Bioassays of

Grande Olde Plaza Shopping Center
Wastewater Treatment Plant

Middleburg, Clay County, Florida

NPDES #FL0113735

Sampled 1/13/97

May 1997

Biology Section
Division of Administrative & Technical Services
Comprehensive Quality Assurance Plan #870346G

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Introduction

Grande Olde Plaza Shopping Center WWTP, 2710 Blanding Boulevard, Middleburg, Clay County, Florida, NPDES #FL0113735, tests performed on 14 to 16 January, 1997.

This extended-aeration wastewater treatment plant has a design flow of 0.04 MGD. Wastewater is treated by aeration, aerobic digestion, clarification, chlorination for disinfection, dechlorination, and filtration through sand filters. The flow from the sand filters seeps into an unnamed creek which flows into the South Fork of Black Creek, a tributary of the St. Johns River. The owner of the facility has been issued a State of Florida Department of Environmental Protection Domestic Wastewater Facility permit (DO10-281453) for the purpose of construction to improve the facility (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. Two additional 48-hour screening bioassays were performed on aliquots of the sample that were dechlorinated in the laboratory by the addition of 1.2 mL of 0.025N sodium thiosulfate per liter of sample. The test species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. The test results did not show toxicity (Table 1).

Total residual chlorine of the 100% whole effluent sample was 0.35 mg/L in the laboratory and was not measured in the field. Total residual chlorine (TRC) of the dechlorinated aliquot of sample was measured at 0.06 mg/L. The amount of sodium thiosulfate (1.2 mL) added to each liter of sample was in excess of that calculated to remove the measured total residual chlorine and regeneration of this amount of chlorine from chloramines or similar organochlorine compounds is unlikely. The residual chlorine measured in the dechlorinated sample was likely the result of interference by an unknown component of the sample. Total ammonia was not detected in the bioassay sample, but was detected in a sample from this facility which was analyzed by the FDEP Chemistry laboratory. The total ammonia in the chemistry sample was 0.054 mg/L. Further chemical analyses were performed on the sample and several metals were identified (Table 2). The copper (40.2 µg/L), silver (1.78 µg/L), and zinc (165 µg/L) concentrations exceeded their respective State of Florida Class III freshwater surface water criterion for copper (11.3 µg/L), silver (≤0.07 µg/L), and zinc (101.4 µg/L) (FAC 62-302.530).

Bioassays performed on a sample of effluent collected from this facility on November 4, 1996, also did not show toxicity but had concentrations of several metals that were in violation of State of Florida water quality standards.

Conclusion

The sample of effluent collected from this facility on January 13, 1997, did not show toxicity; however, the concentrations of several metals in the sample were in violation of State of Florida water quality standards.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the Grande Olde Plaza WWTP, Middleburg , Clay County, Florida, NPDES# FL0113735, performed on 14 to 16 January, 1997.

Facility:	**Grande Olde Plaza WWTP**		**NPDES #**	**FL0113735**	Facility Type: Wastewater Treatment Plant
Location:	2710 Blanding Blvd., Middleburg		Contact/District:	Tim McKelvey / Northeast	
County:	Clay		Test type:	static acute screen	Receiving Water: unnamed creek to the South Fork of Black Creek to the St. Johns River
Sample Collection Date:	1/13/97	Time: 1230	# tests:	2	
Test Beginning Date:	1/14/97	Time: 1505	Chlorination Type:	Chlorinated	
Test Ending Date:	1/16/97	Time: 1605	Sample collected after plant dechlorination unit.		Page 1 of 1

Total Residual CL2	mg/L	Method
Field:	-	-
Lab: 100% sample:	0.35	DR-100
dechlorinated sample:	0.06	DR-100

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:	<0.017	<0.017

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	125	125
20% Dilute Mineral Water (cladocerans):	75	85
100% Sample:	55	95

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	8.2	-	8.3	22.3	-	23.5	8.3	-	8.0	160	190
Control B	0/20	5	5	5	-	-	8.2	-	-	23.5	-	-	8.0	-	195
Control C	0/20	5	5	5	-	-	8.2	-	-	23.4	-	-	7.8	-	195
Control D	0/20	5	5	5	-	-	8.2	-	-	23.3	-	-	7.9	-	215
100% A	20/0	5	5	5	7.4	-	8.0	23.4	-	23.4	8.0	-	7.8	645	770
100% B	20/0	5	5	5	-	-	8.0	-	-	23.4	-	-	7.9	-	790
100% C	20/0	5	5	5	-	-	8.0	-	-	23.4	-	-	7.9	-	790
100% D	20/0	5	5	5	-	-	8.0	-	-	23.3	-	-	7.9	-	815
Decl100% A	20/0	5	5	5	7.4	-	8.0	23.8	-	23.5	8.1	-	7.9	675	820
Decl100% B	20/0	5	5	5	-	-	8.0	-	-	23.5	-	-	7.9	-	785
Decl100% C	20/0	5	5	5	-	-	8.0	-	-	23.5	-	-	7.9	-	780
Decl100% D	20/0	5	5	5	-	-	8.0	-	-	23.3	-	-	7.9	-	800

Decl = Dechlorinated sample

[A] Temperature of test incubator was continously recorded on a strip chart recorder. Incubator temperature range for the test period was 24.4-25.6°C.

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

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature[B]			Dissolved Oxygen			Conductivity Uncorrected mmhos/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	8.0	8.2	8.3	23.8	23.3	23.1	7.9	7.9	7.8	245	245
Control B	0/500	5	5	5	7.9	8.2	8.3	23.8	23.2	23.0	7.9	8.0	7.8	245	245
Control C	0/500	5	5	5	8.0	8.2	8.3	23.8	23.2	23.0	7.9	8.0	8.0	250	245
Control D	0/500	5	5	5	7.9	8.2	8.3	23.8	23.6	23.0	7.9	8.1	8.0	250	245
100% A	500/0	5	5	5	7.3	7.6	7.8	23.8	23.4	23.1	8.1	8.0	7.9	720	720
100% B	500/0	5	5	5	7.2	7.6	7.7	23.7	23.3	23.1	8.2	7.9	7.9	720	720
100% C	500/0	5	5	5	7.2	7.6	7.7	23.6	23.4	23.1	8.2	8.0	7.9	720	720
100% D	500/0	5	5	5	7.2	7.6	7.7	23.7	23.6	23.2	8.2	7.9	7.9	720	720
Decl100% A	500/0	5	5	5	7.4	7.6	7.6	24.0	23.6	23.2	8.3	7.9	7.8	725	725
Decl100% B	500/0	5	5	5	7.4	7.6	7.6	24.0	23.5	23.2	8.3	7.9	7.7	730	725
Decl100% C	500/0	5	5	5	7.4	7.6	7.6	24.0	23.6	23.2	8.3	7.9	7.6	730	725
Decl100% D	500/0	5	5	5	7.4	7.6	7.5	24.1	23.8	23.3	8.3	7.9	7.6	730	730

Decl = Dechlorinated sample

[B] Temperature of test room was continously recorded on a strip chart recorder. Room temperature range for the test period was 23.5-24.0°C.

Table 2. Results of chemical analyses on the effluent from the Grande Olde Plaza Wastewater Treatment Plant sampled on January 13, 1997.

Metals

Aluminum	144	µg/L[A]
Cadmium	0.43	µg/L[A]
Calcium	21.1	mg/L[A]
Copper	40.2	µg/L[J]
Iron	768	µg/L[A]
Magnesium	8.30	mg/L[A]
Silver	1.78	µg/L[J]
Zinc	165	µg/L

Pesticides and Herbicides

none detected

Base, Neutral, & Acid Extractable Organics

none detected

[A] Value reported is the mean of two or more determinations.
[J] Estimated value.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Grand Olde Plaza
County: Clay
Contact / District: NED / Tim McKelvey
NPDES Permit #: FL0113735
LIMS Sample #: 165197 LIMS Job #: 97-JAN-14-20
sample log: 1-17-97

Sample Collection: Date 1/13/97 Time 12:30
Test Beginning: Date 1/14/97 Time 1505
Test Ending: Date 1/16-97 Time 1605
Organism Batch #: 2 Diluent Batch #: 1
Organism Age: < 24 hr
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Temperature range: room N/A
incubator 24.4-25.6
Test Number: 1 of 2
Remarks: D = dead, M = missing

1N aliquot of sample was dechlorinated by the addition of 1.2 ml of 0.025 N Sodium thiosulfate per liter of sample. 1.2 mls was 3X calculated amount. TRC would not read below 0.06 mg/L.

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	21.6 @ 21.6	8.3 @ 24.9 °C	~~123.6~~ 102.8 @ 100.1 1000 @ 1001 @ 24.9 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.2 @ 25.2 °C	9670 @ 9978 104.0 @ 100.1 1001 @ 1001 @ 24.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.0 @ 22.0	8.6 @ 22.7 °C	103.1 @ 100.1 990 @ 1001 @ 24.4 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
ctr	A	5	5	5	8.2		8.3	22.3		23.5	8.3		8.0	160		190
ctr	B	5	5	5			8.2			23.5			8.0			195
ctr	C	5	5	5			8.2			23.4			7.8			195
ctr	D	5	5	5			8.2			23.3			7.9			215
100%	A	5	5	5	7.4		8.0	23.4		23.4	8.0		7.8	645		770
100%	B	5	5	5			8.0			23.4			7.9			790
100%	C	5	5	5			8.0			23.4			7.9			790
100%	D	5	5	5			8.0			23.3			7.9			815
100% DeCl⁻	A	5	5	5	7.4		8.0	23.8		23.5	8.1		7.9	675		820
100% DeCl⁻	B	5	5	5			8.0			23.5			7.9			785
100% DeCl⁻	C	5	5	5			8.0			23.5			7.9			780
100% DeCl⁻	D	5	5	5			8.0			23.3			7.9			800
Measured/Loaded by:		MF	ND	MF	JS		MF	JS		MF	JS		MF	JS		MF
Recorded by:		JS	ND	MF	DW		MF	DW		JS	DW		JS	DW		JS

Investigators' Signatures

Julie Sharp

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form updated 4/01/96

Water Quality Parameters

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not Measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	0.35	DR100	ND
Alkalinity (mg/L as $CaCO_3$):		75	55	Hach	JF
Hardness (mg/L as $CaCO_3$):		85	95	Hach	JF
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -55.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Grand Olde Plaza
County: Clay
Contact / District: Tim McKelvey / NED
NPDES Permit #: FL0811735
LIMS Sample #: 165197 LIMS Job #: 97-JAN-14-20
sample log: 1-17-97

Sample Collection: Date 1/13/97 Time 12:30
Test Beginning: Date 1/14/97 Time 1510
Test Ending: Date 1-16-97 Time 1510
Organism Batch #: 101 Diluent Batch #: WCSI
Organism Age: 12 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Temperature range: room 23.5-24.0 °C
incubator NA
Test Number: 2 of 2

Remarks: D = dead, M = missing
An aliquot of sample was dechlorinated by the addition of 1.2 mL of 0.025 N Sodium thiosulfate per liter of sample. This was 3X the calculated amount. TRC of dechlorinated sample would not need below 0.06 mg/L

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	21.6 @ 21.6	8.3 @ 24.9 °C	102.8 @ 100.1 1000 @ 1001 @ 24.9 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.2 @ 25.2 °C	96700 @ 99781 104.0 @ 100.1 1001 @ 1001 @ 24.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.0 @ 22.0	8.6 @ 22.7 °C	103.1 @ 100.1 990 @ 1001 @ 24.4 °C

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
Ctr A	A1	5	5	5	8.0	8.2	8.3	23.8	23.5	23.1	7.9	7.9	7.8	245	245	245
Ctr B	A2	5	5	5	7.9	8.2	8.3	23.8	23.2	23.0	7.9	8.0	7.8	245	245	245
Ctr C	A3	5	5	5	8.0	8.2	8.3	23.8	23.2	23.0	7.9	8.0	8.0	250	245	245
Ctr D	A4	5	5	5	7.9	8.2	8.3	23.8	23.6	23.0	7.9	8.1	8.0	250	245	245
100% A	A5	5	5	5	7.3	7.6	7.8	23.8	23.4	23.1	8.1	8.0	7.9	~~705~~ A 720 DW 1/14	715	720
100% B	A6	5	5	5	7.2	7.6	7.7	23.7	23.3	23.1	8.2	7.9	7.9	720	720	720
100% C	A7	5	5	5	7.2	7.6	7.7	23.6	23.4	23.1	8.2	8.0	7.9	720	720	720
100% D	A8	5	5	5	7.2	7.6	7.7	23.7	23.6	23.2	8.2	7.9	7.9	720	725	720
100% DeCl A	A9	5	5	5	7.4	7.6	7.6	24.0	23.6	23.2	8.3	7.9	7.8	725	720	725
100% DeCl B	A10	5	5	5	7.4	7.6	7.6	24.0	23.5	23.2	8.3	7.9	7.7	730	725	725
100% DeCl C	A11	5	5	5	7.4	7.6	7.6	24.0	23.6	23.2	8.3	7.9	7.6	730	730	725
100% DeCl D	A12	5	5	5	7.4	7.6	7.5	24.1	23.8	23.3	8.3	7.9	7.6	730	730	730
Measured/Loaded by:		DW	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF	JS	MF	MF
Recorded by:		JF	MF	MF	DW	ND	JS	DW	ND	JS	DW	ND	JS	DW	ND	JS

Investigators' Signatures

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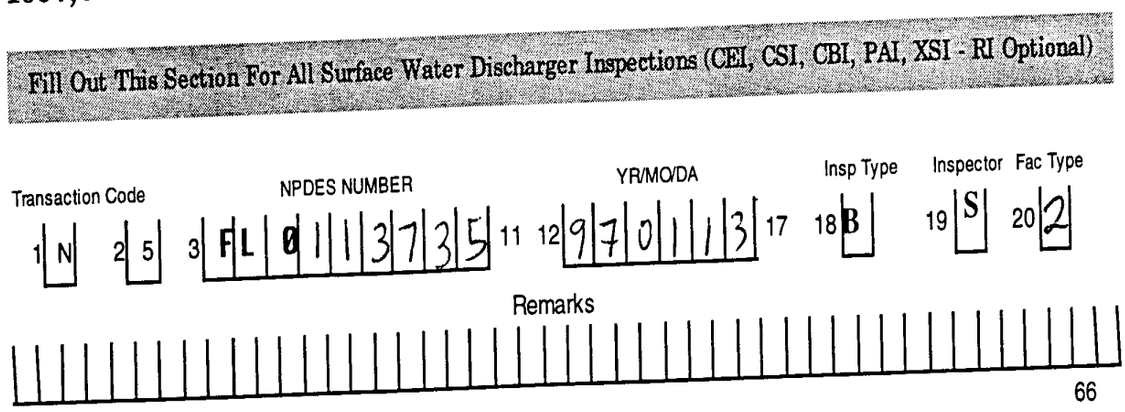
form updated 4/01/96

Water Quality Parameters

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			NOT	Measured	
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	0.35	DR100	ND
Alkalinity (mg/L as $CaCO_3$):	125		55	Hach	JF
Hardness (mg/L as $CaCO_3$):	125		95	Hach	JF
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -55.9 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

The Bioassay of the Grande Olde Plaza WWTP effluent sampled on January 13, 1997, NPDES #FL0113735.



The Priority Pollutants Analysis for the Bioassay of the Grande Olde Plaza WWTP effluent sampled on January 13, 1997, NPDES #FL0113735.

