

Bioassays of the City of

Macclenny Wastewater Treatment Plant

Macclenny, Baker County, Florida

NPDES #FL0040495

Sampled 3/11/96

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June 1996

Biology Section

Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan #870346G

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NPDES #FL0040495

Biology Section
Bureau of Laboratories
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Introduction

City of Macclenny WWTP, Macclenny, Baker County, Florida, NPDES #FL0040495, tests performed on 12 to 14 March, 1996.

This activated sludge wastewater treatment plant is located at S.R. 23A and Honeymill Road, Macclenny. The facility has a design flow of 0.636 MGD. The wastewater treatment process begins with a primary clarifier which leads to an aeration basin. Effluent is then routed into two parallel secondary clarifiers and aerobic digesters. The wastewater is rejoined and flows through a series of three oxidation ponds, a 23.4 acre overland-flow field, a flow diversion holding basin, and a chlorine contact chamber. Effluent is dechlorinated with sulfur dioxide gas prior to discharge into Turkey Creek. At the time of sample collection, the flow exceeded the design flow at approximately 1.0 MGD, the flow field was off-line, and the oxidation ponds were not being aerated (facility summary provided by Tim McKelvey, 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. The test results showed the sample to be acutely toxic to *Cyprinella leedsi*, producing 95% mortality in 48 hours. No mortality occurred in the *Ceriodaphnia dubia* test (Table 1).

Total residual chlorine of the sample was 0.04 mg/L in the laboratory and 0.04 mg/L in the field. Total and unionized ammonia concentrations were 13.25 mg/L and 0.27 mg/L, respectively. 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 (EPA *Quality Criteria for Water* 1986, EPA 44015-86-001, 1986). Further chemical analyses were performed on the sample and several metals were identified (Table 2). The silver concentration of 0.43 µg/L exceeds the State of Florida Class III surface water criterion for silver of less than 0.07 µg/L (FAC 62-302.530).

Conclusion

The sample of effluent collected from this facility on February 26, 1996 was acutely toxic to the *Cyprinella leedsi*, but not to the *Ceriodaphnia dubia*. We attribute the toxicity to the unionized ammonia content of the sample.

Table 1. Data recorded during the 48-hour acute toxicity screening bioassays of a sample of effluent from the City of Macclenny WWTP, Macclenny, Baker County, Florida, NPDES#FL0040495, performed on 12 to 14 March, 1996.

Facility:	**City of Macclenny WWTP**		**NPDES #**	**FL0040495**	Facility Type: **WWTP**
Location:	S.R. 23A and Honeymill Rd.		Contact/District:	T. McKelvey/Northeast	
County:	Baker		Test type:	static acute screen	
Sample Collection Date:	3/11/96	Time: 1510	# tests:	2	Receiving Water: Turkey Creek
Test Beginning Date:	3/12/96	Time: 1245	Chlorination Type:	Sample collected	
Test Ending Date:	3/14/96	Time: 1245		after dechlorination	**Page 1 of 1**

Total Residual CL2	mg/L	Method
Field:	0.04	-
Lab:	0.04	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.017	0.00
20% Dilute Mineral Water (cladocerans):	< 0.017	0.00
100% Sample:	13.25	0.270

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	130
20% Dilute Mineral Water (cladocerans):	75	85
100% Sample:	175	130

Salinity	(ppt)
Control Water:	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	7.9	-	8.2	23.1	-	24.6	8.3	-	7.9	170	280
Control B	0/20	5	5	5	-	-	8.3	-	-	24.5	-	-	7.9	-	205
Control C	0/20	5	5	5	-	-	8.3	-	-	24.5	-	-	7.9	-	200
Control D	0/20	5	5	5	-	-	8.3	-	-	24.4	-	-	7.9	-	205
100% A	20/0	5	5	5	7.6	-	8.5	23.9	-	24.6	8.3	-	7.9	560	540
100% B	20/0	5	5	5	-	-	8.5	-	-	24.6	-	-	7.8	-	550
100% C	20/0	5	5	5	-	-	8.5	-	-	24.6	-	-	7.8	-	550
100% D	20/0	5	5	5	-	-	8.5	-	-	24.4	-	-	7.8	-	560

[A] Temperature of test incubator was continously recorded on a strip chart recorder. Incubator temperature range for the test period was 24.4-25.0°C.

Organism: ***Cyprinella leedsi*** Age: 12 days

	Sample/Diluent	**SURVIVAL # Alive**			pH			Temperature[B]			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	24 hour
Control A	0/500	5	5	4	7.9	8.3	8.4	24.3	23.9	24.2	8.4	7.9	8.1	250	255
Control B	0/500	5	5	5	7.9	8.3	8.4	24.3	23.9	23.9	8.4	7.9	8.2	250	250
Control C	0/500	5	5	5	7.9	8.3	8.4	24.3	23.8	23.8	8.5	8.0	8.4	250	250
Control D	0/500	5	5	5	7.9	8.3	8.4	24.3	24.0	23.9	8.5	8.2	8.4	250	250
100% A	500/0	5	5	0	7.5	8.1	8.1	24.4	23.8	23.8	8.4	7.2	8.1	580	570
100% B	500/0	5	5	0	7.5	8.1	8.1	24.4	23.7	23.5	8.4	7.1	7.8	580	570
100% C	500/0	5	5	1	7.5	8.1	8.1	24.4	23.7	23.5	8.5	7.2	7.8	580	570
100% D	500/0	5	5	0	7.5	8.1	8.1	24.4	23.9	23.7	8.6	7.4	7.8	580	570

[B] Temperature of test room was continously recorded on a strip chart recorder. Room temperature range for the test period was 24.0-27.0°C.

Table 2. Results of chemical analyses on the effluent from the City of Macclenny WWTP sampled on March 11, 1996.

Metals

Aluminum	196	µg/L[I]
Calcium	34.3	mg/L[A]
Copper	5	µg/L[I]
Iron	644	µg/L
Magnesium	9.54	mg/L
Silver	0.43	µg/L
Zinc	12	µg/L[I]

Pesticides and Herbicides

none detected

Base, Neutral, & Acid Extractable Organics

none detected

A Value reported is the mean of two or more determinations.

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

T Value reported is less than the criterion of detection.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: ~~Macclenny~~ incorrect name on label - MF 3-12-96 McClenny (City of)
County: Baker
Contact / District: Tim / McKelvey / NE
NPDES Permit #: FL0040495
LIMS Sample #: 132196 LIMS Job #: 96-MAR-12-05

Sample Collection: Date 3/11/96 Time 15:10
Test Beginning: Date 3/12/96 Time 12:45
Test Ending: Date 3-14-96 Time 1245
Organism Batch #: 12 Diluent Batch #: 12
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 2

Remarks:

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	22.0 @ 22.0	8.2 @ 25.5 °C	103.7 @ 106.2 1383 @ 1409 @ 24.3 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	22.2 @ 22.2	8.4 @ 23.9 °C	112.2 @ 106.2 1394 @ 1409 @ 25.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.1 @ 25.8 °C	9810 @ 10180 107.9 @ 106.2 1352 @ 1409 @ 24.3 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm))		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control	Con A	5	5	5	7.9		8.2	23.1		24.6	8.3		7.9	170		*280 3-14-96 2 times MF
Control	Con B	5	5	5			8.3			24.5			7.9			205
Control	Con C	5	5	5			8.3			24.5			7.9			200
Control	Con D	5	5	5			8.3			24.4			7.9			205
100%	100% A	5	5	5	7.6		8.5	23.9		24.6	8.3		7.9	560		540
100%	100% B	5	5	5			8.5			24.6			7.8			550
100%	100% C	5	5	5			8.5			24.6			7.8			550
100%	100% D	5	5	5			8.5			24.4			7.8			560
Measured/Loaded by:		MF	MF	JKS	MF		MF	MF		MF	MF		MF	MF		MF
Recorded by:		MF	MF	JKS	JKS		JKS	JKS		JKS	JKS		JKS	JKS		JKS

Investigators' Signatures

Marshall Faircloth
Jennifer Sparagan
Jay Smith
Tina M. McKelvey
reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.04	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	—	<0.03	0.04	Dr-100	JKS
Alkalinity (mg/L as $CaCO_3$):	—	75	175	HACH	JKS
Hardness (mg/L as $CaCO_3$):	—	85	130	HACH	JKS
Total ammonia (mg/L as N):	—	<0.017	13.25	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -56.5 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: MacClenny (incorrect name on label - MF 3/12/96) MacClenny (City of)
County: Baker
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL0040495
LIMS Sample #: 132196 LIMS Job #: 96-MAR-12-05

Sample Collection: Date 3/11/96 Time 1510
Test Beginning: Date 3/12/96 Time 1245
Test Ending: Date 3-14-96 Time 1245
Organism Batch #: 15 Diluent Batch #: well
Organism Age: 12 days
Test Organism: Cyprinella leedsi

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
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	22.0 @ 22.0	8.2 @ 25.5 °C	103.7 @ 106.2 1383 @ 1409 @ 24.3 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	22.2 @ 22.2	8.4 @ 23.9 °C	112.2 @ 106.2 1394 @ 1409 @ 25.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.9	8.1 @ 25.8 °C	107.9 @ 106.2 1397 @ 1409 @ 24.3 °C

JN 3-13-96 wrong columns

Conc.	Chamber #	Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
		0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	D1	5	5	4 (1D)	7.9	7.9	8.4	24.3	23.9	24.2	8.4	8.3	8.1	250	245	255
Control B	D2	5	5	5	7.9	7.4	8.4	24.3	23.9	23.9	8.4	8.3	8.2	250	245	250
Control C	D3	5	5	5	7.9	8.0	8.4	24.3	23.8	23.8	8.5	8.3	8.4	250	245	250
Control D	D4	5	5	5	7.9	8.2	8.4	24.3	24.0	23.9	8.5	8.3	8.4	250	250	250
100% A	D5	5	5	0 (5D)	7.5	7.2	8.1	24.4	23.8	23.8	8.4	8.1	8.1	580	570	570
100% B	D6	5	5	0 (5D)	7.5	7.1	8.1	24.4	23.7	23.5	8.4	8.1	7.8	580	570	570
100% C	D7	5	5	1 (4D)	7.5	7.2	8.1	24.4	23.7	23.5	8.5	8.1	7.8	580	570	570
100% D	D8	5	5	0 (6D)	7.5	7.4	8.1	24.4	23.9	23.7	8.6	8.1	7.8	580	570	570
Measured/Loaded by:		DW	MF	JRS	MF	TM	MF	MF	TM	MF	MF	TM	MF	MF	TM	MF
Recorded by:		MF	MF	JRS	JRS	JN	JRS	JRS	JN	JRS	JRS	JN	JRS	JRS	JN	JRS

Investigators' Signatures

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Joseph Smith
Tina M. Kelsey

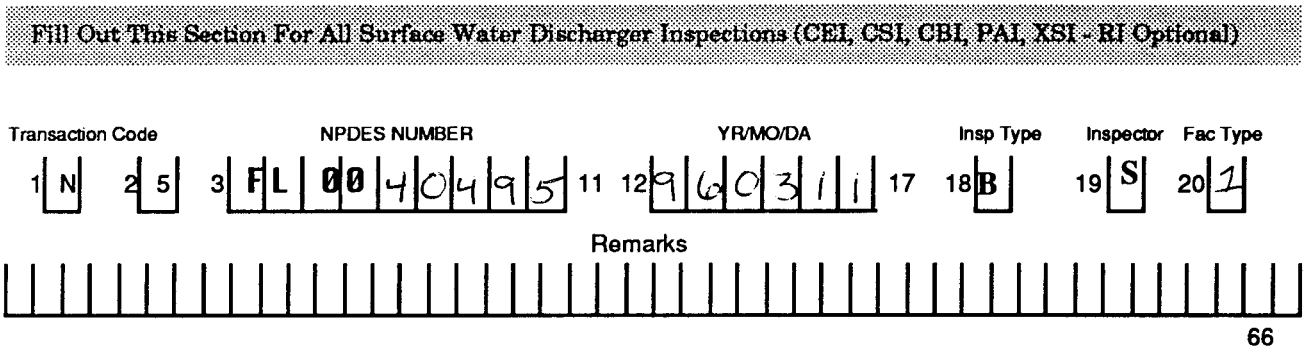
reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.04	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	<0.03	—	0.04	DR-100	JRS
Alkalinity (mg/L as $CaCO_3$):	125	—	175	HACH	JRS
Hardness (mg/L as $CaCO_3$):	130	—	130	HACH	JRS
Total ammonia (mg/L as N):	<0.017	—	13.25	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -56.3 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

The Bioassay of the City of Macclenny WWTP effluent sampled on March 11, 1996, NPDES #FL0040495.



The Priority Pollutants Analysis for the Bioassay of the City of Macclenny WWTP effluent sampled on March 11, 1996, NPDES #FL0040495.

