

Bioassays of

DOT Rest Area Sewage Treatment Plant (I-10 Eastbound)

Sanderson, Baker County, Florida

NPDES #FL0039225

Sampled 12/2/91

December 20, 1991

Biology Section
Division of Technical Services

Bioassays of

DOT Rest Area Sewage Treatment Plant (I-10 Eastbound)

Sanderson, Baker County, Florida

NPDES #FL0039225

Biology Section
Bureau of Laboratories
December 20, 1991

Introduction

DOT Rest Area STP, I-10 Eastbound, Sanderson, Baker County, Florida, NPDES #FL0039225, on 3 to 4 December, 1991.

This facility is a 5000 MGD extended aeration sewage treatment plant with chlorination. The 3000 GPD average flow of effluent is discharged to the drainage ditch serving the wayside park rest area. This facility was in violation of its operating permit for residual chlorine from January to June, 1991.

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 performed static acute toxicity bioassays on a sample of effluent from this facility. Tests were also performed on a portion of the sample which had been dechlorinated in the lab with sodium thiosulfate. The water flea, *Ceriodaphnia dubia*, and the fish, *Notropis leedsi*, were the test species used for the bioassays. The bioassay results indicated that this sample was toxic, producing LC_{50}'s of < 100% in each test.

Total residual chlorine was not detected in the sample. The total ammonia and unionized ammonia concentrations were 52.2 mg/L and 1.04 mg/L (Hach), respectively. No further chemical analyses were performed on the sample. We attributed the toxicity in the sample to the unionized ammonia in the sample. Unionized ammonia has been reported to be acutely toxic to freshwater organisms at concentrations as low as 0.08 mg/L for fish and 0.53 mg/L for invertebrates (US EPA, 1986. *Quality Criteria for Water*)

Conclusion

The sample of effluent from this facility was toxic on 2 December, 1991. We attribute the toxicity to the concentration of unionized ammonia in the sample.

Table 1. Concentration Series and Volumes Used for The Static Acute Screening Bioassays of the DOT Rest Area STP, I-10 Eastbound, on 3 to 5 December, 1991.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	20 mL	0 mL	20 mL
100%	0 mL	20 mL	20 mL

Notropis leedsi (bannerfin shiner)

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

Table 2. LC_{50} Data for the Bioassays of the DOT Rest Area STP, I-10 Eastbound, NPDES# FL0039225, on 3 to 5 December, 1991.

Organism	**48 Hour LC_{50}**
Chlorinated discharge	
Ceriodaphnia dubia	< 100% [a]
Notropis leedsi	< 100% [a] *

a The LC_{50} is < 100% since all the organisms died in the lowest test concentration (100%).

* 18-hour LC_{50}.

Table 3. Data recorded during the acute screening bioassays of a sample of effluent from the DOT Rest Area STP, I-10 Eastbound, Sanderson, Baker County, Florida, NPDES# FL0039225, on 3 to 5 December, 1991.

Facility:	DOT Rest Area STP			NPDES #	FL0039225	Facility Type:	Sewage Treatment
Location:	I-10 Eastbound, Sanderson			Contact/District:	J. Wright / Northeast		
County:	Baker			Test type:	static screening		
Sample Collection Date:	12/2/91	Time:	1545	# tests:	2	Receiving Water:	I-10 drainage ditch
Test Beginning Date:	12/3/91	Time:	1530	Chlorination Type:	chlorinated		
Test Ending Date:	12/5/91	Time:	1130	Dechlor Method:	total residual chlorine not detected		Page 1 of 1

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

* below detection limit

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control Water (daphnids):	0.00	0.00
100% Sample:	52.20	1.04

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	125	120
Cond. Control Water (daphnids):	73	75
100% Sample:	190	265

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours
LC50: < 100%

	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	8.7	-	8.5	8.2	-	8.1	23.3	-	23.2	144	160
Control	5	5	5	-	-	8.5	-	-	8.1	-	-	-	-	-
Control	5	5	5	-	-	8.5	-	-	8.1	-	-	-	-	-
Control	5	5	5	-	-	8.6	-	-	8.0	-	-	-	-	-
100%	5	5	0	7.4	-	8.1	7.5	-	8.2	23.5	-	23.2	1276	1350
100%	5	2	0	-	-	8.2	-	-	8.2	-	-	-	-	-
100%	5	3	0	-	-	8.2	-	-	8.2	-	-	-	-	-
100%	5	4	0	-	-	8.2	-	-	8.2	-	-	-	-	-

Organism: ***Notropis leedsi**** Age: 16 days
LC50: < 100%

	SURVIVAL			Dissolved Oxygen			pH			Temperature			Conductivity	
Concentrations	# at 0 hr	Live at 18 hr	Live at 48 hr	0 hour	18 hour	48 hour	0 hour	18 hour	48 hour	0 hour	18 hour	48 hour	0 hour	18 hour
Control	5	5	-	7.7	8.0	-	7.8	7.9	-	23.1	22.1	-	-	-
Control	5	5	-	7.7	8.1	-	7.8	7.9	-	-	-	-	240	230
100%	5	0	-	5.7	4.9	-	7.5	7.7	-	24.0	22.0	-	-	-
100%	5	0	-	5.8	4.0	-	7.5	7.6	-	-	-	-	1263	1237

* test terminated at 18 hours

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: DOT Rest Area I-10 East
Address/City:
County: Baker
Contact/District: NE / Jim Wright
NPDES Permit #: FL00 39225 Outfall #:

Sample Collection: Date 12/2/91 Time 15:45
Test Beginning: Date 12/3/91 Time 1530
Test Ending: Date 12/4/91 Time 0930
Test Organism: N. leeds;
Life Stage/Age: 17 DAYS

Test Number: 1 of 2 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:
TEST TERMINATED AT 18 HOURS
50:1 DILUTION FOR HACH AMMONIA.
1.2 ON COLOR WHEEL

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7,9@9	8.6@23.5	23.5@23.6	1369@23.6
24 hr	7@7,9@9	8.1@23.4	23.4@23.4	1350@23.4
48 hr	7@7,9@9	8.7@23.1	23.3@23.4	1348@22.9

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	25	5	5		7.8	7.9		23.1	22.1		7.7	8.0				
Control	87	5	5		7.8	7.9					7.7	8.1		240	230	
100%	63	5	0		7.5	7.7		24.0	22.0		5.7	4.9				
100%	39	5	0		7.5	7.6					5.8	4.0		1263	1237	

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BIOLOGY Matrix: W-EFFLUENT
Date Collected: 2-DEC-1991 15:45:00.
Field ID:I-10 East
BSY-SN-CLD BSY-SN-FSH

Measured/Loaded by:	AJ	PL		PL	PL		PL	CO		PL	CO		VZ	CO		
Recorded by:	KP	KP		CO	KP		KP	KP		KP	KP		CO	KP		

Investigators' Signatures
Kim Pearce
Christopher M Oakley
Karl Zyp
Alison Fowler
Reviewer

Water-quality Parameters + wrote well valve in conc. Spoke 12/3/91 AJ

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			BDL		JW
Lab Tot. Resid. Cl2:	0.0	0.0 AJ	0.0	HACH	KP
Alkalinity:	125	73	190	Hach	AJ
Hardness:	120	75	265	Hach	AJ
Total Ammonia:			52.2	Hach	KP

Ammonia Meter Slope: _____ Ammonia Blank: 3.6 Salinity 1.04

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: DOT Rest Area I-10 East
Address/City:
County: Baker
Contact/District: Jim Wright / NE
NPDES Permit #: FL00 34225 Outfall #:

Sample Collection: Date 12/2/91 Time 15:45
Test Beginning: Date 12/3/91 Time 1530
Test Ending: Date 12/5/91 Time 1130
Test Organism: C. dubia
Life Stage/Age: <24 hrs

Test Number: 2 of 2 Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7,9@9	8.6@23.5	23.5@23.6	136@23.6
24 hr	7@7,9@9	8.6@23.4	23.4@23.4	1350@23.4
48 hr	7@7,9@9	8.7@23.1	23.3@23.4	1348@22.9

WROTE COND HERE 12/3/91

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
Control	A 5	4~~4~~ KP	5	5	8.2		8.1	23.3		23.2	8.7		8.5	144		160
Control	B	5	5	5			8.1						8.5			
Control	C	5	5	5			8.1						8.5			
Control	D	5	5	5			8.0						8.6			
100%	A	5	5	0	7.5		8.2	23.5		23.2	7.4		8.1	1276		1350
100 %	B	5	2	0			8.2						8.2			
100 %	C	5	3	0			8.2						8.2			
100 %	D	5	4	0			8.2						8.2			
Measured/Loaded by:		KP	KP	KP	PL		PL	PL		CO	PL		CO	PL		CO
Recorded by:		AJ	CO	KP	CO		KP	CO		KP	CO		KP	CO		KP

Investigators' Signatures

Kim Pearce
Christopher M. Oakley
Paul Tyre
Alison Jowell
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			BDL	Hach	JW
Lab Tot. Resid. Cl2:	0.0		0.0	Hach	KP
Alkalinity:	125	73	190	Hach	AJ
Hardness:	120	75	265	Hach	AJ
Total Ammonia:			52.2	Hach	KP

Ammonia Meter Slope: _____
Ammonia Blank: 3.6
Salinity Sample: _____ ppt

The Bioassay of D.O.T. I-10 East Rest Area STP effluent sampled on December 2, 1991, NPDES# FL0039225.

