

Bioassays of

Cedar Key Reclaiming Facility

Cedar Key, Levy County, Florida

NPDES #FL0031216

Sampled 4/8/02

September 2002

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

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Bureau of Laboratories
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Introduction

Cedar Key Water Reclaiming Facility, 510 Third Street, Cedar Key, Levy County, Florida, NPDES #FL0031216, tests performed on 09 to 11 April 2002.

The Cedar Key Water Reclaiming Facility is a domestic wastewater treatment facility with a design flow of 0.166 MGD and an average flow of 0.110 MGD (average flow -April 2002). Wastewater is treated by a cyclical nitrogen removal extended-aeration process, tertiary filtration, and high-level disinfection with chlorine gas. Treated wastewater is reclaimed and used to irrigate a hay field. The facility has not discharged to surface water since 27 August 2000. Wastewater is dechlorinated with sulfur-dioxide gas only when being discharged (i.e., emergency releases) into the Class III marine waters of Back Bayou (facility information provided by Azeem Syed and Pat Oconner, 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 that was collected from the Cedar Key WWTF. Two additional bioassays were performed on an aliquot of sample that was dechlorinated by the addition of 0.025N sodium thiosulfate at the rate of 2.48 ml/L of sample. The controls for the dechlorinated bioassays were treated similarly. The freshwater test species, the waterflea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*, were used in these bioassays. The test results indicated toxicity to both test species in the original sample, producing 100% mortality within 40 minutes of test initiation, but did not indicate toxicity in the dechlorinated sample tests, showing 100% survival at 48 hours (Table 1).

The total residual chlorine (TRC) concentration in the bioassay sample was 4.8 mg/L in the field and 2.20 mg/L in the laboratory. Since effluent was not being discharged to surface water, compliance is not an issue; however, it should be noted that the TRC concentration in the sample (2.20 mg/L) exceeded the Florida surface water quality criteria for chlorine of ≤ 0.01 mg/L (FAC 62-302.530). Total ammonia was not detected in the bioassay sample in the laboratory. The total ammonia concentration in the sample preserved for chemical analysis was 0.028 mg/L. Additional samples of effluent were collected from this facility and analyzed for herbicides, nutrients, metals, organic compounds, and pesticides. Nutrients and several metals were identified (Table 2).

Conclusion

The sample of effluent collected from this facility on April 8, 2002, showed acute toxicity to both test species within 40 minutes of test initiation. The dechlorinated aliquot of sample did not show toxicity to the test organisms within 48 hours. We attribute the cause of the observed mortality to the total residual chlorine concentration in the sample.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Cedar Key Water Reclaiming Facility, 510 Third Street, Cedar Key, Levy County, Florida, NPDES# FL0031216, performed from 9 to 11 April 2002.

Facility:	**Cedar Key Water Reclaiming Facility**		**NPDES #**	**FL0031216**	Facility Type:	**Wastewater**	**Analysts:** Della Parker-Hanson
Location:	510 Third Street, Cedar Key		Contact/District:	P. Oconner/Northeast		**Reclaiming Facility**	Joshua Ayres
County:	Levy		Test type:	static acute screen		Emergency Discharge to	Gary Hardie
Sample Collection Date:	4/8/02	Time: 1145	# tests:	2	Receiving Water:	Back Bayou	Marshall Faircloth
Test Beginning Date:	4/9/02	Time: 1230	Chlorination Type:	Chlorinated		Class III Marine	
Test Ending Date:	4/11/02	Time: 1330				**Page 1 of 1**	**Reviewer:** David Whiting

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

	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	-	8.2	23.5	-	23.8	8.4	-	8.3	165	190
Control B	0/20	5	5	5	-	-	8.2	-	-	23.9	-	-	8.1	-	180
Control C	0/20	5	5	5	-	-	8.2	-	-	23.8	-	-	8.0	-	185
Control D	0/20	5	5	5	-	-	8.2	-	-	23.7	-	-	8.0	-	190
Dechl Ctrl A	0/20	5	5	5	8.2	-	8.1	23.6	-	23.9	8.3	-	7.9	175	200
Dechl Ctrl B	0/20	5	5	5	-	-	8.2	-	-	23.8	-	-	7.8	-	195
Dechl Ctrl C	0/20	5	5	5	-	-	8.2	-	-	23.7	-	-	7.9	-	195
Dechl Ctrl D	0/20	5	5	5	-	-	8.2	-	-	23.8	-	-	7.9	-	195
Dechl 100 A	20/0	5	5	5	7.3	-	8.4	23.7	-	24.0	8.1	-	7.9	1230	1335
Dechl 100 B	20/0	5	5	5	-	-	8.4	-	-	24.1	-	-	7.8	-	1395
Dechl 100 C	20/0	5	5	5	-	-	8.4	-	-	24.0	-	-	7.8	-	1340
Dechl 100 D	20/0	5	5	5	-	-	8.4	-	-	24.0	-	-	7.9	-	1350
100% A	20/0	5	0	-	7.2	-	-	23.7	-	-	6.6	-	-	1260	-
100% B	20/0	5	0	-	-	-	-	-	-	-	-	-	-	-	-
100% C	20/0	5	0	-	-	-	-	-	-	-	-	-	-	-	-
100% D	20/0	5	0	-	-	-	-	-	-	-	-	-	-	-	-

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-25.5 °C.
Incubator #3 temperature range for the test period was 23.5-25.0°C.

Organism: ***Cyprinella leedsi*** Life stage: 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	48 hour
Control A	0/500	5	5	5	7.8	8.2	8.4	23.6	24.5	26.4	8.1	7.1	7.5	250	275
Control B	0/500	5	5	5	7.9	8.2	8.4	23.6	24.7	24.1	8.1	7.2	7.8	250	270
Control C	0/500	5	5	4	8.0	8.2	8.4	23.5	24.5	24.0	8.2	7.2	8.0	250	270
Control D	0/500	5	5	5	7.9	8.2	8.4	23.4	24.7	24.1	8.2	7.2	8.1	250	270
Dechl Ctrl A	0/500	5	5	5	7.9	8.2	8.4	23.6	24.5	23.9	8.2	7.0	8.0	270	285
Dechl Ctrl B	0/500	5	5	5	7.9	8.2	8.4	23.6	24.6	27.3	8.2	7.2	7.5	265	305
Dechl Ctrl C	0/500	5	5	5	7.9	8.2	8.4	23.6	24.4	26.0	8.2	7.0	7.5	265	300
Dechl Ctrl D	0/500	5	5	5	7.9	8.2	8.4	23.6	24.4	24.1	8.3	7.2	7.5	265	285
Dechl 100% A	500/0	5	5	5	7.3	7.9	8.1	24.2	24.4	23.8	8.0	7.0	7.7	1260	1325
Dechl 100% B	500/0	5	5	5	7.3	7.9	8.1	24.3	24.5	25.3	7.9	7.0	7.5	1280	1410
Dechl 100% C	500/0	5	5	5	7.3	7.9	8.1	24.2	24.5	24.3	7.9	6.5	7.5	1300	1380
Dechl 100% D	500/0	5	5	5	7.3	7.9	8.1	24.2	24.5	23.9	7.9	6.9	7.4	1300	1355
100% A	500/0	5	0	-	7.1	-	-	24.2	-	-	6.4	-	-	1320	-
100% B	500/0	5	0	-	7.1	-	-	24.3	-	-	6.4	-	-	1300	-
100 % C	500/0	5	0	-	7.1	-	-	24.2	-	-	6.4	-	-	1300	-
100% D	500/0	5	0	-	7.1	-	-	24.6	-	-	6.5	-	-	1320	-

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 24.0-25.5°C.
Incubator #3 temperature range for the test period was 23.5-25.0°C.

LIMS	
Job number:	TLH-2002-04-09-17
sample number:	586613

Data Transcription Verification	
date:	9/4/02
by:	Christa Pierini
	Jacquelyn Brynda

Total Residual CL2	mg/L	Method
Field:	4.80	-
Lab:	2.20	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control water (fish):	<0.017	<0.017
Control water (water flea):	<0.017	<0.017
100% Sample:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	155	151
Control water (water flea):	78	75
100% Sample:	143	212

Table 2. Results of chemical analyses on the effluent from Cedar Key Water Reclaiming Facility sampled on April 8, 2002.

Metals

Calcium	51.1	mg/L	
Copper	0.80	µg/L	I
Lead	0.38	µg/L	I
Magnesium	18.6	mg/L	
Selenium	1.3	µg/L	I
Zinc	37	µg/L	

Nutrients

Ammonia-N	0.028	mg N/L
Nitrite+Nitrate-N	0.38	mg N/L
Total Kjeldahl Nitrogen	1.1	mg N/L
Orthophosphate-P	0.27	mg P/L
Total Phosphorus-P	0.31	mg P/L

Pesticides and Herbicides

None detected

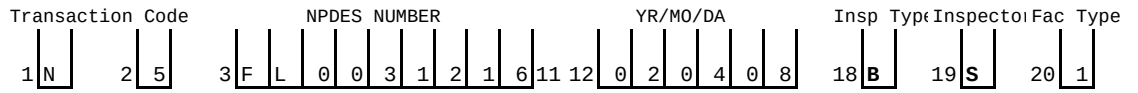
Base, Neutral, & Acid Extractable Organics

None detected

[I] The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

The Bioassay of the Cedar Key WRF effluent sampled on April 8, 2002, NPDES #FL0031216.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, X

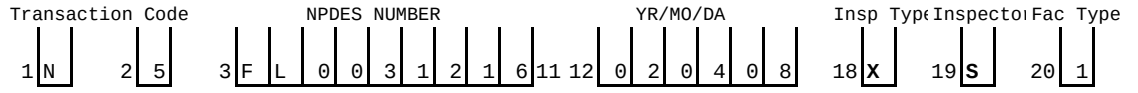


Remarks

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The Priority Pollutants Analysis for the Bioassay of the Cedar Key WRF effluent sampled on April 8, 2002, NPDES #FL0031216.

Fill Out This Section For All Surface Water Discharger Inspections(CEI, CSI, CBI, PAI, X



Remarks

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