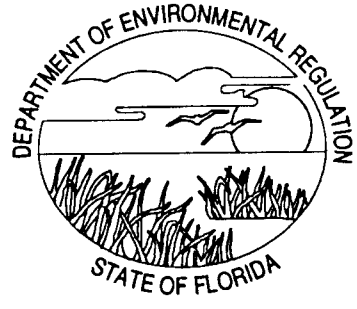


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Bioassays of the Town of

Jupiter Reverse Osmosis Plant

Jupiter, Palm Beach County, Florida

NPDES #FL0042358

Sampled 8/3/92

September 1992

Biology Section
Division of Technical Services

Bioassays of the Town of

Jupiter Reverse Osmosis Plant

Jupiter, Palm Beach County, Florida

NPDES #FL0042358

Biology Section
Bureau of Laboratories
September 1992

Introduction

Town of Jupiter Reverse Osmosis Plant, Palm Beach County, Florida, NPDES # FL0042358, tests performed on 4 to 8 August, 1992.

This facility utilizes a two-stage reverse osmosis process for the production of potable water for the Town of Jupiter. Daily production of 6 mgd of treated, potable water results in an average 1.5 mgd of process reject water. Discharge of reject water is to the C-18 Canal near the southwest fork of the Loxahatchee River. These waters are designated as Class II waters in 17-302.600 (3)(c) 50, F.A.C. The permittee is authorized a limited mixing zone for fluoride and combined radium 226+228. The mixing zone extends radially 1,000 feet into the C-18 Canal from the discharge pipe.

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1991, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027.

Results and Discussion

The FDER Biology Section performed a 96-hour acute definitive static-renewal toxicity bioassay on a sample of effluent from this facility. The salinity of the sample was 20 ppt, therefore, the bioassay organism used for these tests was the mysid shrimp, *Mysidopsis bahia*. The control water for the tests was adjusted to a similar salinity using an artificial sea salt mixture (Forty Fathoms®); the salinity of the sample was not altered. The test results indicated that the effluent was toxic to the mysids, producing a 96-hour LC_{50} of 70%.

Total residual chlorine was not detected in the sample. Total and unionized ammonia concentrations were 1.50 mg/L and 0.08 mg/L, respectively. Further chemical analyses were performed on the sample for metals, organics, and pesticides. The metals, calcium and magnesium, were present at 457 mg/L and 661 mg/L, respectively. These levels are much lower than for seawater. Severe spectral interference was encountered in the analysis for antimony, chromium, copper, iron, and zinc. Unidentified organic compounds were estimated at 10 µg/L. Pesticides and herbicides were not detected.

Conclusion

The sample of effluent from this facility collected on 3 August, 1992, was toxic to the mysids, producing a 96-hr LC_{50} of 70%.

Table 1. Concentration Series and Volumes Used for the 96-hour Static Acute Definitive Bioassay of the Jupiter R/O Plant effluent performed on 4 to 8 August, 1992.

Mysidopsis bahia (mysid shrimp)

Concentration	Dilution Water	Sample	Total Volume
Control	500 mL	0 mL	500 mL
25 %	375 mL	125 mL	500 mL
50 %	250 mL	250 mL	500 mL
75 %	125 mL	375 mL	500 mL
100 %	0 mL	500 mL	500 mL

Table 2. Results of chemical analyses on the effluent from Jupiter Reverse Osmosis Plant, sampled on 3 August, 1992.

Pesticides & Herbicides

none detected

Metals

Calcium	457	mg/L
Magnesium	661	mg/L

Severe spectral interference for Sb, Cr, Cu, Fe, Zn.

Base-Neutral & Acid Extractables

Tentative identification and estimated concentrations:

unidentified compounds	10	µg/L

Table 3. Data recorded during the 96-hour static renewal definitive bioassay of a sample of effluent from the Town of Jupiter Reverse Osmosis Plant, Palm Beach County, Florida, NPDES #FL0042358, on 4 to 8 August, 1992.

Facility:	**Town of Jupiter R/O Plant**	**NPDES #**	**FL0042358**	Facility Type:	**Reverse Osmosis**
Location:	Jupiter	Contact/District:	T. Davis/T. Powell/SE		Drinking Water
County:	Palm Beach	Test type:	static renewal definitive		Treatment
Sample Collection Date:	**8/3/92** Time: 1015	# tests:	1	Receiving Water:	C-18 Canal near SW fork
Test Beginning Date:	8/4/92 Time: 1400	Chlorination Type:	**Non-chlorinated**		of Loxahatchee River
Test Ending Date:	8/8/92 Time: 1430				**Page 1 of 1**

Total Residual Cl2	mg/l	Method
Field:	not measured	-
Lab:	0.0	Hach

Ammonia	Total (mg/l)	Unionized (mg/l)
Salt Water (mysids):	0.00	0.00
100% Sample:	1.50	0.08

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Salt Water (mysids):	90	-
100% Sample:	411	-

Salinity (ppt)	
Saltwater Control:	20.3
100% Sample:	19.0

Organism: ***Mysidopsis bahia*** Age: 1 to 2 days

LC50: 70.34% Trimmed-Spearman-Karber method (95% C.I. = 63.18,78.32%)

* Before Renewal

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	# at 0 hr	Live at 24 hr	Live at 48 hr	0 hr	24 hr	48 hr*	0 hr	24 hr	48 hr*	0 hr	24 hr	48 hr*	0 hr	48 hr*
Control	5	5	5	8.4	8.2	8.1	24.0	23.2	23.4	8.0	7.5	7.3	-	-
Control	5	5	5	8.4	8.3	8.1	-	-	-	8.0	7.6	7.3	31,900	32,100
25%	5	5	5	8.2	8.2	8.2	24.8	23.1	23.3	7.6	7.5	7.2	-	-
25%	5	5	5	8.2	8.2	8.2	-	-	-	7.6	7.1	7.1	33,500	33,300
50%	5	5	5	8.0	8.2	8.3	25.5	23.1	23.5	7.6	7.1	7.1	-	-
50%	5	5	5	8.0	8.2	8.3	-	-	-	7.6	7.1	7.1	33,000	32,300
75%	5	5	4	7.9	8.2	8.3	26.2	23.2	23.5	7.5	7.0	7.0	-	-
75%	5	5	2	7.9	8.2	8.3	-	-	-	7.5	7.0	7.0	32,500	31,400
100%	5	5	1	7.9	8.2	8.4	26.8	23.2	23.3	7.7	7.0	7.2	-	-
100%	5	5	2	7.9	8.2	8.4	-	-	-	7.7	7.0	7.1	31,800	30,300

** After Renewal

	SURVIVAL			pH			Temperature			Dissolved Oxygen			Conductivity	
Concentrations	48 hr **	Live at 72 hr	Live at 96 hr	48 hr**	72 hr	96 hr	48 hr**	72 hr	96 hr	48 hr**	72 hr	96 hr	48 hr**	96 hr
Control	5	5	5	8.5	8.2	8.0	24.2	23.5	23.0	6.9	6.7	7.6	-	-
Control	5	5	5	8.5	8.2	8.0	-	-	-	6.9	6.8	7.7	30,700	31,400
25%	5	5	5	8.2	8.2	8.3	24.2	23.5	23.0	7.0	6.8	7.7	-	-
25%	5	5	5	8.2	8.2	8.3	-	-	-	7.0	6.8	7.8	30,900	31,000
50%	5	5	5	8.1	8.2	8.4	24.2	23.5	23.0	7.2	6.8	7.9	-	-
50%	5	5	5	8.1	8.2	8.4	-	-	-	7.3	6.8	7.9	30,600	30,700
75%	4	2	2	8.0	8.2	8.4	24.2	23.5	23.0	8.5	6.9	7.9	-	-
75%	2	2	2	8.0	8.2	8.4	-	-	-	8.5	6.9	7.9	30,400	30,500
100%	1	0	-	8.0	8.2	-	24.2	23.5	-	7.8	6.8	8.0	-	-
100%	2	0	-	8.0	8.2	-	-	-	-	7.8	6.8	-	29,600	-

Table 4. 96-hr LC_{50} Data for Bioassay of Jupiter Reverse Osmosis Plant effluent performed on 4 to 8 August, 1992.

Non-chlorinated effluent

Organism	Method of Data Analysis	96-Hour LC_{50} (95% Confidence Intervals)
Mysidopsis bahia	Trimmed-Spearman-Karber	70.34% (63.18, 78.32%)

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: JUPITER REVERSE OSMOSIS Plant
Address/City: _____
County: _____
Contact/District: TERRY DAVIS / TIM POWELL / SE
NPDES Permit #: FL00 42358 Outfall #: _____

Sample Collection: Date 8-3-92 Time 1015
Test Beginning: Date 8-4-92 Time 1400
Test Ending: Date 8/8/92 Time 1430
Test Organism: M. BAHIA
Life Stage/Age: 1-2 days

Test Number: 1 of 1 Test Type: Screening / Definitive (KP) 38721 92-AUG-04-21
Static / Static Renewal / Flow-through (KP) entered 8/10/92 96-HR READINGS BY KP/KP

Remarks:
FOUND WE HAD ADEQUATE # OF MYSIDS FOR DEFINITIVE TEST INSTEAD, DESPITE CRASH OF YOUNG ORIGINALLY SET ASIDE FOR TEST

72hr pH DO Temp Cond: 7.6/7.10@10 8.4@25°C 24.7@24.2 958@24.2°C / 9850@24.2°C
96hr 7.7/7.10@10 8.5@24 23.9@23.9 942@24.1 / 9420 recorded counts in wrong copies KP 8/6/92

Instrument Calibrations:

	pH	DO	Temp	Cond @24.0
0 hr	7@7.10@10	8.5@24.0	23.9@ 23.9	962@1000 9620@10000
24 hr	7@7.10@10	8.4@25.0	24.2@ 24.2	986@1K 9830@10K
48 hr	7.7/7.10	8.5@24.0°C	24.5@24.5	969 9830 @ 24.4

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
control	326	5	5	5	8.4	8.2	8.1	24.0	23.2	23.4	8.0	7.5	7.3			
control	19	5	5	5	8.4	8.3	8.1				8.0	7.6	7.3	31900	31700	32100
100%	53	5	5	5/1	7.9	8.2	8.4	26.8	23.2	23.3	7.7	7.0	7.2			
100%	75	5	5	5/2	7.9	8.2	8.4				7.7	7.0	7.1	31800	29800	30300
25%	38	5	5	5	8.2	8.2	8.2	24.8	23.1	23.3	7.6	7.5	7.2			
25%	147	5	5	5	8.2	8.2	8.2				7.6	7.1	7.1	33500	32800	33300
50%	61	5	5	4/5	8.0	8.2	8.3	25.5	23.1	23.5	7.6	7.1	7.1			
50%	76	5	5	2/5	8.0	8.2	8.3				7.6	7.1	7.1	33000	31800	32300
75%	55	5	5	4	7.9	8.2	8.3	26.2	23.2	23.5	7.5	7.0	7.0			
75%	48	5	5	2	7.9	8.2	8.3				7.5	7.0	7.0	32500	30800	31400
		after renewal			after renewal			after renewal			after renewal			after renewal		
		48hr	72hr	96hr	48h	72h	96h	48h	72h	96h	48h	72h	96h	48h	72h	96
control	326	5	5	5	8.5	8.2	8.0	24.2	23.5	23.0	6.9	6.7	7.6			
control	19	5	5	5	8.5	8.2	8.0				6.9	6.8	7.7	30700	31200	31400
25%	38	5	5	5	8.2	8.2	8.3	24.2	23.5	23.0	7.0	6.8	7.7			
25%	147	5	5	5	8.2	8.2	8.3				7.0	6.8	7.8	30900	30800	31000
50%	61	5	5	5	8.1	8.2	8.4	24.2	23.5	23.0	7.2	6.8	7.9			
50%	76	5	5	5	8.1	8.2	8.4				7.3	6.8	7.9	30600	30500	30700
75%	55	4	2	2	8.0	8.2	8.4	24.2	23.5	23.0	8.5	6.9	7.9			
75%	48	2	2	2	8.0	8.2	8.4				8.5	6.9	7.9	30400	30300	30500
100%	53	1	0	—	8.0	8.2	—	24.2	23.5	—	7.8	6.8	8.0			
100%	75	2	0 MF	—	8.0	8.2 KP MF	—		KP MF		7.8	6.8 KP MF	—	29600	30200 KP MF	—
Measured/Loaded by:		MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		KP	KP	MF KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP

UNIONIZED AMMONIA CALC'D TO BE 0.0777 mg/L

Investigators' Signatures

Kim Pearce
Marshall Faircloth

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			not measured		
Lab Tot. Resid. Cl2:		0.0	0.0	Hach	MF
Alkalinity:		90	411	Hach	KP
Hardness:		—	—		
Total Ammonia:	0.0	0.0	0.0 1.5	Orion	MF

recalibrated 8/4/92 MF

Ammonia Meter Slope: -55.6
Ammonia Blank: 0.0
Salinity test Sample: 20 ppt

The Bioassay of the Town of Jupiter R/O Plant effluent sampled on August 3, 1992, NPDES# FL0042368.

