

Bioassays of

St Johns River Power Park

Jacksonville, Duval County, Florida

NPDES #FL0037869

Sampled 4/4/94

July 1994

Biology Section
Division of Administrative and Technical Services

Bioassays of

St Johns River Power Park

Jacksonville, Duval County, Florida

NPDES #FL0037869

Biology Section
Bureau of Laboratories
July 1994

Introduction

St. Johns River Power Park, Jacksonville, Duval County, Florida, NPDES #FL0037869, tests performed on 5 to 7 April 1994.

This electric generating plant is located at 11201 New Berlin Road in Jacksonville. The facility has two 644-MW coal-fired units. Cooling tower blow-down water is combined with treated low-volume wastewater prior to discharge. Low-volume wastewater includes sources such as coal storage runoff, tranformer storage runoff, demineralizer wastewater, and boiler blowdown water. Cooling water is treated by chlorination several hours each day for reduction of biological growth. Treatment of low-volume wastewater consists of clarification by sedimentation, neutralization, and sand filtration. Approximately 33 MGD of effluent is discharged to the northside generating station canal which connects to the St. Johns River (facility summary provided by Ed Cordova, FDEP Jacksonville).

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 29 ppt, therefore, the test species used for these bioassays were the mysid shrimp, *Mysidopsis bahia*, and the inland silverside, *Menidia beryllina*. The control waters for these tests were adjusted to 29 ppt using an artificial sea salt mixture (Forty Fathoms®) to match the salinity of the effluent as collected. No deaths occurred in the mysid test. In the *Menidia* test, 10% mortality occurred in both the control and 100% test concentration.

Total residual chlorine of the sample was 0.04 mg/L in the laboratory. Total residual chlorine was not measured in the field. Total ammonia was not detected in the sample. Further chemical analyses were performed on the sample of effluent and several metals and volatile organic compounds were identified (Table 2).

Cyanide was analyzed for but not detected in the effluent sample. Several metals were also identified (Table 2) in a sample of cooling water *influent* collected from this facility on 4 April 1994. Volatile organic compounds were not detected in the influent sample. Cyanid analyses were not performed on the influent sample.

Conclusion

The sample of effluent collected from this facility on 4 April 1994 did not show toxicity to *Mysidopsis bahia*. The cause of the deaths in the *Menidia beryllina* test was not determined.

Table 1. Concentration series and volumes used for the 48-hour static acute screening bioassays of the St. Johns River Power Park effluent performed on 5 to 7 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 and influent from St. Johns River Power Park, sampled on 4 April, 1994.

Cyanide (Effluent only)

None detected

Base-Neutral & Acid Extractables (Effluent only)

None Detected

Metals

	Effluent	Influent
Aluminum	406 µg/L	222 µg/L [A]
Cadmium	O	2.4 µg/L [I]
Calcium	409 mg/L	277 mg/L [A]
Iron	140 µg/L	50.4 µg/L [A]
Magnesium	1190 mg/L	817 mg/L [A]
Silver	0.7 µg/L [I]	0.5 µg/L [I]
Zinc	O	36 µg/L [I]

Volatile Organic Compounds

Effluent		Influent
Bromoform	86 µg/L	No VOC's detected
Dibromochloromethane	3.5 µg/L	

[A] Value reported is the mean of two or more determinations.
[I] Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit.
[O] Sampled, but analysis lost or not performed.

Table 3. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the St. Johns River Power Park, Jacksonville, Duval County, Florida, NPDES# FL0037869, performed on 5 to 7 April, 1994.

Facility:	**St. Johns River Power Plant**		**NPDES #**	**FL0037869**	Facility Type:	**Power Plant**	
Location:	Jacksonville		Contact/District:	Rich Bowman / Northeast			
County:	Duval		Test type:	static acute screen	Receiving Water:	Northside Generating	
Sample Collection Date:	**4/4/94**	Time: 1200	# tests:	2		Station Canal to	
Test Beginning Date:	4/5/94	Time: 1530	Chlorination Type:	**Chlorinated**		St. Johns River	
Test Ending Date:	4/7/94	Time: 1530				**Page 1 of 1**	

Total Residual CL2	mg/L	Method
Field:	Not Measured	-
Lab:	0.04	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:	115	-

Salinity	ppt *
Artificial Sea Water:	29.1
100% Sample:	29.4

* 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	8.3	8.3	8.2	21.4	23.1	22.8	7.5	6.6	6.9	41.8	42.9
Control	5	5	5	8.3	8.3	8.3			22.8	7.6	6.6	7.0	41.7	43.2
100%	5	5	5	8.0	7.9	7.9	21.9	23.1	22.8	7.8	6.4	6.5	42.7	43.6
100%	5	5	5	8.0	7.9	7.9			22.8	7.8	6.4	6.5	42.8	43.7

Organism: ***Menidia beryllina*** Age: 6 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	4	8.3	8.3	8.3	21.4	23.0	22.8	7.6	6.9	7.0	41.6	43.0
Control	5	5	5	8.3	8.3	8.3			22.8	7.6	7.0	7.1	41.6	43.2
100%	5	5	4	8.0	8.0	8.1	21.9	23.0	22.8	7.7	7.1	7.3	42.7	43.9
100%	5	5	5	8.0	8.0	8.1			22.9	7.7	7.1	7.3	42.9	43.9

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: St. John's River Power Plant
Location:
County: Duval
Contact/District:
NPDES Permit #: FL00 Outfall #:
94-Apr-05-21 70603

Sample Collection: Date 4/4/94 Time 1200
Test Beginning: Date 4/5/94 Time 1530
Test Ending: Date 4/7/94 Time 1530
Organism Batch #: 13 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

Remarks:

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	24.2 @ 24.3	8.4 @ 23.5	970 @ 1,000 9620 @ 10,000 @ 23.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.3 @ 23.3	8.4 @ 23.6	975 @ 1,000 9740 @ 10,000 @ 23.6 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.9 @ 23.1	8.4 @ 23.8	965 @ 1,000 9770 @ 10,000 @ 23.6 °C

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) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	2	5	5	5	8.3	8.3	8.2	21.4	23.1	22.8	7.5	6.6	6.9	41.8	43.1	42.7
Control B	87	5	5	5	8.3	8.3	8.3			22.8	7.6	6.6	7.0	41.7	43.2	43.2
100% A	23	5	~~4~~ 5	5	8.0	7.9	7.7	21.9	23.1	22.8	7.8	6.4	6.5	42.7	43.9	43.6
100% B	630	5	5	5	8.0	7.9	7.9			22.8	7.8	6.4	6.5	42.8	43.9	43.7
			*mysid found after number recorded. mf 4/6/94													
Measured/Loaded by:		TR	mF	MF	DW	mF	MF	DW	mF	MF	DW	mF	MF	DW	mF	MF
Recorded by:		TR	TM	DW	TR	TM	DW	TR	TM	DW	TR	TM	DW	TR	TM	DW

Investigators' Signatures

Reviewer

Water Quality Parameters	(Salt Water) Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not measured		
Lab Total Residual Cl2:	<0.03	—	0.04	DR-100	TR
Alkalinity:	175	—	115	Hach	TR
Hardness:	—	—	—	—	—
Total Ammonia:	<0.017	—	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -56.5 Ammonia Blank: <0.017 Control Salinity: 29.1 ppt Sample 29.4 ppt

FDEP Biology Section — Acute Biology Data

Sample Source: St. John's River Power Plant
Location:
County: Duval
Contact/District:
NPDES Permit #: FL00 94-APR-05-21 76063 Outfall #:

Sample Collection: Date 4/4/94 Time 1200
Test Beginning: Date 4/5/94 Time 1530
Test Ending: Date 4/7/94 Time 1530
Organism Batch #: 13 Diluent Batch #: 8
Organism Age: 6 days
Test Organism: Menidia beryllina

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

Test Number: 2 of 2

Remarks:

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	24.2 @ 24.3	8.4 @ 23.5	970 @ 1,000 9620 @ 10,000 @ 23.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.3 @ 23.3	8.4 @ 23.6	975 @ 1,000 9740 @ 10,000 @ 23.6 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.9 @ 23.1	8.4 @ 23.8	965 @ 1,000 9770 @ 10,000 @ 23.6 °C

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); Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	413	5	5	4	8.3	8.3	8.3	21.4	23.0	22.8	7.6	6.9	7.0	41.6	43.2	43.0
Control B	86	5	5	5	8.3	8.3	8.3			22.8	7.6	7.0	7.1	41.6	43.3	43.2
100% A	424	5	5	4	8.0	8.0	8.1	21.9	23.0	22.8	7.7	7.1	7.3	42.7	43.9	43.9
100% B	333	5	5	5	8.0	8.0	8.1			22.9	7.7	7.1	7.3	42.9	44.0	43.9
Measured/Loaded by:		DW	MF	MF	DW	MF	MF	DW	MF	MF	DW	MF	MF	DW	MF	MF
Recorded by:		TR	TM	DW	TR	TM	DW	TR	TM	DW	TR	TM	DW	TR	TM	DW

Investigators' Signatures

Robin C. Rader
Tina Mikulski
Marshall Frenkel
Reviewer

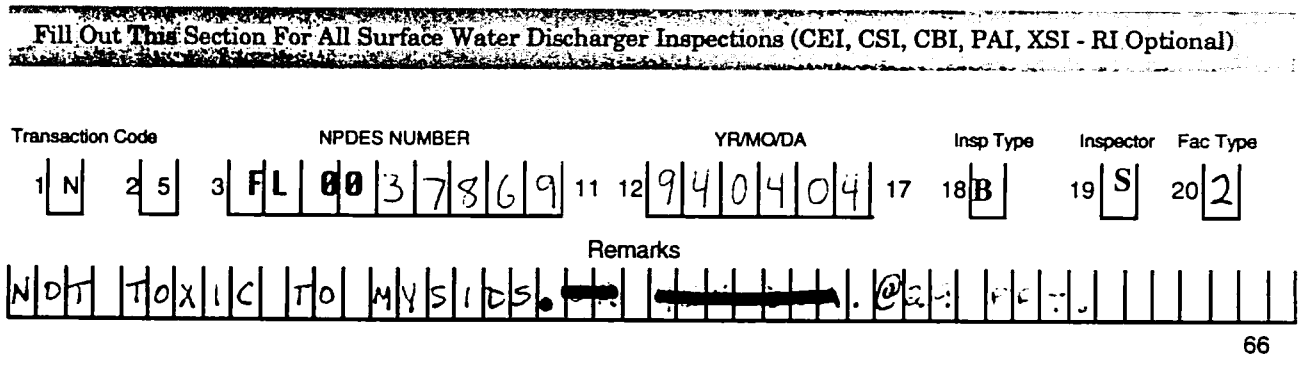
Water Quality Parameters

	(Salt Water) Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			<0.04	not measured	
Lab Total Residual Cl2:	<0.03	—	~~<0.5~~	DR100	TR
Alkalinity:	175	—	115	Hach	TR
Hardness:	—	—	—	—	—
Total Ammonia:	<0.017	—	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: 56.5 Ammonia Blank: <0.017 Control Salinity: 29.1 ppt Sample Salinity: 29.4 ppt

form updated 7/8/93

The Bioassay of the St. Johns River Power Park effluent sampled on 4 April, 1994, NPDES# FL0037869.



The Priority Pollutants Analysis for the Bioassay of the St. Johns River Power Park effluent sampled on 4 April, 1994, NPDES# FL0037869.

