

Biological Assessment of

CSX Transportation - Moncrief

Duval County

NPDES #FL0176877

Sampled December 16, 2002

July 2003

Biology Section

Bureau of Laboratories

Division of Resource Assessment and Management

Quality Manual No. 870346G

NELAC Certification No. E31780

Florida Department of Environmental Protection

Fifth Year Inspection Summary

Discharger:	CSX - Moncrief
County:	Duval
NPDES Number:	FL0176877
Permit Expiration:	September 7, 2003

Toxics Sampling Inspection **(XSI)**

Date Sampled: 12/16/2002

Results: The organic constituents benzyl alcohol (9.8 µg/L), bromacil (0.22 µg/L) and hexazinone (1.8 µg/L) were detected in the effluent at levels below those likely to cause toxic effects. The metals arsenic, copper, lead, nickel and zinc were detected in the effluent at levels that did not exceed Class III Water Quality Criteria. Iron was detected in the effluent at a level (33,200 µg/L) that exceeded the Class III Water Quality Criteria 62-302.530 (39) (1,000 µg/L) by a factor of 33. Although this high single value may have resulted from a pipe break, facility discharge monitoring reports for December 16, 2002 and January 9, 2003 had iron levels of >4,000 µg/L which also exceed Class III Water Quality Criteria. Conductivity, pH and dissolved oxygen in the effluent complied with Class III Water Quality Criteria. Effluent temperature was elevated (20.7°C).

Compliance Biomonitoring Inspection **(CBI)**

Date Sampled: 12/16/2002

Results: The effluent sample was not toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during the 48-hour acute screening bioassay.

Water Quality Inspection **(WQI)**

Date Sampled: 12/16/2002

Results: Fecal and total coliforms were detected in the effluent and Control Site samples at levels that did not exceed Class III Water Quality Criteria. Fecal coliforms were detected in the water sample from the Test Site (867/100ml) at levels that exceeded Class III Water Quality Criteria 62-302.530 (6) F.A.C.

Effluent total nitrogen concentration was 2.5 mg/L and total phosphorus concentration was 1.5 mg/L (Table 1). Most nitrogen was present in the form of ammonia (1.9 mg/L). Neither ortho-phosphate nor nitrate + nitrite was detected in the effluent.

Impact Bioassessment Inspection **(IBI)**

Date Sampled: 12/16/2002

Results: Effluent total suspended solids (56 mg/L) and turbidity (225 NTU) were elevated, increasing the turbidity at the Test Site relative to the Control Site. Effluent algal growth potential (AGP) was elevated (32.2 mg dry weight/L). Water samples from both the Test and Control Sites had AGP results (5.9 and 5.1 mg dry weight/L, respectively) slightly above the 5 mg dry weight/L problem threshold. There was no evidence of growth inhibition in any AGP test.

Biological communities were stressed at both Test and Control Sites, but there was no evidence that the facility's effluent was further degrading either the periphyton or benthic macroinvertebrate assemblages.

Biological assessments are prepared by FDEP staff to provide information for review of NPDES permit renewal applications. Biological assessments, in conjunction with other information concerning the subject facility and its receiving-water body, are used to determine appropriate permit conditions.

Introduction

The CSX Transportation– Moncrief Plant is an industrial facility located in Duval County, Florida (Appendix 1). Activities at this plant are limited to groundwater remediation for chlorinated organic compounds, polycyclic aromatic hydrocarbons and volatile organic contaminants (see Facility Summary in Appendix 2). The effluent is continuously discharged directly from an air stripper into a stormwater ditch that leads to McCoys Creek, a Class III fresh water. The maximum permitted daily average flow of the wastewater system is 0.138 million gallons per day (MGD). The actual flow during this survey was 0.15 MGD (J. Richarde, FDEP, personal communication).

Surface Water Quality Criteria and facility permit limits are listed in Table 1. According to the facility's discharge monitoring reports, the plant had an iron exceedance in March 2002 (Appendix 2).

Methods

The purpose of this investigation was to determine the discharger's effects on the biota of the receiving waters. Chemical and biological comparisons were made between a control site (located in a railroad ditch approximately 10-110 meters above the point of discharge) and a test site (located in the same railroad ditch approximately 10-110 meters downstream of the discharge). Detailed methods are given in Appendix 3.

All field and laboratory biological methods followed Biology Section Standard Operating Procedures (SOPs, see http://www.floridadep.org/labs/qa/2002sops.htm for details) and met FDEP quality assurance/quality control standards (see http://www.floridadep.org/labs/qa/index.htm).

The following were involved in this investigation: Patrick O'Connor and Sharon Evans (FDEP Northeast District), and DEP Central Laboratory in Tallahassee. The report was reviewed by District representatives and the Point Source Studies Review Committee (Wayne Magley, Chuck Ziegmont and Michael Tanski).

Results and Discussion

- Specific chemical results are reported in Table 1 and a complete list of chemical analytes can be reviewed in Appendix 4. The organic constituents benzyl alcohol (9.8 µg/L), bromacil (0.22 µg/L) and hexazinone (1.8 µg/L) were detected in the effluent. These levels are below those known to cause deleterious biological effects, based on the listings in the U.S. EPA ECOTOX database.
- The metals arsenic, copper, lead, nickel and zinc were detected in the effluent at levels that did not exceed Class III Water Quality Criteria. Iron was detected in the effluent at a level (33,200 µg/L) that exceeded the Class III Water Quality Criteria 62-302.530 (39) F. A. C. (1,000 µg/L). There was a break in the discharge line at the time of effluent sampling that was probably responsible for the high iron level in the effluent sample (Melissa Long, FDEP Northeast District, personal communication). However, facility discharge monitoring reports for December 16, 2002 and January 9, 2003 have shown levels of iron that exceed Class III Water Quality Criteria by a factor of >4 (6,700 and 4,400 µg/L, respectively, Melissa Long, FDEP Northeast District, personal communication). These levels of iron appear due to iron naturally present in the groundwater used for remediation (Melissa Long, FDEP Northeast District, personal communication).
- Conductivity, pH, and dissolved oxygen in the effluent complied with Class III Water Quality Criteria and facility permit limits. Effluent temperature was elevated (20.7 °C). Effluent flow was 0.15 MGD at the time of sampling.
- Habitat assessment scores were 52 at the Control Site and 50 at the Test Site (Table 1, data sheets in Appendix 8). Both sites were of poor quality, with slow water velocity, low substrate availability, and poor riparian buffer zone and vegetation quality.
- Dissolved oxygen (DO as mg/L), water temperature (degrees Celsius), pH (Standard Units) and conductivity (umhos/cm) at the Test and Control Sites complied with Class III Water Quality Criteria (Table 1, 62-302.530 F.A.C.). Temperature at the Test Site was elevated 7°C relative to the Control Site (Table 1). Water temperature at the Test Site matched that of the effluent.
- The ditch downstream of the point of discharge was sampled prior to collecting the effluent samples. At the time the Test Site samples were collected, the effluent was not noticeably turbid, although the outfall was discharging effluent. When the effluent was collected, the samples appeared very orange and very turbid, probably as a result of pipe breakage (P. O'Connor, FDEP Northeast District, personal communication). However, emergent plant stems downstream of the outfall were coated with an accumulation of orange floc, suggesting continued release of iron-rich effluent (P. O'Connor, FDEP Northeast District, personal communication).

Table 1. Effluent limits, Class III Criteria and chemical, microbiological and toxicological data.

CSX Moncrief	Class III Criteria	Effluent Limits	Effluent Samples	Control Site	Test Site
Organic Constituents (µg/L)					
Benzyl alcohol	-	-	9.8	-	-
Bromacil	-	-	0.22 I	-	-
Hexazinone	-	-	1.8	-	-
Metals (µg/L) unless otherwise noted, Class III Criteria are less than or equal to the value given)					
Aluminum	-	-	10 U	-	-
Arsenic	50.0	-	8.8 I	-	-
Cadmium	b	1.869	0.025 U	-	-
Calcium (mg/L)	-	-	62.8	-	-
Chromium	b	145	2 U	-	-
Copper	b	16.1	4.9 J	-	-
Iron	1000	-	**33200**	-	-
Lead	b	7.15	0.12 I	-	-
Magnesium (mg/L)	-	-	7.8	-	-
Nickel	b	89.4	5.1 I	-	-
Selenium	5.0	-	1 U	-	-
Silver	0.07	-	0.02 U	-	-
Zinc	b	205.4	6.1 I	-	-
Nutrients (mg/L)					
Ortho-phosphate	-	-	0.004 U	0.015	0.017
Total Phosphorus	-	-	1.5	0.28	0.39
Ammonia	-	-	1.9	0.11	0.19
Un-ionized Ammonia	≤ 0.02 s	-	< 0.02	< 0.02	< 0.02
Nitrate and Nitrite	-	-	0.004 U	0.039	0.026
Total Kjeldahl Nitrogen	-	-	2.5	0.37	0.46
Organic Nitrogen	-	-	0.6	0.26	0.27
Total Nitrogen	-	-	2.5	0.409	0.486
General Physical and Chemical Parameters					
Habitat Assessment	-	-	-	52	50
Dissolved Oxygen (mg/L)	≥ 5.0 s	-	8.3	6.8	7.1
pH (SU)	6.0-8.5 s	6.0-8.5 s	7.2	6.8	7.8
Conductivity (µmhos/cm)	1275 s	-	537	511	512
Temperature (°C)	-	-	20.7	13.7	20.6
Total Suspended Solids (mg/L)	-	-	56	1	3
Turbidity (NTU)	29	-	225	12.1	21.0
Chlorophyll *a* (µg/L)	-	-	4.3 U	0.85 U	0.85 U
Phaeophytin (µg/L)	-	-	4.3 U	0.85 U	0.85 U
Flow (MGD)	-	0.138 c	0.15	-	-
Hardness (mg $CaCO_3$)	-	-	188.9	-	-
Toxicity (48-hour static, screening bioassay, percent mortality in 100% effluent)					
Bioassay - Water flea	*	**	5%	-	-
Bioassay - Fish	*	**	0%	-	-
Microbiology (Number of counts/100ml)					
Fecal Coliforms	800 s		10 K	220	**867**
Total Coliforms	2400 s		30 B	680	967

Bold Face indicates exceedance of Class III water quality criteria

* Class III Criteria: no acute or chronic toxicity (for definitions see 62.302.200 F.A.C.)

b - Value is calculated based on hardness and is reported under Effluent Limits.

c - Daily average

B - Results based on colony counts outside the acceptable range

I - Value reported is < the minimum quantitation limit, and ≥ the minimum detection limit

J - Estimated value

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

s - Single sample

** NOEC - A no observed effect concentration less than 100% effluent will constitute a violation of this permit

- Effluent total suspended solids (56 mg/L) and turbidity (225 NTU) were elevated compared to the Control Site (Table 1). Total suspended solids in water samples from the Test and Control Sites were 3 mg/L and 1 mg/L, respectively. Turbidity at the Test Site was higher than turbidity at the Control Site (21 vs. 12.1 NTU), but did not exceed the Class III Water Quality Criteria (Table 1). Turbidity at the Test Site was greater than that at 95% of typical Florida streams, while turbidity at the Control site was greater than that at 90% of typical Florida streams (Appendix 6). Elevated turbidity at the Test Site was related to the turbidity of the discharge.
- Fecal and total coliform levels were within Class III Water Quality Criteria in water samples from the effluent and the Control Site. However, the water sample from the Test Site contained levels of fecal coliform bacteria (867/100 ml) that exceeded the Class III Water Quality Criteria for Bacteriological Quality (800/100 ml, single sample) (62-302.530 (6) F.A.C.).
- The effluent sample was not acutely toxic to the fish, *Cyprinella leedsi,* or to the water flea, *Ceriodaphnia dubia,* during 48-hour acute screening bioassays (See Table 1 for percent mortality and Appendix 7 for bioassay bench sheets).
- Effluent total nitrogen concentration was 2.5 mg/L and total phosphorus concentration was 1.5 mg/L (Table 1). Most nitrogen was present in the form of ammonia (1.9 mg/L). Neither ortho-phosphate nor nitrate + nitrite was detected in the effluent. Total phosphorus, ammonia and TKN levels at the Test Site were somewhat higher compared with Control Site levels, but were similar for orthophosphate and organic nitrogen. This is consistent with the nutrients detected in the effluent. Levels of TKN, nitrate + nitrite and orthophosphate at both the Test Site and the Control Site were lower than 80-95% of typical Florida streams. Levels of ammonia and total phosphorus at the Test Site were higher than 70-80% of typical Florida streams. Levels of ammonia and total phosphorus at the Control Site were higher than 60-70% of typical Florida Streams (Appendix 6).
- Algal growth potential (AGP) is a measure of nutrients available for algal growth (Miller *et al.* 1978). Raschke and Shultz (1987) found that AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. The AGP value at the upstream Control Site was 5.1 mg dry weight/L (Table 2). The AGP values of the downstream Test Site (5.9 mg dry weight/L) and the effluent (32.2 mg dry weight/L) were above this threshold. There was no evidence of growth inhibition in AGP tests for either the Test or Control Sites (Table 2). Note that no orthophosphate was detected in the effluent. Therefore, the predicted AGP growth cannot be calculated for the effluent (Table 1, Appendix 3).
- Chlorophyll *a* was not detected in water samples from the effluent, Test Site and Control Site (Table 1).
- There were no major differences between Test and Control Site periphyton community compositions (Table 3, Appendix 9). Diversity

Table 2. Measured and predicted algal growth potential (AGP) for total soluble inorganic nitrogen (TSIN) limitation

Location	AGP (measured)	Predicted AGP (TSIN) ± 20%	Inorganic N:P ratio
Control (mg dry wt/L)	5.1	5.7 + 1.1	9.9
Test (mg dry wt/L)	5.9	8.2 + 1.6	12.7
Effluent (mg dry wt/L)	32.2	N.D.	N.D.

N.D. = no data.

Table 3. Periphyton composition at control and test sites.

CSX Moncrief	Control Site	Test Site
Number of Taxa	46	26
Shannon-Weaver Diversity	4.12	4.02
Chlorophyll *a* (mg/m^2)	0.43 U	0.11 U
Phaeophytin (mg/m^2)	0.43 U	0.11 U
Algal Density ($number/cm^3$)	60,184	14,230
Percent Dominant Taxon	28.3	26.2
Dominant Taxon (name)	*Oscillatoria*	*Lyngbya*
Number of Algal Units Identified	258	61
Percentage Composition:		
Blue-green algae	45.7	47.5
Green algae	5.4	9.8
Diatoms	46.9	41.0
Euglenophycota	1.6	1.6
Cryptophycota	0.4	0.0

Table 4. Macroinvertebrate Hester-Dendy Samples - Quantitative

CSX Moncrief	Control Site	Test Site
Summary Statistics		
Shannon-Weaver Diversity	ID	2.27
Number of Taxa	3	13
Florida Index	ID	1
Number of EPT Taxa	ID	0
Percent Dominant Taxon	ID	45.2
Dominant Taxon (name)	ID	*Chironomus* sp.
Total Number of Individuals	7	252
Community Composition: Percent of total		
Diptera	ID	71.8
Ephemeroptera	ID	0.0
Gastropoda	ID	27.0
Odonata	ID	0.4
Trichoptera	ID	0.0
Other	ID	0.8
Functional Feeding Groups: Percent of total		
Predators	ID	5.0
Surface Deposit Feeders	ID	66.9
Suspension Feeders	ID	0.6
Scrapers	ID	27.0
Other	ID	0.6

ID = Insufficient Data

and community composition were similar at Test and Control Sites. Blue-green algae were the dominant group at both Test and Control Sites and comprised ~45% of the total community represented in the samples collected. Periphyton chlorophyll *a* concentration was below the detection level at both sites.

- Quantitative measures of benthic macroinvertebrate assemblages from Hester-Dendy samplers could not be compared between sites because only seven individuals and three taxa were found on Control Site samplers (Table 4, Appendix 10). Observations at the Control Site suggested flow velocity was very slow (see Habitat Assessment sheets in Appendix 8) and samplers may have been dry during part of the 28-day incubation period (P. O'Connor, FDEP Northeast District, personal communication). Shannon-Weaver diversity at the Test Site was similar to that of the lowest 20% of typical Florida streams (Appendix 6). Pollution-tolerant dipterans and gastropods were the most abundant taxa at the Test Site (Table 4, Appendix 10).

- Qualitative measures of benthic macroinvertebrate assemblages from dipnet samples are summarized in Tables 5 and 6 and in Appendix 11. The Control Site SCI score of 19 and the Test Site SCI score of 23 placed them in the "Poor" and "Good" category, respectively. However, benthic macroinvertebrate communities at both Test and Control Sites were degraded. At the Control Site the dominant taxon was a gastropod tolerant of low dissolved oxygen (*Physella* sp.) while 50% of the Test Site sample was composed of oligochaetes and an additional 26% was composed of pollution-tolerant dipterans.

Summary

The organic constituents benzyl alcohol (9.8 µg/L), bromacil (0.22 µg/L) and hexazinone (1.8 µg/L) were detected in the effluent. Effluent temperature was elevated (20.7°C) relative to ambient conditions. Effluent total suspended solids and turbidity were high, and the receiving water turbidity was elevated relative to the Control Site. However, turbidity of the receiving water did not exceed the Class III Water Quality Criteria.

Iron was detected in the effluent at a level (33,200 µg/L) that exceeded the Class III Water Quality Criteria 62-302.530 (39) F.A.C. (1,000 µg/L) and the facility discharge monitoring reports show effluent iron concentrations of >4,000 µg/L (P. O'Connor and M. Long, FDEP Northeast District, personal communication). The data and observations suggest that the effluent iron content routinely exceeds Class III Water Quality Criteria.

Biological communities were stressed at both Test and Control Sites, but there was no evidence that the facility's effluent was further degrading either the periphyton or benthic macroinvertebrate assemblages.

The high levels of iron in the effluent exceed the Class III Water Quality Criteria (62-302.530 (39) F. A. C.) and are a cause for concern and warrant additional monitoring.

Literature Cited

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Table 5. Macroinvertebrate Dipnet Samples - Qualitative

CSX Moncrief	Control Site	Test Site
Stream Condition Index (value)	19	23
Stream Condition Index (word)	Poor	Good
Stream Condition Index Metrics		
Florida Index	3	4
Number of EPT Taxa	0	0
Number of Taxa	17	22
Number of Chironomid Taxa	4	9
Percent Dominant Taxon	41.4	32.7
Percent Dipterans	12.6	26.4
Percent Suspension Feeders and Filterers	0	1.8
Total Number of Individuals	87	110
Community Composition: Percent of total		
Dominant Taxon (name)	*Physella* sp.	*Limnodrilus hoffmeisteri*
Coleoptera	4.6	0.0
Decapoda	3.5	0.9
Diptera	12.6	26.4
Gastropoda	42.5	14.6
Odonata	28.7	0.0
Oligochaeta	2.3	50.0
Other	5.7	8.2
Functional Feeding Groups: Percent of total		
Burrowing Deposit Feeders	2.3	50.0
Predators	32.8	10.5
Surface Deposit Feeders	15.5	21.4
Suspension Feeders and Filterers	0.0	1.8
Scrapers	42.5	14.6
Shredders	5.2	1.4
Scavenger	1.7	0.5

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CSX - Moncrief: Control Site

Table 6a. Stream Condition Index Metrics: Northeast, Winter index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	17	≥18	17-9	<9	3
Number of EPT Taxa	0	-	≥3	<3	1
Number of Chironomid Taxa	4	≥4	3-2	<2	5
Percent Contribution of Dominant Taxon	41.4	≤37	38-69	>69	3
Percent Diptera	12.6	-	≤67	>67	3
Florida Index	3	≥6	5-3	<3	3
Percent Suspension Feeders and Filterers	0	≥25	25-13	<13	1
Total Score		CSX - Moncrief Control Site			**19**
Interpretation of Scores		Excellent			26-31
		Good			20-25
		Poor			**14-19**
		Very Poor			7-13

CSX - Moncrief: Test Site

Table 6b. Stream Condition Index Metrics: Northeast, Winter index					
Metric:	Value	5	3	1	Score
Total Number of Taxa	22	≥18	17-9	<9	5
Number of EPT Taxa	0	-	≥3	<3	1
Number of Chironomid Taxa	9	≥4	3-2	<2	5
Percent Contribution of Dominant Taxon	32.7	≤37	38-69	>69	5
Percent Diptera	26.4	-	≤67	>67	3
Florida Index	4	≥6	5-3	<3	3
Percent Suspension Feeders and Filterers	1.8	≥25	25-13	<13	1
Total Score		CSX - Moncrief Test Site			**23**
Interpretation of Scores		Excellent			26-31
		Good			**20-25**
		Poor			14-19
		Very Poor			7-13

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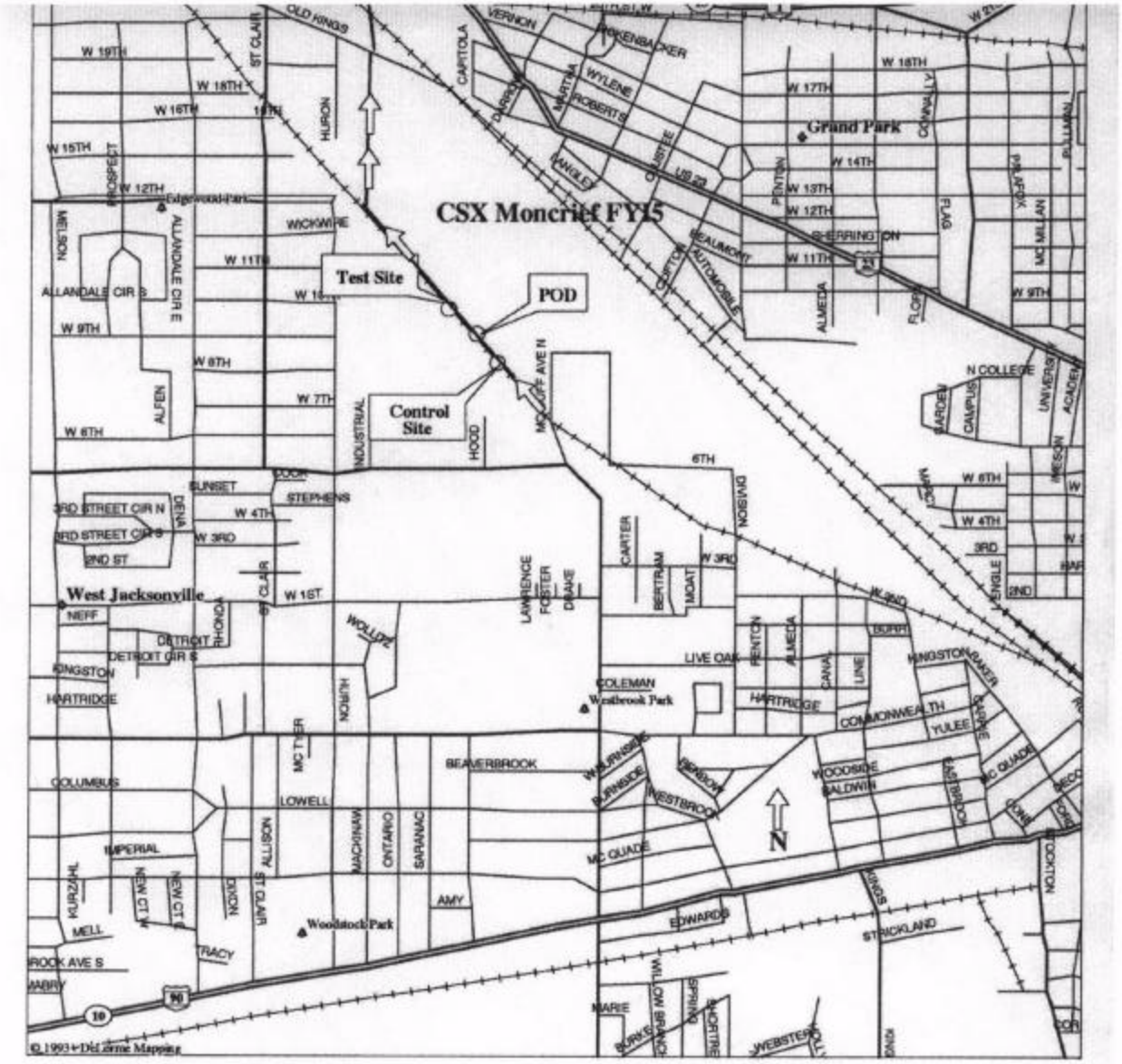
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Appendices

- Appendix 1. Map of facility
- Appendix 2. Facility summary
- Appendix 3. Methods
- Appendix 4. Chemical analyses of effluent and receiving water.
- Appendix 5. Explanation of biological measurements
- Appendix 6. Typical values for selected parameters in Florida waters
- Appendix 7. Additional physical, chemical, toxicological and microbiological results
- Appendix 8. Habitat Assessment field sheets
- Appendix 9a. Periphyton: Taxa list and density (number of individuals per cm^2)
- Appendix 9b. Periphyton: Taxa list and number of individuals counted
- Appendix 10a. Hester-Dendy multi-plate samplers: Taxa list and macroinvertebrate density (average number of individuals per m^2)
- Appendix 10b. Hester-Dendy multi-plate samplers: Taxa list and total number of macroinvertebrates counted
- Appendix 11a. Dipnet samples: Taxa list and number of macroinvertebrates counted (collapsed)
- Appendix 11b. Dipnet samples: Taxa list and number of macroinvertebrates counted

Appendix 1

Map of CSX Moncrief



LEGEND

- Geo Feature
- Town, Small City
- Park
- US Highway
- Population Center
- Street, Road
- Major Street/Road
- US Highway
- Railroad
- River

Scale 1:15,625 (at center)

1000 Feet

500 Meters

Mag 15.00
Wed Oct 16 17:26:25 2002

Appendix 2

State of Florida
Department of Environmental Protection
Facility Summary

Facility Name: CSX - Moncrief		**Prepared By:** Melissa M. Long **Date:** 11/08/02
Location: Jacksonville	**County:** 16 - Duval	**District:** Northeast
Federal Permit No.: FL0176877 **Expiration Date:** 9/7/03	**State GMS #:** **State Expiration Date:** N/A	**Facility Type:** Industrial
Function of Facility: Groundwater remediation		
Description of treatment process: The wastewater treatment facility consists of wells to pump the water over to an air stripper. The air then goes through a carbon filter. The water is directly discharged from the air stripper.		
Receiving Waters: McCoys Creek		**Classification:** Class III - Fresh
Design Flow:	**Mean Flow:**	**Flow during survey:**
Discharge is: Continuous X *Intermittent* Seasonal *Rainfall Dependent* Other		
Facility Mixing Zone Details: none.		
List effluent limits: _		

Parameter	Limit	Describe special permit conditions and permit modifications:
<u>Outfall D001</u> Flow (MGD)	Daily Average 0.138 Daily Maximum Report Only	
EPA Method 601	Daily Maximum Not to exceed 62-302.530	
EPA Method 602	Daily Maximum Not to exceed 62-302.530	
EAP Method 610	Daily Maximum Not to exceed 62-302.530	
Arsenic, Total Recoverable (µg/l)	Daily Maximum 50.0	
Zinc, Total Recoverable (µg/l)	Daily Maximum See Note	Shall not be >=exp(0.8476[lnH]+0.7614), where "lnH" mean the natural logarithm of total harness expressed as mg/l of CaCO3. The harness shall be set at 25 mg/l if actual hardness is <25 mg/l and set at 400 mg/l if actual harness is >400 mg/l. A hardness of 100 mg/l will be used in the equation when no water is available for sampling at SWU-1 (upstream sample location).
Hardness, Total as CaCO3 (mg/l)	Daily Maximum See Note	
pH	Daily Maximum 8.5 Daily Minimum 6.0	
Acute Toxicity	Minimum 100	

Description of permitted outfall: Outfall D-001 has 0.138 MGD groundwater remediation system discharge that goes to a stormwater ditch, thence to McCoys Creek
List permit violations (DMR data) and plant upsets that occurred at the plant within the past year: None.
Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions: The last toxicity sampling was in January 2002, which showed passing the acute test. The toxicity test in January 2001 was report by the lab as passing. However, it appears that some of the data may have been abnormal for CD. 100% mortality in 25% effluent. 5% or less mortality in all other concentrations. Labs says not toxic. Abnormal results should have been retested. Some test temps were a bit low.
Discuss MOR trends to prior data; is the trend improving or declining: The trends appear to be relatively consistent.
Additional Information: On the last sampling inspection in March 2002, they had an iron exceedance.

Appendix 3

Methods

The purpose of this investigation was to determine the discharger's effects on the biota of the receiving waters. Chemical and biological comparisons were made between a control site and a test site. A habitat assessment was performed *in situ* to compare biological conditions at the control and test sites. The resulting scores were based upon the examinations of the physical structure and extent of disturbance at the study sites and aid in the interpretation of biological community data. Supplemental physical and chemical data were collected on the effluent and at both study sites.

The effluent was analyzed for nutrients, metals, organic constituents (base, neutral, and acid extractables) and pesticides. The results from these analyses were compared with Water Quality Limits (62-302 F.A.C.) and facility permit limits (Table 1, Appendix 2). A list of the analytes tested for, the minimum detection limit and the practical quantitation limit are given in Appendix 4. Methods used for all chemical analyses are on file at the FDEP Central Chemistry Laboratory in Tallahassee and may be viewed on the web at http://www.floridadep.org/labs/sop/index.htm.

Acute screening toxicity bioassays were performed on the effluent sample using the water flea, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi* (Weber 1993). The effluent and water from control and test sites were analyzed for the presence and concentration of total and fecal coliform bacteria (APHA 1992, methods 9222 B, 9222 D).

An effluent sample and water samples from the control and test sites were autoclaved, filtered (0.45 μm), inoculated with the unicellular green alga, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum*, USEPA 2002), and incubated for 14 days (Miller et al. 1978). The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller et al. 1978). To measure possible inhibition of algal growth based on possible toxicants in effluent or site water, AGP results were compared to expected levels of dry weight production based on the nutrient content of the water (Miller et al. 1978, Appendix 5).

Periphyton were sampled at both control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (APHA 1992, Method 1033). Periphyton were subsampled and identified to the lowest practicable level, usually species. Periphyton assemblages were examined for (1) cell density, (2) community composition, (3) taxa richness, and (4) Shannon-Weaver Diversity Index. To estimate periphyton biomass, chlorophyll *a* concentration was measured on a subsample of the slides (APHA 1992, Method 10200H).

Benthic macroinvertebrates were collected from multiple substrates (*e.g.* snags, leaf packs, vegetation) using discrete dipnet sweeps (qualitative samples, method modified from Plafkin *et al.* 1989). Collections were also made with Hester-Dendy multi-plate samplers incubated for 28 days (quantitative samples, method modified from APHA 1992, method 10500.5). Benthic macroinvertebrates were sorted and identified to the lowest practical taxonomic level, usually species. Eight measures were calculated from benthic macroinvertebrate data to determine the effects of the discharge on receiving waters. These measures included: (1) taxa richness, (2) community composition, (3) functional feeding groups, (4) percent dominant taxon, (5) Shannon-Weaver Diversity Index, (6) the Florida Index, (7) the number of Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa, and (8) the Stream Condition Index (SCI). For a discussion of each biological measure and its potential relationship to Florida Administrative Code, see Appendix 5.

Statistical comparisons of the proportions of taxa, major groups or feeding groups were made using 95% confidence intervals on proportions. A 95% confidence interval is the range of values above and below a given proportion that has a 95% chance of containing the true proportion (Sokal and Rohlf 1995). If the 95% confidence intervals for two proportions do not overlap, then the proportion of X in sample 1 is significantly different from the proportion of X in sample 2 at $p<0.05$. A "$p<0.05$" level of significance means that there is less than a 5% chance that the true proportions in the two samples are the same. All comparisons that are labeled as significant in the text have a probability <0.05 that the proportions are the same.

Appendix 4

Chemical analyses of effluent and receiving water

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 10:45	CONTROL SITE	Bio-AGP/LimNut	Algal Growth Potential	5.08	mg DryWt/L		0.1	0.3
12/16/02 10:45	CONTROL SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	0.43	mg/m2	U	0.43	1.3
12/16/02 10:45	CONTROL SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
12/16/02 10:45	CONTROL SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0.43	mg/m2	U	0.43	1.3
12/16/02 10:45	CONTROL SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
12/16/02 10:45	CONTROL SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	23	# Taxa			
12/16/02 10:45	CONTROL SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	34	#Taxa			
12/16/02 10:45	CONTROL SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	12	#Taxa			
12/16/02 10:45	CONTROL SITE	Nutrients-Liquid	Ammonia-N	0.11	mg N/L		0.01	0.02
12/16/02 10:45	CONTROL SITE	Nutrients-Liquid	NO2NO3-N	0.039	mg N/L		0.004	0.01
12/16/02 10:45	CONTROL SITE	Nutrients-Liquid	N_KJEL_TOT	0.37	mg N/L		0.06	0.2
12/16/02 10:45	CONTROL SITE	Nutrients-Liquid	O-Phosphate-P	0.015	mg P/L		0.004	0.01
12/16/02 10:45	CONTROL SITE	Nutrients-Liquid	Total-P	0.28	mg P/L		0.015	0.04
12/16/02 10:45	CONTROL SITE REP.1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	2	# Taxa			
12/16/02 10:45	CONTROL SITE REP.2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	1	# Taxa			
12/16/02 10:45	CONTROL SITE REP.3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	1	# Taxa			
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,2,4-Trichlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,2-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,3-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,4-Dichlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	75
12/16/02 11:20	EQUIP BLANK	BNA-Water	1-Naphthylamine	9.4	ug/L	U	9.4	38
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,3,4,6-Tetrachlorophenol	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,4,5-Trichlorophenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,4,6-Trichlorophenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,4-Dichlorophenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,4-Dimethylphenol	47	ug/L	U	47	190
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	57
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,4-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,6-Dichlorophenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2,6-Dinitrotoluene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Acetylaminofluorene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Chloronaphthalene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Chlorophenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Methyl-4,6-dinitrophenol	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Methylnaphthalene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Naphthylamine	9.4	ug/L	U	9.4	38
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Nitroaniline	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Nitrophenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	2-Picoline	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
12/16/02 11:20	EQUIP BLANK	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	UJ	19	75
12/16/02 11:20	EQUIP BLANK	BNA-Water	3-Methylcholanthrene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	3-Nitroaniline	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Bromophenyl phenyl ether	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Chloro-3-methylphenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Chloroaniline	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Nitroaniline	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	4-Nitrophenol	14	ug/L	U	14	57
12/16/02 11:20	EQUIP BLANK	BNA-Water	5-Nitro-o-toluidine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Acenaphthene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Acenaphthylene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Acetophenone	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	Aniline	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Anthracene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzidine	94	ug/L	U	94	380
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzo(a)anthracene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzo(a)pyrene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzo(b)fluoranthene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzo(g,h,i)perylene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzo(k)fluoranthene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Benzyl alcohol	0.94	ug/L	U	0.94	3.8

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 11:20	EQUIP BLANK	BNA-Water	Bis(2-chloroethoxy)methane	0.94	ug/L	UJ	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Bis(2-chloroethyl)ether	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Bis(2-chloroisopropyl)ether	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	57
12/16/02 11:20	EQUIP BLANK	BNA-Water	Butyl benzyl phthalate	4.7	ug/L	U	4.7	19
12/16/02 11:20	EQUIP BLANK	BNA-Water	Chrysene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Di-n-butyl phthalate	4.7	ug/L	U	4.7	19
12/16/02 11:20	EQUIP BLANK	BNA-Water	Di-n-octyl phthalate	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Dibenzo(a,h)anthracene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Dibenzofuran	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	Diethyl phthalate	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Dimethyl phthalate	47	ug/L	U	47	190
12/16/02 11:20	EQUIP BLANK	BNA-Water	Dimethylaminoazobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	Diphenylamine	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	Ethyl methanesulfonate	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Fluoranthene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Fluorene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	Hexachlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Hexachlorobutadiene	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Hexachlorocyclopentadiene	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Hexachloroethane	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	Indeno(1,2,3-cd)pyrene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Isophorone	0.94	ug/L	UJ	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Isosafrole	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Methapyrilene	3.8	ug/L	UJ	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	Methyl methanesulfonate	0.94	ug/L	UJ	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosodi-n-butylamine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosodiethylamine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosodiphenylamine	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosomorpholine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosopiperidine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	Naphthalene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	75
12/16/02 11:20	EQUIP BLANK	BNA-Water	Pentachlorobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Pentachloroethane	47	ug/L	U	47	190
12/16/02 11:20	EQUIP BLANK	BNA-Water	Pentachloronitrobenzene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Pentachlorophenol	2.8	ug/L	U	2.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	11
12/16/02 11:20	EQUIP BLANK	BNA-Water	Phenanthrene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Phenol	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Pyrene	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
12/16/02 11:20	EQUIP BLANK	BNA-Water	Safrole	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.7
12/16/02 11:20	EQUIP BLANK	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.5
12/16/02 11:20	EQUIP BLANK	BNA-Water	o-Toluidine	0.94	ug/L	U	0.94	3.8
12/16/02 11:20	EQUIP BLANK	GC-Water	Alachlor	0.57	ug/L	U	0.57	2.28
12/16/02 11:20	EQUIP BLANK	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
12/16/02 11:20	EQUIP BLANK	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
12/16/02 11:20	EQUIP BLANK	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
12/16/02 11:20	EQUIP BLANK	GC-Water	Bromacil	0.19	ug/L	U	0.19	0.76
12/16/02 11:20	EQUIP BLANK	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
12/16/02 11:20	EQUIP BLANK	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
12/16/02 11:20	EQUIP BLANK	GC-Water	Chlorpyrifos Methyl	0.095	ug/L	U	0.095	0.38
12/16/02 11:20	EQUIP BLANK	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 11:20	EQUIP BLANK	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
12/16/02 11:20	EQUIP BLANK	GC-Water	Fonofos	0.095	ug/L	UJ	0.095	0.38
12/16/02 11:20	EQUIP BLANK	GC-Water	Hexazinone	0.095	ug/L	U	0.095	0.38
12/16/02 11:20	EQUIP BLANK	GC-Water	Malathion	0.14	ug/L	UJ	0.14	0.56
12/16/02 11:20	EQUIP BLANK	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
12/16/02 11:20	EQUIP BLANK	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
12/16/02 11:20	EQUIP BLANK	GC-Water	Metribuzin	0.095	ug/L	U	0.095	0.38
12/16/02 11:20	EQUIP BLANK	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
12/16/02 11:20	EQUIP BLANK	GC-Water	Naled	0.76	ug/L	U	0.76	3.04
12/16/02 11:20	EQUIP BLANK	GC-Water	Norflurazon	0.095	ug/L	U	0.095	0.38
12/16/02 11:20	EQUIP BLANK	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
12/16/02 11:20	EQUIP BLANK	GC-Water	Parathion Methyl	0.095	ug/L	U	0.095	0.38
12/16/02 11:20	EQUIP BLANK	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
12/16/02 11:20	EQUIP BLANK	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
12/16/02 11:20	EQUIP BLANK	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
12/16/02 11:20	EQUIP BLANK	Metals-Water	Aluminum	10	ug/L	U	10	40
12/16/02 11:20	EQUIP BLANK	Metals-Water	Arsenic	3	ug/L	U	3	12
12/16/02 11:20	EQUIP BLANK	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
12/16/02 11:20	EQUIP BLANK	Metals-Water	Calcium	0.04	mg/L	U	0.04	0.12
12/16/02 11:20	EQUIP BLANK	Metals-Water	Chromium	2	ug/L	U	2	8
12/16/02 11:20	EQUIP BLANK	Metals-Water	Copper	1.7	ug/L	U	0.75	3
12/16/02 11:20	EQUIP BLANK	Metals-Water	Iron	7	ug/L	U	7	28
12/16/02 11:20	EQUIP BLANK	Metals-Water	Lead	0.1	ug/L	U	0.1	0.4
12/16/02 11:20	EQUIP BLANK	Metals-Water	Magnesium	0.01	mg/L	U	0.01	0.04
12/16/02 11:20	EQUIP BLANK	Metals-Water	Nickel	2	ug/L	U	2	8
12/16/02 11:20	EQUIP BLANK	Metals-Water	Selenium	1	ug/L	U	1	4
12/16/02 11:20	EQUIP BLANK	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
12/16/02 11:20	EQUIP BLANK	Metals-Water	Zinc	2	ug/L	U	2	8
12/16/02 11:20	EQUIP BLANK	Nutrients-Liquid	Ammonia-N	0.01	mg N/L	U	0.01	0.02
12/16/02 11:20	EQUIP BLANK	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
12/16/02 11:20	EQUIP BLANK	Nutrients-Liquid	N_KJEL_TOT	0.06	mg N/L	U	0.06	0.2
12/16/02 11:20	EQUIP BLANK	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
12/16/02 11:20	EQUIP BLANK	Nutrients-Liquid	Total-P	0.015	mg P/L	U	0.015	0.04
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,1,1-Trichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,1,2,2-Tetrachloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,1,2-Trichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,1-Dichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,1-Dichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,2-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,2-Dichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,2-Dichloropropane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,3-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	1,4-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	2-Chloroethylvinyl ether	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Benzene	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Bromodichloromethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Bromoform	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Bromomethane	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Carbon tetrachloride	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Chlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Chloroethane	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Chloroform	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Chloromethane	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Dibromochloromethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Ethylbenzene	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Methylene chloride	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Tetrachloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Toluene	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	Trichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Trichlorofluoromethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	Vinyl chloride	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	cis-1,3-Dichloropropene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	m,p-Xylene	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	o-Xylene	0.5	ug/L	U	0.5	2
12/16/02 11:20	EQUIP BLANK	VOC-Water	trans-1,2-Dichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	EQUIP BLANK	VOC-Water	trans-1,3-Dichloropropene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,2,4,5-Tetrachlorobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,2,4-Trichlorobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,2-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,3,5-Trinitrobenzene	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,3-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,3-Dinitrobenzene	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,4-Dichlorobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	1,4-Naphthoquinone	19	ug/L	U	19	77

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,4,5-Trichlorophenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,4,6-Trichlorophenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,4-Dichlorophenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,4-Dimethylphenol	48	ug/L	U	48	190
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,4-Dinitrophenol	14	ug/L	U	14	58
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,4-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,6-Dichlorophenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2,6-Dinitrotoluene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Acetylaminofluorene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Chloronaphthalene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Chlorophenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Methyl-4,6-dinitrophenol	2.9	ug/L	U	2.9	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Methylnaphthalene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Naphthylamine	9.6	ug/L	U	9.6	38
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Nitroaniline	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Nitrophenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	2-Picoline	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	3,3'-Dichlorobenzidine	38	ug/L	U	38	150
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	3,3'-Dimethylbenzidine	19	ug/L	UJ	19	77
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	3-Methylcholanthrene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	3-Nitroaniline	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4,4'-DDD	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4,4'-DDE	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4,4'-DDT	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Aminobiphenyl	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Bromophenyl phenyl ether	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Chloro-3-methylphenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Chloroaniline	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Chlorophenyl phenyl ether	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Nitroaniline	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	4-Nitrophenol	14	ug/L	U	14	58
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	5-Nitro-o-toluidine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	7,12-Dimethylbenz(a)anthracene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Acenaphthene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Acenaphthylene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Acetophenone	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Aldrin	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Aniline	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Anthracene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Azobenzene/1,2-Diphenylhydrazine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzidine	96	ug/L	U	96	380
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzo(a)anthracene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzo(a)pyrene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzo(b)fluoranthene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzo(g,h,i)perylene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzo(k)fluoranthene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Benzyl alcohol	9.8	ug/L		0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Bis(2-chloroethoxy)methane	0.96	ug/L	UJ	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Bis(2-chloroethyl)ether	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Bis(2-chloroisopropyl)ether	2.9	ug/L	U	2.9	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Bis(2-ethylhexyl)phthalate	14	ug/L	U	14	58
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Butyl benzyl phthalate	4.8	ug/L	U	4.8	19
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Chrysene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Di-n-butyl phthalate	4.8	ug/L	U	4.8	19
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Di-n-octyl phthalate	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Dibenzo(a,h)anthracene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Dibenzofuran	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Dieldrin	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Diethyl phthalate	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Dimethyl phthalate	48	ug/L	U	48	190
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Dimethylaminoazobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Dinoseb	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Diphenylamine	2.9	ug/L	U	2.9	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Endosulfan I	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Endosulfan II	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Endosulfan sulfate	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Endrin	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Endrin aldehyde	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Ethyl methanesulfonate	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Fluoranthene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Fluorene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Heptachlor	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Heptachlor epoxide	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Hexachlorobenzene	0.96	ug/L	U	0.96	3.8

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Hexachloroethane	2.9	ug/L	U	2.9	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Hexachloropropene	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Indeno(1,2,3-cd)pyrene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Isophorone	0.96	ug/L	UJ	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Isosafrole	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Methapyrilene	3.8	ug/L	UJ	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Methyl methanesulfonate	0.96	ug/L	UJ	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosodi-n-butylamine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosodi-n-propylamine	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosodiethylamine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosodimethylamine	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosodiphenylamine	2.9	ug/L	U	2.9	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosomethylethylamine	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosomorpholine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosopiperidine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	N-Nitrosopyrrolidine	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Naphthalene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Nitrobenzene	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Nitroquinoline-1-oxide	19	ug/L	U	19	77
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Pentachlorobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Pentachloroethane	48	ug/L	U	48	190
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Pentachloronitrobenzene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Pentachlorophenol	2.9	ug/L	U	2.9	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Phenacetin	3.8	ug/L	U	3.8	12
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Phenanthrene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Phenol	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Pyrene	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Pyridine	3.8	ug/L	U	3.8	15
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	Safrole	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	alpha-BHC	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	beta-BHC	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	delta-BHC	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	gamma-BHC	1.4	ug/L	U	1.4	5.8
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	m,p-Cresols	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	o-Cresol	1.9	ug/L	U	1.9	7.7
12/16/02 11:40	FINAL EFFLUENT	BNA-Water	o-Toluidine	0.96	ug/L	U	0.96	3.8
12/16/02 11:40	FINAL EFFLUENT	Bio-AGP/LimNut	Algal Growth Potential	32.2	mg DryWt/L		0.1	0.3
12/16/02 11:40	FINAL EFFLUENT	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	4.3	ug/L	U	4.3	13
12/16/02 11:40	FINAL EFFLUENT	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	4.3	ug/L	U	4.3	13
12/16/02 11:40	FINAL EFFLUENT	Bio-Toxicology	Bioassay-Acute-Screen-FW-C.dubia, LC50	100	LC50	L		
12/16/02 11:40	FINAL EFFLUENT	Bio-Toxicology	Bioassay-Acute-Screen-FW-Fish, LC50	100	LC50	L		
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Alachlor	0.58	ug/L	U	0.58	2.32
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Ametryn	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Atrazine	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Azinphos Methyl	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Bromacil	0.22	ug/L	I	0.19	0.76
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Butylate	0.19	ug/L	U	0.19	0.76
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Chlorpyrifos Ethyl	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Chlorpyrifos Methyl	0.097	ug/L	U	0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Diazinon	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Ethion	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Ethoprop	0.097	ug/L	U	0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Fenamiphos	0.19	ug/L	U	0.19	0.76
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Fonofos	0.097	ug/L	UJ	0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Hexazinone	1.8	ug/L		0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Malathion	0.14	ug/L	UJ	0.14	0.56
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Metalaxyl	0.24	ug/L	U	0.24	0.96
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Metolachlor	0.48	ug/L	U	0.48	1.92
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Metribuzin	0.097	ug/L	U	0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Mevinphos	0.19	ug/L	U	0.19	0.76
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Naled	0.78	ug/L	U	0.78	3.12
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Norflurazon	0.097	ug/L	U	0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Parathion Ethyl	0.14	ug/L	U	0.14	0.56
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Parathion Methyl	0.097	ug/L	U	0.097	0.388
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Phorate	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Prometryn	0.14	ug/L	U	0.14	0.56
12/16/02 11:40	FINAL EFFLUENT	GC-Water	Simazine	0.048	ug/L	U	0.048	0.192
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Aluminum	10	ug/L	U	10	40
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Arsenic	8.8	ug/L	I	3	12
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Cadmium	0.025	ug/L	U	0.025	0.1
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Calcium	62.8	mg/L		0.04	0.12
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Chromium	2	ug/L	U	2	8
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Copper	4.9	ug/L	J	0.75	3
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Iron	33200	ug/L		7	28

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Nickel	5.1	ug/L	I	2	8
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Selenium	1	ug/L	U	1	4
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Silver	0.02	ug/L	U	0.02	0.08
12/16/02 11:40	FINAL EFFLUENT	Metals-Water	Zinc	6.1	ug/L	I	2	8
12/16/02 11:40	FINAL EFFLUENT	Nutrients-Liquid	Ammonia-N	1.9	mg N/L		0.2	0.4
12/16/02 11:40	FINAL EFFLUENT	Nutrients-Liquid	NO2NO3-N	0.004	mg N/L	U	0.004	0.01
12/16/02 11:40	FINAL EFFLUENT	Nutrients-Liquid	N_KJEL_TOT	2.5	mg N/L		0.06	0.2
12/16/02 11:40	FINAL EFFLUENT	Nutrients-Liquid	O-Phosphate-P	0.004	mg P/L	U	0.004	0.01
12/16/02 11:40	FINAL EFFLUENT	Nutrients-Liquid	Total-P	1.5	mg P/L		0.075	0.2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,1,1-Trichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,1,2,2-Tetrachloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,1,2-Trichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,1-Dichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,1-Dichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,2-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,2-Dichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,2-Dichloropropane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,3-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	1,4-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	2-Chloroethylvinyl ether	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Benzene	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Bromodichloromethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Bromoform	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Bromomethane	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Carbon tetrachloride	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Chlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Chloroethane	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Chloroform	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Chloromethane	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Dibromochloromethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Ethylbenzene	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Methylene chloride	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Tetrachloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Toluene	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Trichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Trichlorofluoromethane	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	Vinyl chloride	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	cis-1,3-Dichloropropene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	m,p-Xylene	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	o-Xylene	0.5	ug/L	U	0.5	2
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	trans-1,2-Dichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:40	FINAL EFFLUENT	VOC-Water	trans-1,3-Dichloropropene	0.2	ug/L	U	0.2	1
12/16/02 9:55	TEST SITE	Bio-AGP/LimNut	Algal Growth Potential	5.89	mg DryWt/L		0.1	0.3
12/16/02 9:55	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Periphyton	0.11	mg/m2	U	0.11	0.34
12/16/02 9:55	TEST SITE	Bio-Chl-a	Chlorophyll-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
12/16/02 9:55	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Periphyton	0.11	mg/m2	U	0.11	0.34
12/16/02 9:55	TEST SITE	Bio-Chl-a	Phaeophytin-A, Monochromatic, Water	0.85	ug/L	U	0.85	2.6
12/16/02 9:55	TEST SITE	Bio-Invertebrates	Macroinvert-FW-Qual-Dipnetx20-# Taxa	23	# Taxa			
12/16/02 9:55	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Diatom Taxa	17	#Taxa			
12/16/02 9:55	TEST SITE	Bio-Peri/Phyto	Periphyton-Quantitative-# Wet Taxa	9	#Taxa			
12/16/02 9:55	TEST SITE	Nutrients-Liquid	Ammonia-N	0.19	mg N/L		0.01	0.02
12/16/02 9:55	TEST SITE	Nutrients-Liquid	NO2NO3-N	0.026	mg N/L		0.004	0.01
12/16/02 9:55	TEST SITE	Nutrients-Liquid	N_KJEL_TOT	0.46	mg N/L		0.06	0.2
12/16/02 9:55	TEST SITE	Nutrients-Liquid	O-Phosphate-P	0.017	mg P/L		0.004	0.01
12/16/02 9:55	TEST SITE	Nutrients-Liquid	Total-P	0.39	mg P/L		0.015	0.04
12/16/02 9:55	TEST SITE REP.1	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	11	# Taxa			
12/16/02 9:55	TEST SITE REP.2	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	7	# Taxa			
12/16/02 9:55	TEST SITE REP.3	Bio-Invertebrates	Macroinvert-FW-Quan-ArtSubstr-# Taxa	8	# Taxa			
12/16/02 11:20	TRIP BLANK	VOC-Water	1,1,1-Trichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,1,2,2-Tetrachloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,1,2-Trichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,1-Dichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,1-Dichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,2-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,2-Dichloroethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,2-Dichloropropane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,3-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	1,4-Dichlorobenzene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	2-Chloroethylvinyl ether	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Benzene	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Bromodichloromethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Bromoform	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Bromomethane	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Carbon tetrachloride	0.2	ug/L	U	0.2	1

Date Sampled	Field ID	Analysis Group	Component	Result	Units	Remark	MDL	PQL
12/16/02 11:20	TRIP BLANK	VOC-Water	Chloroform	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Chloromethane	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Dibromochloromethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Ethylbenzene	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Methylene chloride	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Tetrachloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Toluene	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	Trichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Trichlorofluoromethane	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	Vinyl chloride	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	cis-1,3-Dichloropropene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	m,p-Xylene	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	o-Xylene	0.5	ug/L	U	0.5	2
12/16/02 11:20	TRIP BLANK	VOC-Water	trans-1,2-Dichloroethene	0.2	ug/L	U	0.2	1
12/16/02 11:20	TRIP BLANK	VOC-Water	trans-1,3-Dichloropropene	0.2	ug/L	U	0.2	1

Appendix 5

Explanation of Biological Measures

(1) Habitat Assessment:

Eight aspects of the physical structure and extent of disturbance are ranked, with 20 possible points for each factor (FDEP SOP FT 3100, based on Plafkin *et al.*, 1989 and Barbour and Stribling, 1994). The Habitat Assessment score includes types and amounts of benthic substrates, water velocity, amount of sand or silt accumulation, extent of artificial channelization, bank stability, and riparian zone width and vegetation type. All scores are summed to yield an overall Habitat Assessment score. Habitat Assessment score ranges from 11-160 and overall habitat quality is assigned to one of four categories: Optimal (120-160 points), Suboptimal (80-119 points), Marginal (40-79 points), and Poor (11-39 points).

(2) Effluent and Water Samples from Control and Test Sites

Algal Growth Potential (AGP): The effluent and water from control and test sites are autoclaved, filtered (0.45μm), inoculated with the unicellular green alga, *Pseudokirchneriella subcapitata* (formerly *Selenastrum capricornutum,* USEPA 2002*),* and incubated for 14 days. The algal growth potential (AGP) value is the peak growth of the alga within that 14-day period, recorded as mg dry weight/L (Miller *et al.* 1978). Raschke and Shultz (1987) found that an AGP above 5.0 mg dry weight/L represents a "problem" threshold for fresh receiving waters, implying nutrient enrichment. High AGP values may constitute one line of evidence for violation of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

The concentration of nutrients in a water sample may be used to calculate the expected yield of AGP under the assumption that other required nutrients (e.g. silicon, micronutrients) are present in excess (Miller *et al.* 1978). The expected amount of production is calculated as 38 times the total soluble inorganic nitrogen (nitrate and nitrite plus ammonia) under nitrogen limitation or 430 times the ortho-phosphate (OP) concentration under phosphorus limitation with an error of ± 20%. When the ratio of nitrogen to phosphorus (N:P) is less than 11:1, nitrogen limitation of algal production is likely. When the N:P ratio is above 11:1, phosphorus limitation is likely. Production of lower biomass than expected may be evidence of growth inhibition related to toxic compounds present in the water sample tested and may be a violation of 62-302.530(62) F.A.C..

(3) Algal Phytoplankton and Periphyton Assemblages

Chlorophyll *a* Content: Chlorophyll *a* content is measured in both phytoplankton and periphyton samples to estimate algal biomass (APHA 1992, modified from *Standard Methods* 10200H). High algal biomass implies nutrient stress (Stevenson and Bahls 1999) and may be a violation of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

Cell Density: Cell density is estimated as number/ml for phytoplankton samples and number/cm^2 for periphyton samples (APHA 1992, modified from *Standard Methods* 10200F and 10900G).

Taxa richness: Taxa richness is the number of distinct algal taxa present in a sample. Stress tends to reduce the number of different types of algae present in a sample, but moderate nutrient enrichment of nutrient poor waters may sometimes be correlated with increased algal taxa richness (Stevenson and Bahls 1999).

Community Composition: Shifts in relative proportions of major groups of algae downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge (Stevenson and Bahls 1999) and may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present with more equitable abundance among taxa (Magurran 1988). Low diversity scores related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

(4) Benthic Macroinvertebrate Assemblages

Taxa richness: Taxa richness is the number of distinct macroinvertebrate taxa present in a sample. Stress, habitat destruction and pollution tend to reduce the number of different types of organisms present (Karr and Chu 1998).

Decreases in taxa richness related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

Percent Contribution of Dominant Taxon: Percent contribution of the dominant taxon is calculated by dividing the number of individuals in the most abundant taxa by the total number of individuals counted. Percent contribution of the dominant taxon tends to increase with increasing perturbation (Plafkin *et al.*, 1989). Increases in the percent contribution of the dominant taxon related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C. and/or 62-302.530(48)(b) F.A.C..

Shannon-Weaver Diversity Index: This index is specified in the Florida Administrative Code 62-302 as a measure of biological integrity. Low diversity scores are undesirable. Where diversity is low, only a few taxa are abundant as compared to an area where many taxa are present in equitable abundance among taxa (Magurran 1988). A difference of 25% in Shannon-Weaver diversity between results from Hester-Dendy multiplate samplers incubated for 28 days at test and control sites constitutes a violation of 62-302.530(11) F.A.C..

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. The Florida Index assigns points to stream-dwelling macroinvertebrates based on their ranked sensitivity to pollution (Beck 1954). A site with a high Florida Index score is considered healthy (Ross 1990). Decreases in Florida Index points related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

Ephemeroptera/Plecoptera/Trichoptera (EPT) Taxa: This value is the number of EPT taxa present. More EPT taxa are usually present in unpolluted waters (Plafkin *et al.*, 1989, Wallace *et al.*, 1996). Decreases in the number of EPT taxa related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

Community Composition: Shifts in proportions of major groups of organisms downstream of a point source, compared to upstream, control conditions, may indicate negative effects of a discharge (Karr and Chu 1998). Shifts in community composition related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

Functional Feeding Groups: Environmental degradation may differentially affect groups of invertebrates based on how the group feeds (e.g. predators, deposit feeders, etc.). In Florida, pollution may be responsible for reducing the numbers of filter feeders (FDEP 1994) and shredders (EA Engineering 1994). Changes in the proportions of functional feeding groups related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996a, b) developed for Florida. Using data from qualitative dipnet samples, the SCI assigns points to seven parameters, depending on how closely each parameter approaches an expected reference condition (Barbour *et al.* 1996a, b and FDEP SOP FS 7420, LT 7200). Points are summed to yield a final SCI score (range 7-33, depending on region and index period). Included in the calculation of SCI are taxa richness, number of EPT taxa, number of Chironomid taxa, percent contribution of the dominant taxon, the Florida Index, percent contribution of Diptera, and the percent contribution of suspension and filter feeders. Scores are broken into four ordinal groups: Excellent, Good, Poor and Very Poor. A decrease in ordinal SCI score from the Control to the Test site may be evidence of degradation related to a facility's effluent. An SCI score of "Poor" or "Very Poor" related to a facility's effluent may constitute violations of 62-302.530(47) F.A.C., 62-302.530(48)(a) F.A.C., 62-302.530(48)(b) F.A.C. and/or 62-302.530(62) F.A.C..

Appendix 6

Typical Values for Selected Parameters in Florida Waters

Percentile Distribution (1617 stations)

CONTROL SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85	**0.43 U**
Hester-Dendy Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	**ND**
Hester-Dendy Taxa Richness	**6**	6.5	9	11.5	13	15	17	21.5	26	29	32	**3**
Dipnet Taxa Richness	9	12	**17**	20	22	24.5	26	28	31	37	53	**17**
Total Kjeldahl Nitrogen	**0.30**	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80	**0.37**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	**0.11**	0.14	0.20	0.34	0.60	**0.11**
Nitrate plus nitrite	0.01	0.01	**0.03**	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05	**0.039**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	**0.25**	0.39	0.74	1.51	**0.28**
Orthophosphate	0.01	**0.01**	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37	**0.015**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	**10.45**	16.30	**12.1**

TEST SITE

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%	Measured
Periphyton Chlorophyll *a* (mg/m^2)	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85	**0.11 U**
Hester-Dendy Diversity	0.84	**2.12**	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90	**2.27**
Hester-Dendy Taxa Richness	6	6.5	9	11.5	**13**	15	17	21.5	26	29	32	**13**
Dipnet Taxa Richness	9	12	17	20	**22**	24.5	26	28	31	37	53	**22**
Total Kjeldahl Nitrogen	0.30	**0.39**	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80	**0.46**
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	**0.14**	0.20	0.34	0.60	**0.19**
Nitrate plus nitrite	0.01	**0.01**	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05	**0.026**
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	**0.39**	0.74	1.51	**0.39**
Orthophosphate	0.01	**0.01**	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37	**0.017**
Turbidity (NTU)	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	**16.30**	**21.0**

Taxa richness and diversity values are for benthic macroinvertebrates. Hester-Dendy sample= benthic macroinvertebrates collected from a standardized multi-plate sampler. Dipnet taxa richness = number of taxa collected in standardized dipnet sweep samples. Diversity = Shannon-Weaver H'. NTU = Nephelometric turbidity units. Adapted from Joe Hand, FDER, personal communication, 1991 (data collected 1980-1989). ND = No data. U = Material was analyzed for, but not detected, result is the minimum detection limit.

Appendix 7

Toxicological results

Data recorded during the 48-hour acute screening bioassays of a sample of effluent from CSX-Montcrief, 2500 West 5th Street, Jacksonville, Duval County, Florida, NPDES# FL0176877, performed from 17 to 19 December 2002.

Facility: **CSX-Montcrief** | **NPDES #:** **FL0176877** | Facility Type: **Industrial** | **Analysts:** Jacquelyn Brynda, Joshua Ayres, James Daniels, Marshall Faircloth, Christa Pierini

Location: 2500 West 5th Street, Jacksonville | Contact/District: O'Conner/NE

County: Duval | Test type: static acute screen

Sample Collection Date: 12/16/2002 Time: 1140 | # tests: 2 | Receiving Water: McCoys Creek

Test Beginning Date: 12/17/2002 Time: 1600 | Chlorination Type: non-chlorinated

Test Ending Date: 12/19/2002 Time: 1330 | FDEP SOP#: TA07_01 / 02

Reviewer: David Whiting

Organism: ***Ceriodaphnia dubia*** Life stage: <24 hours [B]Feeding: YCT/Algae

Chamber size: 30 mL

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[A] 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	8.2	-	8.1	24.2	-	24.3	8.1	-	7.3	190	187
Control B	0/20	5	5	5	-	-	8.2	-	-	23.8	-	-	7.6	-	178
Control C	0/20	5	5	5	-	-	8.2	-	-	23.8	-	-	7.2	-	184
Control D	0/20	5	5	5	-	-	8.2	-	-	23.9	-	-	7.6	-	195
100% A	20/0	5	5	5	7.6	-	8.4	24.6	-	24.2	8.1	-	7.1	515	465
100% B	20/0	5	5	5	-	-	8.5	-	-	24.3	-	-	7.4	-	480
100% C	20/0	5	5	5	-	-	8.5	-	-	24.1	-	-	7.1	-	490
100% D	20/0	5	5	4	-	-	8.5	-	-	24.0	-	-	7.6	-	505

[A] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-25.5°C.
Incubator #3 temperature range for the test period was 24.5-26.0°C.

[B] Organisms fed prior to testing.

Organism: ***Cyprinella leedsi*** Life stage: 14 days [D]Feeding: artemia

Chamber size: 1 L

Concentrations	Sample/Diluent Volume(mL)	SURVIVAL # Alive 0 hr	24 hr	48 hr	pH 0 hour	24 hour	48 hour	Temperature[C] 0 hour	24 hour	48 hour	Dissolved Oxygen 0 hour	24 hour	48 hour	Conductivity Uncorrected µmhos/cm 0 hour	48 hour
Control A	0/500	5	5	5	8.1	8.4	8.3	24.1	23.9	24.8	8.1	7.0	7.3	295	280
Control B	0/500	5	5	5	8.1	8.4	8.4	24.2	24.1	24.9	8.1	7.4	7.5	270	280
Control C	0/500	5	5	5	8.1	8.4	8.4	24.3	23.9	24.3	8.1	6.9	7.3	265	280
Control D	0/500	5	5	5	8.1	8.4	8.4	24.3	23.8	24.6	8.1	7.4	7.5	260	280
100% A	500/0	5	5	5	7.7	8.2	8.4	24.0	24.1	24.7	7.9	7.1	7.3	520	540
100% B	500/0	5	5	5	7.6	8.2	8.4	24.0	23.9	25.0	7.9	7.4	7.3	525	550
100 % C	500/0	5	5	5	7.6	8.2	8.4	24.0	23.9	24.6	7.7	7.0	7.4	530	540
100% D	500/0	5	5	5	7.6	8.2	8.4	24.0	23.9	24.8	7.9	7.3	7.4	530	540

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.0-25.5°C.
Incubator #3 temperature range for the test period was 24.5-26.0°C.

[D] Organisms fed prior to testing.

LIMS	
Job number:	TLH-2002-12-17-14
sample number:	643863

Data Transcription Verification	
date:	3/26/2003
by:	James Daniels, Josh Ayres

Total Residual CL2	mg/L	Method
Field:	-	-
Lab:	<0.015	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:	2.09	0.057

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control water (fish):	136	132
Control water (water flea):	75	80
100% Sample:	214	185

Light Intensity during the test was 50-100 foot candles.
Photoperiod during the test was 16 hours of light : 8 hours of dark.

STATE OF FLORIDA
DEPT. OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
Division of Water Facilities
Surface Water Section

MICROBIOLOGICAL ANALYSIS REPORT

NAME OF SURVEY			COLLECTOR
CSX Moncrief			O'Connor
DATE: COLLECTED	**RECEIVED**	**PROCESS START**	**COMPLETED**
12/16/02	14:10 12/16/02	15:12 12/16/02	15:20 12/17/02
SURVEY TYPE	**SAMPLE TYPE**	**COUNTY**	**ANALYTICAL METHOD**
Industrial Waste Compliance	Test/Control Final Effluent		Membrane Filter
ANALYST	**COMMENTS**		
Kallemeyn			

LAB NO.	STORET NO.	SITE LOCATION	COLL TIME	SET UP TIME	TOTAL COLIFORM #/100ML	TOTAL COLIFORM CODE	FECAL COLIFORM #/100ML	FECAL COLIFORM CODE
021943		CSX Test site	9:55	15:15	967		867	
021944		CSX control site	10:45	15:12	680		220	
021946		CSXFinal Effluent	11:40	15:19	30	B	10	K

RESULTS APPROVED BY:	DATE
Jeremy Parrish	5-12-03

PAGE 1

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 021946 STATION : DATE: 12/16/02 TIME: 11:40
SAMPLE SOURCE CSX FYI 5 SAMPLER: PO/SE/JR
STATION LOCATION: Final Effluent
PROGRAM MOD.: IW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:		Sample Depth:		W.Temp. °C:	20.7
Conductivity: µmoh/cm (EPA 120.1) :	537	Diss. Oxygen (EPA 360.1)	8.3	EPA 170.1	
Stream Velocity:		Salinity:	0.26	T.R.C.:	
pH:(EPA 150.1)	7.23	Secchi:		EPA 330.5	

WEATHER CONDITIONS:

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1	225	Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B		C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	56	Vol. S.S: EPA 160.4	10	Fix. S.S :	46
Tot.Solids : EPA 160.3		T.D.S EPA 160.1			
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody
Sample Released to: Biipin Adhyaru Date: 12/16/2002

Preservation: Ice Time: 15:00

Reported by: Bipin Adhyaru Date:: 12/18/2002

K = Actual value is known to be less than the value given.
A = Value is the mean of two or more determinations.
O = Sampled, but analysis lost or not performed.
Q = Sample held beyond the accepted holding time.
T = Value reported is less than the laboratory method detection limit.
U = Indicates that the compound was analyzed for but not detected.
Y = The laboratory analysis was from an unpreserved or improperly preserved sample.
REJ = Data is rejected and should not be used.
L = Off - scale high. Actual value is known to be greater than value given
J = Estimated value; value not accurate.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 021943 STATION : DATE: 12/16/02 TIME: 09:55
SAMPLE SOURCE CSX FYI 5 SAMPLER: PO/SE/JR
STATION LOCATION: CSX Moncrief Test Site
PROGRAM MOD.: IW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	0.7	Sample Depth:	0.3	W.Temp. °C:	20.6
Conductivity: µmoh/cm (EPA 120.1) :	512	Diss. Oxygen (EPA 360.1)	7.1	EPA 170.1	
Stream Velocity:		Salinity:	0.25	T.R.C.:	
pH:(EPA 150.1)	7.84	Secchi:	0.25 L	EPA 330.5	

WEATHER CONDITIONS:

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1	21.0	Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B		C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	3	Vol. S.S: EPA 160.4	1	Fix. S.S :	2
Tot.Solids : EPA 160.3		T.D.S EPA 160.1			
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody
Sample Released to: Biipin Adhyaru Date: 12/16/2002

Preservation: Ice Time: 15:00

Reported by: Bipin Adhyaru Date:: 12/18/2002

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 021944 STATION : DATE: 12/16/02 TIME: 10:45
SAMPLE SOURCE CSX FYI 5 SAMPLER: PO/SE/JR
STATION LOCATION: CSX Moncrief Control Site
PROGRAM MOD.: IW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:	1.1	Sample Depth:	0.3	W.Temp. °C:	13.7
Conductivity: µmoh/cm (EPA 120.1) :	511	Diss. Oxygen (EPA 360.1)	6.8	EPA 170.1	
Stream Velocity:		Salinity:	0.25	T.R.C.:	
pH:(EPA 150.1)	7.75	Secchi:	0.3 L	EPA 330.5	

WEATHER CONDITIONS:

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1	12.1	Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B		C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	1	Vol. S.S: EPA 160.4	1 K	Fix. S.S :	1
Tot.Solids : EPA 160.3		T.D.S EPA 160.1			
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

Sample Custody
Sample Released to: Biipin Adhyaru Date: 12/16/2002

Preservation: Ice Time: 15:00

Reported by: Bipin Adhyaru Date:: 12/18/2002

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STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY, SUIT B-200 **Comp.QAP # 880236**
JACKSONVILLE, FL 32256-7577

SAMPLE ID : 021945 STATION : DATE: 12/16/02 TIME: 11:20
SAMPLE SOURCE CSX FYI 5 SAMPLER: PO/SE/JR
STATION LOCATION: Equipment Blank
PROGRAM MOD.: IW COMPLIANCE: ☒ ENFORCEMENT: ☐
FIELD MEASUREMENTS

Tot. Depth:		Sample Depth:		W.Temp. °C:	22.4
Conductivity: µmoh/cm (EPA 120.1) :	1	Diss. Oxygen (EPA 360.1)		EPA 170.1	
Stream Velocity:		Salinity:		T.R.C.:	
pH:(EPA 150.1)	7.73	Secchi:		EPA 330.5	

WEATHER CONDITIONS:

LABORATORY MEASUREMENTS

Turbidity (NTU) : EPA 180.1	0.1 U	Color (PtCo): EPA 110.2			
pH (standard unit): EPA 150.1		Conductivity(µmohs/cm) EPA 120.1			

The following values are in mg/L

B.O.D : EPA 405.1		C.B.O.D : SM 5210-B		C.O.D : EPA 410.4	
Tot. S.S : EPA 160.2	1 U	Vol. S.S: EPA 160.4	1 U	Fix. S.S :	1 U
Tot.Solids : EPA 160.3		T.D.S EPA 160.1			
T. Alkalinity: EPA 310.1		Settleable Matter: EPA 160.5		Diss. Oxygen: EPA 360.2	

COMMENTS:

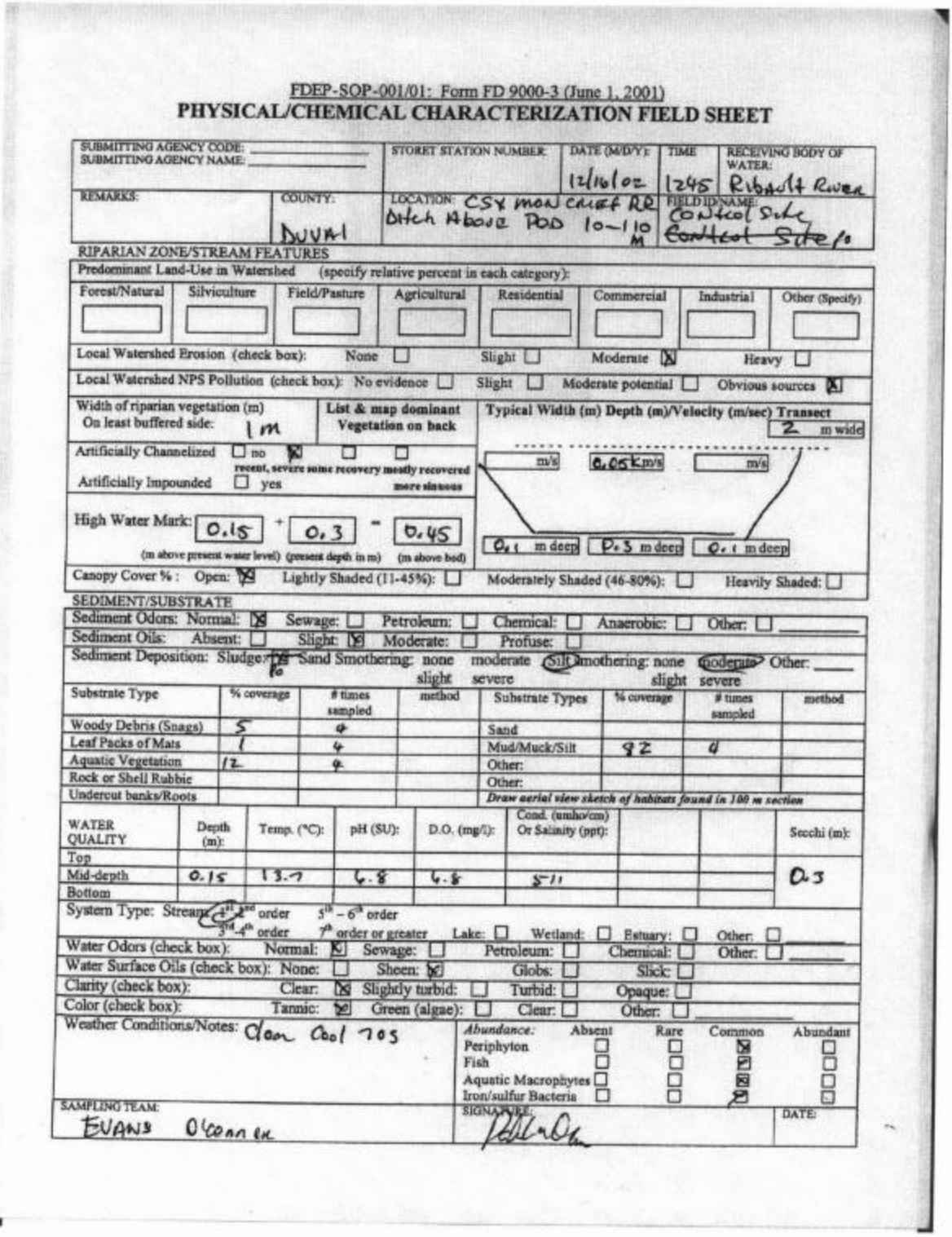
Sample Custody
Sample Released to: Bipin Adhyaru Date: 12/16/2002

Preservation: Ice Time: 15:00

Reported by: Bipin Adhyaru Date:: 12/18/2002

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A = Value is the mean of two or more determinations.
O = Sampled, but analysis lost or not performed.
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J = Estimated value; value not accurate.

Habitat Assessment Field Sheets.



FDEP-SOP-001/01: Form FD 9000-3 (June 1, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 12/16/02	TIME: 1245	RECEIVING BODY OF WATER: Ribault River
REMARKS:	COUNTY: DUVAL	LOCATION: CSX main cliff RR Ditch Above POD 10–110 M	FIELD ID NAME: Control Site Control Site 10	

RIPARIAN ZONE/STREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☒ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒

Width of riparian vegetation (m) On least buffered side: 1 m

List & map dominant Vegetation on back

Typical Width (m) Depth (m)/Velocity (m/sec) Transect: 2 m wide; m/s | 0.05 m/s | m/s; 0.1 m deep | 0.3 m deep | 0.1 m deep

Artificially Channelized ☐ no ☒ recent, severe ☐ some recovery ☐ mostly recovered more sinuous

Artificially Impounded ☐ yes

High Water Mark: 0.15 (m above present water level) + 0.3 (present depth in m) = 0.45 (m above bed)

Canopy Cover %: Open: ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☐ Slight: ☒ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☒ No Sand Smothering: none moderate Silt Smothering: none moderate Other: ____ slight severe slight severe

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	4		Sand			
Leaf Packs of Mats	1	4		Mud/Muck/Silt	92	4	
Aquatic Vegetation	12	4		Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.15	13.7	6.8	6.8	51			0.3
Bottom								

System Type: Stream: 1st 2nd order 5th – 6th order 3rd 4th order 7th order or greater Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): None: ☐ Sheen: ☒ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☒ Slightly turbid: ☐ Turbid: ☐ Opaque: ☐

Color (check box): Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes: Clear Cool 70s

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☐	☒	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☐	☐	☒	☐
Iron/sulfur Bacteria	☐	☐	☒	☐

SAMPLING TEAM: EVANS O'Connell

SIGNATURE: [signature] DATE:

FDEP-SOP-001/01: Form FD 9000-5 (June 1, 2001)

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

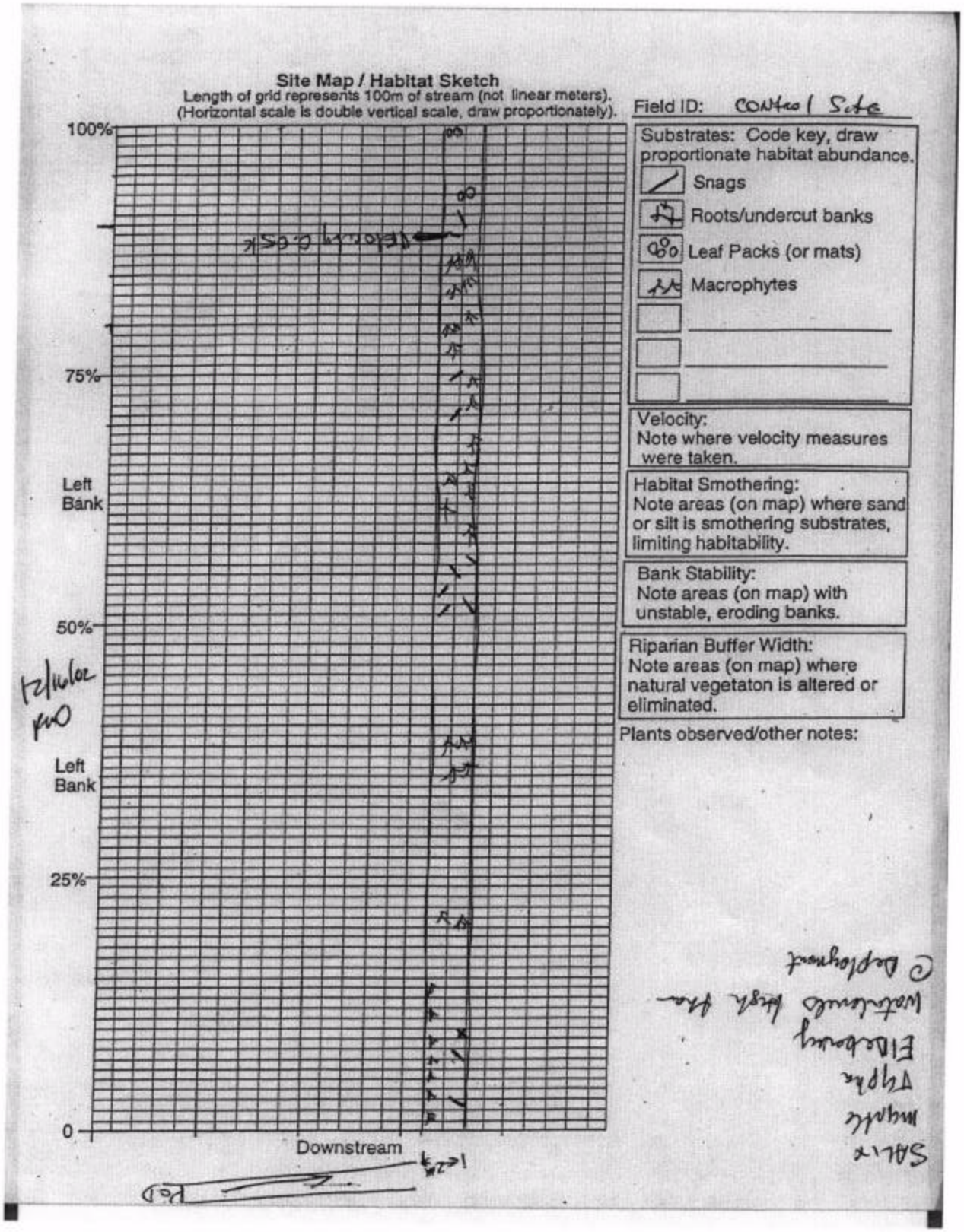
SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		12/16/02	Ribault River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Duval	CSX RR Ditch 16-110M ABOVE POD	~~FDEP~~ Site Control/Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity 13	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability 11	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity 1	Max. observed at typical transect: > 0.25 m/sec. But < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec. Or spate occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 5 Primary Score 30	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components Artificial Channelization 5	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	Many have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 4 Left Bank 4	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 1 Left Bank 2	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12m to 18 m 8 7 6	Width of native vegetation 6 to 12 m. human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 2 Left Bank 2 Secondary Score 22	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian ozone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1

TOTAL SCORE 52

ANALYSIS DATE:	ANALYST:	SIGNATURE:
12/16/02	D Ann	Robert Ann


Site Map / Habitat Sketch
Length of grid represents 100m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).
Field ID: Control Site
100%
75%
Left Bank
50%
Left Bank
25%
0
Downstream
Substrates: Code key, draw proportionate habitat abundance.
Snags
Roots/undercut banks
Leaf Packs (or mats)
Macrophytes
Velocity:
Note where velocity measures were taken.
Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.
Bank Stability:
Note areas (on map) with unstable, eroding banks.
Riparian Buffer Width:
Note areas (on map) where natural vegetaton is altered or eliminated.
Plants observed/other notes:

FDEP-SOP-001/01: Form FD 9000-3 (June 1, 2001)

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		12/16/02	1340	

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
	Duval	CSX Moncrief RR Ditch 10-40m below POO	Test Site

RIPARIAN ZONE/STREAM FEATURES

Predominant Land-Use in Watershed (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☒ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Slight ☐ Moderate potential ☐ Obvious sources ☒

Width of riparian vegetation (m) On least buffered side: 1

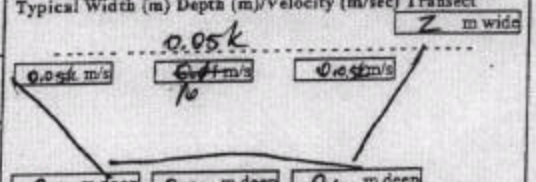
List & map dominant Vegetation on back

Artificially Channelized ☐ no ☐ ☐ ☐ recent, severe some recovery mostly recovered more sinuous

Artificially Impounded ☐ yes

High Water Mark: 0.1 (m above present water level) + 0.2 (present depth in m) = 0.3 (m above bed)

Typical Width (m) Depth (m)/Velocity (m/sec) Transect



Canopy Cover %: Open: ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand Smothering: none moderate slight severe (Silt) smothering: none (moderate) slight severe Other: ____

Substrate Type	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	4		Sand			
Leaf Packs of Mats	1	4		Mud/Muck/Silt	6		
Aquatic Vegetation	12	4		Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots				*Draw aerial view sketch of habitat found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (umho/cm) Or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.15	20.6	7.84	7.1	512			0.2L
Bottom								

System Type: Stream: (1st-2nd order) 3rd-4th order 5th-6th order 7th order or greater Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

Water Odors (check box): Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): None: ☐ Sheen: ☒ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☒ Opaque: ☐

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☐ Other: ☒ YELLOWISH

Weather Conditions/Notes: Clear Cool 70°

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☒	☐	☐
Fish	☐	☐	☒	☐
Aquatic Macrophytes	☐	☐	☒	☐
Iron/sulfur Bacteria	☐	☐	☒	☐

SAMPLING TEAM: Evans Dixon

SIGNATURE: Paul Dixon

DATE: 12/16/02

FDEP-SOP-001/01: Form FD 9000-5 (June 1, 2001)

STREAM/RIVER HABITAT ASSESSMENT FIELD SHEET

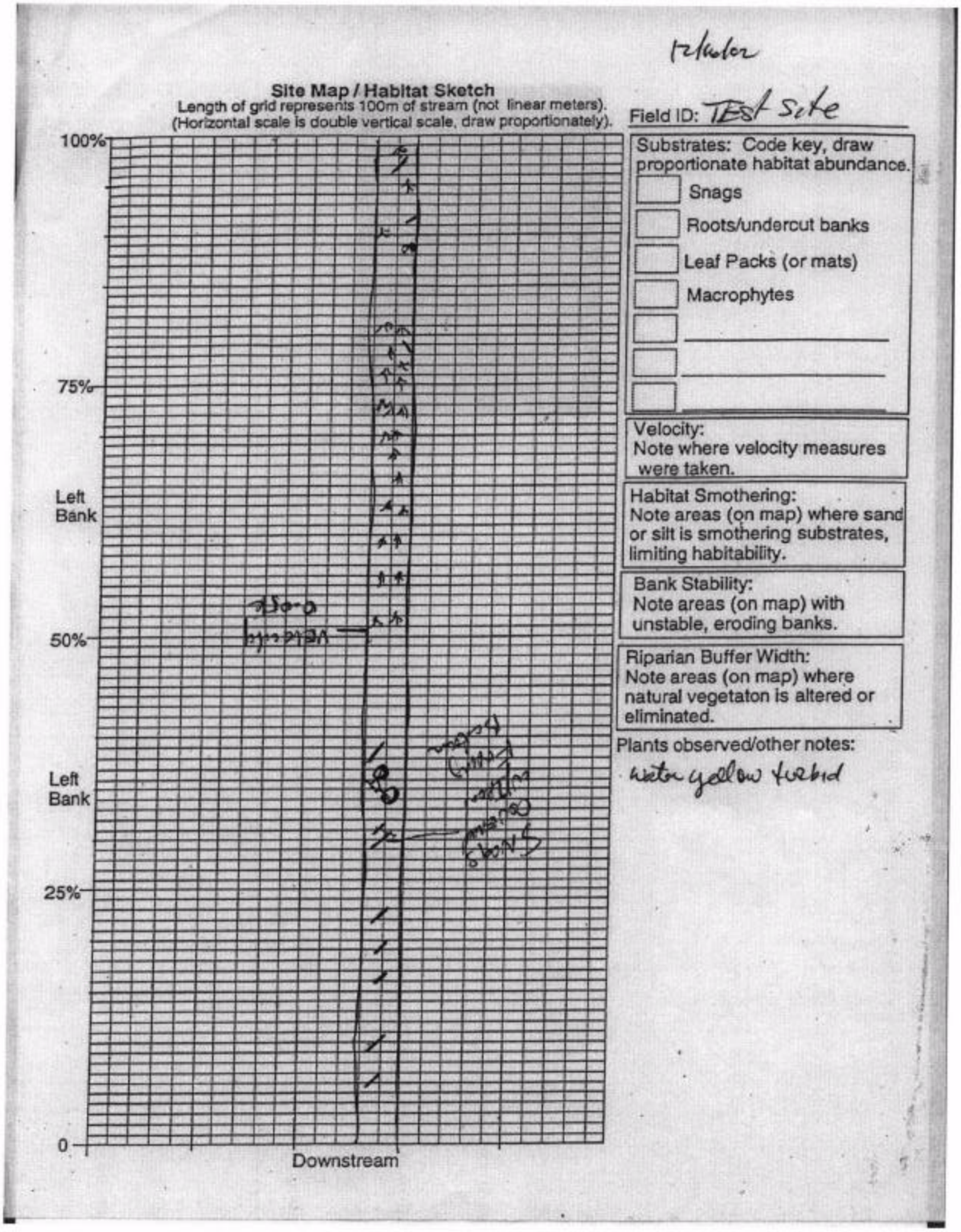
SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 12/11/02	RECEIVING BODY OF WATER: Ribault River

REMARKS:	COUNTY: Duval	LOCATION: CSX Moncrief RR Ditch 10-11 m below Pond	FIELD ID/NAME: Control Site Test Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity 11	Four or more productive habitats present (snags, tree roots/undercut banks, aquatic vegetation, leaf packs (partially decayed), rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability 10	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15% productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity 2	Max. observed at typical transect: > 0.25 m/sec. But < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect: <0.05 m/sec. Or spate occurring: > 1 m/sec 5 4 3 2 1
Habitat Smothering 5 Primary Score 27	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of the habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, as severe problem, pools absent 5 4 3 2 1
Secondary Habitat Components Artificial Channelization 5	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	Many have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank 5 Left Bank 5	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank 2 Left Bank 2	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12m to 18 m 8 7 6	Width of native vegetation 6 to 12 m. human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank 3/2 Left Bank 3 Secondary Score 22	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody machrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian ozone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1

TOTAL SCORE 49

ANALYSIS DATE: 12/11/02	ANALYST: O Bonn	SIGNATURE:


Site Map / Habitat Sketch
Length of grid represents 100m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).
Field ID: TEST Site
100%
75%
Left Bank
50%
Left Bank
25%
0
Downstream
Substrates: Code key, draw proportionate habitat abundance.
Snags
Roots/undercut banks
Leaf Packs (or mats)
Macrophytes
Velocity:
Note where velocity measures were taken.
Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.
Bank Stability:
Note areas (on map) with unstable, eroding banks.
Riparian Buffer Width:
Note areas (on map) where natural vegetaton is altered or eliminated.
Plants observed/other notes:
water yellow turbid

Appendix 9a

Taxa list and density (number/cm^2) for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of CSX - Moncrief facility discharge, 12/16/02.

	Control Site	Test Site
Bacillariophyta		
Achnanthes sp.	700	233
Achnanthes exigua	2,566	233
Achnanthes lanceolata	233	233
Amphora sp.	933	233
Bacillaria paxillifer	233	233
Catenula sp.	233	-
Cocconeis placentula	233	233
Cyclotella pseudostelligera	233	-
Diploneis sp.	233	-
Eunotia sp.	5,365	467
Fallacia sp.	233	-
Fragilariaceae	1,166	233
Gomphonema sp.	467	233
Gomphonema affine	233	-
Gomphonema parvulum	933	933
Hantzschia amphioxys	233	-
Navicula sp.	2,099	933
Navicula cryptocephala	1,866	233
Navicula cryptotenella	233	-
Navicula elginensis	233	-
Navicula minima	233	233
Navicula pupula	233	233
Naviculaceae	2,099	233
Nitzschia sp.	4,199	467
Nitzschia amphibia	233	-
Nitzschia frustulum	233	-
Nitzschia linearis	233	-
Nitzschia palea	700	-
Pennales sp.	233	-
Pinnularia sp.	233	-
Rhopalodia sp.	233	233
Rhopalodia gibba	233	-
Stauroneis smithii	233	-
Surirella sp.	233	-
Chlorophycota		
Chlamydomonas sp.	1,166	233
Chlorella sp.	1,400	233
Chlorococcum sp.	233	-
Mougeotia sp.	-	467
Oocystis sp.	467	467
Cryptophycophyta		
Cryptomonas sp.	233	-
Cyanophycota		
Anabaena sp.	1,866	1,400
Aphanocapsa sp.	233	-
Cyanobium parvum	1,866	933
Lyngbya sp.	6,532	3,732
Oscillatoria sp.	17,029	-
Schizothrix sp.	-	700
Euglenophycota		
Euglena sp.	467	-
Phacus sp.	467	-
Trachelomonas sp.	-	233

Appendix 9b

Taxa list and number of individuals counted for periphyton collected from glass microscope slides incubated for 28 days upstream and downstream of CSX -Moncrief facility discharge, 12/16/02.

	Control Site	Test Site
Bacillariophyta		
Achnanthes sp.	3	1
Achnanthes exigua	11	1
Achnanthes lanceolata	1	1
Amphora sp.	4	1
Bacillaria paxillifer	1	1
Catenula sp.	1	-
Cocconeis placentula	1	1
Cyclotella pseudostelligera	1	-
Diploneis sp.	1	-
Eunotia sp.	23	2
Fallacia sp.	1	-
Fragilariaceae	5	1
Gomphonema sp.	2	1
Gomphonema affine	1	-
Gomphonema parvulum	4	4
Hantzschia amphioxys	1	-
Navicula sp.	9	4
Navicula cryptocephala	8	1
Navicula cryptotenella	1	-
Navicula elginensis	1	-
Navicula minima	1	1
Navicula pupula	1	1
Naviculaceae	9	1
Nitzschia sp.	18	2
Nitzschia amphibia	1	-
Nitzschia frustulum	1	-
Nitzschia linearis	1	-
Nitzschia palea	3	-
Pennales sp.	1	-
Pinnularia sp.	1	-
Rhopalodia sp.	1	1
Rhopalodia gibba	1	-
Stauroneis smithii	1	-
Surirella sp.	1	-
Chlorophycota		
Chlamydomonas sp.	5	1
Chlorella sp.	6	1
Chlorococcum sp.	1	-
Mougeotia sp.	-	2
Oocystis sp.	2	2
Cryptophycophyta		
Cryptomonas sp.	1	-
Cyanophycota		
Anabaena sp.	8	6
Aphanocapsa sp.	1	-
Cyanobium parvum	8	4
Lyngbya sp.	28	16
Oscillatoria sp.	73	-
Schizothrix sp.	-	3
Euglenophycota		
Euglena sp.	2	-
Phacus sp.	2	-
Trachelomonas sp.	-	1

Appendix 10a

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the CSX -Moncrief facility for 28 days (12/16/02). Taxa collected and density (average number of individuals/m^2) rounded to the nearest individual (n = 3 samples). See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

	Control Site	Test Site
Annelida		
Hirudinea		
Placobdella papillifera	-	3
Arthropoda		
Crustacea		
Cambaridae	-	3
Insecta		
Diptera		
Chironomus sp.	-	302
Goeldichironomus sp.	3	-
Goeldichironomus holoprasinus	-	116
Goeldichironomus natans	-	3
Kiefferulus sp.	-	11
Larsia decolorata	-	29
Polypedilum beckae	-	8
Pseudochironomus richardsoni	-	3
Tanytarsus sp. T Epler	-	8
Heteroptera		
Microvelia sp.	3	-
Odonata		
Ischnura sp.	-	3
Pachydiplax longipennis	13	-
Mollusca		
Gastropoda		
Ancylidae	-	144
Physella sp.	-	36

Appendix 10b

Benthic macroinvertebrates collected from Hester-Dendy artificial substrates incubated upstream and downstream of the CSX - Moncrief facility for 28 days (12/16/02). Taxa collected and total number of individuals counted (n = 3 samples).

	Control Site	Test Site
Annelida		
Placobdella papillifera	-	1
Arthropoda		
Crustacea		
Cambaridae	-	1
Insecta		
Diptera		
Chironomidae	-	10
Chironomus sp.	-	114
Goeldichironomus sp.	1	1
Goeldichironomus holoprasinus	-	43
Goeldichironomus natans	-	1
Kiefferulus sp.	-	4
Larsia decolorata	-	1
Polypedilum sp.	-	1
Polypedilum beckae	-	2
Pseudochironomus richardsoni	-	1
Tanytarsus sp.	-	2
Tanytarsus sp. T Epler	-	1
Heteroptera		
Microvelia sp.	1	-
Odonata		
Ischnura sp.	-	1
Pachydiplax longipennis	5	-
Mollusca		
Gastropoda		
Ancylidae	-	48
Physella sp.	-	12
Undetermined Gastropoda	-	8

Appendix 11a

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of CSX – Moncrief facility (12/16/02). Taxa list and number of individuals counted (collapsed). See SOP LT 7100 sect. 4.2.1 for method on collapsing taxa.

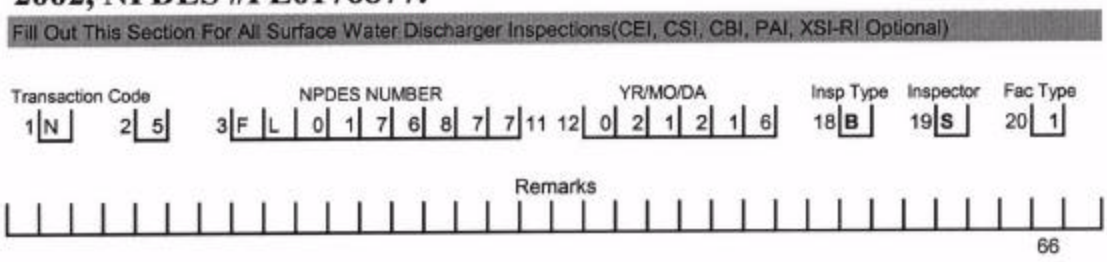
	Control Site	Test Site
Annelida		
Oligochaeta		
Aulodrilus pigueti	-	5
Dero sp.	1	-
Dero pectinata	-	14
Limnodrilus hoffmeisteri	-	36
Lumbriculus variegatus	1	-
Arthropoda		
Arachnida		
Oribatei sp.	1	1
Crustacea		
Cambaridae	-	1
Procambarus sp.	3	-
Insecta		
Coleoptera		
Curculionidae	2	-
Desmopachria sp.	1	-
Staphylinidae	1	-
Collembola		
Undetermined Collembola	4	3
Diptera		
Chironomus sp.	-	15
Clinotanypus sp.	-	2
Goeldichironomus holoprasinus	-	1
Kiefferulus sp.	4	-
Larsia sp.	-	2
Polypedilum beckae	2	-
Polypedilum illinoense grp.	1	2
Polypedilum tritum	4	1
Rheotanytarsus exiguus grp.	-	1
Tabanidae	-	1
Tanypus sp.	-	2
Tanytarsus sp.	-	2
Heteroptera		
Merragata sp.	-	1
Microvelia sp.	-	2
Saldidae	-	1
Odonata		
Boyeria vinosa	8	-
Enallagma sp.	11	-
Ischnura sp.	6	-
Mollusca		
Gastropoda		
Ancylidae	1	14
Physella sp.	36	2
Nemertea		
Prostoma sp.	-	1

Appendix 11b

Qualitative benthic macroinvertebrate collections (n = 20 discrete dipnet sweeps) upstream and downstream of CSX - Moncrief facility (12/16/02). Taxa list and number of individuals counted.

	Control Site	Test Site
Annelida		
Oligochaeta		
Aulodrilus pigueti	-	5
Dero sp.	1	-
Dero pectinata	-	14
Limnodrilus hoffmeisteri	-	36
Lumbriculus variegatus	1	-
Arthropoda		
Arachnida		
Oribatei sp.	1	1
Crustacea		
Cambaridae	-	1
Procambarus sp.	3	-
Insecta		
Coleoptera		
Curculionidae	2	-
Desmopachria sp.	1	-
Staphylinidae	1	-
Collembola		
Undetermined Collembola	4	3
Diptera		
Chironomidae	-	2
Chironomus sp.	-	15
Clinotanypus sp.	-	1
Goeldichironomus holoprasinus	-	1
Kiefferulus sp.	3	-
Larsia sp.	-	2
Polypedilum beckae	2	-
Polypedilum illinoense grp.	1	2
Polypedilum tritum	3	1
Rheotanytarsus exiguus grp.	-	1
Tabanidae	-	1
Tanypus sp.	-	1
Tanytarsus sp.	-	2
Undetermined Diptera	2	-
Heteroptera		
Merragata sp.	-	1
Microvelia sp.	-	2
Saldidae	-	1
Odonata		
Boyeria vinosa	8	-
Coenagrionidae	11	-
Enallagma sp.	4	-
Ischnura sp.	2	-
Mollusca		
Gastropoda		
Ancylidae	1	14
Physella sp.	36	2
Nemertea		
Prostoma sp.	-	1

The Bioassay of CSX-Moncrief effluent sampled on December 16, 2002, NPDES #FL0176877.



The Priority Pollutants Analysis for Bioassay of CSX-Moncrief effluent sampled on December 16, 2002, NPDES #FL01767877.

