 24, 2012
Physical Address: 13041 Wyandotte Road, Gibsonton, FL 33534	
District: Southwest	**County:** Hillsborough
Function of Facility: Provide potable water by desalination of marine water	
Facility Type: Drinking Water	**Permitted Capacity (MGD):** 19.5 MGD
Mean Flow for previous 12 months for all EXTERNAL outfalls listed in permit (list date range including months): June 2011-May 2012: 8.6 MGD	
If applicable, Mean Flow for previous 12 months for REUSE outfall(s) (list date range including months): N/A	
Description of type of Discharge: ☒ Continuous ☐ Intermittent ☐ Seasonal ☐ Rainfall Dependent ☐ Other, please specify	

Appendix F. (continued)

Description of Sampling Location(s) - actual permit designation of permitted sampling point(s):

a. Samples shall be taken at the monitoring site locations listed in permit condition I.A.1 and as described below:

Sample Point	Description of Monitoring Location
FLW-TECO	Total cooling water available prior to intake to RO Plant
FLW-INTAKE	Flow, intake to RO Plant form available cooling water
FLW-1 (V_1)	Calculated Flow, power plant cooling water available for mixing and dilution with RO discharge. FLW-1 = (FLW-TECO) – (FLW-INTAKE)
FLW-2 (V_2)	Flow, discharge of RO Concentrate from RO discharge pump station.
FLW-3 ($V_3 = V_1 + V_2$)	Calculated Flow, Total flow after mixing dilution water with RO Concentrate.
INT-1 (C_1)	Intake to the desalination facility prior to filtering or chemical additions. (Dilution Water Quality)
INT-2 (C_2)	Internal discharge from the RO discharge sample pump(RO Concentrate) prior to mixing with the TECO Big Bend Power Plant cooling water.
EFF-3 (C_3)	Effluent point-final, combined discharge of RO discharge and power plant cooling water.

Description of Permitted Outfall(s):

INTERNAL OUTFALLS:

D-001 is comprised of the following internal outfalls.

Outfall I-001 is located approximately at Latitude: 27° 47' 36", Longitude: 82° 24' 16".
Outfall I-002 is located approximately at Latitude: 27° 47' 36", Longitude: 82° 24' 12".
Outfall I-003 is located approximately at Latitude: 27° 47' 36", Longitude: 82° 24' 10".
Outfall I-004 is located approximately at Latitude: 27° 47' 36", Longitude: 82° 24' 05".

Appendix F. (continued)

Description of Treatment Process (if multiple discharge points, include a detailed map or diagram of facility):

TREATMENT DESCRIPTION

The pretreatment processes consist of (1) intake water disinfection and biological growth control with chlorine dioxide (ClO_2) and potassium permanganate ($KMnO_4$); (2) screening by a self-cleaning, continuous belt fine screen to remove suspended particulates or larger objects from raw water; (3) coagulation/flocculation with ferric chloride and an approved polymer as the coagulant and sulfuric acid for pH adjustment; (4) 32-cell single stage sand filtration; (5) pre-coat microfiltration with diatomaceous earth (DE); and (6) 5-micron cartridge filtration. Sodium bisulfite will be injected into the pretreated water to reduce disinfectant residual prior to the RO membranes.

Backwash water and coagulation/flocculation sludge from the pre-treatment system are sent to the sludge treatment system that includes a rapid mixing chamber, a flocculation tank, a Lamella clarifier and a belt press. Clarifier supernatant is routed to the discharge pump station to be discharged with the RO concentrate or recycled back to the head of the pretreatment process. Belt press pressate is returned to the rapid mixing chamber. Dewatered sludge is disposed of at a landfill.

The RO process consists of a first pass and a partial second pass set of RO membranes. The facility is designed to operate only one pass of RO treatment under most conditions. The second pass may be operated and the flow may be varied, as needed, to meet Tampa Bay Water's product water quality requirements. The first pass RO concentrate is routed to the discharge pump station for discharge to TECO Big Bend Power Plant's discharge Canal. The second pass RO concentrate is returned to the transfer pump station prior to the pre-coat microfiltration system. The initial flush of spent membrane cleaning solution generated during RO membrane cleaning will be diverted to a scavenger tank for off-site disposal. The remaining membrane cleaning rinse water will be routed to the concentrate discharge.

Post treatment of the RO permeate includes sodium hypochlorite addition for disinfection and addition of carbon dioxide, lime and sulfuric acid to adjust pH, alkalinity and hardness of the product water.

Appendix F. (continued)

PART I: Continued

List current Effluent Limits of Outfall(s) to be Sampled: This should include any AO or CO limits the facility may be under (Leave cell blank if not applicable)

	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS		
PARAMETERS (UNITS)	Monthly Average	Daily Maximum	Monitoring Frequency	Sample Type	Sample Point
RO Facility Intake Flow, MGD	NA	Report	Continuous	Recorder	FLW-INTAKE
Mixing Water Flow, MGD	NA	Report	Monthly	Calculated[1]	FLW-1
Dilution Ratio	See Item I.A.1.e.		Continuous	Calculated	FLW-1, FLW-2
RO Facility Discharge Flow, MGD	Report	22.8	Continuous	Recorder	FLW-2
	NA	22.8	Monthly	Recorder	FLW-2
Dissolved Oxygen (DO), mg/l	See Item I.A.1.d.		Weekly	4 Grabs/day	INT-2
	NA	Report (minimum)	Weekly	4 Grabs/day	INT-1
Chlorides, mg/l	NA	Report	7days/week	24-hr Composite	INT-1 (C_1)
	NA	Report	7days/week	24-hr Composite	INT-2 (C_2)
	NA	10% above intake	7days/week	Calculated[1]	EFF-3 (C_3)
Specific Conductance, umhos/cm	NA	Report	7days/week	24-hr Composite	INT-1
	NA	Report	7days/week	24-hr Composite	INT-2
Salinity, ppt	NA	Report	7days/week	24-hr Composite	INT-1 (C_1)
	NA	Report	7days week	24-hr Composite	INT-2 (C_2)
	NA	35.8	7days/week	Calculated[1]	EFF-3 (C_3)
Total Recoverable Copper, ug/l	NA	Report	Monthly	24-hr Composite	INT-1 (C_1)
	NA	Report	Monthly	24-hr Composite	INT-2 (C_2)
	NA	3.7	Monthly	Calculated[1]	EFF-3 (C_3)
Total recoverable Iron, mg/l	NA	Report	Monthly	24-hr Composite	INT-1 (C_1)
	NA	Report	Monthly	24-hr Composite	INT-2 (C_2)
	See Item I.A.1.e.		Monthly	Monthly	EFF-3 (C_3)
Total Recoverable Nickel, ug/l	NA	Report	Monthly	24-hr Composite	INT-1 (C_1)
	NA	Report	Monthly	24-hr Composite	INT-2 (C_2)

[1] See item I.A.1.b. for calculations
[2] See item I.A.1.f

Appendix F. (continued)

PART I: Continued					
List <u>current</u> Effluent Limits of Outfall(s) to be Sampled: This should include any AO or CO limits the facility may be under (Leave cell blank if not applicable)					
	NA	8.3	Monthly	Calculated[1]	EFF-3 (C_3)
Radium 226 + 228, Total, pCi/l	NA	Report	Monthly	24-hr Composite	INT-1 (C_1)
	NA	Report	Monthly	24-hr Composite	INT-2 (C_2)
	NA	5	Monthly	Calculated[1]	EFF-3 (C_3)
Alpha, Gross Particle Activity, pCi/l	NA	Report	Monthly	24-hr Composite	INT-1 (C_1)
	NA	Report	Monthly	24-hr Composite	INT-2 (C_2)
	NA	15	Monthly	Calculated[1]	EFF-3 (C_3)
pH, Standards Units	6.5 daily minimum	8.5	Continuous[2]	Meter	INT-2 (C_2)
Chronic Whole Effluent Toxicity	See I.A.1.h below			Grab	INT-1, INT-2

Appendix F. (continued)

PART I: Continued	
Receiving Waters: Hillsborough Bay	**Classification (indicate whether fresh or marine):** Class III Marine Waters
Toxicity Test Requirements (routine and/or additional test language, test species, salinity adjustment, etc.): See attached document: Tampa Bay Water Desalination Toxicity Language	
Administrative or Consent Orders (date executed, specific requirements, interim limit dates-if applicable, etc.): N/A	
Facility Mixing Zone Details (if applicable): N/A	
List Permit Violations (DMR data) and plant upsets that occurred at the plant within the last year:	

Date	Parameter and Units	Limit	Result
December 2011	Copper (µg/L)	3.7 µg/L	3.9 µg/L
April 2012	Iron (mg/L)	0.3 mg/L	6.3 mg/L
April 2012	Nickel (µg/L)	8.3 µg/L	8.7 µg/L
April 2012	Copper (µg/L)	3.7 µg/L	8.7 µg/L

Describe previous FYI and WQBEL study: No prior FYI's or WQBEL Studies have been performed.
Describe previous or current Enforcement Actions (including WLs):
Describe any violations or problems noted in previous inspection: See attached Compliance Inspection Report
Discuss whether DMR trends within previous five years are improving or declining:

Appendix F. (continued)

PART II: Sampling Event Information	
Date(s) sample collected: 20 August 2012	**Sampler(s):** Pete Wenner
Temperature (Deg C): 38.87	**pH (SU):** 6.56
Dissolved Oxygen (mg/L): 4.00	**Conductivity (umhos/cm):** 68500
Total Residual Chlorine (mg/L): N/A	**Total Residual Chlorine - after Disinfection (mg/L):** N/A
Method of Chlorination: N/A	**Method of De-chlorination:** N/A
Flow During Sample Collection for each outfall(MGD): 9.36 MGD	
Mean Flow for each outfall for previous 12 months based on sampling date (If samples are taken on more than one day, indicate Mean Flow for each day): 6.3 MGD	
Describe Discharge during Sampling Event: ☒ **Continuous** ☐ **Intermittent** ☐ **Seasonal** ☐ **Rainfall Dependent** ☐ **Other, please specify**	
Describe any conditions, difficulties or abnormal events that occurred during the sample collection and any other additional comments here: Sample point was a PVC spigot which provided a metered flow. Field parameters were thus taken by filling the calibration cup of the YSI and recording the pertinent data. Therefore, these data are not felt to be truly representative of the physical characteristics at the time of sampling.	

Appendix G. EPA End Sheet

The Bioassay of Tampa Bay Water Desalination Facility effluent sampled on August 20, 2012. NPDES #FL0186813.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, XSI-RI Optional)

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 1 8 6 8 1 3 11	12 1 2 0 8 2 0	18 B	19 S	20 2

Remarks

66

The Priority Pollutants Analysis of Tampa Bay Water Desalination Facility effluent sampled on August 20, 2012. NPDES #FL0186813.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, XSI-RI Optional)

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 1 8 6 8 1 3 11	12 1 2 0 8 2 0	18 X	19 S	20 2

Remarks

66

Biological Analyses of Tampa Bay Water Desalination Facility effluent sampled on August 20, 2012. NPDES #FL0186813.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, XSI-RI Optional)

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 F L 0 1 8 6 8 1 3 11	12 1 2 0 8 2 0	18 S	19 S	20 2

Remarks

66