

Bioassays of

Airport Motor Inn Wastewater Treatment Plant

Jacksonville, Duval County, Florida

NPDES #FL0032221

Sampled 3/2/98

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July 1998

Biology Section
Division of Administrative & Technical Services
Comprehensive Quality Assurance Plan #870346G

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Airport Motor Inn Wastewater Treatment Plant

Jacksonville, Duval County, Florida

NPDES #FL0032221

Biology Section
Bureau of Laboratories
July 1998

Introduction

Airport Motor Inn WWTP, 1500 Airport Road, Jacksonville, Duval County, Florida, NPDES #FL0032221, tests performed on 3 to 5 March, 1998.

This privately owned domestic wastewater treatment system has a design flow of 0.01 MGD and an annual average flow of 0.004 MGD. Wastewater is treated by aeration and secondary clarification. Wastewater is chlorinated for disinfection, then dechlorinated with sodium sulfide tablets prior to being discharged into Little Cedar Creek. Sludge is removed by a private firm and is disposed of by land application.

The sample of effluent for these bioassays was collected from the chlorine contact chamber because the end-of-pipe discharge point was inaccessible (facility summary and sample collection information provided by Jason Sparks and Tim McKelvey, respectively, 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. Two additional bioassays were performed on an aliquot of sample which had been dechlorinated in the laboratory by the addition of 6.7 mL of 0.025 N sodium thiosulfate per liter of sample. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The chlorinated sample proved toxic, producing 100% mortality in both test species within 5 minutes of the test animals being loaded into the test chambers. The dechlorinated test did not show toxicity to *Ceriodaphnia dubia* but did show toxicity to *Cyprinella leedsi* (65% mortality in 48-hours) (Table 1).

Total residual chlorine (TRC) of the 100% whole effluent sample was not measured in the field but was 5.75 mg/L in the laboratory. TRC of the dechlorinated aliquot of sample was < 0.03 mg/L. Total residual chlorine levels as low as 0.028 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates (USEPA, 1986. Quality Criteria for Water. EPA 440/15-86-001). The total ammonia and unionized ammonia concentrations were respectively, 4.57 mg/L and 0.123 mg/L at 0-hours, and were 3.18 mg/L and 0.378 mg/L, at 48-hours. Although the concentration of total ammonia decreased, the concentration of unionized ammonia increased during the test period due to an increase in the pH of the test solution. Unionized ammonia levels as low as 0.08 mg/L and 0.5 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates, respectively (USEPA, 1986. Quality Criteria for Water. EPA 44015-86-001). Further chemical analyses were performed on the sample and several metals were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on March 2, 1998, showed toxicity to both test species, producing 100% mortality within 5-minutes of test initiation. The dechlorinated aliquot of sample was not toxic to *Ceriodaphnia dubia* but was toxic to *Cyprinella leedsi*. We attribute the toxicity of the sample to the concentrations of both the total residual chlorine and the unionized ammonia in the sample.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Airport Motor Inn WWTP, Jacksonville, Duval County, Florida, NPDES Permit #FL0032221, performed on 3 to 5 March, 1998.

Facility:	**Airport Motor Inn WWTP**	**NPDES #**	**FL0032221**	Facility Type:	Wastewater Treatment Plant
Location:	1500 Airport Road, Jacksonville	Contact/District:	Tim McKelvey/Northeast		
County:	Duval	Test type:	static acute screen		
Sample Collection Date:	3/2/98 Time: 1500	# tests:	2	Receiving Water:	Cedar Creek
Test Beginning Date:	3/3/98 Time: 1530	Chlorination Type:	Chlorinated		
Test Ending Date:	3/5/98 Time: 1530				**Page 1 of 1**

Total Residual Cl2	mg/L	Method
100% sample Field:	not measured	
100% sample Lab:	5.75	DR-100
Dechlorinated sample:	<0.03	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	<0.017	<0.017
Control Water (20% DMW) (cladocerans):	<0.017	<0.017
100% Sample at 0-hour:	4.57	0.123
100% Sample at 48-hours:	3.18	0.378

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	120	132
Control Water (20% DMW) (cladocerans):	72	90
100% Sample:	184	247

Salinity	(ppt)
Control Water (fish):	0
Control Water (20% DMW) (cladocerans):	0
100% Sample:	0

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours old

	Sample/Diluent	**SURVIVAL # Alive**			pH			Temperature[A]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	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 A	0/20	5	5	5	8.2	-	7.9	22.2	-	23.3	7.9	-	7.4	165	246
Control B	0/20	5	5	5	-	-	8.1	-	-	23.3	-	-	7.8	-	192
Control C	0/20	5	5	5	-	-	8.1	-	-	23.3	-	-	7.5	-	204
Control D	0/20	5	5	5	-	-	8.1	-	-	23.3	-	-	7.7	-	218
100% A	20/0	5	0[B]	-	7.7	-	-	22.6	-	-	7.3	-	-	690	-
100% B	20/0	5	0[B]	-	-	-	-	-	-	-	-	-	-	-	-
100% C	20/0	5	0[B]	-	-	-	-	-	-	-	-	-	-	-	-
100% D	20/0	5	0[B]	-	-	-	-	-	-	-	-	-	-	-	-
Decl100% A	20/0	5	5	5	7.9	8.0	8.4	23.4	-	23.6	7.3	-	7.5	765	708
Decl100% B	20/0	5	5	5	-	8.0	8.4	-	-	23.5	-	-	7.7	-	759
Decl100% C	20/0	5	5	5	-	8.0	8.4	-	-	23.4	-	-	7.5	-	812
Decl100% D	20/0	5	5	5	-	8.1	8.5	-	-	23.3	-	-	7.7	-	808

Decl = Dechlorinated sample

[B] Count made at 0-hour plus 5-minutes.

[A] Temperature of test incubator # 1 and test room were continuously recorded on strip chart recorders.
Incubator temperature range for the test period was 23.9-25.4°C.
Test room temperature range for the test period was 24.0-25.0°C.

Organism: ***Cyprinella leedsi*** Age: 13 days

	Sample/Diluent	**SURVIVAL # Alive**			pH			Temperature[C]			Dissolved Oxygen			Conductivity Uncorrected µmhos/cm	
Concentrations	Volume(mL)	0 hr	24 hr	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 A	0/500	5	5	5	8.0	8.2	8.2	25.4	25.2	25.0	7.8	7.4	7.0	255	256
Control B	0/500	5	5	5	8.0	8.2	8.2	25.4	25.1	24.7	7.8	7.5	7.2	255	261
Control C	0/500	5	5	5	8.0	8.3	8.3	25.4	25.0	24.6	7.8	7.7	7.2	255	262
Control D	0/500	5	5	5	8.0	8.3	8.3	25.4	25.6	24.4	7.8	7.6	7.3	255	262
100% A	500/0	5	0[D]	-	7.6	-	-	25.1	-	-	7.0	-	-	760	-
100% B	500/0	5	0[D]	-	7.6	-	-	25.2	-	-	7.0	-	-	760	-
100% C	500/0	5	0[D]	-	7.6	-	-	25.2	-	-	7.0	-	-	760	-
100% D	500/0	5	0[D]	-	7.6	-	-	25.2	-	-	6.9	-	-	760	-
Decl 100% A	500/0	5	3	2	7.9	8.2	8.3	25.0	24.4	24.3	7.0	7.1	6.9	790	747
Decl 100% B	500/0	5	5	0	7.9	8.2	8.3	25.1	25.0	25.0	7.1	7.2	6.7	795	778
Decl 100% C	500/0	5	5	3	7.9	8.2	8.3	25.0	25.1	24.9	7.1	7.0	6.7	795	787
Decl 100% D	500/0	5	5	2	7.9	8.2	8.3	25.1	25.3	24.4	7.2	7.1	6.8	795	778

Decl = Dechlorinated sample

[D] Count made at 0-hour plus 5-minutes.

[C] Temperature of test incubator # 3 and test room were continuously recorded on strip chart recorders.
Incubator temperature range for the test period was 25.0-26.5°C.
Test room temperature range for the test period was 24.0.5-25.0°C.

Table 2. Results of chemical analyses on the effluent from the Airport Motor Inn sampled on March 2, 1998.

Metals

Aluminum	136	µg/L
Calcium	79.4	mg/L
Copper	8.9	µg/L
Iron	317	µg/L
Lead	1.30	µg/L
Magnesium	24.0	mg/L
Zinc	20	µg/L[I]

Base, Neutral, & Acid Extractable Organics

none detected

Herbicides and Pesticides

none detected

I Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Airport Inn WWTP
County: Duval
Contact / District: T. McKelvey NE-JAX
NPDES Permit #: FL0032221
LIMS Sample #: 310287 LIMS Job #: 1998-03-04-17
sample log: 3/6/98 DW
Test Type: Screening | Definitive
Static | Static Renewal | Flow-through
Temperature range: room 24.0-25.0 °C
incubator 23.7-25.4 °C
Test Number: 1 of 2
Remarks: D = dead, M = missing
Sample dechlorinated by the addition of 6.7 mL of 0.025 N Sodium thiosulfate per Liter of sample. TRC of dechlorinated sample = <0.03 mg/L
In 100% sample all organisms dead within 5 minutes of loading in test vessels.

Sample Collection: Date 3/2/98 Time 1445
Test Beginning: Date 3/3/98 Time 1440
Test Ending: Date 3/4/98 Time 1345
Organism Batch #: 12 Diluent Batch #: 20 MF
Organism Age: <24 hours
Test Organism: Ceriodaphnia dubia

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	21.7 @ 21.7	8.2 @ 24.8 °C	98.4 @ 96.3
	9.0 @ 9.0			981 @ 1005 @ 24.2 °C
24 hr	7.0 @ 7.0	22.1 @ 22.1	8.2 @ 24.9 °C	98.0 @ 96.3
	9.0 @ 9.0			990 @ 1005 @ 24.5 °C
48 hr	7.0 @ 7.0	22.4 @ 22.4	8.2 @ 25.2 °C	96 @ 96.3
	9.0 @ ___			955 @ 1005 @ 25.4 °C

Total Ammonia @ 48 hours = 3.18 mg/L
Sample was collected at chlorine contact chamber

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	A	5	5	5	8.2		7.9	22.2		23.3	7.9		7.4	165		196
Control B	B	5	5	5			8.1			23.3			7.8			192
Control C	C	5	5	5			8.1			23.3			7.5			204
Control D	D	5	5	5			8.1			23.3			7.7			218
100% A	A	5	0 ASD	—	7.7			22.6			7.3			690		
100% B	B	5	0 ASD	—												
100% C	C	5	0 ASD	—												
100% D	D	5	0 ASD	—												
100% A	A	5	5	5	7.9		8.4	23.4		23.6	7.3		7.5	765		709
100% B	B	5	5	5			8.4			23.5			7.7			759
100% C	C	5	5	5			8.4			23.4			7.5			812
100% D	D	5	5	5			8.5			23.3			7.7			808
Measured/Loaded by:		MF	MF	FW	MF		DAW	MF		DAW	MF		DAW	MF		DAW
Recorded by:		MF	MF	FW	MF		FW	MF		FW	MF		FW	MF		FW

Dechlorinated Aliquot

N count at 0 hour plus 5 minutes MF 6/9/98

Investigators' Signatures

Marshall Faircloth
Karen Overturf
David Wainright

reviewer

form updated 4/01/96

Water Quality Parameters (Verified by MF)

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L)			Not measured		
Lab Total Residual Cl2 (mg/L)		<0.03	5.75	DR-100	DAW
Alkalinity (mg/L as $CaCO_3$)		72	184	Hach	DAW
Hardness (mg/L as $CaCO_3$)		90	247	Hach	DAW
Total ammonia (mg/L as N)		<0.017	4.57	ORION	FW

Ammonia Meter #98136 Meter Slope: -58.1 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Airport INN
County: Duval
Contact / District: T. McKelvey NE-JAX
NPDES Permit #: FL0033221
LIMS Sample #: 310287 LIMS Job #: TCH 1998 03-04-17
sample log: 3/6/98 mw

Sample Collection: Date 3/2/98 Time 1445
Test Beginning: Date 3/3/98 Time 1510
Test Ending: Date 3/4/98 Time 1245 (3 minutes auto corrected to 165.48 hr)
Organism Batch #: 14 Diluent Batch #: WSWH20
Organism Age: 13 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) I Definitive
(Static) I Static Renewal I Flow-through
Temperature range: room 24.0 - 25.0 °C
incubator 25.0 - 26.5 °C
Test Number: 2 of 2

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 | 21.7 @ 21.7 | 8.2 @ 24.8 °C | 98.4 @ 96.3 / 981 @ 1005 @ 24.2°C
24 hr 7.0 @ 7.0 / 9.0 @ 9.0 | 22.1 @ 22.1 | 8.2 @ 24.9 °C | 98.0 @ 96.3 / 990 @ 1005 @ 24.5 °C
48 hr 7.0 @ 7.0 / 9.0 @ 9.0 | 22.4 @ 22.4 | 8.2 @ 25.2C | 99.6 @ 96.3 / 995 @ 1005 @ 25.1 °C

Remarks: D = dead, M = missing
Sample dechlorinated by the addition of 6.7 mL of 0.025N Sodium Thiosulfate per liter of sample
all test organisms were dead in 48 100% sample within 5 minutes of loading in test vessels. TRC of dechlorinated test = <0.03 mg/L. Total ammonia @ 48 hours = 3.18 mg/L
Sample was collected at Klorine Contact Chamber.

Conc.	Chamber #	Number Live 0 hr	24 h	48 h	pH 0 hr	24 h	48 h	Temperature (°C) 0 hr	24 h	48 h	D.O. (mg/L) 0 hr	24 h	48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	~~F9~~ F9	5	5	5	8.0	8.2	8.2	25.4	25.2	25.0	7.8	7.4	7.0	255	265	256
Control B	F10	5	5	5	8.0	8.2	8.2	25.4	25.1	24.7	7.8	7.5	7.2	255	265	261
Control C	F11	5	5	5	8.0	8.3	8.3	25.4	25.0	24.6	7.8	7.7	7.2	255	265	262
Control D	F12	5	5	5	8.0	8.3	8.3	25.4	25.6	24.4	7.8	7.6	7.3	255	270	263
100% A	F13	5	0 SDA	0	7.6			25.1			7.0			760		
100% B	F14	5	0 SDA	0	7.6			25.2			7.0			760		
100% C	F15	5	0 SDA	0	7.6			25.2			7.0			760		
100% D	F16	5	0 SDA	0	7.6			25.2			6.9			760		
100% A	F17	5	3 2D	2 1D	7.9	8.2	8.3	25.0	24.4	24.3	7.0	7.1	6.9	790	775	767
100% B	F18	5	5	0 5D	7.9	8.2	8.3	25.1	25.0	25.0	7.1	7.2	6.7	795	790	778
100% C	F19	5	5	3 2D	7.4	8.2	8.3	25.0	25.1	24.9	7.1	7.0	6.7	795	790	787
100% D	F20	5	5	2 3D	7.9	8.2	8.3	25.1	25.3	24.4	7.2	7.1	6.8	795	795	775
	B incorrect letter written MF 6/9/98		A count at 0 hour & has 5 minutes MF 6/9/98													
Measured/Loaded by:		MF	MF	SAW	MF	MF	DAW	MF	MF	DAW	MF	MF	DAW	MF	MF	DAW
Recorded by:		MF	MF	DAW	MF	FW	FW	MF	FW	FW	MF	FW	FW	MF	FW	FW

Dechlorinated Effluent

Investigators' Signatures
Marshall Fairchild
Susan Mitchell
Randi Weinstein

Water Quality Parameters (verified by MF)

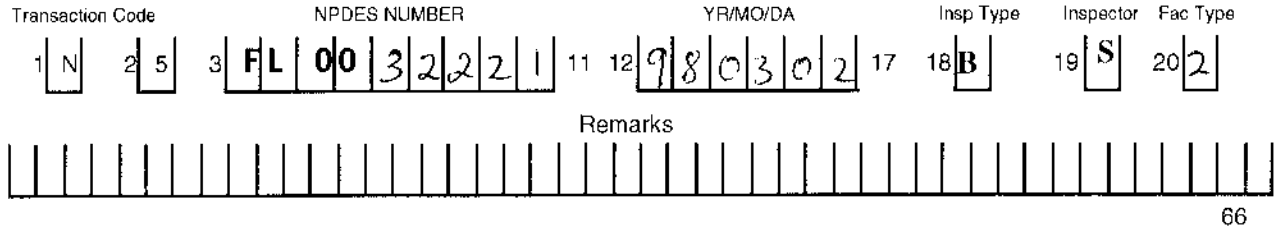
	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not measured		
Lab Total Residual Cl2 (mg/L):	<0.03		5.75	DR-100	DAW
Alkalinity (mg/L as $CaCO_3$):	120		184	Hach	DAW
Hardness (mg/L as $CaCO_3$):	132		247	Hach	DAW
Total ammonia (mg/L as N):	<0.017		4.57	Orion	FW

Ammonia Meter #98136 Ammonia Meter Slope: -58.1 Ammonia Blank: 20.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

reviewer

The Bioassay of the Airport Motor Inn WWTP effluent sampled on March 2, 1998, NPDES #FL0032221.

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



The Priority Pollutants Analysis for Bioassay of the Airport Motor Inn WWTP effluent sampled on March 2, 1998, NPDES #FL0032221.

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

