Bioassays of

Florida Power and Light - Putnam Plant

East Palatka, Putnam County, Florida

NPDES #FL0032166

Sampled 4/11/94

July 1994

Biology Section
Division of Administrative and Technical Services

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Biology Section
Bureau of Laboratories
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Introduction

Florida Power and Light - Putnam Plant, East Palatka, Putnam County, Florida, NPDES #FL0032166, tests performed on 12 to 14 April 1994

This facility is located on US 17 in East Palatka and generates, transmits, and distributes electricity. The sample was collected from the combined effluent discharge formed by joining the cooling tower blowdown effluent (outfall 001) and neutralization basin effluent (outfall 006) streams. Both outfalls were active during the sampling period. The combined effluent stream is discharged to the St. Johns River.

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1993, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027F.

Results and Discussion

The FDEP Biology Section performed two 48-hour static acute screening toxicity bioassays on a sample of effluent from this facility. The salinity of the sample was about 2 ppt, therefore, the test species used for these bioassays were the mysid shrimp, *Mysidopsis bahia*, and the inland silverside, *Menidia beryllina*.

To accommodate the salinity requirement of 1-32 ppt for *Menidia*, the control water for the *Menidia* tests was adjusted to 2 ppt using an artificial sea salt mixture (Forty Fathoms®) to match the salinity of the effluent as collected. The salinity of the effluent sample was not adjusted for the *Menidia* test.

To accommodate the salinity requirement of 5-30 ppt for *Mysidopsis bahia*, artificial sea salts were used to adjust the salinity of both the control water and an aliquot of the effluent sample to the minimum required 5 ppt for the mysid test.

Test results indicated that the sample was not toxic to *Menidia beryllina* and minimally toxic to *Mysidopsis bahia*, producing one death in the 100% mysid test.

Total residual chlorine of the sample was < 0.03 mg/L in the laboratory and 0.15 mg/L in the field. Total ammonia was not detected in the sample. Further chemical analyses were performed on the sample, and base-neutral and acid-extractable organics and several metals were identified (Table 2). Volatile organic compounds were not detected in the sample. The copper (42 µg/L) and iron (907 µg/L) concentrations in the sample both exceeded their respective Class III marine surface water criterion of ≤ 2.9 µg/L for copper and ≤ 300 µg/L for iron (FAC 17-302.530). However, neither metal was present in amounts known to be acutely toxic to the test species.

Conclusion

The sample of effluent collected from this facility on 11 April 1994 did not show toxicity to *Menidia beryllina* but showed minimal toxicity to *Mysidopsis bahia*. The cause of toxicity was not determined.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the Florida Power and Light-Putnam Plant effluent performed on 12 to 14 April, 1994.

Menidia beryllina (inland silverside)

Concentration	Dilution Water	Sample	Total Volume
Control	500 mL	0 mL	500 mL
100 %	0 mL	500 mL	500 mL

Mysidopsis bahia (mysid shrimp)

Concentration	Dilution Water	Sample	Total Volume
Control	500 mL	0 mL	500 mL
100 %	0 mL	500 mL	500 mL

Table 2. Results of chemical analyses on the effluent from Florida Power and Light-Putnam Plant, sampled on 11 April, 1994.

Metals

Aluminum	395	µg/L [A]
Calcium	150	mg/L
Copper	42	µg/L
Iron	907	µg/L
Magnesium	48.7	mg/L
Nickel	15	µg/L [A]
Zinc	57	µg/L [A]

Volatile Organic Compounds

None Detected

Base-Neutral & Acid Extractables

Unidentifiable Organic Compounds (total) 675 µg/L

[A] Value reported is the mean of two or more determinations.

Table 3. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Florida Power & Light-Putnam Plant, East Palatka, Putnam County, Florida, NPDES# FL0032166, performed on 12 to 14 April, 1994.

Facility:	**FP&L-Putnam Plant**		**NPDES #**	**FL0032166**	Facility Type: **Power Plant**
Location:	U.S. 17, East Palatka		Contact/District:	E. Cordova/NE	
County:	Putnam		Test type:	static acute screen	
Sample Collection Date:	**4/11/94**	Time: 1100	# tests:	2	Receiving Water: St. Johns River
Test Beginning Date:	4/12/94	Time: 1400	Chlorination Type:	**Chlorinated**	
Test Ending Date:	4/14/94	Time: 1430			**Page 1 of 1**

Total Residual CL2	mg/L	Method
Field:	0.15	-
Lab:	< 0.03	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Artificial Sea Water:	< 0.017	0.00
100% Sample:	< 0.017	0.00

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Artificial Sea Water:	175	-
100% Sample:	150	-

Salinity	mysids (ppt) *	Menidia (ppt) *
Artificial Sea Water:	5.0	2.0
100% Sample:	5.0	2.0

* Salinity converted from conductivity readings

Organism: ***Mysidopsis bahia*** Life stage: 4 days

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity (mmhos/cm)	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.2	8.4	8.4	23.0	23.4	23.6	7.9	7.5	7.7	8.59	8.79
Control	5	5	5	8.2	8.4	8.4			23.6	7.9	7.5	7.7	8.59	8.80
100%	5	4	4	8.3	8.2	8.0	22.7	23.5	23.4	8.3	7.4	7.3	8.58	8.87
100%	5	5	5	8.3	8.2	8.0			23.4	8.3	7.3	7.2	8.58	8.89

Organism: ***Menidia beryllina*** Age: 13 days

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity (mmhos/cm)	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control	5	5	5	8.1	8.3	8.4	22.8	23.5	23.1	8.1	7.8	7.5	3.62	3.72
Control	5	5	5	8.1	8.3	8.3			23.0	8.1	7.8	7.6	3.62	3.82
100%	5	5	5	8.1	7.9	7.9	22.3	23.4	23.0	8.3	7.3	7.4	3.84	4.03
100%	5	5	5	8.1	8.0	7.9			23.0	8.3	7.2	7.2	3.84	4.00

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: FPL Putnam
Location: FPL - Putnam
County: PUTNAM
Contact/District: ED CORDOVA / NE
NPDES Permit #: FL00 Outfall #:
94 APR -12-07 77232

Sample Collection: Date 4-11-94 Time 1100
Test Beginning: Date 4-12-94 Time 1400
Test Ending: Date 4-14-94 Time 1430
Organism Batch #: 14 Diluent Batch #: 8
Organism Age: 4 days
Test Organism: Mysidopsis bahia

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Test Number: 1 of 2

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 / 9.0 @ 9.0	24.0 @ 24.0	8.3 @ 24.1	980 @ 1,000 / 9760 @ 10,000 @ 23.8 °C
24 hr	7.0 @ 7.0 / 9.0 @ 9.0	24.4 @ 24.4	8.3 @ 24.5	985 @ 1,000 / 9840 @ 10,000 @ 24.2 °C
48 hr	7.0 @ 7.0 / 9.0 @ 9.0	24.0 @ 24.1	8.3 @ 24.5	980 @ 1,000 / 9820 @ 10,000 @ 24.0 °C

Remarks:
2‰ was salinity of sample as collected.
Alk 135
Mysids were tested @ 5ppt. Effluent salinity adjusted w/ 40F salts from 2‰ to 5‰.

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
Control A	76	5	5	5	8.2	8.4	8.4	23.0	23.4	23.6	7.9	7.5	7.7	8.59	8.76	8.79
Control B	149	5	5	5	8.2	8.4	8.4			23.6	7.9	7.5	7.7	8.59	8.75	8.80
100% A	15	5	4	4	8.3	8.2	8.0	22.7	23.5	23.4	8.3	7.4	7.3	8.58	8.87	8.87
100% B	219	5	5	5	8.3	8.2	8.2			23.4	8.3	7.3	7.2	8.58	8.87	8.89
Measured/Loaded by:		TR	TM	MF	TR	TR	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF
Recorded by:		TR	TM	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF

Investigators' Signatures
Robin C. Rader
Tina Mikulski
Marshall Faircloth

Reviewer

form updated 7/8/93

(Salt Water) Water Quality Parameters

	Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.15	—	MD
Lab Total Residual Cl2:	<0.03	—	<0.03	DR-100	TR
Alkalinity:	175	—	135	Hach	TR
Hardness:	—	—	—	Hach	TR
Total Ammonia:	<0.017	—	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -56.4 Ammonia Blank: 2.80 Control Salinity: 5 ppt Sample Salinity: 5 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: FPL-Putnam
Location: FPL -Putnam/PALATKA?
County: PUTNAM
Contact/District: ED CORDOVA /NE
NPDES Permit #: FL00 94APR-12-07 77232 Outfall #:

Sample Collection: Date 4-11-94 Time 1100
Test Beginning: Date 4-12-94 Time 1400
Test Ending: Date 4-14-94 Time 1430
Organism Batch #: #13 Diluent Batch #: 8
Organism Age: 13 days
Test Organism: Menidia beryllina

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Test Number: 2 of 2

Remarks: 5‰ KP 2ppt was salinity of sample as collected. Alk 150

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.0	8.3 @ 24.1	980 @ 1,000 9760 @ 10,000 @ 23.8 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.4	8.3 @ 24.5	985 @ 1,000 9840 @ 10,000 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.3 @ 24.5	980 @ 1,000 9820 @ 10,000 @ 24.0 °C

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
		0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	4	5	5	5	8.1	8.3	8.4	22.8	23.5	23.1	8.1	7.8	7.5	3.62	3.71	3.72
Control B	25	5	5	5	8.1	8.3	8.3			23.0	8.1	7.8	7.6	3.62	3.81	3.82
100% A	630	5	5	5	8.1	7.9	7.9	22.3	23.4	23.0	8.3	7.3	7.4	3.84	4.02	4.03
100% B	11	5	5	5	8.1	8.0	7.9			23.0	8.3	7.2	7.2	3.84	4.02	4.00
Measured/Loaded by:		TR	TM	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF	TR	TM	MF
Recorded by:		TR	TM	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF	TR	TR	MF

Investigators' Signatures

Peter C. Rader

Tina Mikulski

Marshall Faircloth

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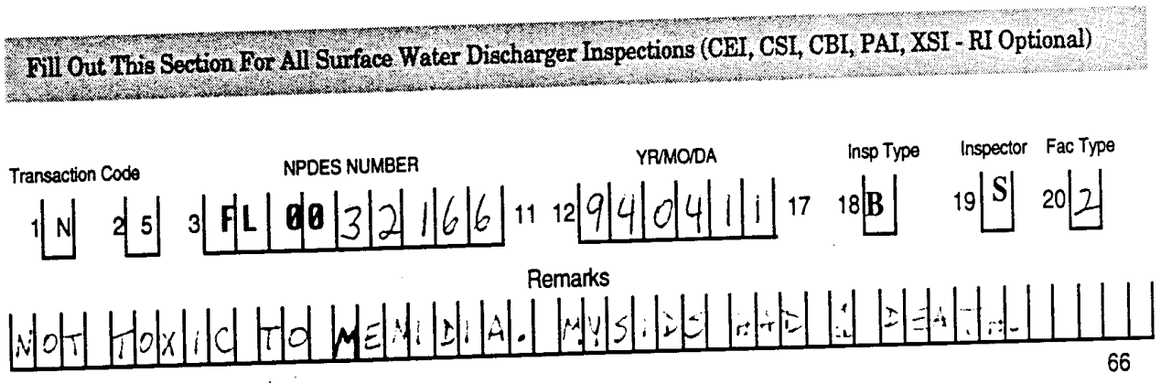
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Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			0.15	—	MD
Lab Total Residual Cl2:	<0.03	—	<0.03	DR-100	TR
Alkalinity:	175	—	~~185~~ 150 TR	Hach	TR
Hardness:	—	—	—	Hach	TR
Total Ammonia:	<0.017	—	150 <0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -56.4 Ammonia Blank: 20.017

Control Salinity: 2 ppt Sample Salinity: 2 ppt

The Bioassay of the Florida Power and Light-Putnam Plant effluent sampled on 11 April, 1994, NPDES# FL0032166.



The Priority Pollutants Analysis for the Bioassay of the Florida Power and Light-Putnam Plant effluent sampled on 11 April, 1994, NPDES# FL0032166.

