

Bioassays of

OCPUD/Eastern Water Reclamation Facility

Orlando, Orange County, Florida

NPDES #FL0038849

Sampled 6/11/01

November 2001

Biology Section

Division of Resource Assessment & Management

Comprehensive Quality Assurance Plan #870346G

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Bureau of Laboratories
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Introduction

OCPUD/Eastern Water Reclamation Facility, 1621 South Alafaya Trail, Orlando, Orange County, Florida, NPDES #FL0038849, tests performed on 12 to 14 June 2001.

This domestic wastewater treatment facility has an annual average daily flow of 19.0 MGD. This facility consists of two parallel treatment tracks with a common preliminary structure and an effluent pump station. The initial treatment includes odor control, mechanical influent screening, and grit removal. The effluent is then separated into two, five-stage Bardenpho™ Process carrousels for nutrient removal and re-aeration. Following re-aeration, the effluent is processed through the chemical feed facilities, secondary clarifiers, and tertiary filters. The effluent then receives chlorination, thickening, and dewatering of residuals.

The effluent currently flows into reuse system R003, which comprises approximately 300 acres of man-made and natural wetlands. Dechlorination of the effluent is achieved through retention time in the wetlands before being discharged into the Class III freshwater of an unnamed tributary of the Big Econlockhatchee River. The Econlockhatchee River is listed as an Outstanding Florida Water.

Reuse system R002 is currently under construction and will manage some portion of the effluent in the future (facility summary provided by John Bowles, FDEP, Orlando).

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 sample was collected from the reclaim wet well that contained the combined effluent from two separate chlorine contact chambers because the facility was not discharging to the wetlands. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results indicated that the 100% sample was toxic to both, *C. leedsi* and *C. dubia*, producing 100% mortality within 35 hours for *C. dubia*, and within 10 minutes of test initiation for *C. leedsi* (Table 1). Since the samples were not collected at the NPDES compliance point, the toxicity test failures do not represent a permit violation.

The total residual chlorine (TRC) concentration of the sample was 5.0 mg/L in the field and 5.04 mg/L in the laboratory. An aliquot of the sample was dechlorinated using sodium thiosulfate. The TRC of the dechlorinated aliquot was 0.04 mg/L. The same ratio of sodium thiosulfate was added to an aliquot of each of the control waters and tested along side the other tests. The additional controls were used to test for any adverse effects to the test species by the addition of sodium thiosulfate. No mortality was observed in any of the controls. The dechlorinated sample tests did not show toxicity to either test species by 48 hours (Table 1).

The total and unionized ammonia concentrations were 3.38 mg/L and 0.092 mg/L in the original 100% sample and 4.13 mg/L and 0.218 mg/L in the sodium thiosulfate-treated aliquot of

100% sample, respectively. Further chemical analyses were performed on the sample and several metals and a pesticide were identified in the sample (Table 2). The toxicity is attributed primarily to the chlorine in the sample, since a lack of mortality was observed in the dechlorinated aliquot of sample. Total residual chlorine levels as low as 0.028 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates (EPA *Quality Criteria for Water* 1986, EPA 44015-86-001, 1986). However, the dechlorination process used in the lab can also remove other toxicants, so chlorine cannot be identified as the sole cause for the observed toxicity.

Conclusion

The sample of effluent collected from this facility on June 11, 2001, showed toxicity to both test species within 24 hours. The toxicity is attributed primarily to the chlorine in the sample. However, the dechlorination process used in the lab can also remove other toxicants, so chlorine cannot be identified as the sole cause for the observed toxicity. Since the samples were not collected at the NPDES compliance point, the toxicity test failures do not represent a permit violation.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the OCPUD/Eastern Water Reclamation Facility, 1621 South Alafaya Trail, Orlando, Orange County, Florida, NPDES# FL0038849, performed on 12 to 14 June 2001.

Facility:	**OCPUD/Eastern WRF**		**NPDES #**	**FL0038849**	Facility Type:	**Wastewater**	**Analysts:** Joshua Ayres
Location:	1621 South Alafaya Trail		Contact/District:	P. Kane/Central District		**Reclamation**	Marshall Faircloth
County:	Orange		Test type:	static acute screen		**Facility**	Shannon Gerardi
Sample Collection Date:	6/11/01	Time: 0935	# tests:	2	Receiving Water:	Big Econlockhatchee	Della Parker-Hanson
Test Beginning Date:	6/12/01	Time: 1340	Chlorination Type:	Chlorinated		River	
Test Ending Date:	6/14/01	Time: 1250				**Page 1 of 2**	**Reviewer:** David Whiting

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

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[B] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µmhos/cm 0 hour	48 hour
Control A	0/20	5	5	5	8.1	-	8.3	25.3	-	23.5	7.9	-	7.8	180	185
Control B	0/20	5	5	5	-	-	8.3	-	-	22.7	-	-	7.8	-	185
Control C	0/20	5	5	5	-	-	8.3	-	-	22.7	-	-	7.9	-	185
Control D	0/20	5	5	5	-	-	8.3	-	-	22.7	-	-	8.0	-	190
Control A[A]	0/20	5	5	5	8.2	-	8.3	25.0	-	22.8	8.0	-	8.0	200	205
Control B[A]	0/20	5	5	5	-	-	8.2	-	-	22.9	-	-	8.0	-	215
Control C[A]	0/20	5	5	5	-	-	8.2	-	-	22.9	-	-	8.0	-	230
Control D[A]	0/20	5	5	5	-	-	8.2	-	-	22.8	-	-	8.0	-	235
100% A[A]	20/0	5	5	5	7.9	-	8.6	25.1	-	22.9	8.0	-	8.1	660	675
100% B[A]	20/0	5	5	5	-	-	8.6	-	-	23.2	-	-	8.1	-	650
100% C[A]	20/0	5	5	5	-	-	8.6	-	-	23.2	-	-	7.9	-	695
100% D[A]	20/0	5	5	5	-	-	8.6	-	-	23.1	-	-	7.9	-	700
100% A	20/0	5	0	-	7.6	-	-	25.2	-	-	7.5	-	-	655	-
100% B	20/0	5	0	-	-	-	-	-	-	-	-	-	-	-	-
100% C	20/0	5	0	-	-	-	-	-	-	-	-	-	-	-	-
100% D	20/0	5	0	-	-	-	-	-	-	-	-	-	-	-	-

[A] These replicates are treated with sodium thiosulfa [B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-26.0°C.
Incubator #2 temperature range for the test period was 24.0-25.0°C.

Data Transcription Verification	
date:	11/1/01
by:	Della Parker-Hanson
	Frances Moore

Total Residual CL2	mg/L	Method
Field:	5.00	-
Lab:	5.04	Hach

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.017	<0.017
20% Dilute Mineral Water (cladocerans):	< 0.017	<0.017
100% Sample:	3.380	0.092
Treated 100% Sample	4.130	0.218

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	133	135
20% Dilute Mineral Water (cladocerans):	79	84
100% Sample:	177	132

Continued

Table 1. concluded Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the OCPUD/Eastern Water Reclamation Facility, 1621 South Alafaya Trail, Orlando, Orange County, Florida, NPDES# FL0038849, performed on 12 to 14 June 2001.

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Location:	1621 South Alafaya Trail		Contact/District:	P. Kane/Central District		**Reclaimation**		Marshall Faircloth
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Test Beginning Date:	6/12/01 Time: 1340		Chlorination Type:	Chlorinated		River		
Test Ending Date:	6/14/01 Time: 1250					**Page 2 of 2**	**Reviewer:**	David Whiting

Organism: ***Cyprinella leedsi*** Life stage: 13 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected	
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	7.9	8.3	8.5	24.7	24.0	24.0	7.7	7.8	8.2	265	275
Control B	0/500	5	5	5	7.9	8.3	8.5	24.6	24.3	24.1	7.8	7.9	7.9	265	270
Control C	0/500	5	5	5	7.9	8.3	8.5	24.5	24.1	24.4	7.7	7.9	7.9	265	275
Control D	0/500	5	5	5	7.9	8.3	8.4	24.5	23.8	24.4	7.9	7.8	7.6	265	275
Control A[A]	0/500	5	5	5	8.0	8.3	8.4	24.5	24.0	24.3	7.8	7.7	7.4	285	300
Control B[A]	0/500	5	5	5	7.9	8.3	8.4	24.5	23.8	25.0	7.9	7.8	7.4	285	310
Control C[A]	0/500	5	5	5	8.0	8.3	8.4	24.5	24.0	24.6	7.8	7.7	7.2	285	305
Control D[A]	0/500	5	5	5	8.0	8.3	8.3	24.5	24.0	24.4	7.9	7.6	7.2	285	300
100% A	500/0	5	5	5	7.9	8.3	8.4	24.7	24.5	24.5	7.9	7.5	7.2	635	640
100% B	500/0	5	5	5	7.9	8.3	8.4	24.7	24.1	24.5	7.7	7.5	7.2	665	660
100% C	500/0	5	5	5	7.9	8.3	8.4	24.8	23.8	24.5	7.6	7.4	7.1	670	670
100% D	500/0	5	5	5	7.6	8.2	8.4	24.8	24.2	24.2	7.5	7.4	7.1	670	660
100% A[A]	500/0	5	0	-	7.6	-	-	25.1	-	-	7.6	-	-	655	-
100% B[A]	500/0	5	0	-	7.6	-	-	25.2	-	-	7.3	-	-	650	-
100% C[A]	500/0	5	0	-	7.6	-	-	25.2	-	-	7.2	-	-	650	-
100% D[A]	500/0	5	0	-	7.6	-	-	25.2	-	-	7.2	-	-	650	-

[A]These replicates are treated with sodium thiosulfate.

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-26.0°C.
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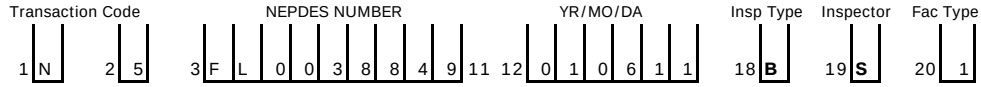
Table 2. Results of chemical analyses on the effluent from OCPUD/Eastern Water Reclamation Facility sampled on June 11, 2001.

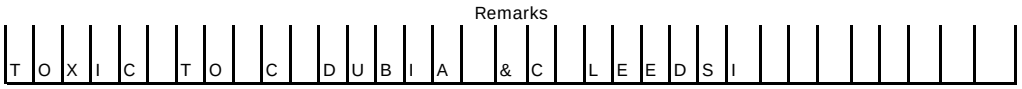
Metals			
Calcium	39.2	mg/L	
Chromium	1.1	µg/L	I
Copper	2.8	µg/L	
Iron	61	µg/L	I
Lead	0.4	µg/L	I
Magnesium	7.7	mg/L	
Selenium	0.62	µg/L	I
Silver	0.075	µg/L	I
Zinc	68	µg/L	
Pesticides and Herbicides			
Atrazine	0.16	µg/L	I
Base, Neutral, & Acid Extractable Organics			
None detected			

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

The Bioassay of OCPUD/Eastern Water Reclamation Facility effluent sampled on June 11, 2001, NPDES # FL0038849.

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

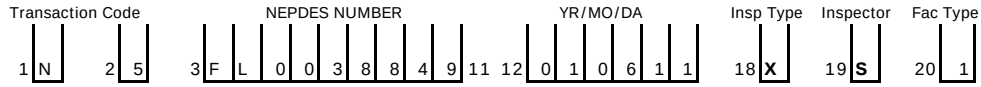


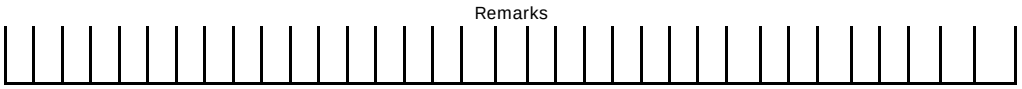


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The Priority Pollutants Analysis for Bioassay of OCPUD/Eastern Water Reclaimation Faiclity effluent sampled on June 11, 2001, NPDES # FL0038849.

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





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