

Bioassays of

Boca Chica Naval Air Station
Wastewater Treatment Plant

Boca Chica Key, Monroe County, Florida

NPDES #FL0020982

Sampled 2/1/93

March 1993

Biology Section
Division of Technical Services

Bioassays of

Boca Chica Naval Air Station Wastewater Treatment Plant

Boca Chica Key, Monroe County, Florida

NPDES #FL0020982

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Bureau of Laboratories
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Introduction

Boca Chica NAS Wastewater Treatment Plant, US 1, Mile 7.7, Boca Chica Key, Monroe County, Florida, NPDES #FL0020982, on 2 to 4 February, 1993.

This facility is located at the Boca Chica Naval Air Station on Boca Chica Key. The design flow is 0.4 MGD with an average flow of 0.3 MGD. Treatment consists of extended aeration enhanced by contact stabilization, clarification, and chlorine disinfection and dechlorination. Construction of a dechlorination system was permitted October, 1991. Dechlorinated effluent is discharged to the Atlantic Ocean.

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 two 48-hour static acute toxicity bioassays on a sample of effluent from this facility. A definitive test was performed using the mysid shrimp, *Mysidopsis bahia*. A screening test was also performed using the inland silverside, *Menidia beryllina*.

The salinity of the sample was 10 ppt, therefore, the control water for the tests was adjusted to a salinity of 10 ppt using an artificial sea salt mixture (Forty Fathoms®); the salinity of the sample was not altered. The bioassays indicated that the sample from this facility was not toxic to *M. bahia* or *M. beryllina*.

Total residual chlorine levels in the sample in both the field and laboratory measurements were 0.17 mg/L and 0.02 mg/L, respectively. Total and unionized ammonia concentrations were 0.8 mg/L and < 0.01 mg/L, respectively.

Conclusion

The sample of effluent collected from this facility on 1 February, 1993, did not show toxicity.

Table 1. Concentration series and volumes used for the 48-hour static acute definitive and screening bioassays of the NAS Boca Chica WWTP effluent performed on 2 to 4 February, 1993.

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

Menidia beryllina (inland silverside)

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

Table 2. Data recorded during the acute screening bioassays of a sample of effluent from the Boca Chica NAS WWTP, Boca Chica Key, Monroe County, Florida, NPDES# FL0020982, performed on 2 to 4 February, 1993.

Facility:	Boca Chica NAS WWTP		NPDES #	FL0020982	Facility Type: WWTP
Location:	Boca Chica Key		Contact / District:	Gus Rios/S	
County:	Monroe		Test type:	static acute screen	
Sample Collection Date:	2/1/93	Time:. 1030	# tests:	2	Receiving Water: Atlantic Ocean
Test Beginning Date:	2/2/93	Time: 1400	Chlorination Type:	Sample collected	
Test Ending Date:	2/4/93	Time: 1400		after dechlorination	Page 1 of 1

Total Residual Cl2	mg/l	Method
Field:	0.17	
Lab:	0.02	DR-100

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	<0.001	0.00
20% Dilute Mineral Water (cladocerans):	<0.001	0.00
100% Sample:	0.83	<0.01

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	35	-
20% Dilute Mineral Water (cladocerans):	70	80
100% Sample:	105	-

Salinity (ppt)	
Control Water:	10
100% Sample:	10

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

	SURVIVAL			pH			Temperature			Dissolved Oxygen			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	5	5	5	8.3	7.8	7.6	21.9	21.8	22.3	7.7	7.4	6.7	16.2	17.0
Control	5	5	5	8.3	7.8	7.6	-	-	-	7.7	7.4	6.7	16.2	17.2
25%	5	5	5	7.7	7.8	7.7	22.4	21.7	22.1	7.8	7.5	6.7	15.8	16.4
25%	5	5	5	7.7	7.8	7.6	-	-	-	7.8	7.5	6.6	15.8	17.7
50%	5	5	4	7.2	7.7	7.7	23.0	21.8	22.1	7.8	6.9	6.5	15.8	16.4
50%	6 *	6 *	6 *	7.2	7.7	7.7	-	-	-	7.8	6.9	6.5	15.8	16.5
75%	5	5	5	7.0	7.8	7.8	23.6	21.8	22.2	7.8	7.1	6.5	16.3	17.0
75%	5	5	5	7.0	7.8	7.7	-	-	-	7.8	7.1	6.5	16.5	17.4
100%	5	5	5	7.0	7.8	7.8	24.2	22.0	22.5	7.9	6.9	6.7	15.9	17.4
100%	5	5	5	6.9	7.8	7.8	-	-	-	7.9	6.9	6.6	16.4	16.9

*6 mysids initially loaded into this test jar, instead of 5; discovered at 24-hour count

Organism: ***Menidia beryllina*** Age: 12 days

	SURVIVAL			pH			Temperature			Dissolved Oxygen			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	5	5	5	8.2	7.9	7.8	22.0	22.0	22.2	7.8	7.4	6.8	16.3	16.7
Control	5	5	5	8.3	7.9	7.8	-	-	-	7.8	7.4	6.8	16.3	16.8
100%	5	5	5	7.0	7.8	7.8	24.0	21.9	22.2	7.8	6.8	6.8	16.2	16.6
100%	5	5	5	7.0	7.8	7.8	-	-	-	7.8	6.8	6.8	16.2	16.5

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Boca Chica NAS WWTP
Location:
County: Monroe
Contact/District: Gus Rios / South District
NPDES Permit #: FL0020982 Outfall #:
49133 93Feb 02 09

Sample Collection: Date 2/1/93 Time 1030
Test Beginning: Date 2/2/93 Time 1400
Test Ending: Date 2/4/93 Time 1400
Organism Batch #: 6 Diluent Batch #: —
Organism Age: 4days
Test Organism: Mysidopsis bahia

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

Test Number: 1 of 2

Remarks:
EFFLUENT COLLECTED AFTER PLANT DECHLORINATION

** Recorded wrong DO TR

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 10.0 @ 10.0	22.2 @ 22.4	~~7.7~~ ** @ ~~23.0~~ ** 8.5 23.6	970 @ 1,000 9700 @ 10,000 @22.2
24 hr	7.0 @ 7.0 10.0 @ 10.0	21.5 @ 21.6	8.6 @ 23.0	970 @ 1,000 @23.1 9740 @ 10,000
48 hr	7.0 @ 7.0 10.0 @ 10.0	21.8 @ 21.9	7.9 @ 26.0	980 @ 1,000 9790 @ 10,000

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) Cond. (µmhos/cm) 0	24	48	day0 Salinity ‰
Control	74	5	5	5	8.3	7.8	7.6	21.9	21.8	22.3	7.7	7.4	6.7	16.2	16.6	17.0	10.1
Control	1	5	5	5	8.3	7.8	7.6				7.7	7.4	6.7	16.2	16.7	17.2	10.1
25%	39	5	5	5	7.7	7.8	7.7	22.4	21.7	22.1	7.8	7.5	6.7	~~16.2~~ *	15.6	16.4	~~9.2~~
25%	18	5	5	5	7.7	7.8	7.6				7.8	7.5	6.6	~~14.7~~	17.1	17.7	~~9.2~~
50%	15	5	5	4	7.2	7.7	7.7	23.0	21.8	22.1	7.8	6.9	6.5	~~13.2~~	15.6	16.4	~~8.0~~
50%	25	~~86~~	6	6	7.2	7.7	7.7				7.8	6.9	6.5	~~13.2~~	16.1	16.5	~~8.0~~
75%	69	5	5	5	7.0	7.8	7.8	23.6	21.8	22.2	7.8	7.1	6.5	~~11.6~~	16.8	17.0	~~6.8~~
75%	16	5	5	5	7.0	7.8	7.7				7.8	7.1	6.5	~~11.6~~	17.0	17.4	~~6.8~~
100%	366	5	5	5	7.0	7.8	7.8	24.2	22.0	22.5	7.9	6.9	6.7	~~9.8~~	17.1	17.4	~~5.6~~
100%	2	5	5	5	6.9	7.8	7.8				7.9	6.9	6.6	~~9.8~~	16.5	16.9	~~5.6~~
														~~*14.8~~	recorded		Salinity
		discovered next day										*	25%	15.8	wrong		9.9
		that 6 mysids										*	25%	15.8		TR	9.9
		must have been loaded										*	50%	15.8			9.7
		in jar #25			at time=0,							*	50%	15.8			9.7
		instead of			the usual 5.							*	75%	16.3			9.8
					KMP 3/19/93							*	75%	16.5			9.9
												*	100%	15.9			9.7
												*	100%	16.4			10.1
Measured/Loaded by:		TR	MF	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM
Recorded by:		TR	TM	TM	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR

Investigators' Signatures

Marshall Fairbairn
Tobin A. Rader
Tina Mikulski
Kim Pearce

Reviewer

form updated 10/20/92

Water Quality Parameters

	Salt Water / ~~Well Water~~	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			~~not measured~~		GR 0.17 misread data sheet KP 2/24/93
Lab Total Residual Cl2:	.02	.02	.02	DR160	TR
Alkalinity:	35	70	105	Hach	TM
Hardness:	—	80	—	Hach	TM
Total Ammonia:	<0.000	<0.001	0.828	Orion	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -56.4 Ammonia Blank: _____ Sample Salinity: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Boca Chica NAS WWTP
Location:
County: Monroe
Contact/District: Gus Rios / South District
NPDES Permit #: FL00 20982 Outfall #:
49133 93Feb 0209

Sample Collection: Date 2/1/93 Time 0830
Test Beginning: Date 2/2/93 Time 1400
Test Ending: Date 2/4/93 Time 1400
Organism Batch #: ____ Diluent Batch #: ____
Organism Age: 12 days
Test Organism: Mysidopsis Bahia

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
0 hr	~~7.00~~ 10.00 @ 7.0 / 10.00 @ 10.0	22.2 @ 22.4	~~7.4~~ 8.5 @ ~~23.0~~ 23.6	970 @ 1,000 / 9700 @ 10,000 @23.2
24 hr	7.0 @ 7.0 / 10.0 @ 10.0	21.5 @ 21.6	8.6 @ 23.0	970 @ 1,000 / 9740 @ 10,000 @23.1
48 hr	7.0 @ 7.0 / 10.0 @ 10.0	21.8 @ 21.9	7.9 @ 24.0	980 @ 1,000 / 9790 @ 10,000 @23.0

*recorded wrong DO TR

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temperature (°C) 0	24	48	D.O. (mg/L) 0	24	48	Cond. (mmhos/cm) / Cond. (µmhos/cm) 0	24	48	day 0 Salinity 0/00
Control	210	5	5	5	8.2	7.9	7.8	22.0	22.0	22.2	7.8	7.4	6.8	16.3	16.5	16.7	10.2
Control	10	5	5	5	8.3	7.9	7.8				7.8	7.4	6.8	16.3	16.5	16.8	10.2
100%	891	5	5	5	7.0	7.8	7.8	24.0	21.9	22.2	7.8	6.8	6.8* / ~~1.8~~	16.2	16.6		~~5.6~~
100%	22	5	5	5	7.0	7.8	7.8				7.8	6.8	6.8* / ~~1.8~~	16.2	16.5		~~5.6~~
													100%*	16.2			9.7
													100%*	16.2			9.7
Measured/Loaded by:		TM	TM/VP	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM	TR	TM	TM
Recorded by:		TR	TM	TM	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR

*adjusted for salinity TR

Investigators' Signatures

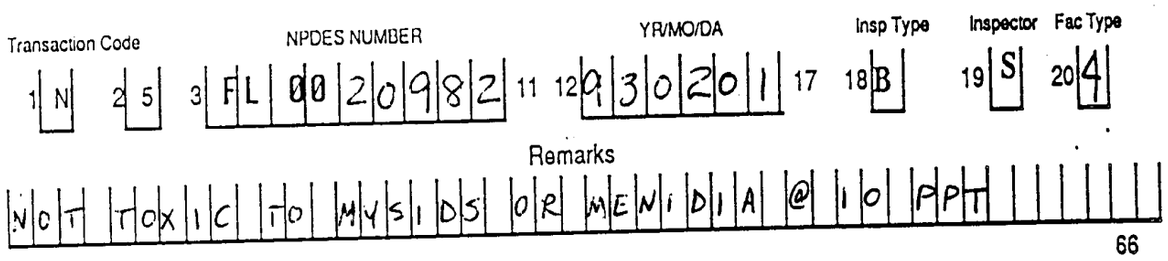
Marshall Faircloth
Tobin A. Rader
Tina Mikulski
Kim Pearce

Reviewer

	Salt Water/ Well Water	Water Quality Parameters: 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			~~not measured~~ misread data sheet KP 0.17 GK		
Lab Total Residual Cl2:	.02	.02	.02	DR100	TR
Alkalinity:	55	70	105	Hach	TM
Hardness:	—	80	—	Hach	TM
Total Ammonia:	<0.001	<0.001	0.828	orion	MF
	Ammonia		Ammonia		Sample

Cl2 Blank: ____ ____ ____

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



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

