

Bioassays of

City of Largo Wastewater Treatment Facility

Pinellas County

NPDES #FL0026603

Sampled May 3, 5, & 7, 2004

September 2004

Biology Section
Bureau of Laboratories
Division of Resource Assessment and Management

Quality Manual No. 870346G
NELAC Certification No. E31780

City of Largo Wastewater Treatment Facility, 5100 150th Avenue, Largo, Pinellas County, Florida, NPDES #FL0026603. Effluent samples for this facility were collected on May 3, 5, & 7, 2004.

Introduction

The City of Largo domestic Wastewater Treatment Facility (WWTF) has a design flow of 15.0 million gallons per day (MGD) and an average flow of 13.58 MGD (data from February 2003-January 2004). The treatment plant consists of three separate process trains (rated at 6 MGD each) having a combined total plant capacity of 18 MGD. Each process train has a grit removal basin, a primary clarifier, an anaerobic basin, an anoxic basin, an aeration basin, and two final clarifiers. The treatment process utilizes a high rate three-stage biological nutrient removal process (A20 process). The effluents from the facility's six final clarifiers flow by gravity to a transfer pumping station where they are combined into one stream. Effluent is then pumped to nine deep-bed denitrification filters, one post aeration basin, one chlorine contact chamber, three traveling-bridge type shallow-bed sand filters, and finally to an additional chlorine contact chamber. Treated effluent is dechlorinated with sulfur dioxide prior to being discharged to the Feather Sound stormwater system (into the Class III freshwaters of a lake on Feather Sound Golf Course which flows into a series of lakes then onto state owned lands dominated by mangroves). From the mangrove forest, mosquito control ditches drain the effluent into a mosquito control ditch that leads to Feather Sound (located on the West side of Old Tampa Bay) then into Tampa Bay. Residuals are processed on site by gravity thickening, sludge dewatering, and heat processing to produce a marketable bulking agent for use in fertilizer (facility information provided by Lori Pillsbury, FDEP, Southwest District, Tampa).

Methods

Samples were collected from the NPDES effluent sampling point by Lori Pillsbury, Nahir Cornwall and Todd Falkner (FDEP Tampa, Southwest District) following DEP-SOP-001/01 FS 2400 Wastewater Sampling. All DEP SOP's are available on the web at: http://www.floridadep.org/labs/qa/sops.htm.

The toxicity and algal growth potential tests discussed in this report were performed following internal DEP SOP's TA07_05,TA07_09, and TA08_01 through TA08_06. All internal DEP SOP's are available on the web at: http://www.floridadep.org/labs/cgi-bin/sop/biosop.asp

Toxicity Test Results

Tests were performed May 4 - 11, 2004.

Ceriodaphnia dubia chronic screening bioassay – Not Toxic; NOEC = 100% sample for survival and reproduction

Pimephales promelas chronic screening bioassay – Not Toxic; NOEC = 100% sample for survival and growth

See Appendix 1 for bioassay bench sheets.

Algal Growth Potential

The effluent Algal Growth Potential (AGP) was 62.2 mg dry wt/L of the unicellular green alga, *Pseudokirchneriella subcapitata*, formerly known as *Selenastrum capricornutum*. Raschke and Shultz (1987) found that AGP values above 5.0 mg dry weight/L represent a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The analytical chemistry suggests that the effluent is nitrogen-limited. The predicted AGP based on the nitrogen concentration was 63.1 (±20%) mg dry wt/L (Table 1).

Chemistry Results

Total residual chlorine and total ammonia were not detected in the three bioassay samples in the laboratory. Total residual chlorine was detected at 0.01 mg/L in the effluent sample collected in the field on May 3, 2004. Total ammonia was detected in the field in effluent samples collected on May 3, 5, and 7, at concentrations of 0.061 mg/L, 0.037 mg/L, and 0.086 mg/L, respectively. Total ammonia was detected at 0.063 mg/L in the preserved grab sample collected from the effluent on May 3. Based on field measurements of pH and temperature, the calculated unionized ammonia concentration was $\leq$ 0.02 mg/L in each of the samples.

Samples were collected for chemical analyses from this facility on May 3, 5, and 7, 2004. Two sets of samples collected on May 3, 2004, were identified separately as effluent and nutrient.

Chloroform (sample from May 3), dibromochloromethane (sample from May 3), aluminum (samples from May 3 and May 7, and the nutrient sample from May 3), iron (samples from May 3, 5, and 7, as well as the nutrient sample), lead (sample from May 7), and zinc (samples from May 3, 5, and 7, as well as the nutrient sample) were detected in the effluent samples at levels that complied with Class III Freshwater Quality Criteria (62-302 F.A.C.; Table 1).

Atrazine (sample from May 3, 5, and 7), aluminum (sample from May 5), copper and nickel (sample from May 3, 5, 7 and nutrient sample from May 3), lead (sample from May 3 and 5, as well as the nutrient sample from May 3), and silver (sample from May 5 and 7, as well as the nutrient sample from May 3), were detected at levels between the laboratory method detection limit and the laboratory practical quantitation limit (Table 1).

Bromodichloromethane in the effluent sample collected on May 3, exceeded the Class III Freshwater Quality Criteria ($\leq$ 22 ug/L) at 24 ug/L. The conductivity in the effluent sample collected on May 7 also exceeded the Class III Fresh Water Quality Criteria ($\leq$ 1275 ug/L) at a concentration of 1293 ug/L.

See Table 1 for results of analytes detected in the effluent sampled on May 7, 2004.

See Appendix 2 for a complete list of chemical analyses performed.

Conclusion

The effluent samples collected from this facility on May 3, 5, and 7, did not show chronic toxicity to either test species during the chronic screening bioassay tests. The effluent AGP result exceeded the "problem" threshold for fresh receiving waters.

Bromodichloromethane in the effluent sample collected on May 3 and conductivity in the effluent sample collected on May 7 exceeded Class III Freshwater Quality Criteria.

Literature Cited

Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

Table 1. *Measured and predicted algal growth potential (AGP) for ortho phosphate (OP)and total phosphorus (TP) limitation for the sample of effluent collected from the City of Largo Wastewater Treatment Plant on May 3, 2004.*

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	Predicted AGP (OP) ± 20%	Inorganic N:P ratio
Effluent Samples	62.2	63.12 ± 12.624	98.9 ± 19.78	7.22

Table 2. *Effluent limits, Class III Criteria and chemical data from samples collected from the City of Largo Wastewater Treatment Plant sampled on May 3, 5, & 7, 2004.*

City of Largo Wastewater Treatment Plant	Class III Freshwater Stds	Effluent Limits	Effluent Samples 5/3/04	nutrient sample 5/03/04	Effluent Samples 5/5/04	Effluent Samples 5/7/04
Organic Constituents (µg/L)						
Atrazine	-	-	0.14 I	-	0.1 I	0.085 I
Bromodichloromethane	≤ 22	-	24	-	-	-
Chloroform	≤ 470.8	-	77	-	-	-
Dibromochloromethane	≤ 34	-	6.4	-	-	-
Metals (µg/L unless otherwise noted)						
Aluminum	-	-	20	28	18 I	23
Arsenic	≤ 50	-	5 U	5 U	5 U	5 U
Cadmium	≤ 2.6 b	-	0.025 U	0.025 U	0.025 U	0.025 U
Calcium (mg/L)	-	-	99.1	94.6	95.3	96.5
Chromium-III	≤ 202.2 b	-	2 U	2 U	2 U	2 U
Copper	≤ 22.7 b	≤ 22.2 b	2.2 I	2.2 I	2.2 I	2.2 I
Iron	≤ 1000	-	53	50	60	62
Lead	≤ 12 b	-	0.14 I	0.16 I	0.16 I	0.21
Magnesium (mg/L)	-	-	8.7	8.4	8.3	8.3
Nickel	≤ 125.9 b	-	3.8 I	4.3 I	3.9 I	5.1 I
Selenium	≤ 5	-	1 U	1 U	1 U	1 U
Silver	≤ 0.07	-	0.02 U	0.026 I	0.022 I	0.024 I
Zinc	≤ 289.5 b	-	16.2	18.1	21 I	21.6
Nutrients (mg/L)						
Organic Carbon	-	-	11	11 A	-	-
TSS	-	-	4 U	-	-	-
Ortho-phosphate	-	-	0.23	-	-	-
Total Phosphorus	-	-	0.3	0.31	-	-
Ammonia	-	-	0.061	0.063	0.037	0.086
Unionized Ammonia	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
Nitrate+Nitrite	-	-	1.6	1.2	-	-
Color	-	-	10		-	-
Total Kjeldahl Nitrogen	-	-	1.2	1.1	-	-
Organic Nitrogen	-	-	1.14 c	1.04 c	-	-
Total Nitrogen	-	6.0	2.8 c	2.3 c	-	-
Turbidity	-	-	0.95	-	-	-
General Physical and Chemical Parameters						
Habitat Assessment	-	-	-	-	-	-
Dissolved Oxygen (mg/L)	≥ 5	≥ 5	8.4	-	7.8	8.1
pH (S.U.)	-	6.5 - 8.5	6.9	-	6.7	6.8
Conductivity (umhos/cm)	≤ 1275	-	974	-	1045	1293
Temperature (C)	-	-	27.1	-	26.7	27.6
BOD (mg/L)	-	-	1.9	2.2	-	-
BOD (mg/L)	-	-	1.8 A	2.2	-	-
Oil and Grease (mg/l)	≤ 5	-	0.69 U	-	-	-
Flow	-	-		-	-	
Hardness (mg/L)	-	-	283.3 c	270.8 c	272.1 c	275.1 c
AGP (mg DryWt/L)	-	-	62.2	-	-	-
Total Residual Chlorine (mg/L) field	≤ 0.01	≤ 0.01	0.01	-	-	-
Total Residual Chlorine (mg/L) lab	≤ 0.01	≤ 0.01	≤ 0.03 U	-	≤ 0.03 U	≤ 0.03 U

value exceeds Class III freshwater standards

A - Value reported is the mean of two or more determinations

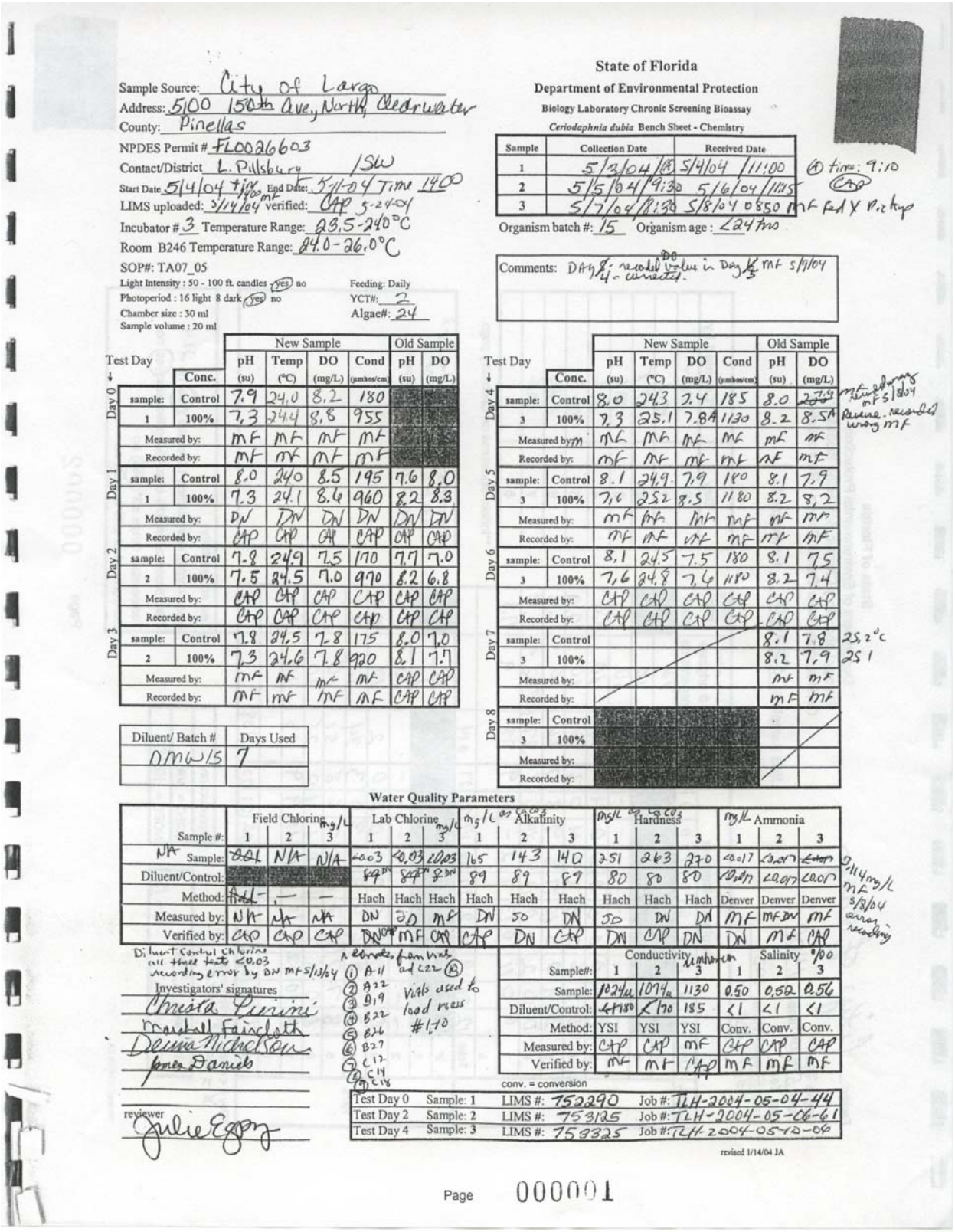
b - value is calculated based on hardness.

c - calculated value.

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

U - Material analyzed for but not detected; value reported is the minimum detection limit

Appendix 1. Bench Sheets



State of Florida
Department of Environmental Protection
Biology Laboratory Chronic Screening Bioassay
Ceriodaphnia dubia Bench Sheet - Chemistry

Sample Source: City of Largo
Address: 5100 150th Ave, North Clearwater
County: Pinellas
NPDES Permit # FL0026603
Contact/District L. Pillsbury /SW
Start Date 5/4/04 time 1400 End Date: 5/11/04 Time 1400
LIMS uploaded: 5/14/04 verified: CAP 5-24-04
Incubator # 3 Temperature Range: 23.5-24.0°C
Room B246 Temperature Range: 24.0-26.0°C
SOP#: TA07_05
Light Intensity : 50 - 100 ft. candles (yes) no
Photoperiod : 16 light 8 dark (yes) no
Chamber size : 30 ml
Sample volume : 20 ml
Feeding: Daily
YCT#: 2
Algae#: 24

Sample	Collection Date	Received Date
1	5/3/04 @	5/4/04 11:00
2	5/5/04 9:30	5/6/04 1115
3	5/7/04 @	5/8/04 0850

@ time: 9:10 CAP
MF FedX Pickup

Organism batch #: 15 Organism age : <24 hrs

Comments: Day 3/4 - recorded DO value in Day 4 by MF 5/9/04

Test Day			New Sample pH (su)	Temp (°C)	DO (mg/L)	Cond (µmhos/cm)	Old Sample pH (su)	DO (mg/L)
Day 0	sample:	Control	7.9	24.0	8.2	180		
	1	100%	7.3	24.4	8.8	955		
	Measured by:		MF	MF	MF	MF		
	Recorded by:		MF	MF	MF	MF		
Day 1	sample:	Control	8.0	24.0	8.5	195	7.6	8.0
	1	100%	7.3	24.1	8.6	960	8.2	8.3
	Measured by:		DN	DN	DN	DN	DN	DN
	Recorded by:		CAP	CAP	CAP	CAP	CAP	CAP
Day 2	sample:	Control	7.8	24.9	7.5	170	7.7	7.0
	2	100%	7.5	24.5	7.0	970	8.2	6.8
	Measured by:		CAP	CAP	CAP	CAP	CAP	CAP
	Recorded by:		CAP	CAP	CAP	CAP	CAP	CAP
Day 3	sample:	Control	7.8	24.5	7.8	175	8.0	7.0
	2	100%	7.3	24.6	7.8	920	8.1	7.7
	Measured by:		MF	MF	MF	MF	CAP	CAP
	Recorded by:		MF	MF	MF	MF	CAP	CAP

Test Day			New Sample pH (su)	Temp (°C)	DO (mg/L)	Cond (µmhos/cm)	Old Sample pH (su)	DO (mg/L)
Day 4	sample:	Control	8.0	24.3	7.4	185	8.0	2.9
	3	100%	7.3	25.1	7.8A	1130	8.2	8.5A
	Measured by:		MF	MF	MF	MF	MF	MF
	Recorded by:		MF	MF	MF	MF	MF	MF
Day 5	sample:	Control	8.1	24.9	7.9	180	8.1	7.9
	3	100%	7.6	25.2	8.5	1180	8.2	8.2
	Measured by:		MF	MF	MF	MF	MF	MF
	Recorded by:		MF	MF	MF	MF	MF	MF
Day 6	sample:	Control	8.1	24.5	7.5	180	8.1	7.5
	3	100%	7.6	24.8	7.6	1180	8.2	7.4
	Measured by:		CAP	CAP	CAP	CAP	CAP	CAP
	Recorded by:		CAP	CAP	CAP	CAP	CAP	CAP
Day 7	sample:	Control					8.1	7.8 25.2°C
	3	100%					8.2	7.9 25.1
	Measured by:						MF	MF
	Recorded by:						MF	MF
Day 8	sample:	Control						
	3	100%						
	Measured by:							
	Recorded by:							

MF 5/8/04 Review - recorded wrong MF

Diluent/ Batch #	Days Used
DMW15	7

Water Quality Parameters

Sample #:	Field Chlorine mg/L 1	2	3	Lab Chlorine mg/L 1	2	3	Alkalinity mg/L as CaCO3 1	2	3	Hardness mg/L as CaCO3 1	2	3	Ammonia mg/L 1	2	3
NA Sample:	0.01	N/A	N/A	<0.03	<0.03	<0.03	165	143	140	251	263	270	<0.017	<0.017	<0.017
Diluent/Control:				89 DN	89 DN	89 DN	89	89	89	80	80	80	<0.017	<0.017	<0.017
Method:	~~Hach~~	—	—	Hach	Hach	Hach	Hach	Hach	Hach	Hach	Hach	Hach	Denver	Denver	Denver
Measured by:	NA	NA	NA	DN	DN	MF	DN	SD	DN	SD	DN	DN	MF	MF DN	MF
Verified by:	CAP	CAP	CAP	DN MF	MF	CAP	CAP	DN	CAP	DN	CAP	DN	DN	MF	CAP

0.114 mg/L MF 5/8/04 error reading

Diluent Control Chlorine all three tests <0.03 recording error by DN MF 5/13/04

Investigators' signatures
Christa Funini
Marshall Faircloth
Dennis Nicholson
Jones Daniels

reviewer Julie Eggy

Reboots from Wet and L22 (A)
① A11
② A22
③ B19
④ B22
⑤ B26
⑥ B27
⑦ C12
⑧ C14
⑨ C18
Vials used to load mass #1-10

Sample#:	Conductivity µmhos/cm 1	2	3	Salinity ‰ 1	2	3
Sample:	1024u	1074u	1130	0.50	0.52	0.56
Diluent/Control:	4180	<170	185	<1	<1	<1
Method:	YSI	YSI	YSI	Conv.	Conv.	Conv.
Measured by:	CAP	CAP	MF	CAP	CAP	CAP
Verified by:	MF	MF	CAP	MF	MF	MF

conv. = conversion

Test Day 0	Sample: 1	LIMS #: 752290	Job #: TLH-2004-05-04-44
Test Day 2	Sample: 2	LIMS #: 753125	Job #: TLH-2004-05-06-61
Test Day 4	Sample: 3	LIMS #: 753325	Job #: TLH-2004-05-10-06

revised 1/14/04 JA

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Facility: City of Largo

State of Florida
Department of Environmental Protection
Biology Laboratory Chronic Screening Bioassay
Ceriodaphnia dubia Bench Sheets - Reproduction

Begin Test:
Date: 5/4/04 Time: 1400
End Test:
Date: ~~5/12/04~~ 5/11/04 CAP Time: 1030

LIMS Sample # 752290 for sample #1.

Conc.	Day	Replicate Number 1	2	3	4	5	6	7	8	9	10	total # young	Live adult # ~~original~~ organisms	young per adult
Control	0*												10	
	1												10	
	2	–	–	–	–	–	–	–	–	–	–		10	
	3	0	0	0	0	0	0	0	0	4	0	4	10	0.4
	4	3	3	6	0	5	3	2	4	0	3	29	10	2.9
	5	3	9	0	5	10	7	8	9	8	7	66	10	6.6
	6	0	10	2	7	0	0	0	X4	6	8	37	CAP 9	3.7
	7	6	0	11	10	13	7	12	–	10	9	78	9	7.8
	8													
	Total	12	22	19	22	28	17	22	17	28	27	214		
100%	0*												10	
	1												10	
	2	–	–	–	–	–	–	–	–	–	–		10	
	3	0	0	0	0	0	0	0	0	2	0	2	10	0.2
	4	3	3	5	6	4	3	4	3	0	3	34	10	3.4
	5	8	7	0	10	7	0	8	7	6	8	51	10	5.1
	6	0	0	5	8	0	10	0	1	4	0	28	10	2.8
	7	6	10	12	9	11	6	10	11	9	9	93	10	9.3
	8													
	Total	17	20	22	23	22	19	22	22	21	20	208		

*Day 0 = equals test initiation day.
X = adult dead

Day	**Counted by:
0	MF
1	MF
2	MF
3	MF
4	MF
5	MF
6	CAP
7	MF
8	

**Initials-signatures on Chemistry page.

Comments: 5/4/03 Control Rep 3 adult is hatchling - MF
Day 5 Large #s of MF

T-test Value 0.33896
T-Table Value 1.734 df = 18

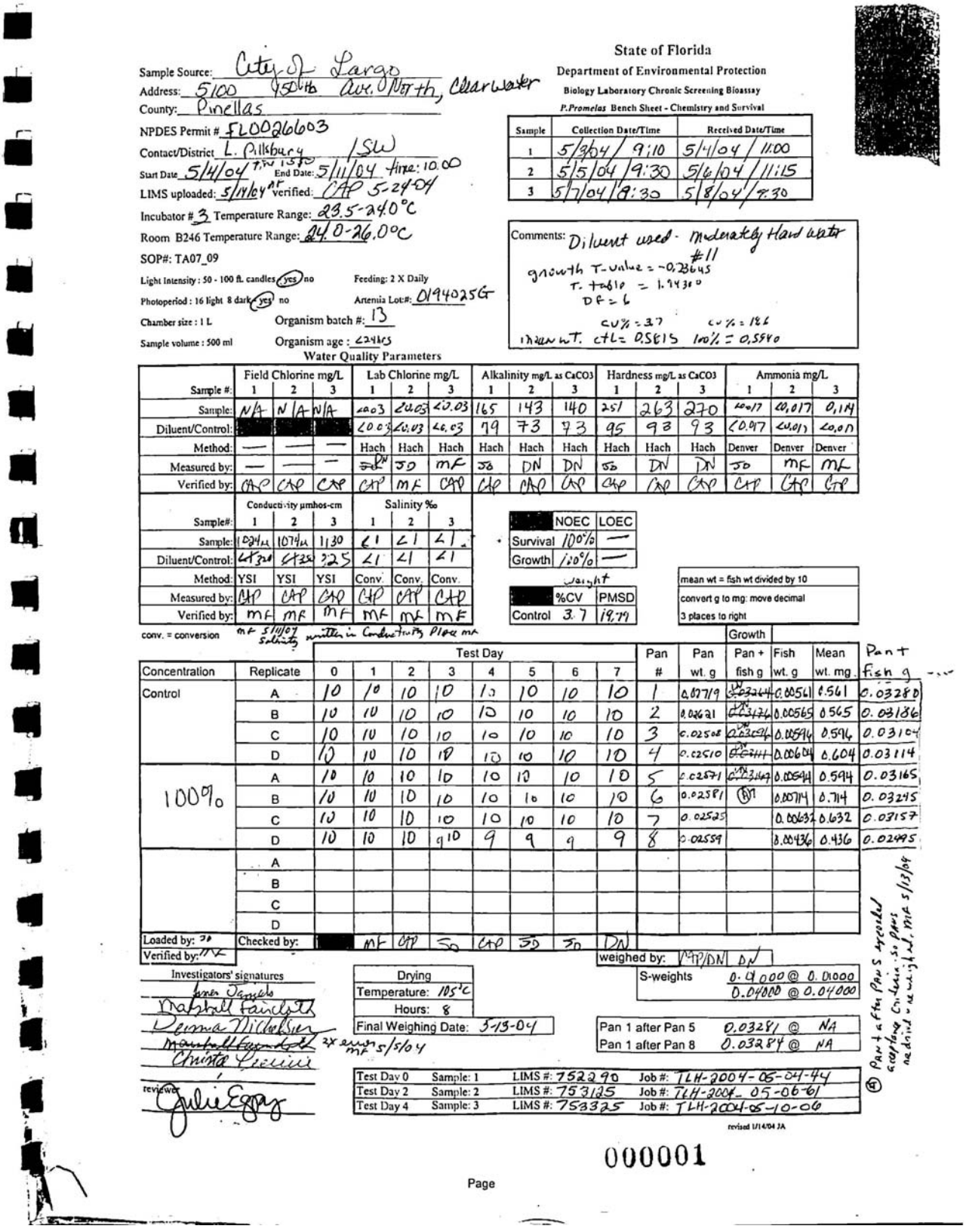
reproduction
LOEC = NA
NOEC = 100%

Test acceptability
Mean control reproduction 15/female : (yes) no 21.4
Third Brood ≥8 in 60% of surviving females: (yes) no
Temperature range ≤3°: (yes) no
Control survival ≥80%: (yes) no

revised 1/14/04 JA

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Appendix 1. Bench Sheets continued.



State of Florida
Department of Environmental Protection
Biology Laboratory Chronic Screening Bioassay
P.Promelas Bench Sheet - Chemistry and Survival

Sample Source: City of Largo
Address: 5100 150th Ave. North, Clearwater
County: Pinellas
NPDES Permit # FL0026603
Contact/District L. Pilkbury /SW
Start Date 5/4/04 End Date: 5/11/04 time: 10.00
LIMS uploaded: 5/14/04 verified: CAP 5-24-04
Incubator # 3 Temperature Range: 23.5-24.0°C
Room B246 Temperature Range: 24.0-26.0°C
SOP#: TA07_09
Light Intensity : 50 - 100 ft. candles (yes) no
Photoperiod : 16 light 8 dark (yes) no
Chamber size : 1 L
Sample volume : 500 ml
Feeding: 2 X Daily
Artemia Lot#: 0194025G
Organism batch #: 13
Organism age : 24hrs

Sample	Collection Date/Time	Received Date/Time
1	5/3/04 / 9:10	5/4/04 / 11:00
2	5/5/04 / 9:30	5/6/04 / 11:15
3	5/7/04 / 8:30	5/8/04 / 9:30

Comments: Diluent used - Moderately Hard water #11
growth T-value = -0.28645
T. table = 1.94310
DF = 6
CV% = 3.7 CV% = 12.6
mean wt. ctl = 0.5615 100% = 0.5540

Water Quality Parameters

Sample #:	Field Chlorine mg/L 1	2	3	Lab Chlorine mg/L 1	2	3	Alkalinity mg/L as CaCO3 1	2	3	Hardness mg/L as CaCO3 1	2	3	Ammonia mg/L 1	2	3
Sample:	N/A	N/A	N/A	<0.03	<0.03	<0.03	165	143	140	251	263	270	<0.017	<0.017	0.114
Diluent/Control:	[redacted]			<0.03	<0.03	<0.03	79	73	73	95	98	93	<0.017	<0.017	<0.017
Method:	—	—	—	Hach	Hach	Hach	Hach	Hach	Hach	Hach	Hach	Hach	Denver	Denver	Denver
Measured by:	—	—	—	~~DN~~ SD	SD	MF	SB	DN	DN	SB	DN	DN	SD	MF	MF
Verified by:	CAP	CAP	CAP	CAP	MF	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP

Sample#:	Conductivity µmhos-cm 1	2	3	Salinity ‰ 1	2	3
Sample:	1024µ	1074µ	1130	<1	<1	<1
Diluent/Control:	<320	<325	<325	<1	<1	<1
Method:	YSI	YSI	YSI	Conv.	Conv.	Conv.
Measured by:	CAP	CAP	CAP	CAP	CAP	CAP
Verified by:	MF	MF	MF	MF	MF	MF

conv. = conversion
MF 5/11/04 Salinity written in Conductivity Place MA

[redacted]	NOEC	LOEC
Survival	100%	—
Growth	100%	—

[redacted]	%CV	PMSD
Control	3.7	19.79

Weight

mean wt = fish wt divided by 10
convert g to mg: move decimal 3 places to right

Concentration	Replicate	Test Day 0	1	2	3	4	5	6	7	Pan #	Pan wt. g	Growth Pan + fish g	Fish wt. g	Mean wt. mg	Pan + fish g
Control	A	10	10	10	10	10	10	10	10	1	0.07719	~~0.03264~~	0.00561	0.561	0.03280
	B	10	10	10	10	10	10	10	10	2	0.02621	~~0.03176~~	0.00565	0.565	0.03186
	C	10	10	10	10	10	10	10	10	3	0.02508	~~0.03094~~	0.00596	0.596	0.03104
	D	10	10	10	10	10	10	10	10	4	0.02510	~~0.03111~~	0.00604	0.604	0.03114
100%	A	10	10	10	10	10	10	10	10	5	0.02571	~~0.03167~~	0.00594	0.594	0.03165
	B	10	10	10	10	10	10	10	10	6	0.02581	(BT)	0.00714	0.714	0.03245
	C	10	10	10	10	10	10	10	10	7	0.02525		0.00632	0.632	0.03157
	D	10	10	10	9 10	9	9	9	9	8	0.02559		0.00436	0.436	0.02995
	A														
	B														
	C														
	D														
Loaded by: SD	Checked by: [redacted]		MF	CAP	SD	CAP	SD	SD	DN						
Verified by: MF										weighed by:		CAP/DN	DN		

Pan + after Pan S recorded
Graphing Container so pans
no drift = no weight MF 5/13/04

Investigators' signatures
Karen Daniels
Marshall Faircloth
Deanna Mikulsen
Marshall Fairchild 2x
Christa Pecinni
reviewer Julie Espy

Drying	
Temperature:	105°C
Hours:	8
Final Weighing Date:	5-13-04

S-weights 0.04000 @ 0.01000
0.04000 @ 0.04000

Pan 1 after Pan 5 0.03281 @ NA
Pan 1 after Pan 8 0.03284 @ NA

Test Day 0	Sample: 1	LIMS #: 752290	Job #: TLH-2004-05-04-44
Test Day 2	Sample: 2	LIMS #: 753125	Job #: TLH-2004-05-06-61
Test Day 4	Sample: 3	LIMS #: 753325	Job #: TLH-2004-05-10-06

revised 1/14/04 JA

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Appendix 1. Bench Sheets continued.

[redacted]

State of Florida
Department of Environmental Protection
Biology Laboratory Chronic Screening Bioassay
***P.Promelas* and *M. beryllina* Bench Sheet - Chemistry**

Sample Source: City of Largo

Start Date 5/4/04 15:30 End Date: 5/11/04 end time 10:00

Test Day ↓		Conc.	New Sample: Test Rep.	pH (su)	Temp (°C)	DO (mg/L)	Cond (µmhos/cm)	Old Sample: Test Rep.	pH (su)	Temp (°C)	DO (mg/L)	Cond (µmhos/cm)
Day 0	sample:	Control	A	7.6	24.2	8.0	320	[redacted]				
	1	100%	A	7.5	24.2	8.3	945					
	Measured by:		CAP	MF	CAP	MF	MF					
	Recorded by:		~~DN~~ MF	MF	CAP	MF	MF					
Day 1	sample:	Control	B	7.7	24.4	8.4	340	B	7.6	24.3	7.9	315
	1	100%	B	7.3	24.8	8.4	970	B	7.8	24.3	7.9	920
	Measured by:		DN	DN	DN	DN	DN	CAP	CAP	CAP	CAP	CAP
	Recorded by:		CAP	CAP	CAP	CAP	CAP	~~DN~~ DN	DN	DN	DN	DN
Day 2	sample:	Control	C	7.7	24.5	7.1	350	C	7.6	24.5	7.9	320
	2	100%	C	7.3	24.6	8.0	1015	C	7.7	24.4	8.0	930
	Measured by:		CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
	Recorded by:		CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
Day 3	sample:	Control	D	7.6	24.9	7.0	320	D	7.5	24.9	5.4	320
	2	100%	D	7.3	25.1	7.3	995	D	7.5	24.7	5.6	945
	Measured by:		CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
	Recorded by:		CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
Day 4	sample:	Control	A	7.5	24.2	7.4	325	A	7.4	24.7	5.2	340
	3	100%	A	7.3	25.1	8.8	1130	A	7.5	25.0	5.1	1043
	Measured by:		MF	MF	MF	MF	MF	CAP	CAP	CAP	CAP	CAP
	Recorded by:		MF	MF	MF	MF	MF	CAP	CAP	CAP	CAP	CAP
Day 5	sample:	Control	B	7.2	24.4	6.0	34	~~B~~ 7.6		24.6	7.6	311
	3	100%	B	7.6	24.3	5.7	1012	B	7.3	24.8	7.8	1007
	Measured by:		JD	JD	JD	JD	JD	JD	JD	JD	JD	JD
	Recorded by:		JD	JD	JD	JD	JD	JD	JD	JD	JD	JD
Day 6	sample:	Control	C	7.3	~~25.0~~	~~6.6~~ 7.0	316	C	7.2	25.5	6.0	~~8.8~~ 312
	3	100%	C	7.2	~~24.8~~	~~6.8~~ 7.4	1044	C	7.5	24.2	6.0	1091
	Measured by:		JD	JD	JD	JD	JD	JD	JD	JD	JD	JD
	Recorded by:		JD	JD	JD	JD	JD	JD	JD	JD	JD	JD
Day 7	sample:	Control	[redacted]					D	7.6	24.0	5.9	315
	3	100%						D	7.7	24.7	5.8	1090
	Measured by:							CAP	CAP	CAP	CAP	CAP
	Recorded by:							CAP	CAP	CAP	CAP	CAP

@25.1 10
@25.1 10

Test Rep. = Replicate

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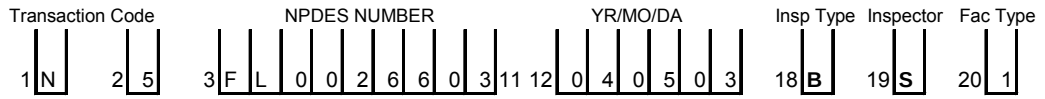
Appendix 2. Chemical Analyses performed on the effluent from the City of Largo Wastewater Treatment Plant sampled on May 7, 2004.

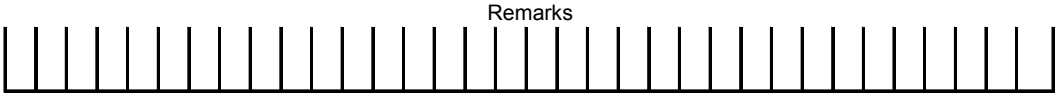
DATE SAMPLED	FIELD ID	ANALYSIS GROUP	COMPONENT	RESULT	UNITS	REMARK	MDL	PQ
5/5/2004 9:20	OUTFALL D001	BNA-Water	1,2,4-Trichlorobenzene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	1,2-Dichlorobenzene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	1,3-Dichlorobenzene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	1,4-Dichlorobenzene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2,4,6-Trichlorophenol	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2,4-Dichlorophenol	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2,4-Dimethylphenol	48	ug/L	UJ	48	19
5/5/2004 9:20	OUTFALL D001	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	5
5/5/2004 9:20	OUTFALL D001	BNA-Water	2,4-Dinitrotoluene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2,6-Dinitrotoluene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2-Chloronaphthalene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2-Chlorophenol	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	2-Nitrophenol	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	15
5/5/2004 9:20	OUTFALL D001	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	4-Bromophenyl phenyl ether	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	4-Chloro-3-methylphenol	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.
5/5/2004 9:20	OUTFALL D001	BNA-Water	4-Nitrophenol	14	ug/L	U	14	5
5/5/2004 9:20	OUTFALL D001	BNA-Water	Acenaphthene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Acenaphthylene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Anthracene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Benzidine	95	ug/L	U	95	38
5/5/2004 9:20	OUTFALL D001	BNA-Water	Benzo(a)anthracene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Benzo(a)pyrene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Benzo(b)fluoranthene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Benzo(g,h,i)perylene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Benzo(k)fluoranthene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Bis(2-chloroethoxy)methane	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Bis(2-chloroethyl)ether	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	5
5/5/2004 9:20	OUTFALL D001	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Chrysene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Di-n-octyl phthalate	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Dibenzo(a,h)anthracene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Diethyl phthalate	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	19
5/5/2004 9:20	OUTFALL D001	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Endrin	1.4	ug/L	UJ	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Endrin aldehyde	3.8	ug/L	UJ	3.8	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Fluoranthene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Fluorene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Hexachlorobenzene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	UJ	2.9	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	1
5/5/2004 9:20	OUTFALL D001	BNA-Water	Indeno(1,2,3-cd)pyrene	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	Isophorone	0.95	ug/L	U	0.95	3.
5/5/2004 9:20	OUTFALL D001	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.
5/5/2004 9:20	OUTFALL D001	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.
5/5/2004 9:20	OUTFALL D001	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	1

5/5/2004 9:20	OUTFALL D001	BNA-Water	Naphthalene	0.95	ug/L	U	0.95	3.8
5/5/2004 9:20	OUTFALL D001	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.6
5/5/2004 9:20	OUTFALL D001	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	11
5/5/2004 9:20	OUTFALL D001	BNA-Water	Phenanthrene	0.95	ug/L	U	0.95	3.8
5/5/2004 9:20	OUTFALL D001	BNA-Water	Phenol	0.95	ug/L	U	0.95	3.8
5/5/2004 9:20	OUTFALL D001	BNA-Water	Pyrene	0.95	ug/L	U	0.95	3.8
5/5/2004 9:20	OUTFALL D001	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
5/5/2004 9:20	OUTFALL D001	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
5/5/2004 9:20	OUTFALL D001	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
5/5/2004 9:20	OUTFALL D001	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
5/5/2004 9:20	OUTFALL D001	GC-Water	Alachlor	0.58	ug/L	UJ	0.58252	2.33
5/5/2004 9:20	OUTFALL D001	GC-Water	Ametryn	0.049	ug/L	U	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Atrazine	0.1	ug/L	I	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Azinphos Methyl	0.049	ug/L	U	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Bromacil	0.19	ug/L	U	0.19417	0.777
5/5/2004 9:20	OUTFALL D001	GC-Water	Butylate	0.19	ug/L	U	0.19417	0.777
5/5/2004 9:20	OUTFALL D001	GC-Water	Chlorpyrifos Ethyl	0.049	ug/L	U	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Chlorpyrifos Methyl	0.097	ug/L	U	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Diazinon	0.049	ug/L	UJ	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Ethion	0.049	ug/L	U	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Ethoprop	0.097	ug/L	U	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Fenamiphos	0.19	ug/L	U	0.19417	0.777
5/5/2004 9:20	OUTFALL D001	GC-Water	Fonofos	0.097	ug/L	UJ	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Hexazinone	0.097	ug/L	U	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Malathion	0.15	ug/L	U	0.14563	0.583
5/5/2004 9:20	OUTFALL D001	GC-Water	Metalaxyl	0.24	ug/L	U	0.24272	0.971
5/5/2004 9:20	OUTFALL D001	GC-Water	Metolachlor	0.49	ug/L	U	0.48544	1.94
5/5/2004 9:20	OUTFALL D001	GC-Water	Metribuzin	0.097	ug/L	U	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Mevinphos	0.19	ug/L	U	0.19417	0.777
5/5/2004 9:20	OUTFALL D001	GC-Water	Naled	0.78	ug/L	UJ	0.7767	3.11
5/5/2004 9:20	OUTFALL D001	GC-Water	Norflurazon	0.097	ug/L	U	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Parathion Ethyl	0.15	ug/L	UJ	0.14563	0.583
5/5/2004 9:20	OUTFALL D001	GC-Water	Parathion Methyl	0.097	ug/L	U	0.097087	0.388
5/5/2004 9:20	OUTFALL D001	GC-Water	Phorate	0.049	ug/L	U	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	GC-Water	Prometryn	0.15	ug/L	UJ	0.14563	0.583
5/5/2004 9:20	OUTFALL D001	GC-Water	Simazine	0.049	ug/L	U	0.048544	0.194
5/5/2004 9:20	OUTFALL D001	Metals-Water	Aluminum	18	ug/L	I	5	20
5/5/2004 9:20	OUTFALL D001	Metals-Water	Arsenic	5	ug/L	U	5	20
5/5/2004 9:20	OUTFALL D001	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
5/5/2004 9:20	OUTFALL D001	Metals-Water	Calcium	95.3	mg/L		0.05	0.2
5/5/2004 9:20	OUTFALL D001	Metals-Water	Chromium	2	ug/L	U	2	8
5/5/2004 9:20	OUTFALL D001	Metals-Water	Copper	2.2	ug/L	I	0.75	3
5/5/2004 9:20	OUTFALL D001	Metals-Water	Iron	60	ug/L		5	20
5/5/2004 9:20	OUTFALL D001	Metals-Water	Lead	0.16	ug/L	I	0.05	0.2
5/5/2004 9:20	OUTFALL D001	Metals-Water	Magnesium	8.3	mg/L		0.02	0.08
5/5/2004 9:20	OUTFALL D001	Metals-Water	Nickel	3.9	ug/L	I	2	8
5/5/2004 9:20	OUTFALL D001	Metals-Water	Selenium	1	ug/L	U	1	4
5/5/2004 9:20	OUTFALL D001	Metals-Water	Silver	0.022	ug/L	I	0.02	0.08
5/5/2004 9:20	OUTFALL D001	Metals-Water	Zinc	21	ug/L	I	2	20.5
5/5/2004 9:20	OUTFALL D001	Nutrients-Liquid	Ammonia-N	0.037	mg N/L		0.01	0.02
5/5/2004 9:30	OUTFALL D001 (COMPOSITE DAY 3)	Bio-Toxicology	Bioassay-Chronic-Scrn-FW-C.dubia, NOEC		NOEC			
5/5/2004 9:30	OUTFALL D001 (COMPOSITE DAY 3)	Bio-Toxicology	Bioassay-Chronic-Scrn-FW-Fish, NOEC		NOEC			

The Bioassay of the City of Largo Wastewater Treatment Facility effluent sampled on 3, 5, and 7, May 2004, NPDES #FL0026603.

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





The Priority Pollutants Analysis for Bioassay of the City of Largo Wastewater Treatment Facility effluent sampled on 3, 5, and 7 May, 2004, NPDES #FL0026603.

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