



Bioassays of
**Arbors Mobile Home Park Reverse
Osmosis Water Treatment Plant**

Sarasota County
NPDES #FL0188913
Sampled July 18, 2005

November 2005

**Biology Section
Bureau of Laboratories
Division of Resource Assessment and Management**

Quality Manual No. 870346G
NELAC Certification No. E31780

Arbors Mobile Home Park Reverse Osmosis Water Treatment Plant, 515 S. Tamiami Trail, Osprey, Sarasota County, Florida, NPDES #FL0188913. Effluent samples for this facility were collected on July 18, 2005.

Introduction

The Arbors Mobile Home Park Reverse Osmosis Water Treatment Plant provides potable water for the Arbors Mobile Home Park. The facility has a design flow of 0.034 million gallons per day (MGD). The mean flow from July 2004 through June 2005 was 0.007 MGD. Effluent from this facility is not treated. Reverse Osmosis (RO) concentrate is discharged (through I-002) into an on-site storm water pond. Discharge from the pond is intermittent and rainfall dependent. The pond periodically overflows through a 45.7 cm (18-inch) diameter pipe (Outfall D-001) into an adjacent roadside ditch (Class III freshwater). The point of discharge is located approximately at latitude 27°11'14" N, longitude -82°27'01" W. Water from the ditch ultimately drains into Little Sarasota Bay.

There are no Administrative or Consent Orders for this facility. The facility has no mixing zones. During the past sixteen months, the facility has had several violations of permit limits which also exceeded water quality standards, including: pH exceeded the standard of 8.5 SU (8.66 SU in April 2004 and 8.99 SU in January 2005); gross alpha exceeded the standard of 15.0 pCi/L (16.3 pCi/L in March 2004 and 17.9 pCi/L in July 2004); and Radium 226/228 exceeded the standard of 5.0 pCi/L (13 pCi/L in March 2004, 7.8 pCi/L in July 2004, 7.6 pCi/L in September 2004, 8.9 pCi/L in October 2004 and 7.8 pCi/L in January 2005). A warning letter was sent to the facility in February 2005 requiring them to address the violations for radium (facility information provided by Lori Pillsbury and Joe Hillring FDEP Southwest District).

Methods

Samples were collected from the EFF-1 NPDES sampling point for Outfall D-001 by Lori Pillsbury and Nahir Cornwell (FDEP 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 48-hour acute screening toxicity tests and algal growth potential test were performed following internal DEP SOP's TA07_01, TA07_02, and TA08_01 through TA08_09. All internal DEP SOP's are available on the web at: <http://www.floridadep.org/labs/cgi-bin/sop/biosop.asp>. While the 48-hour acute screening toxicity test does not reflect the permit required conditions (96-hour acute definitive bioassays), the Department uses it to provide reasonable assurance that the facility does not adversely affect waters of the state.

Toxicity Test Results

Tests were performed July 19 - 21, 2005.

Ceriodaphnia dubia 48-hr acute screening bioassay – LC₅₀ > 100%, 0% mortality* in 100% sample at 48 hours

Cyprinella leedsii 48-hr acute screening bioassay – LC₅₀ > 100%, 20% mortality* in 100% sample at 48 hours

The bioassay sample was not acutely toxic to the *Ceriodaphnia dubia* test organisms but showed a low level of acute toxicity to the *Cyprinella leedsii* test organisms. The cause of the observed mortality in the *Cyprinella leedsii* test was not determined.

See Appendix 1 for bioassay bench sheets.

*NOTE: In a 48-hr acute screening test of 100% effluent, mortality of <20% provides reasonable assurance that the effluent meets the acute toxicity criterion of Florida's Surface Water Quality Standards (Rule 62-302.500 (1)(a)4, F.A.C.). Mortality between 20-50% mortality indicates low to moderate levels of toxicity, and further action may be required. Mortality of >50% provides reasonable assurance that the effluent fails to meet the minimum requirement to discharge to waters of the state (Rule 62-4.244(3)(a), F.A.C.).

Algal Growth Potential

The effluent Algal Growth Potential (AGP) was 19.0 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 inorganic nitrogen concentrations was 13.57 ($\pm 20\%$) mg dry wt/L (Table 1, Miller et al. 1978).

See Table 1 for AGP results.

Chemistry Results

Total residual chlorine (TRC) was detected in the bioassay sample in the laboratory at a concentration of 0.06 mg/L and is believed to be the result of interfering substances within the sample, since effluent receives no treatment prior to discharge. Total ammonia was not detected in the bioassay sample in the laboratory. The total ammonia concentration in the sample collected and preserved for chemical analysis was 0.047 mg/L. Based on the pH, salinity, and temperature of the effluent as collected, the calculated unionized ammonia concentration was < 0.02 mg/L.

Aluminum was detected in the effluent. Atrazine, iron, and selenium were detected between their respective laboratory method detection limits (MDLs) and practical quantitation limits (PQLs). The effluent's combined Radium 226 and 228 (5.4 pCi/L) exceeded the Class III freshwater quality criterion of ≤ 5 pCi/L (62-302.530(58), F.A.C.).

See Table 2 for results of analytes detected in the effluent, and corresponding limits.

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

Conclusion

The effluent sample collected from Outfall D-001 for this facility on July 18, 2005, was not acutely toxic to the *Ceriodaphnia dubia* test organisms, but showed a low level of toxicity to the *Cyprinella leedsi* test organisms during the acute screen 48-hour bioassays. The cause of observed toxicity was not determined. The effluent AGP result exceeded the "problem" threshold for fresh receiving waters. The effluent's total Radium 226 and 228 exceeded water quality standards and the permit limit.

Literature Cited

Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. EPA-600/9-78-018. U. S. EPA, Cincinnati, Ohio. 126 p.

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; dry wt/L) of *Pseudokirchneriella subcapitata* for total soluble nitrogen (TSIN) and total nitrogen (TN) limitation and nitrogen to phosphorus ratios for samples collected from Arbors Mobile Home Park Reverse Osmosis Water Treatment Plant on July 18, 2005.

Location	AGP (measured)	Predicted AGP (TSIN) \pm 20%	Predicted AGP (TN) \pm 20%	Inorganic N:P ratio	Total N:P ratio
Effluent Samples	19.0	13.57 \pm 2.714	95.38 \pm 19.076	1.49	4.83

Table 2. Effluent limits, Class III Freshwater Criteria, and chemical and microbiological data for the samples collected from Arbors Mobile Home Park Reverse Osmosis Water Treatment Plant on July 18, 2005.

Arbors Mobile Home Park Reverse Osmosis WTP NPDES# FL0188913	Class III Freshwater Stds	Effluent Limits	Effluent Samples
Organic Constituents (µg/L)			
Atrazine	-	-	0.18 l
Metals (µg/L unless otherwise noted)			
Aluminum	-	-	66
Arsenic	≤ 50	-	4 U
Cadmium	≤ 3.4 b	-	0.5 U
Calcium (mg/L)	-	-	124
Chromium-III	≤ 268.2 b	-	2 U
Copper	≤ 30.5 b	-	5 U
Iron	≤ 1,000	-	30 l
Lead	≤ 18.6 b	-	2.1 U
Magnesium (mg/L)	-	-	35
Nickel	≤ 168.5 b	-	2 U
Selenium	≤ 5	-	1.6 l
Silver	≤ 0.07	-	0.025 U
Zinc	≤ 387.8 b	-	3 U
Nutrients (mg/L)			
Ortho-phosphate	-	-	0.24
Total Phosphorus	-	-	0.52
Ammonia	-	-	0.047
Unionized Ammonia	≤ 0.02	-	≤ 0.02
Nitrate+Nitrite	-	-	0.31 f
Total Kjeldahl Nitrogen	-	-	2.2
Organic Nitrogen	-	-	2.15 c
Total Nitrogen	-	-	2.51 c
General Physical and Chemical Parameters			
Alpha, Total (pCi/L)	≤ 15	≤ 15	5.5
Alpha-Counting Error (pCi/L)	-	-	1.1
Radium 226 (pCi/L)	-	-	4.5
Radium 226-Counting Error (pCi/L)	-	-	0.4
Radium 228 (pCi/L)	-	-	0.9 U
Radium 228-Counting Error (pCi/L)	-	-	0.6
Radium 226 + Radium 228, Total (pCi/L)	≤ 5	≤ 5	5.4 c
Dissolved Oxygen (mg/L)	≥ 5	≥ 5	6.6
pH (S.U.)	6.0-8.5 s	6.0-8.5 s	7.6
Conductivity (umhos/cm)	≤ 1,275	Report	1,082
Temperature (C)	-	-	30.4
TSS (mg/L)	-	-	5 l
Turbidity (NTU)	≤ 29 t	-	6
CBOD (mg/L)	-	-	4.9
Flow (MGD)	-	0.034	0.007 a
Hardness (mg/L)	-	-	453.8 c
Microbiology (# counts/100ml)			
Fecal Coliforms-Membrane Filter	800	-	290 *
Total Coliforms	2,400	-	400 BK*

Value exceeds the Class III Fresh Water Quality Criteria (62-302, F.A.C.) and/or Effluent Limits

a - Annual average

b - Value is calculated based on hardness

c - Calculated value

f - Nitrate + nitrite were detected in the field blank at a concentration of 0.31 mg/L

s - Single sample

t - Shall not exceed 29 NTUs above background

B - Results based on colony counts outside the acceptable range

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

K - Actual value is known to be less than value given

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

* - Data provided by FL DEP SW District chemistry lab

Appendix 1. Bench Sheets

FDEP Biology Section - Acute Bioassay Bench Sheets

Facility: Arbors Mobile Home Park RO WTP
 Address: 515 S. Tamiami Trail
 City: OSPREY County: Sarasota
 Contact/District: Lori Pillsbury / SW-District
 NPDES Permit #: FL 0188913
 LIMS Job #: 14-205-07-19-32 LIMS Sample #: B50104
 LIMS Data Entry: 7-27-05 MF Data Entry Verification: D.N. 7/27/05

Sample Collection: Date: 7-18-05 Time: 1000
 Hold time Start: Date: 7-18-05 Time: 1000

Comments:

Instructions (for below): Circle appropriate wording. If yes is circled complete blanks.
 Test Type: Static Flow-through
 Test 1 validation: Control survival $\geq 90\%$: Yes No
 Temperature Range $\leq 3^{\circ}\text{C}$: Yes No
 Test 2 validation: Control survival $\geq 90\%$: Yes No
 Temperature Range $\leq 3^{\circ}\text{C}$: Yes No
 Initial sample handling: pH adjustment: yes No
 Aeration: yes No
 Salinity adjusted (Test 1): yes No
 Salinity adjusted (Test 2): yes No
 Dechlorination: yes No
 Sample Validation: Temperature: Shipped $\leq 6^{\circ}\text{C}$ No Hand Delivered: Cooling (received $^{\circ}\text{C}$ < collected $^{\circ}\text{C}$) Yes No
 Holding Time: ≤ 36 Hours No (Composite-end of collection; grab-when collected; 4 in 24 - time last sample collected)

Temperature Range $^{\circ}\text{C}$
 Incubator # 5 Range 25.7 - 26.7
 Room B246: 23.9 - 24.3
 Waterbath: N/A

Water Quality Parameters	20% DMW	Well Water	Salt Water ASW NSW Test 1	Salt Water ASW NSW Test 2	Moderately Hard Water	Original Sample	Method	Measured by	Verified by
Field Total Residual Cl ₂ (mg/L):	N/A	N/A	N/A	N/A	N/A	not measured	HACH	SP	SP
Lab Total Residual Cl ₂ (mg/L):	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	HACH	SP	MP
Alkalinity (mg/L as CaCO ₃):	95	153	138	138	138	138	HACH	DN	SP
Hardness (mg/L as CaCO ₃):	103	134	449	449	449	449	HACH	DN	SP
Total Ammonia (mg/L as N):	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	DENVER	MF	SP
Salinity (ppt):	<1	<1	<1	<1	<1	<1	YSI Mettler	DN	DN

Investigators' Signatures:
[Signature]
[Signature]
[Signature]
 REVIEWER: [Signature]

Appendix 1. Bench Sheets (continued)

Bioassay Parameters

Test # : 1 of 2

LIMS Sample # : 850104

TEST SOP: TA07_01 Test Species: Ceriodaphnia dubia Cyprinella leedsii Pimephales promelas
Americamysis bahia *Menidia beryllina* Other:

v.1 2/24/04

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Concentration	CTRL					
Replicate	A		B			
pH (S.U.)	8.2		8.3			
Temperature °C	24.0		24.2			
Dissolved Oxygen mg/L	7.7		7.7			
Conductivity μ mhos	175		215			
(initials) Measured by:	JN		JN			
(initials) Recorded by:	JN		JN			

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Concentration	100%					
Replicate	A		B			
pH (S.U.)	7.9		8.4			
Temperature °C	24.7		24.2			
Dissolved Oxygen mg/L	7.7		7.7			
Conductivity μ mhos	1080		1290			
(initials) Measured by:	JN		JN			
(initials) Recorded by:	JN		JN			

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Concentration						
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity μ mhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Concentration						
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity μ mhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

000024

v.1 2/24/04

Appendix 1. Bench Sheets (continued)

Bioassay Parameters

Test # : 2 of 2

LIMS Sample # : 850104

TEST SOP: TA07_02 Test Species: Ceriodaphnia dubia Cyprinella leedsi Pimephales promelas

Americamysis bahia Menidia beryllina Other: _____

v1.1 2/24/04

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A	B	C			
pH (S.U.)	8.1	8.3	8.4			
Temperature °C	24.5	25.0	24.0			
Dissolved Oxygen mg/L	7.6	7.5	7.3			
Conductivity µmhos mmhos	265	287	295			
(initials) Measured by:	SP	DW/SP	SP			
(initials) Recorded by:	SP	SP	SP			

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate	A	B	C			
pH (S.U.)	8.0	8.2	8.2			
Temperature °C	24.7	24.4	24.6			
Dissolved Oxygen mg/L	7.4	7.6	6.4			
Conductivity µmhos mmhos	1095	1129	1145			
(initials) Measured by:	SP	DW/SP	SP			
(initials) Recorded by:	SP	SP	SP			

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

Concentration	0 Hr.	24 Hr.	48 Hr. before renewal	48 Hr. after renewal	72 Hr.	96 Hr.
Replicate						
pH (S.U.)						
Temperature °C						
Dissolved Oxygen mg/L						
Conductivity µmhos mmhos						
(initials) Measured by:						
(initials) Recorded by:						

Comments:

v1.1 2/24/04

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Appendix 2. Chemical Analyses performed on the effluent from the Arbors Mobile Home Park Reverse Osmosis Water Treatment Plant Outfall D-001, sampled on July 18, 2005.

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:00	Outfall D001	Bio-AGP/LimNut	Algal Growth Potential	19	mg DryWt/L	A	0.3	0.9
7/18/2005 10:00	Outfall D001	Bio-BOD	Biochemical Oxygen Demand-5 Day,N-Inhib	4.9	mg/L		0.2	2
7/18/2005 10:00	Outfall D001	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	56	ug/L	A	1.7	5.1
7/18/2005 10:00	Outfall D001	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	18	ug/L	A	1.7	5.1
7/18/2005 10:00	Outfall D001	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
7/18/2005 10:00	Outfall D001	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
7/18/2005 10:00	Outfall D001	BNA-Water	1,2,4-Trichlorobenzene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	1,2-Dichlorobenzene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	1,3-Dichlorobenzene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	1,4-Dichlorobenzene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2,4,6-Trichlorophenol	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2,4-Dichlorophenol	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2,4-Dimethylphenol	50	ug/L	U	50	200
7/18/2005 10:00	Outfall D001	BNA-Water	2,4-Dinitrophenol	15	ug/L	U	15	60
7/18/2005 10:00	Outfall D001	BNA-Water	2,4-Dinitrotoluene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2,6-Dinitrotoluene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2-Chloronaphthalene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2-Chlorophenol	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	2-Methyl-4,6-dinitrophenol	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	BNA-Water	2-Nitrophenol	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	3,3'-Dichlorobenzidine	40	ug/L	U	40	160
7/18/2005 10:00	Outfall D001	BNA-Water	4,4'-DDD	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	4,4'-DDE	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	4,4'-DDT	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	4-Bromophenyl phenyl ether	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	4-Chloro-3-methylphenol	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	4-Chlorophenyl phenyl ether	2	ug/L	U	2	8
7/18/2005 10:00	Outfall D001	BNA-Water	4-Nitrophenol	15	ug/L	U	15	60
7/18/2005 10:00	Outfall D001	BNA-Water	Acenaphthene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Acenaphthylene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Aldrin	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	alpha-BHC	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Anthracene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Benzidine	100	ug/L	U	100	400
7/18/2005 10:00	Outfall D001	BNA-Water	Benzo(a)anthracene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Benzo(a)pyrene	1	ug/L	U	1	4

Appendix 2. Chemical Analyses (continued)

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:00	Outfall D001	BNA-Water	Benzo(b)fluoranthene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Benzo(g,h,i)perylene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Benzo(k)fluoranthene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	beta-BHC	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Bis(2-chloroethoxy)methane	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Bis(2-chloroethyl)ether	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Bis(2-chloroisopropyl)ether	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	BNA-Water	Bis(2-ethylhexyl)phthalate	15	ug/L	U	15	60
7/18/2005 10:00	Outfall D001	BNA-Water	Butyl benzyl phthalate	5	ug/L	U	5	20
7/18/2005 10:00	Outfall D001	BNA-Water	Chrysene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	delta-BHC	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Dibenzo(a,h)anthracene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Dieldrin	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Diethyl phthalate	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Dimethyl phthalate	50	ug/L	U	50	200
7/18/2005 10:00	Outfall D001	BNA-Water	Di-n-butyl phthalate	5	ug/L	U	5	20
7/18/2005 10:00	Outfall D001	BNA-Water	Di-n-octyl phthalate	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Endosulfan I	4	ug/L	U	4	16
7/18/2005 10:00	Outfall D001	BNA-Water	Endosulfan II	4	ug/L	U	4	16
7/18/2005 10:00	Outfall D001	BNA-Water	Endosulfan sulfate	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Endrin	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Endrin aldehyde	4	ug/L	U	4	16
7/18/2005 10:00	Outfall D001	BNA-Water	Fluoranthene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Fluorene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	gamma-BHC	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Heptachlor	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Heptachlor epoxide	1.5	ug/L	U	1.5	6
7/18/2005 10:00	Outfall D001	BNA-Water	Hexachlorobenzene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Hexachlorobutadiene	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	BNA-Water	Hexachlorocyclopentadiene	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	BNA-Water	Hexachloroethane	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	BNA-Water	Indeno(1,2,3-cd)pyrene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Isophorone	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Naphthalene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Nitrobenzene	2	ug/L	U	2	8
7/18/2005 10:00	Outfall D001	BNA-Water	N-Nitrosodimethylamine	2	ug/L	U	2	8
7/18/2005 10:00	Outfall D001	BNA-Water	N-Nitrosodiphenylamine	3	ug/L	U	3	12

Appendix 2. Chemical Analyses (continued)

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:00	Outfall D001	BNA-Water	Pentachlorophenol	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	BNA-Water	Phenanthrene	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Phenol	1	ug/L	U	1	4
7/18/2005 10:00	Outfall D001	BNA-Water	Pyrene	1	ug/L	U	1	4
7/18/2005 10:15	Field Blank	BNA-Water	1,2,4-Trichlorobenzene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	1,2-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	1,3-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	1,4-Dichlorobenzene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2,4,6-Trichlorophenol	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2,4-Dichlorophenol	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
7/18/2005 10:15	Field Blank	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
7/18/2005 10:15	Field Blank	BNA-Water	2,4-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2,6-Dinitrotoluene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2-Chloronaphthalene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2-Chlorophenol	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	2-Nitrophenol	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
7/18/2005 10:15	Field Blank	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	4-Bromophenyl phenyl ether	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	4-Chloro-3-methylphenol	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.6
7/18/2005 10:15	Field Blank	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
7/18/2005 10:15	Field Blank	BNA-Water	Acenaphthene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Acenaphthylene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Anthracene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Benzidine	95	ug/L	U	95	380
7/18/2005 10:15	Field Blank	BNA-Water	Benzo(a)anthracene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Benzo(a)pyrene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Benzo(b)fluoranthene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Benzo(g,h,i)perylene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Benzo(k)fluoranthene	0.95	ug/L	U	0.95	3.8

Appendix 2. Chemical Analyses (continued)

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:15	Field Blank	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Bis(2-chloroethoxy)methane	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Bis(2-chloroethyl)ether	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
7/18/2005 10:15	Field Blank	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
7/18/2005 10:15	Field Blank	BNA-Water	Chrysene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Dibenzo(a,h)anthracene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Diethyl phthalate	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
7/18/2005 10:15	Field Blank	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
7/18/2005 10:15	Field Blank	BNA-Water	Di-n-octyl phthalate	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
7/18/2005 10:15	Field Blank	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
7/18/2005 10:15	Field Blank	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
7/18/2005 10:15	Field Blank	BNA-Water	Fluoranthene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Fluorene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
7/18/2005 10:15	Field Blank	BNA-Water	Hexachlorobenzene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Hexachlorobutadiene	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	Hexachlorocyclopentadiene	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	Indeno(1,2,3-cd)pyrene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Isophorone	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Naphthalene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.6
7/18/2005 10:15	Field Blank	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.6
7/18/2005 10:15	Field Blank	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.6
7/18/2005 10:15	Field Blank	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	11
7/18/2005 10:15	Field Blank	BNA-Water	Phenanthrene	0.95	ug/L	U	0.95	3.8

Appendix 2. Chemical Analyses (continued)

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:15	Field Blank	BNA-Water	Phenol	0.95	ug/L	U	0.95	3.8
7/18/2005 10:15	Field Blank	BNA-Water	Pyrene	0.95	ug/L	U	0.95	3.8
7/18/2005 10:00	Outfall D001	GC-Water	Alachlor	0.58	ug/L	UJ	0.58	2.3
7/18/2005 10:00	Outfall D001	GC-Water	Ametryn	0.049	ug/L	U	0.049	0.2
7/18/2005 10:00	Outfall D001	GC-Water	Atrazine	0.18	ug/L	I	0.049	0.2
7/18/2005 10:00	Outfall D001	GC-Water	Azinphos Methyl	0.19	ug/L	U	0.19	0.76
7/18/2005 10:00	Outfall D001	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
7/18/2005 10:00	Outfall D001	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
7/18/2005 10:00	Outfall D001	GC-Water	Chlorpyrifos Ethyl	0.049	ug/L	U	0.049	0.2
7/18/2005 10:00	Outfall D001	GC-Water	Chlorpyrifos Methyl	0.097	ug/L	U	0.097	0.39
7/18/2005 10:00	Outfall D001	GC-Water	Diazinon	0.049	ug/L	U	0.049	0.2
7/18/2005 10:00	Outfall D001	GC-Water	Ethion	0.049	ug/L	U	0.049	0.2
7/18/2005 10:00	Outfall D001	GC-Water	Ethoprop	0.097	ug/L	U	0.097	0.39
7/18/2005 10:00	Outfall D001	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
7/18/2005 10:00	Outfall D001	GC-Water	Fonofos	0.097	ug/L	U	0.097	0.39
7/18/2005 10:00	Outfall D001	GC-Water	Hexazinone	0.097	ug/L	U	0.097	0.39
7/18/2005 10:00	Outfall D001	GC-Water	Malathion	0.15	ug/L	UJ	0.15	0.6
7/18/2005 10:00	Outfall D001	GC-Water	Metalaxyl	0.24	ug/L	UJ	0.24	0.96
7/18/2005 10:00	Outfall D001	GC-Water	Metolachlor	0.49	ug/L	UJ	0.49	2
7/18/2005 10:00	Outfall D001	GC-Water	Metribuzin	0.097	ug/L	U	0.097	0.39
7/18/2005 10:00	Outfall D001	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
7/18/2005 10:00	Outfall D001	GC-Water	Naled	0.78	ug/L	U	0.78	3.1
7/18/2005 10:00	Outfall D001	GC-Water	Norflurazon	0.15	ug/L	U	0.15	0.6
7/18/2005 10:00	Outfall D001	GC-Water	Parathion Ethyl	0.15	ug/L	U	0.15	0.6
7/18/2005 10:00	Outfall D001	GC-Water	Parathion Methyl	0.097	ug/L	U	0.097	0.39
7/18/2005 10:00	Outfall D001	GC-Water	Phorate	0.049	ug/L	U	0.049	0.2
7/18/2005 10:00	Outfall D001	GC-Water	Prometryn	0.15	ug/L	UJ	0.15	0.6
7/18/2005 10:00	Outfall D001	GC-Water	Simazine	0.049	ug/L	U	0.049	0.2
7/18/2005 10:15	Field Blank	GC-Water	Alachlor	0.57	ug/L	UJ	0.57	2.3
7/18/2005 10:15	Field Blank	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.19
7/18/2005 10:15	Field Blank	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.19
7/18/2005 10:15	Field Blank	GC-Water	Azinphos Methyl	0.19	ug/L	U	0.19	0.76
7/18/2005 10:15	Field Blank	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
7/18/2005 10:15	Field Blank	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
7/18/2005 10:15	Field Blank	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.19
7/18/2005 10:15	Field Blank	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
7/18/2005 10:15	Field Blank	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.19

Appendix 2. Chemical Analyses (continued)

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:15	Field Blank	GC-Water	Ethion	0.048	ug/L	U	0.048	0.19
7/18/2005 10:15	Field Blank	GC-Water	Ethoprop	0.095	ug/L	U	0.095	0.38
7/18/2005 10:15	Field Blank	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
7/18/2005 10:15	Field Blank	GC-Water	Fonofos	0.095	ug/L	U	0.095	0.38
7/18/2005 10:15	Field Blank	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
7/18/2005 10:15	Field Blank	GC-Water	Malathion	0.14	ug/L	UJ	0.14	0.56
7/18/2005 10:15	Field Blank	GC-Water	Metalaxyl	0.24	ug/L	UJ	0.24	0.96
7/18/2005 10:15	Field Blank	GC-Water	Metolachlor	0.48	ug/L	UJ	0.48	1.9
7/18/2005 10:15	Field Blank	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
7/18/2005 10:15	Field Blank	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
7/18/2005 10:15	Field Blank	GC-Water	Naled	0.76	ug/L	U	0.76	3
7/18/2005 10:15	Field Blank	GC-Water	Norflurazon	0.14	ug/L	U	0.14	0.56
7/18/2005 10:15	Field Blank	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
7/18/2005 10:15	Field Blank	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
7/18/2005 10:15	Field Blank	GC-Water	Phorate	0.048	ug/L	U	0.048	0.19
7/18/2005 10:15	Field Blank	GC-Water	Prometryn	0.14	ug/L	UJ	0.14	0.56
7/18/2005 10:15	Field Blank	GC-Water	Simazine	0.048	ug/L	U	0.048	0.19
7/18/2005 10:00	Outfall D001	Metals-Water	Aluminum	66	ug/L		5	20
7/18/2005 10:00	Outfall D001	Metals-Water	Arsenic	4	ug/L	U	4	16
7/18/2005 10:00	Outfall D001	Metals-Water	Cadmium	0.5	ug/L	U	0.5	2
7/18/2005 10:00	Outfall D001	Metals-Water	Calcium	124	mg/L		0.05	0.2
7/18/2005 10:00	Outfall D001	Metals-Water	Chromium	2	ug/L	U	2	8
7/18/2005 10:00	Outfall D001	Metals-Water	Copper	5	ug/L	U	5	20
7/18/2005 10:00	Outfall D001	Metals-Water	Iron	30	ug/L	I	10	40
7/18/2005 10:00	Outfall D001	Metals-Water	Lead	2.1	ug/L	U	2.1	8.4
7/18/2005 10:00	Outfall D001	Metals-Water	Magnesium	35	mg/L		0.01	0.04
7/18/2005 10:00	Outfall D001	Metals-Water	Nickel	2	ug/L	U	2	8
7/18/2005 10:00	Outfall D001	Metals-Water	Selenium	1.6	ug/L	I	0.5	2
7/18/2005 10:00	Outfall D001	Metals-Water	Silver	0.025	ug/L	U	0.025	0.1
7/18/2005 10:00	Outfall D001	Metals-Water	Zinc	3	ug/L	U	3	12
7/18/2005 10:15	Field Blank	Metals-Water	Aluminum	5	ug/L	U	5	20
7/18/2005 10:15	Field Blank	Metals-Water	Arsenic	4	ug/L	U	4	16
7/18/2005 10:15	Field Blank	Metals-Water	Cadmium	0.5	ug/L	U	0.5	2
7/18/2005 10:15	Field Blank	Metals-Water	Calcium	0.05	mg/L	U	0.05	0.2
7/18/2005 10:15	Field Blank	Metals-Water	Chromium	2	ug/L	U	2	8
7/18/2005 10:15	Field Blank	Metals-Water	Copper	5	ug/L	U	5	20
7/18/2005 10:15	Field Blank	Metals-Water	Iron	10	ug/L	U	10	40

Appendix 2. Chemical Analyses (continued)

Date Sampled	Field ID	Analysis	Component	Result	Units	Remark	MDL	PQL
7/18/2005 10:15	Field Blank	Metals-Water	Lead	2.1	ug/L	U	2.1	8.4
7/18/2005 10:15	Field Blank	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04
7/18/2005 10:15	Field Blank	Metals-Water	Nickel	2	ug/L	U	2	8
7/18/2005 10:15	Field Blank	Metals-Water	Selenium	0.5	ug/L	U	0.5	2
7/18/2005 10:15	Field Blank	Metals-Water	Silver	0.025	ug/L	U	0.025	0.1
7/18/2005 10:15	Field Blank	Metals-Water	Zinc	3	ug/L	U	3	12
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	Ammonia-N	0.047	mg N/L		0.01	0.02
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	Kjeldahl Nitrogen	2.2	mg N/L		0.12	0.4
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	NO2NO3-N	0.31	mg N/L		0.02	0.05
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	O-Phosphate-P	0.24	mg P/L		0.08	0.2
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	Total-P	0.52	mg P/L		0.02	0.06
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	TSS	5	mg/L	I	4	16
7/18/2005 10:00	Outfall D001	Nutrients-Liquid	Turbidity	6	NTU		0.05	0.05
7/18/2005 10:15	Field Blank	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
7/18/2005 10:15	Field Blank	Nutrients-Liquid	Kjeldahl Nitrogen	0.12	mg N/L	U	0.12	0.4
7/18/2005 10:15	Field Blank	Nutrients-Liquid	NO2NO3-N	0.31	mg N/L		0.004	0.01
7/18/2005 10:15	Field Blank	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
7/18/2005 10:15	Field Blank	Nutrients-Liquid	Total-P	0.02	mg P/L	U	0.02	0.06
7/18/2005 10:00	Outfall D001	Overflow	Alpha, Total	5.5	pCi/L			
7/18/2005 10:00	Outfall D001	Overflow	Alpha-Counting Error	1.1	pCi/L			
7/18/2005 10:00	Outfall D001	Overflow	Radium 226	4.5	pCi/L			
7/18/2005 10:00	Outfall D001	Overflow	Radium 226-Counting Error	0.4	pCi/L			
7/18/2005 10:00	Outfall D001	Overflow	Radium 228	0.9	pCi/L	U		
7/18/2005 10:00	Outfall D001	Overflow	Radium 228-Counting Error	0.6	pCi/L			
7/18/2005 10:15	Field Blank	Overflow	Alpha, Total	1	pCi/L	U		
7/18/2005 10:15	Field Blank	Overflow	Alpha-Counting Error	0.6	pCi/L			
7/18/2005 10:15	Field Blank	Overflow	Radium 226	0.1	pCi/L			
7/18/2005 10:15	Field Blank	Overflow	Radium 226-Counting Error	0.1	pCi/L			
7/18/2005 10:15	Field Blank	Overflow	Radium 228	0.8	pCi/L	U		
7/18/2005 10:15	Field Blank	Overflow	Radium 228-Counting Error	0.5	pCi/L			

