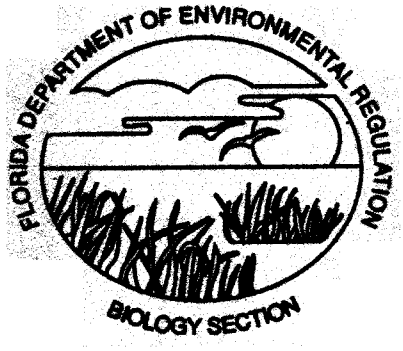


Bioassays of

Defuniak Springs Wastewater Treatment Plant

Defuniak Springs, Walton County, Florida

NPDES #FL0021580

Sampled 9/9/91

October 18, 1991

Biology Section
Division of Technical Services

Bioassays of

Defuniak Springs Wastewater Treatment Plant

Defuniak Springs, Walton County, Florida

NPDES #FL0021580

Biology Section
Bureau of Laboratories
October 18, 1991

Introduction

Defuniak Springs WWTP, Defuniak Springs, Walton County, Florida, NPDES #FL0021580 on 10 to 12 September, 1991.

This facility is located on North Fourth Street in Defuniak Springs. The treatment at this 0.75 MGD contact stabilization plant includes biological treatment using activated sludge, secondary clarification and chlorination. Sludge is treated by digestion and is then dewatered on sludge drying beds. Dried sludge is disposed of in a landfill. The annual average discharge of 0.550 MGD is to the West Sandy Creek which flows to the Choctawhatchee River.

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 acute definitive bioassays, on a sample of effluent from this facility using the bioassay test organisms, the waterflea, *Ceriodaphnia dubia*, and the fish, *Notropis leedsi*. The toxicity tests indicated that the sample was toxic to the waterflea, producing a 48 hour LC_{50} of 43.58%, but was not toxic to the fish. The cause of the observed mortality in the *C. dubia* test organisms was not determined. A total residual chlorine concentration of 0.5 mg/L was detected in the sample by a field measurement but no total residual chlorine was detected by laboratory measurements. The total ammonia concentration was 0.2 mg/L and the unionized ammonia was < 0.001 mg/L. Further chemical analyses were not performed.

Conclusion

The sample of effluent from this facility was toxic on 9 September, 1991. The cause of toxicity was not determined.

Table 1. Concentration Series and Volumes Used for The Static Definitive Bioassays of the Defuniak Springs WWTP on 10 to 12 September, 1991.

Ceriodaphnia dubia (water flea)

Concentration	Dilution Water	Sample	Total Volume
Control	20 mL	0 mL	20 mL
25%	15 mL	5 mL	20 mL
50%	10.mL	10 mL	20 mL
75%	5 mL	15 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
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

Table 2. Data recorded during the acute definitive bioassay of a sample of effluent from the Defuniak Springs WWTP, Defuniak Springs, Walton County, Florida, NPDES# FL0021580, on 10 to 12 September, 1991.

Facility:	**Defuniak Springs WWTP**		**NPDES #**	**FL0021580**	Facility Type: **Wastewater Treatment**
Location:	North Fourth St., Defuniak Springs		Contact/District:	G. Butts / Northwest	
County:	Walton		Test type:	static definitive	
Sample Collection Date:	9/9/91	Time: 1035	# tests:	2	Receiving Water: West Sandy Creek to
Test Beginning Date:	9/10/91	Time: 1430	Chlorination Type:	**chlorinated**	Choctawhatchee River
Test Ending Date:	9/12/91	Time: 1430	Residual chlorine was not detected in the bioassay sample. **Page 1 of 1**		

Total Residual Cl2	mg/l	Method
Field:	0.5	-
Lab:	0.0	Hach
Lab:	0.0	Iodometric

Ammonia	Total (mg/l)	Unionized (mg/l)
Control Water (fish):	0.00	0.00
Cond. Control		
Water (daphnids):	0.00	0.00
100% Sample:	0.20	0.00

Alk & Hardness	Alkalinity (mg/l)	Hardness (mg/l)
Control Water (fish):	105	120
Cond. Control		
Water (daphnids):	60	82
100% Sample:	20	70

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours
LC50: 43.58% Binomial: 42.97% Moving Average: 43.58%

	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	9.0	-	8.7	8.2	-	8.2	20.8	-	20.4	173	185
Control	5	5	4	-	-	8.7	-	-	8.3	-	-	-	-	-
Control	5	5	5	-	-	8.8	-	-	8.3	-	-	-	-	-
Control	5	5	4	-	-	8.8	-	-	8.3	-	-	-	-	-
25.0%	5	5	5	8.8	-	8.7	7.5	-	8.2	20.2	-	20.6	278	257
25.0%	5	5	5	-	-	8.7	-	-	8.2	-	-	-	-	-
25.0%	5	5	5	-	-	8.7	-	-	8.2	-	-	-	-	-
25.0%	5	5	4	-	-	8.7	-	-	8.2	-	-	-	-	-
50.0%	5	5	1	8.7	-	8.8	7.4	-	8.1	20.2	-	20.4	285	304
50.0%	5	5	1	-	-	8.8	-	-	8.1	-	-	-	-	-
50.0%	5	5	3	-	-	8.8	-	-	8.1	-	-	-	-	-
50.0%	5	5	2	-	-	8.8	-	-	8.1	-	-	-	-	-
75.0%	5	5	1	8.5	-	8.8	7.2	-	8.0	20.1	-	20.4	335	362
75.0%	5	4	0	-	-	8.8	-	-	8.0	-	-	-	-	-
75.0%	5	4	0	-	-	8.8	-	-	8.0	-	-	-	-	-
75.0%	5	4	0	-	-	8.8	-	-	8.0	-	-	-	-	-
100.0%	5	0	0	8.3	-	8.8	7.0	-	7.9	20.2	-	20.6	387	425
100.0%	5	1	0	-	-	8.8	-	-	7.9	-	-	-	-	-
100.0%	5	1	0	-	-	8.8	-	-	7.8	-	-	-	-	-
100.0%	5	1	0	-	-	8.8	-	-	7.8	-	-	-	-	-

Organism: ***Notropis leedsi*** Age: 25 days
LC50: -

	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	9.0	8.6	8.6	8.0	8.2	8.3	20.9	20.3	20.7	-	-
Control	5	5	5	9.0	8.6	8.6	8.0	8.1	8.2	-	-	-	243	239
25.0%	5	5	5	8.8	8.4	8.5	7.7	8.0	8.2	21.0	20.1	20.5	-	-
25.0%	5	5	5	8.8	8.4	8.5	7.7	8.0	8.2	-	-	-	285	286
50.0%	5	5	5	8.6	8.2	8.2	7.4	7.8	8.0	21.0	20.1	20.3	-	-
50.0%	5	5	5	8.6	8.2	8.2	7.4	7.8	8.0	-	-	-	324	320
75.0%	5	5	5	8.3	8.2	8.4	7.2	7.6	7.8	20.9	20.0	20.2	-	-
75.0%	5	5	5	8.3	8.2	8.4	7.2	7.6	7.8	-	-	-	363	362
100.0%	5	5	5	8.2	8.2	8.3	6.8	7.2	7.5	20.8	20.0	20.2	-	-
100.0%	5	5	5	8.2	8.2	8.3	6.8	7.2	7.4	-	-	-	403	405

Table 3. LC_{50} Data for the Bioassay of the Defuniak Springs Wastewater Treatment Plant on 10 to 12 September, 1991.

Organism	Method of Data Analysis	48 Hour LC_{50} (95% Confidence Intervals)
Chlorinated discharge		
Ceriodaphnia dubia	Binomial	42.97% (25.00%, 75.00%)
	Moving Average	43.58% (22.71%, 50.36%)[a]
	Probit	[b]
Notropis leedsi		Not Toxic

a This LC_{50} is reported in the text since it is the most statistically conservative value of the data set.

b Due to an insufficient number of dead organisms, or to the irregular distribution of mortality, an LC_{50} value cannot be calculated using this method of statistical analysis.

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Defuniak Springs WWTP
Address/City: Defuniak Springs, Florida
County: WALTON
Contact/District: G. Butts / North West
NPDES Permit #: FL0021580 Outfall #: 001

Sample Collection: Date 09/09/91 Time 1035
Test Beginning: Date 09/10/91 Time 1430
Test Ending: Date 9/12/91 Time 1430
Test Organism: Ceriodaphnia dubia
Life Stage/Age: < 24hours

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

Remarks:
No residual Chlorine detected in the lab by this sample

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7.7 @ 9	8.5 @ 22°C	23.8 @ 23.6°C	1376 @ 24.3°C
24 hr	7.0 - 9.9	8.5 @ 21°C	24.2 @ 24°C	1368 @ 23.8 @ 13
48 hr	7.0 9 @ 9	8.9 @ 21.5°	21.5° @ 24.5°	1368 @ 24.3 @

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	5	5	8.2		8.2	20.8		20.4	9.0		8.7	173		185
Control	B	5	5	4			8.3						8.7			
Control	C	5	5	5			8.3						8.8			
Control	D	5	5	4			8.3						8.8			
25 %	A	5	5	5	7.5		8.2	20.2		20.6	8.8		8.7	278		257
25 %	B	5	5	5			8.2						8.7			
25 %	C	5	5	5			8.2						8.7			
25 %	D	5	5	4			8.2						8.7			
50 %	A	5	5	1	7.4		8.1	20.2		20.4	8.7		8.8	285		304
50 %	B	5	5	1			8.1						8.8			
50 %	C	5	5	3			8.1						8.8			
50 %	D	5	5	2			8.1						8.8			
75 %	A	5	5	1	7.2		8.0	20.1		20.4	8.5		8.8	335		362
75 %	B	5	4	0			8.0						8.8			
75 %	C	5	4	0			8.0						8.8			
75 %	D	5	4	0			8.0						8.8			
100 %	A	5	0	0	7.0		7.9	20.2		20.6	8.3		8.8	387		425
100 %	B	5	1	0			7.9						8.8			
100 %	C	5	1	0			7.8						8.8			
100 %	D	5	1	0			7.8						8.8			
Measured/Loaded by:		KP	MF	MF	MF		AJ	MF		AJ	MF		AJ	MF		AJ
Recorded by:		KP	MF	KP	KP		KP	KP		KP	KP		KP	KP		KP

Investigators' Signatures

Marshall Faircloth
Kim Pearce
Alison M Jordan

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Clz:	Blank 0.0		0.5	—	G. Butts
Lab Tot. Resid. Clz:			0.0	Hach	MF
Alkalinity:	105	60	20	Hach	MF
Hardness:	120	82	70	Hach	MF
Total Ammonia:	0.0	0.0	0.2	Hach	MF

Ammonia Ammonia 0.0 Salinity

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: DeFuniak Springs WWTP
Address/City: DeFuniak Springs, Florida
County: WALTON
Contact/District: Glenn Butts / Northwest
NPDES Permit #: FL00 21580 Outfall #: 001

Sample Collection: Date 9/09/91 Time 103
Test Beginning: Date 9/10/91 Time 143i
Test Ending: Date 9/12/91 Time 143e
Test Organism: Nitrocris Perski
Life Stage/Age: 1st Instar 25 days
* moving in every place

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

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7.99	8.8@22°C	20.8@23.6°C	1376@24.3°C@1
24 hr	7@7.99	8.9@21°C	21.3@24.0°C	1368@24.8°C@13
48 hr	7@7.99	8.5@21.5	21.5@24.5	1380@24.3°C

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	14	5	5	5	8.0	8.2	8.3	20.9	20.3	20.7	9.0	8.6	8.6			
Control	38	5	5	5	8.0	8.1	8.2				9.0	8.6	8.6	243	239	239
25%	88	5	5	5	7.7	8.0	8.2	21.0	20.1	20.5	8.8	8.4	8.5			
25%	87	5	5	5	7.7	8.0	8.2				8.8	8.4	8.5	285	281	286
50%	8	5	5	5	7.4	7.8	8.0	21.0	20.1	20.3	8.6	8.2	8.2			
50%	19	5	5	5	7.4	7.8	8.0				8.6	8.2	8.2	324	321	320
75%	63	5	5	5	7.2	7.6	7.8	20.9	20.0	20.2	8.3	8.2	8.4			
75%	68	5	5	5	7.2	7.6	7.8				8.3	8.2	8.4	363	360	362
100%	142	5	5	5	6.8	7.2	7.5	20.8	20.0	20.2	8.2	8.2	8.3			
100%	77	5	5	5	6.8	7.2	7.4				8.2	8.2	8.3	403	401	405

91-SEP-10-05 22547 - 22549
efuniak Springs WWTP 10-SEP-1991 12
ate Received: 10-SEP-1991 12:08:28.
ederal Express BIOLOGY
-EFFLUENT NW-PC
AGP

Measured/Loaded by:	MF	MF	MF	MF	MK	AJ	MF	MK	AJ	MF	MK	AJ	MF	MK	AJ
Recorded by:	KP	MF	MF	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	KP	AJ

Investigators' Signatures

Marshall Faircloth
Kim Pearce
Glenn Jordan

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Clz:	[illegible]	[illegible]	0.5	—	G Butts
Lab Tot. Resid. Clz:			0.0	Hach	M.F
Alkalinity:	105	60	20	Hach	MF
Hardness:	120	82	70	Hach	MF
Total Ammonia:	0	0	0.2	Hach	MF

Ammonia Meter Slope: _____
Ammonia Blank: 0.0
Salinity Sample: _____ ppt