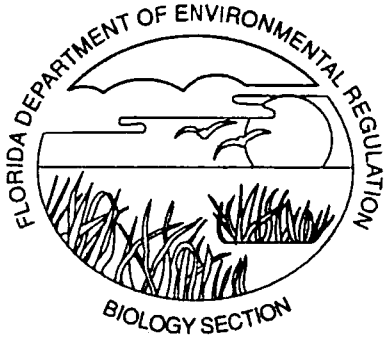


Bioassays of

Stock Island Electric Power Plant

City of Key West Utilities

Key West, Monroe County, Florida

NPDES #FL0002089

Sampled 5/30/89

October 18, 1989

Biology Section
Division of Administrative and Technical Services

Bioassays of

Stock Island Electric Power Plant

City of Key West Utilities

Key West, Monroe County, Florida

NPDES #FL0002089

Biology Section
Bureau of Laboratories
October 18, 1989

Introduction

Stock Island Electric Power Plant, Key West, Monroe County, Florida, NPDES #FL0002089, on 31 May to 2 June, 1989.

This facility is located on the southern peninsula of Stock Island, 1 1/2 miles from Key West, in the Florida Keys. The plant is operated by the Utility Board of the City of Key West and consists of a single unit, 37 MW capacity oil-fired steam generator. After aeration for dissolved-oxygen and hydrogen sulfide control, once-through cooling water is discharged into the Boca Chica Channel. The non-contact cooling water average flow is 26.9 MGD. The maximum flow is 44.1 MGD. Low-volume waste and metal cleaning water are treated and held in an evaporation/percolation pond. Material-storage runoff is discharged untreated.

The toxicity tests discussed in this report were performed in accordance with methods described by Peltier and Weber, 1985, *Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms*, 3rd Edition, and by the U.S. EPA, 1978, *Bioassay Procedures for the Ocean Disposal Permit Program.*

Results and Discussion

The sample of discharge from this facility was not toxic to the bioassay test organism, *Mysidopsis bahia*. Control mortality caused the bioassay test using *M. bahia* to be invalidated. The control water was prepared using Forty Fathoms® sea salt and deionized water. The control water was not aged and this may have been a factor in the control mortality. Cannibalism was the probable cause of the two deaths in the 100% sample (no bodies were found); no toxicity was indicated. The sample was stimulatory to the Microtox® assay test organism, *Photobacterium phosphoreum*. Since the sample was not toxic, chemical analyses were not performed.

Conclusion

The sample of discharge from the Stock Island Electric Power Plant was not toxic on 30 May, 1989.

Table 1. Concentration Series and Volumes Used for These Static Bioassays.

Mysidopsis bahia (mysid shrimp)

Concentration	Dilution Water	Sample	Total Volume
Control	500.0 ml	0.0ml	500 ml
100.0%	0.0 ml	500.0 ml	500 ml

Table 2. Data recorded during the 48 hour static screening bioassay of a sample of discharge from the Stock Island Electric Power Plant, Key West, Monroe County, Florida, NPDES #FL0002089 on 31 May to 2 June, 1989.

Facility:	Stock Island Electric Power Plant		NPDES #	FL0002089	Facility Type: Power Plant
Location:	Stock Island, Key West		Contact/District:	G. Rios / S	
County:	Monroe		Test type:	static screen	
Sample Collection Date:	5/30/89	Time: 1136	# tests:	1	Receiving Water: Boca Chica channel to Atlantic Ocean
Test Beginning Date:	5/31/89	Time: 1530	Chlorination Type:	nonchlorinated	
Test Ending Date:	6/2/89	Time: 1530			Page 1 of 1

Total Residual Cl2	mg/l	Method
Field:	-	-
Lab:	-	-
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water :	0.00	0.00
100% Sample:	0.00	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water :	172	-
100% Sample:	125	-

Salinity (ppt)	
Control Water:	36
100% Sample:	37

Organism: ***Mysidopsis bahia*** Life stage: 1-5 days
LC50: - Binomial: - Moving Average: - Probit: -

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
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	8	4	3	6.2	5.5	5.8	8.0	7.8	7.7	22.5	21.0	20.5	-	-
Control	8	5	4	6.2	5.6	5.7	8.0	7.8	7.7	-	-	-	52000	48000
100.0%	8	8	6*	5.6	6.1	5.9	7.9	7.8	7.7	21.8	21.0	20.5	-	-
100.0%	8	8	8	5.6	6.1	6.0	7.9	7.8	7.7	-	-	-	53000	52000

*no bodies

Table 3. Microtox test results, Stock Island Electric Power Plant, Monroe County, NPDES #FL0002089, on 31 May, 1989.

Microtox Test

% Sample	Final Reclaimed Water nonchlorinated	
	5-min	15-min
0	17	10
0	17	10
0	15	9
12.38	26	18
12.38	26	18
12.38	25	16
24.75	29	20
24.75	29	19
24.75	29	19
49.5	33	24
49.5	30	23
49.5	31	22
99	34	26
99	33	27
99	33	28

EC_{50} Nonchlorinated (15 minute, 15 °C) = stimulatory

EC_{50} (15 minute, 15 °C) is calculated using the Data Reduction Computer Program developed by Microbics Corporation for the Sharp Model EL-5100 calculator. (*Microbics Systems Operating Manual,* 1982, Microbics Corporation, Carlsbad,California.)

DER Biology Section --- Acute-bioassay Bench Sheet

Sample Source: KEY WEST UTILITIES - STOCK ISLAND STEAM PLANT
Address/City: STOCK ISLAND
County: MONROE
Contact/District: GUS RUIZ / SE
NPDES Permit #: FL0002089 Outfall #: 001

Sample Collection: Date 5/30/87 Time 1136
Test Beginning: Date 5/31/87 Time 1330
Test Ending: Date 6/2 Time 1430
Test Organism: MYSIDOPSIS BAHIA
Life Stage/Age: 1-5 days

Test Number: 1 of 1 Test Type: Screening (Definitive) Static | Static Renewal | Flow-through

Remarks: Control adjusted from 34.5 ‰, pH 7.8 to 37 ‰, pH 8.0.
* 6 live no bodies cannibalized?

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.99	8.0@22°	13300 22.4	22°C @ 22°C
24 hr	7.99	9.0@21	13300 22.3	22°
48 hr	7.99	9.0@21	13100 21.6	22°

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
CONTROL	58	4	4	3	6.2	5.5	5.8	8.0	7.8	7.7	22.5	21.0	20.5			
"	31	3	5	4	6.2	5.6	5.7	8.0	7.8	7.7				52.00		49.00
100%	~~2450~~	5	4	6*	5.6	6.1	5.9	7.9	7.8	7.7	21.8	21.0	20.5			
"	~~46~~ 99	5	8	8	5.6	6.1	6.0	7.9	7.8	7.7				53.00		52.00
30%	~~21~~															
"	160															
50%	40															
"	76															
76%	72															
"	6															
55%	18															
"	183															
100%	50															
"	99															
Measured by:		AH	MF	MF	AH	MF	MF	MF	MF	MF	AH	MF	MF	MF		AH
Recorded by:		MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF		MF

Investigators' Signatures

Steven Welsh
Reviewer

Water-quality Parameters

	Well Water	Cont. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:		172	125	Hach	AHW
Hardness:		—	—		
Total Ammonia:		0.0	0.0	ORION PRO 2	AHW

SLOPE = -57.3

MICROTOX™ Data Reduction Sheet

SOURCE: Key West Stock Island Power Plant cooling H2O

GRAPH CALC EC 50 (15 MIN, 15 °C) = ~~SAMPLE~~ STIMULATORY mgL

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.): effluent.

DATE ASSAYED: 6/1/89 TIME: 1100

VISUAL COLOR: clear CORRECTION REQUIRED: YES NO

VISUAL TURBIDITY: SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS DRY NaCl OTHER not adj.

PRIMARY DILUTION OF SAMPLE:

OPERATOR: N. Faircloth REAGENT VIAL LOT NO. ~~AC~~ AVLW

REMARKS: Sample @ 37‰ salinity

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	T5	T15	NOTES
A1	0	17	10	Y	X	
B1		17	10			
C1		13	9			
A2	12.38	26	18	-.36	-.44	
B2		26	18			
C2		25	16			
A3	24.75	29	20	-.44	-.50	
B3		29	19			
C3		29	19			
A4	49.5	33	24	-.48	-.58	
B4		30	23			
C4		31	22			
A5	99	34	26	-.51	-.64	
B5		33	27			
C5		33	28			
EC_{50} (MIN, °C)						STIMULATORY

REVIEWED BY:

DATE: 10/24/89