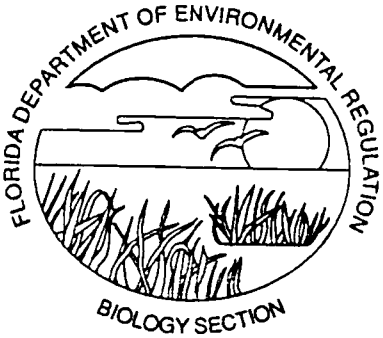


Bioassays of

Mandarin Wastewater Treatment Plant #5

Jacksonville, Duval County, Florida

NPDES #FL0023493

Sampled 9/24/90

January 7, 1991

Biology Section
Division of Administrative and Technical Services

Bioassays of

Mandarin Wastewater Treatment Plant #5

Jacksonville, Duval County, Florida

NPDES #FL0023493

Biology Section
Bureau of Laboratories
January 7, 1991

Introduction

Mandarin WWTP #5, Jacksonville, Duval County, Florida, NPDES #FL0023493, on 25 to 28 September, 1990.

This facility is located at 10828 Hampton Road in Jacksonville. It has a design capacity of 5.0 MGD and has an average flow of 3.02 MGD. Treatment includes aeration, clarification, aerobic sludge digestion, chlorination, and dechlorination. Digested sludge is transported to the Buckman Plant in Jacksonville for dewatering prior to incineration.

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 FDER Biology Section, 1985, *Quality Assurance Manual for Performing Acute Toxicity Tests*, 2nd Edition.

Results and Discussion

The Biology Section, using the freshwater bioassay test organisms, the waterflea, *Ceriodaphnia dubia*, the fish, *Notropis leedsi*, and the saltwater bioassay test organism, the crustacean, *Mysidopsis bahia*, performed bioassays on a sample of discharge from this facility.

These bioassays indicated that the sample was not toxic to the test organisms, *N. leedsi*. However, several deaths occurred in the *C. dubia* tests and also in the *M. bahia* tests. The cause of these deaths was not determined although physical evidence observed in the test flasks suggested that entanglement in the large amount of suspended solids present in the sample was possibly a contributing factor in the observed mortality. The "excessive solids" were also noted at the sampling site by the sampler, K. Gerard, of the FDER Northeast District office in Jacksonville. The sample did not contain any residual chlorine. The total ammonia was 16.0 mg/l and the unionized ammonia was 0.24 mg/l. Further chemical analyses performed on the sample detected the metals, aluminum (311 µg/l), copper (111 µg/l), iron (345 µg/l), and zinc (68 µg/l). Several organic compounds were analyzed for but not detected.

Conclusion

The cause of the several deaths noted in the bioassays performed on a sample of discharge from this facility was not determined on 25 to 28 September, 1990.

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

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	15.0 ml	0.0 ml	15 ml
10.0%	13.5 ml	1.5 ml	15 ml
30.0%	10.5 ml	4.5 ml	15 ml
50.0%	7.5 ml	7.5 ml	15 ml
70.0%	4.5 ml	10.5 ml	15 ml
85.0%	2.25 ml	12.75 ml	15 ml
100.0%	0.0 ml	15.0 ml	15 ml

Mysidopsis bahia (mysid shrimp)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	0 ml	500 ml
100.0%	0 ml	500 ml	500 ml

Notropis leedsi (bannerfin shiner)

Concentration	Dilution Water	Sample	Total Volume
Control	500 ml	0 ml	500 ml
10.0%	450 ml	50 ml	500 ml
30.0%	350 ml	150 ml	500 ml
50.0%	250 ml	250 ml	500 ml
70.0%	150 ml	350 ml	500 ml
85.0%	75 ml	425 ml	500 ml
100.0%	0 ml	500 ml	500 ml

Table 2. Data recorded during the static acute bioassays performed on a sample of discharge from the Mandarin WWTP #5, Jacksonville, Duval County, Florida, NPDES #FL0023493, on 25 to 28 September, 1990.

Facility:	Mandarin WWTP #5		NPDES #	FL0023493	Facility Type: Sewage Treatment
Location:	10828 Hampton Road, Jacksonville		Contact/District:	K. Gerard	
County:	Duval		Test type:	static definitive	
Sample Collection Date:	9/24/90	Time: 1450	# tests:	3	Receiving Water: St. Johns River
Test Beginning Date:	9/25/90	Time: 1045	Chlorination Type:	dechlorinated	
Test Ending Date:	9/28/90	Time: 1100	Dechlor Method:	plant dechlorination unit	Page 1 of 3

Total Residual Cl2	mg/l	Method
Field:	0.0	Hach
Lab:	0.0	Hach
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	16.00	0.24

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	116	118
Cond. Control Water (daphnids):	97	117
100% Sample:	95	252

Salinity (ppt)		
Control Water:	20	Adjusted with
100% Sample:	20	artificial Sea Salts

Organism: *Ceriodaphnia dubia* Life stage: <24 hours
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	5	5	5	8.9	-	8.6	8.1	-	8.1	20.0	-	21.1	318	338
Control	5	5	5	-	-	-	-	-	-	-	-	-	-	-
Control	5	5	5	-	-	-	-	-	-	-	-	-	-	-
Control	5	5	5	-	-	-	-	-	-	-	-	-	-	-
10%	5	5	5	8.8	-	8.6	7.9	-	8.1	21.0	-	21.0	390	415
10%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
10%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
10%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
30%	5	5	5	8.6	-	8.6	7.8	-	8.2	21.5	-	21.0	516	524
30%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
30%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
30%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
50%	5	5	5	8.4	-	8.5	7.7	-	8.3	22.0	-	21.1	651	657
50%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
50%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
50%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
70%	5	5	3	8.2	-	8.5	7.6	-	8.3	22.3	-	21.1	786	774
70%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
70%	5	4	4	-	-	-	-	-	-	-	-	-	-	-
70%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
85%	5	5	5	7.8	-	8.5	7.6	-	8.3	22.8	-	21.1	897	896
85%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
85%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
85%	5	5	4	-	-	-	-	-	-	-	-	-	-	-
100%	5	5	5	6.6	-	8.5	7.4	-	8.3	22.9	-	21.1	969	974
100%	5	5	5	-	-	-	-	-	-	-	-	-	-	-
100%	5	5	1	-	-	-	-	-	-	-	-	-	-	-
100%	5	5	5	-	-	-	-	-	-	-	-	-	-	-

-continued-

Table 2. Continued.

Facility:	Mandarin WWTP #5		NPDES #	FL0023493	Facility Type: Sewage Treatment
Location:	10828 Hampton Road, Jacksonville		Contact/District:	K. Gerard	
County:	Duval		Test type:	static definitive	
Sample Collection Date:	9/24/90	Time: 1450	# tests:	3	Receiving Water: St. Johns River
Test Beginning Date:	9/25/90	Time: 1045	Chlorination Type:	dechlorinated	
Test Ending Date:	9/28/90	Time: 1100	Dechlor Method:	plant dechlorination unit	Page 2 of 3

Total Residual Cl2	mg/l	Method
Field:	0.0	Hach
Lab:	0.0	Hach
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	16.00	0.24

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	116	118
Cond. Control Water (daphnids):	97	117
100% Sample:	95	252

Salinity (ppt)		
Control Water:	20	Adjusted with
100% Sample:	20	artificial Sea Salts

Organism: ***Mysidopsis bahia*** Life stage: < 7 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	5	5	5	8.1	5.0	5.2	8.5	7.7	7.5	21.4	21.0	21.1	-	-
Control	5	5	5	8.2	5.1	5.4	8.5	7.8	7.6	-	-	-	28400	28600
100.0%	5	5	4	6.4	5.6	6.0	7.7	8.0	8.1	23.0	21.0	21.1	-	-
100.0%	5	5	4	6.4	5.3	6.1	7.7	7.9	8.1	-	-	-	27000	26600

Organism: ***Notropis leedsi*** Age: 16 days 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	5	5	5	8.9	8.8	8.7	7.6	8.0	8.0	21.2	21.0	21.2	-	-
Control	5	5	5	8.9	8.8	8.7	7.6	8.0	8.0	-	-	-	235	239
10%	5	5	5	8.8	8.5	8.6	7.6	7.9	8.0	21.6	21.0	21.0	-	-
10%	5	5	5	8.8	8.5	8.5	7.6	7.9	8.0	-	-	-	308	309
30%	5	5	5	8.5	8.3	8.5	7.5	7.9	8.0	22.0	21.0	21.0	-	-
30%	5	5	5	8.5	8.3	8.4	7.5	7.9	8.0	-	-	-	474	466
50%	5	5	5	8.2	8.0	8.2	7.4	7.9	8.0	22.7	21.0	21.0	-	-
50%	5	5	5	8.2	8.0	8.2	7.4	7.9	8.0	-	-	-	626	610
70%	5	5	5	7.7	7.7	8.0	7.3	7.9	8.0	23.0	21.0	21.0	-	-
70%	5	5	5	7.7	7.7	7.9	7.3	7.9	8.0	-	-	-	785	755
85%	5	5	5	5.7	6.9	6.9	7.3	7.8	7.9	23.5	21.0	20.9	-	-
85%	5	5	5	7.2	6.9	6.8	7.3	7.8	7.9	-	-	-	902	861
100%	5	5	5	5.1	6.4	6.3	7.2	7.8	7.9	23.5	21.0	21.0	-	-
100%	5	5	5	5.0	6.4	6.7	7.2	7.8	7.9	-	-	-	1013	976

-continued-

Table 2. Continued.

Facility:	Mandarin WWTP #5			NPDES #	FL0023493	Facility Type:	Sewage Treatment
Location:	10828 Hampton Road, Jacksonville			Contact/District:	K. Gerard		
County:	Duval			Test type:	static definitive		
Sample Collection Date:	9/24/90	Time:	1450	# tests:	3	Receiving Water:	St. Johns River
Test Beginning Date:	9/25/90	Time:	1045	Chlorination Type:	dechlorinated		
Test Ending Date:	9/28/90	Time:	1100	Dechlor Method:	plant dechlorination unit	Page 3 of 3	

Total Residual Cl2	mg/l	Method
Field:	0.0	Hach
Lab:	0.0	Hach
Lab:	-	-

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	16.00	0.24

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	116	118
Cond. Control Water (daphnids):	97	117
100% Sample:	95	252

Salinity (ppt)		
Control Water:	20	Adjusted with
100% Sample:	20	artificial Sea Salts

Organism: ***Mysidopsis bahia*** Life stage: < 7 days
LC50: - Binomial: - Moving Average: - Probit: -

Concentrations	SURVIVAL # at 72 hr	Dissolved Oxygen 72 hour	pH 72 hour	Temperature 72 hour	Conductivity 72 hour
Control	5	4.6	7.4	21.2	
Control	5	4.6	7.5	-	29200
100.0%	4	4.6	8.1	21.3	-
100.0%	3	4.6	8.1	-	26800

Organism: ***Notropis leedsi*** Life stage: 16 days
LC50: - Binomial: - Moving Average: - Probit: -

Concentrations	SURVIVAL Live at 72 hr	Dissolved Oxygen 72 hour	pH 72 hour	Temperature 72 hour	Conductivity 72 hour
Control	5	8.7	8.0	21.2	-
Control	5	8.8	8.0	-	242
100.0%	5	6.4	7.8	21.5	-
100.0%	5	6.9	7.9	-	984

Table 3. Results of chemical analyses on the sample of discharge from the Mandarin WWTP #5, Duval County, Florida.

Organics	
Acid Extractables	None detected
Base Neutral Extractables	None detected
Pesticide Extractables	None detected

Metals	
Aluminum	311 µg/l
Copper	111 µg/l
Iron	345 µg/l
Zinc	68 µg/l

Sample Source: City of Jacksonville Mandarin WWTP
Address/City: 10825 Hampton Road, Jacksonville
County: Duval
Contact/District: Kathleen Edwards
NPDES Permit #: FL0023213 Outfall #: 001

Sample Collection: Date 9-24-90 Time 1430
Test Beginning: Date 9-25-90 Time 1045
Test Ending: Date 9-28-90 Time 1100
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24 hours

Test Number: 1 of 3 Test Type: Screening | (Definitive)
(Static) | Static Renewal | Flow-through

Remarks: Ok parameters on rep vials.
* 45hrs, Technician completing flow

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7.9 9	8.6@22°C	1343@23.0°C	210@22.2
24 hr	7@7.9 9	9.0@24°C	34@23.2	216@22.9
48 hr	7@7.9 81	9.0@21°C	1316@23.3	211@22.7

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		5	5	5	8.9	8.9	8.6	8.1	7.5	7.1	20.0	21.0	21.1	318	425	333
Control		5	5	5												
Control		5	5	5												
Control		5	5	5												
10%		5	5	5	8.8		8.4	7.9		8.1	21.0		21.0	390		415
10%		5	5	5												
10%		5	5	5												
10%		5	5	5												
30%		5	5	5	8.6		8.4	7.8		8.1	21.5		21.0	516		524
30%		5	5	5												
30%		5	5	5												
30%		5	5	5												
50%		5	5	5	8.4		8.5	7.7		8.3	22.0		21.1	651		657
50%		5	5	5												
50%		5	4	5												
50%		5	5	5												
70%		5	5	3*	8.2	8.1	8.5	7.6	8.2	8.3	22.3	21.3	21.1	786	803	774
70%		5	5	5												
70%		5	4	4*												
70%		5	5	5												
85%		5	5	5	7.8	8.5	8.5	7.6	8.2	8.3	22.8	21.3	21.1	897	919	896
85%		5	5	5												
85%		5	5	5												
85%		5	4	4*												
100%		5	5	5	6.6	8.5	8.5	7.4	8.2	8.3	22.9	21.5	21.1	969	1057	974
100%		5	5	5												
100%		5	5	1*												
100%		5	5	5												
Measured/Loaded by		LB	LB	LB	MF	SMF	SMF	MF	SMF	SMF	MF	SMF	SMF	MF	SMF	SMF
Recorded by		LB	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB

Investigators' Signatures
Marshall Faircloth
Lynn Burton
Supervisor

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.0	Hach	K Edwards
Lab Tot Resid. Cl2:			0.0	Hach	MF
Alkalinity:	116	97	95	Hach	LB
Hardness:	118	117	52	Hach	LB
Total Ammonia	0	0	0.0	Orion	MF

Ammonia meter slope = 57

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Jacksonville Meridian #5 — **Sample Collection:** Date 9-24-96 Time 1450

Address/City: _____ — **Test Beginning:** Date 9-25-96 Time 1045

County: _____ — **Test Ending:** Date 9-30-96 Time 1100

Contact/District: _____ — **Test Organism:** Mysidopsis bahia

NPDES Permit #: _____ **Outfall #:** _____ — **Life Stage/Age:** 1-6 days

Test Number: 2 of 3 — **Test Type:** Screening | Definitive

Static | Static Renewal | Flow-through

Remarks: [illegible] 100% 96 hr

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live			DO (mg/l)			pH			Temp. (°C)			Cond. (µmhos/cm)		
		0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	144	5	5	5	8.9	8.8	8.1	7.6	8.0	8.1	21.2	21.0	21.2			
Control	174	5	5	5	8.4	8.8	8.7	7.6	8.0	8.1				235		241
10%	12	5	5	5	8.8	8.5	8.2	7.6	7.9	8.1	21.6	21.0	21.2			
10%	82	5	5	5	8.3	8.5	8.2	7.6	7.9	8.1				305		301
30%	16	5	5	5	8.5	8.3	8.0	7.5	7.9	8.0	22.0	21.0	21.1			
30%	136	5	5	5	8.5	8.3	8.4	7.5	7.9	8.0				474		466
50%	35	5	5	5	8.2	8.0	8.1	7.4	7.9	8.0	22.3	21.0	21.1			
50%	83	5	5	5	8.2	8.0	8.1	7.4	7.9	8.0				626		616
70%	3	5	5	5	7.7	7.7	8.0	7.3	7.9	8.0	23.0	21.0	21.0			
70%	13	5	5	5	7.7	7.7	7.9	7.3	7.9	8.0				785		770
85%	287	5	5	5	5.7	6.9	6.9	7.3	7.8	7.9	23.5	21.0	21.1			
85%	71	5	5	5	7.2	6.9	6.8	7.3	7.8	7.9				902		861
100%	18	5	5	5	5.1	6.4	6.3	7.2	7.8	7.9	23.5	21.0	21.0			
100%	43	5	5	5	5.0	6.4	6.7	7.2	7.8	7.9				1013		1176
				72hr			72hr			72hr			72hr			72hr
Control	144			5			5.7			5.0			21.2			
Control	174			5			5.9			5.0						242
10%				5												
10%				5												
30%				5												
30%				5												
50%				5												
50%				5												
70%				5												
70%				5												
85%				5												
85%				5												
100%	18/43			5/5			6.4/6.7			7.9/7.9			21.2/21.2			1594
Measured/Loaded by:		MF	MF	MF	MF	LB	SMC	MF	LB	MF	MF	LB	LB	MF		DF
Recorded by:		MF	MF	SMC	LB	SMC	LB	LB	SMC	LB	LB	SMC	LB	LB		LB

Investigators' Signatures

Marshall Faircloth

Sandy McClure

Lyn Fenton

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:					

Sample Source: Jacksonville Mountain #3

Address/City: I

County: Duval

Contact/District:

NPDES Permit #: _____ Outfall #: _____

Test Number: 3 of 3 Test Type: Screening | Definitive

Static | Static Renewal | Flow-through

Remarks:

extended test to 72 hours.

organisms expired in solution - did not count

Sample Collection: Date 4/24-26 Time 1430

Test Beginning: Date 9/25/96 Time 1045

Test Ending: Date 9/28/96 Time 1100

Test Organism: Mysidopsis bahia

Life Stage/Age: 4 days

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr				
24 hr				
48 hr				

20 ppm salt

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	19	5	5	5	8.1	5.0 5.1	5.2	8.5	7.7	7.5	21.4	21.0	21.1			
Control	43	5	5	5	8.2	5.1 5.3	5.4	8.5	7.8	7.6				33400		35200
100%	147	5	5	4*	6.4	5.6 5.7	6.6	7.7	8.0	8.1	23.0	21.2	21.1			
100%	39	5	5	4*	6.4	5.3 5.8	6.1	7.7	7.4	8.1				27000		32000
Control				72hr	72hr		72hr			72hr			72hr			72hr
Control	19			5			4.6			7.4			21.2			
Control	43			5			4.6			7.5				32000		31200
100%	147			4*			4.6			8.1			21.3			
100%	39			3*			4.6			8.1						28500
				NF			SMC			SMC			SMC			SMC
				NF			LB			LB			LB			LB
Measured/Loaded by		MF	MF	MF	MF	SMC	SMC	MF	SMC	SMC	MF	SMC	SMC	MF		SMC
Recorded by		MF	MF	MF	LB	LB	SMC	LB	LB	SMC	LB	LB	SMC	LB		SMC

Investigators' Signatures

Marshall Faircloth

Lyn Burton

Sandy McClure

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Clz:					
Lab Tot. Resid. Clz:					
Alkalinity:					
Hardness:					
Total Ammonia:					

Ammonia meter slope: _____