

Biological Assessment of
Olin Corporation
Wakulla County
NPDES #FL0002518
Sampled April and May 1991

October 1991

Biology Section
Division of Technical Services

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger: Olin Corporation
County: Wakulla
NPDES Number: FL0002518
State Permit Expiration Date:

Toxics Sampling Inspection (XSI)	
Date Sampled:	22 April 1991
Results:	No organic priority pollutants detected. Zinc in effluent sample was in excess of ambient criteria.

Results:

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	22 April 1991
Results:	Effluent was not toxic to *Ceriodaphnia dubia* or *Pimephales promelas*. It was stimulatory to *Photobacterium phosphoreum* (most likely due to concentrations of inorganic nitrogen present).

Impact Bioassessment Inspection (IBI)	
Date Sampled:	22 April 1991 and 20 May 1991
Results:	Biological communities in Big Boggy Branch were healthy, although benthic diversity was reduced downstream of the discharge. It was thought that factors other than the discharge (*e.g.*, proximity to estuarine conditions) were responsible for this effect.

Water Quality Inspection (WQI)	
Date Sampled:	22 April 1991
Results:	Nitrogen enrichment was observed downstream of the discharge, leading to algal growth potential results (8.9 mg algal dry wt/l) that were an order of magnitude higher than at the control site. AGP results above 5 mg algal dry wt/l are considered undesirable.

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

Introduction

The Olin Corporation, a manufacturer of gunpowder and other explosive materials, is located in St. Marks, Wakulla County, Florida (Figure 1). A wastewater discharge of 1 MGD is sprayed onto a forested wetland, where it sheet flows for approximately 500 meters to Big Boggy Branch, a tributary of the Wakulla River. Treatment prior to discharge includes extended aeration, chlorination, two week retention in a holding pond, and final spray irrigation.

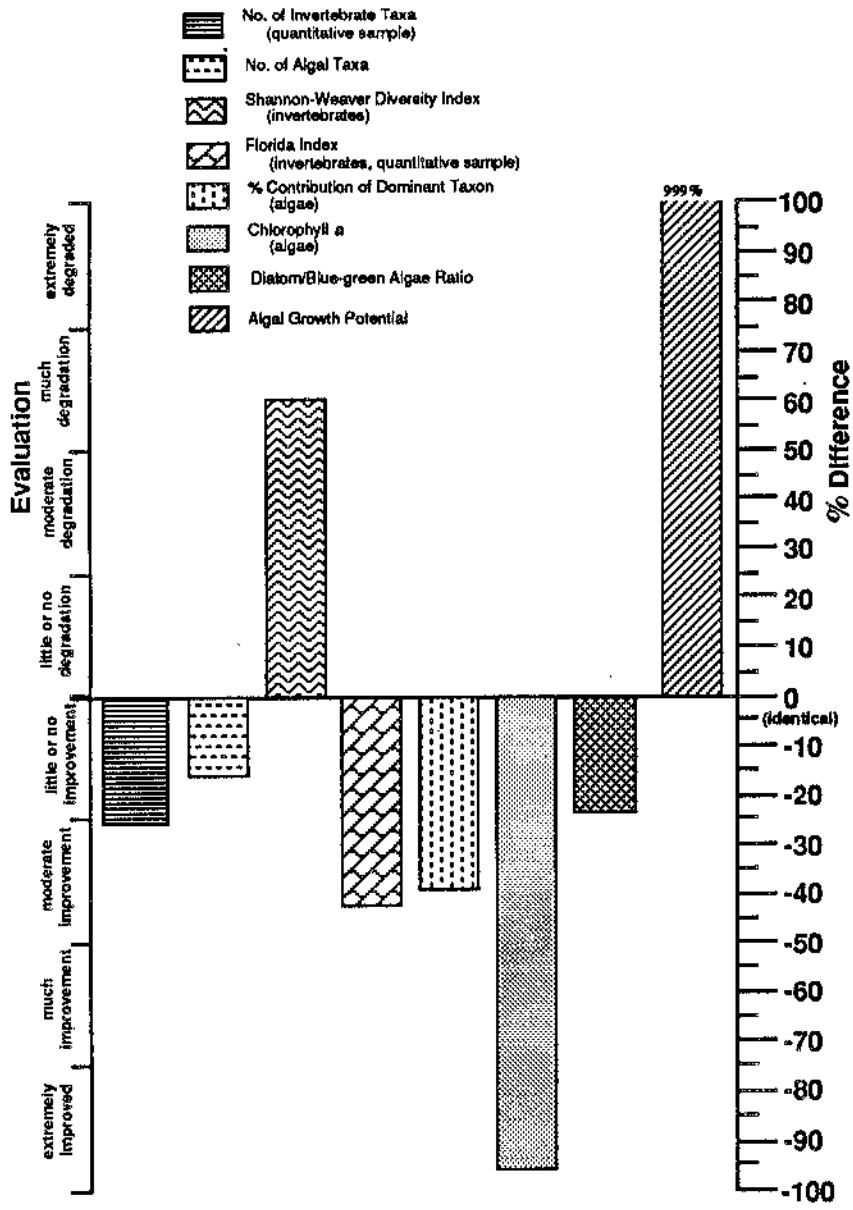
Raw materials for the production of explosives include various nitrogenous compounds, organic solvents, alcohol, and mixed acids. Potentially toxic compounds in the discharge may include ammonia, chlorine, phthalates, phosphates, and certain heavy metals (cadmium, chromium, copper, lead, mercury, and zinc).

Bioassays conducted on the Olin effluent by the FDER Biology Section in 1980 and in 1987 indicated no toxicity.

A study by the DER Northwest District in 1987 suggested that the biota in Big Boggy Branch and downstream in the Wakulla River may have been stressed by the Olin discharge (FDER 1987). Additional studies by Dames and Moore (1990) occurred after major upgrades in Olin's wastewater treatment facility. Dames and Moore (1990) concluded that there was little, if any, evidence of anthropogenic contamination.

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	34	35
Florida Index	9	7
% Contribution of Dominant Taxon	18.4	54.6
% Malacostraca	1.7	54.6
% Diptera	52.3	28.8
% Gastropoda	13.2	4.8
% Oligochaeta	17.2	.44
% Pelecypoda	6.9	0
% Odonata	2.3	3.1
% Other	6.4	8.3
% Predators	13.1	20.5
% Collector-Gatherers	40.9	63.9
% Collector-Filterers	14.1	3.1
% Scrapers	14.7	7.5
% Shredders	16.6	3.1
% Piercers	.30	2.0
Macroinvertebrate Hester-Dendy		
Number of Taxa	27	32
Florida Index	7	10
Shannon-Weaver Diversity	3.5	1.4
% Malacostraca	1.9	80.9
% Diptera	83.9	5.1
% Ephemeroptera	.49	3.9
% Gastropoda	4.9	5.9
% Odonata	1.5	2.4
% Hirudinea	3.9	.76
% Other	3.4	1.0
% Predators	14.1	4.3
% Collector-Gatherers	49.8	85.7
% Collector-Filterers	9.7	1.4
% Scrapers	9.9	8.5
% Shredders	16.8	0
% Parasites	2.4	.42
Periphyton Algae		
Number of Taxa	33	38
% Contribution of Dominant Taxon	25.6	15.6
Chlorophyll a (mg/sq. m)	78.6	3.8
Diatom/B-G Abundance Ratio	0.74	0.92
% Blue-green	24.0	5.6
% Green	9.0	23.5
% Diatoms	67.0	66.8
% Other	0	4.1
Algal Growth Potential (mg dry wt/l)	0.81	8.9



Effect of discharge on receiving stream
(measured as difference between control and test sites).

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located above the discharge in Big Boggy Branch) and a test site (the area downstream of the discharge, also in Big Boggy). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Pimephales promelas* as test organisms, were performed on an effluent sample (Peltier and Weber 1985, FDER 1985). A Microtox® test, using the bacterium, *Photobacterium phosphoreum*, to evaluate toxicity, was also performed. The effluent was analyzed for organic constituents (base neutrals, acid extractables, and pesticide extractables) and metals. Additionally, nutrient analyses were performed on reference and test sites. Methods used for all chemical analyses are on file at the Tallahassee DER Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at reference and test sites. Collection methods consisted of a timed (one hour per site) multi-substrate (*e.g.*, snags, vegetation, sediment) semi-quantitative effort. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Periphyton was sampled at both reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for periphyton communities (Ross 1990). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroin-

vertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, the diversity index, Florida Index and the diatom to blue-green algae ratio are measured as the control site minus test site divided by the control site. The percent differences between sites involving the percent contribution of dominant taxon, chlorophyll *a*, and algal growth potential are measured as the test site minus control site divided by the control site.

The following personnel were involved in this investigation: Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

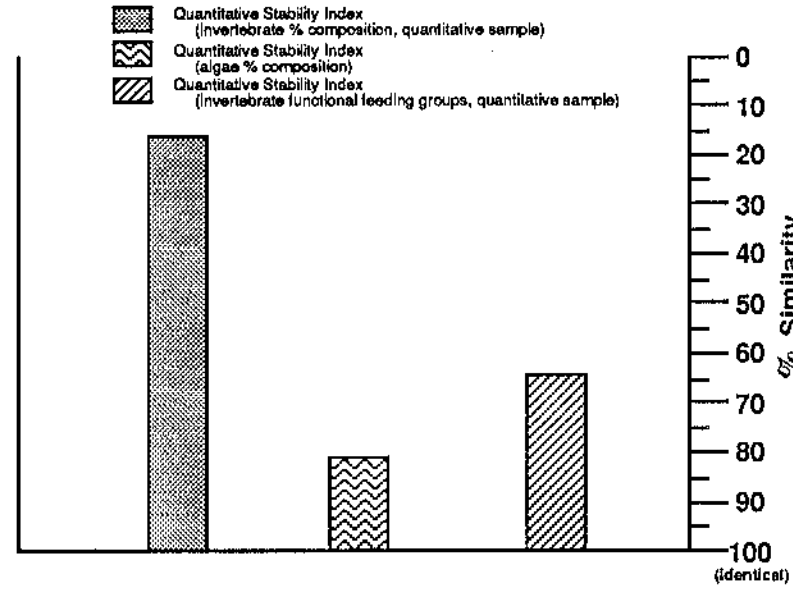
Results

The habitat quality rating at the control and test sites, both located in Big Boggy Branch, was 30 and 41, respectively. Big Boggy Branch is a coastal, sluggish stream receiving drainage from many hardwood swamps and pine flatwoods. It has been channelized at both sampling locations. Dissolved oxygen was adequate (above 5.0 mg/L) at the two sampling sites, and the water was slightly alkaline (pH = 7.9 upstream and 7.5 downstream). Conductivity was higher at the downstream station (690 µmhos/cm^2), due to the proximity to estuarine conditions (the conductivity of the effluent was only 130 µmhos/cm^2). Big Boggy Branch enters the Wakulla River approximately 0.6 miles downstream of the test site. The mean tidal range at that point is 2.5 feet, and surface conductivity there has been measured at 1520 µmhos/cm^2 (Dames and Moore 1990). The influence of the estuarine conditions at the test site is a major difference between it and the control.

The effluent sample was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Pimephales promelas*, but it stimulated the growth of *Photobacterium phosphoreum*. The growth of *Photobacterium phosphoreum* is often stimulated by the presence of inorganic nitrogen. No organic priority pollutants and only two metals, iron at 70 µg/L, and zinc at 38 µg/L, were detected in the discharge. The zinc value is in excess of freshwater ambient criteria.

Total coliform bacteria was measured to be 300 organisms/100 ml at the control, and 800 organisms/100 ml at the test site. Fecal coliforms were 30 organisms/100 ml and 80 organisms/100 ml at the control control and test sites, respectively. None of these values are considered troublesome.

Ortho-phosphorus concentrations were low in the control site, test



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

site, and effluent samples (0.14 mg/L, 0.18 mg/L, and 0.08 mg/L, respectively). Total phosphorus was below detection limits at all sampling locations.

Nitrogen enrichment due to the Olin discharge was evident. Nitrate-nitrite of the effluent (33 mg/L) was very elevated, but had reduced to 1 mg/L after exiting the wetland treatment system at the test site. Nitrate-nitrite was undetected at the upstream location. TKN increased from 0.2 mg/L upstream to 0.9 mg/L downstream of the discharge. Ammonia was three times higher at the test site (0.12 mg/L) than it was at the control (0.04 mg/L).

This observed nitrogen enrichment had a substantial influence on algal growth potential results. AGP increased by an order of magnitude at the downstream site (from 0.8 mg algal dry wt/l to 8.9 mg algal dry wt/l). AGP values above 5 mg algal dry wt/l are considered undesirable (Raschke and Schultz 1987).

Most measures of macroinvertebrate health indicated that the discharge was not adversely affecting the community. The figure on p. 2 indicates the degree of difference between the control and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the control. The figure on p. 3 summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness and Florida Index were both better at the test site (increases of 26% and 43%, respectively). Diversity, however, was much lower downstream of the discharge. This was predominantly due to the high numbers of *Hyalella azteca* recovered at the test site. This amphipod is a Class II Florida Index indicator organism, considered moderately sensitive to pollution. Its abundant presence in this estuarine transitional zone may be due to factors other than the discharge (e.g., tolerance to rapidly changing or moderately elevated conductivity). Dominance of *Hyalella* in similar conductivity transition areas has been noted previously (FDER 1990, Heard 1979).

In view of the situation (and mindful of the results of other metrics), this lowered diversity probably does not represent a problem associated with the Olin discharge. The differences between control and test sites with respect to percent composition and functional feeding groups are also an artifact of this *Hyalella* dominance.

Periphyton community health did not appear to be negatively affected by the effluent, although one confounding factor was noted during periphytometer recovery. Extensive mats of a green filamentous algal form were present throughout the site, which led to partial shading of the artificial substrate sampler. This may be one reason that chlorophyll *a* was found to be lower at the test site. Furthermore, chlorophyll *a* at the control site was high, and this appeared to contradict the results from control site nutrient and AGP analyses. The number of algal taxa, the % contribution of the dominant taxon, and Diatom/Blue-green Algae Ratio all indicated that the test site was better than the control.

Conclusions

The Olin Corporation effluent was not acutely toxic to fish or invertebrate test organisms, nor did it contain any organic priority pollutants. Zinc in the effluent (measured prior to spray irrigation) was in excess of ambient freshwater standards.

Nitrogen enrichment due to the Olin discharge was evident, leading to a substantial increase in the algal growth potential at the downstream site.

Biological communities were relatively healthy in Big Boggy Branch, although Shannon-Weaver diversity was reduced at the test site. It is thought that factors other than the discharge were responsible for this effect.

Literature Cited

American Public Health Assoc., American Water Works Assoc., and Water Pollution Control Federation. 1989. Standard Methods for the Examination of Water and Wastewater, 17th ed. New York, N.Y. 1268 p.

Florida Department of Environmental Regulation. 1985. Quality assurance manual for performing acute toxicity tests. 2nd edition. Fla. Dept. Environmental Regulation, Biology Section, Tallahassee. 53 pp.

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Heard, R. W. 1979. Guide to common tidal marsh invertebrates of the Northeastern Gulf of Mexico. Mississippi, Alabama Sea Grant Consortium. MASGP-79-004. 82 pp.

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

Peltier, W. H. and C. I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 3rd edition. EPA/600/4-85/013. U. S. EPA, Cincinnati, Ohio. 216 pp.

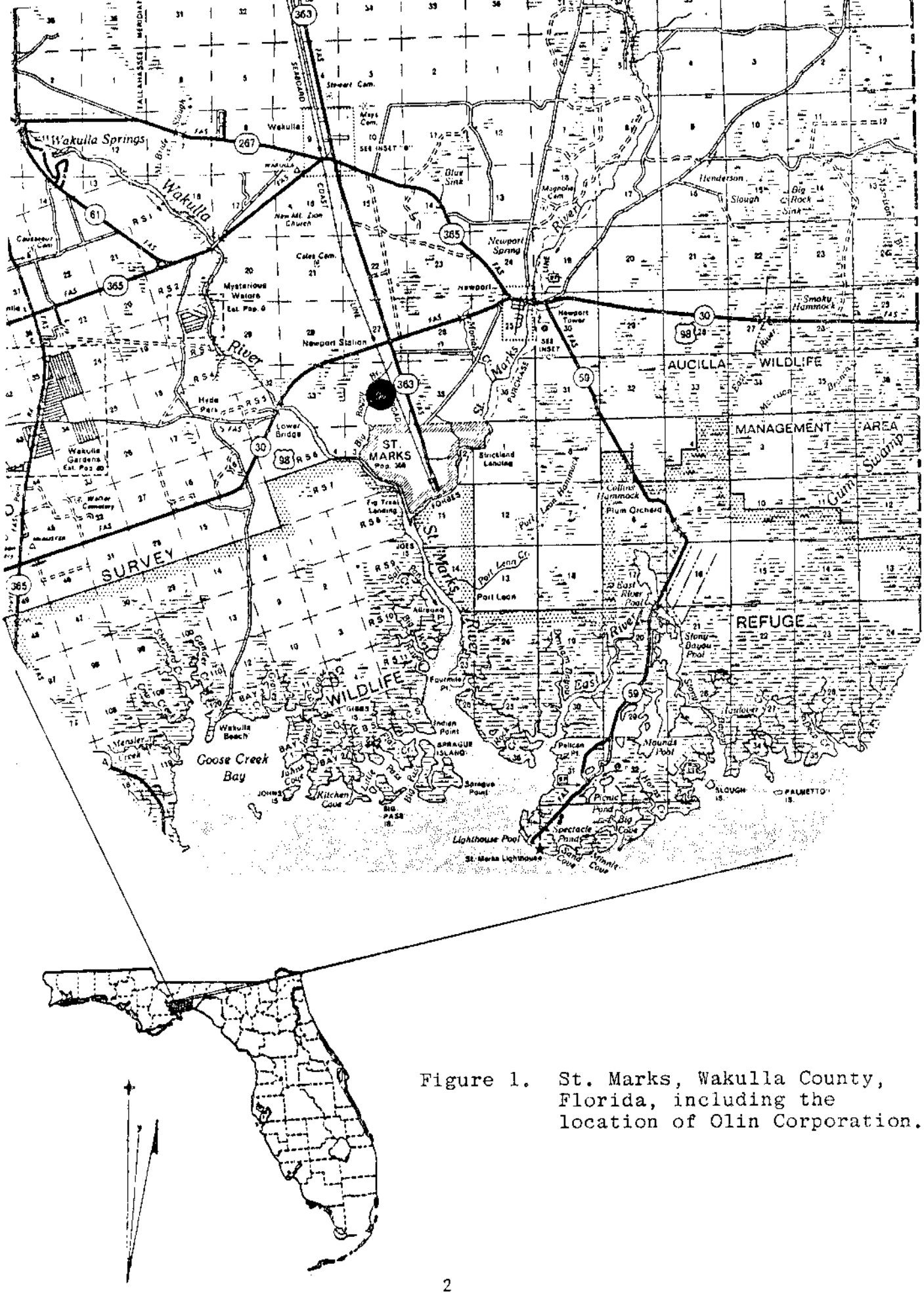
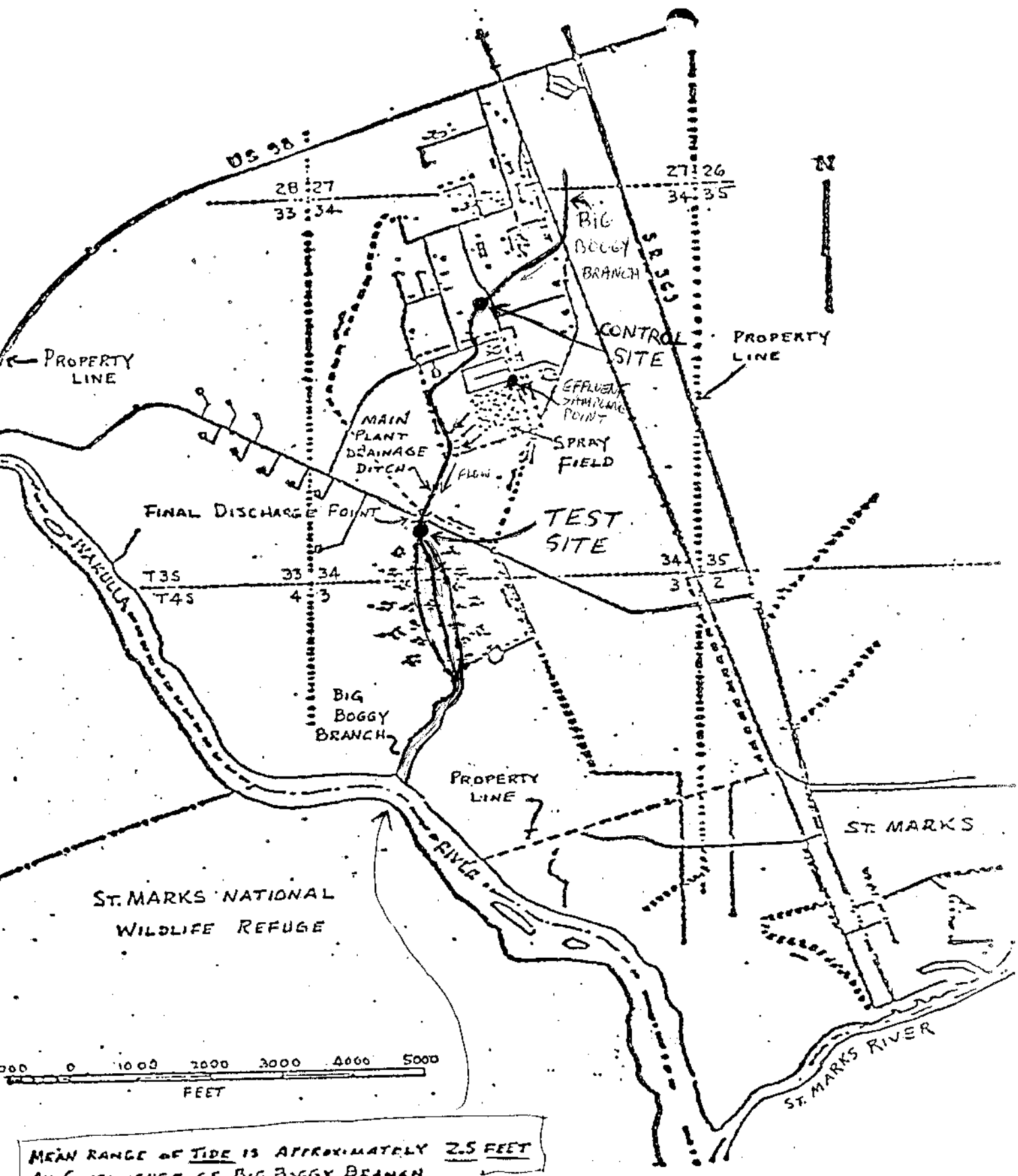


Figure 1. St. Marks, Wakulla County, Florida, including the location of Olin Corporation.



MEAN RANGE OF TIDE IS APPROXIMATELY 2.5 FEET AT CONFLUENCE OF BIG BOGGY BRANCH AND THE WAKULLA RIVER.

OLIN SMOKELESS POWDER PLANT
LOCATION MAP

County of Wakulla, State of Florida
Olin Corporation, P. O. Box 222
St. Marks, Florida 32355

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

CHEMICAL ANALYSIS REPORT

Job ID: 91-APR-22-02
Date Received: 22-APR-1991
Authorized: 14-JUN-1991
Submitted By: DER Biology Lab Russ Frydenborg

Project: BIOASSAY
Customer ID: BIOLOGY
By: Bill Coppenger

N-Series
EPD, Up+Down

For Additional Information, Please Contact
G. William Coppenger, Ph.D.
Yuh-Hsu Pan, Ph.D.
Suncom 277-2571
(904) 487-2571

Certified By: _____ Date: 6-18-91

Abbreviations & Storet Codes:

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practical quantitation limit
U - Material was analyzed for but not detected;
The value reported is the minimum detection limit
Q - Evidence that analyte was present in sample is equivocal
NA - Not applicable
NR - Not requested

Sample ID: 17798/91-APR-22-02-01 Matrix: W-EFFLUENT
Location: Olin
Field ID:
Collected: 22-APR-1991 09:30 By: R.B. Frydennborg
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00610	Ammonia-N	0.11	mg N/L

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 29-APR-1991 By: Tim Fitzpatrick
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	33 A	mg N/L

Analysis ID: W-TKN
TKN for water sample
Analyzed: 22-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	2.36	mg N/L

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 22-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.4 U	mg P/L

Sample ID: 17799/91-APR-22-02-02 Matrix: W-SURF-FRH
Location: Olin Upstream
Field ID: 001
Collected: 22-APR-1991 11:00 By: R.B. Frydennborg
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00610	Ammonia-N	0.04	mg N/L

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 29-APR-1991 By: Tim Fitzpatrick
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	0.04 U	mg N/L

Analysis ID: W-TKN
TKN for water sample
Analyzed: 22-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	0.2 U	mg N/L

 Continued on Page 4

17799/91-APR-22-02-02 Continued from Page 3

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 24-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.2 U	mg P/L

Sample ID: 17800/91-APR-22-02-03 Matrix: W-SURF-FRH
Location: Olin Downstream
Field ID: 002
Collected: 22-APR-1991 10:00 By: R.B. Frydennborg
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00610	Ammonia-N	0.12	mg N/L

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 29-APR-1991 By: Tim Fitzpatrick
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	0.97 A	mg N/L

17800/91-APR-22-02-03 Continued on Page 5

17800/91-APR-22-02-03 Continued from Page 4

Analysis ID: W-TKN
TKN for water sample
Analyzed: 22-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	0.85	mg N/L

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 24-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.2 U	mg P/L

Sample ID: 17801/91-APR-22-02-04 Matrix: W-TRIP-BLK
Location: Olin
Field ID:
Collected: 22-APR-1991 00:00 By:
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments: BLANK

Analysis ID: W-NH3
Analysis for ammonia in water
Analyzed: 15-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00610	Ammonia-N	0.02 U	mg N/L

17801/91-APR-22-02-04 Continued on Page 6

17801/91-APR-22-02-04 Continued from Page 5

Analysis ID: W-NO2NO3
Analysis for nitrite+nitrate in water
Analyzed: 29-APR-1991 By: Tim Fitzpatrick
Authorized: 12-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
00630	NO2NO3-N	0.04 U	mg N/L

Analysis ID: W-TKN
TKN for water sample
Analyzed: 22-MAY-1991 By: John Montana
Authorized: 12-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00625	N_KJEL_TOT	0.2 U	mg N/L

Analysis ID: W-TP
Analysis for total phosphorus in water
Analyzed: 24-MAY-1991 By: John Montana
Authorized: 6-JUN-1991 By: Tim Fitzpatrick
Sample exceeded holding time prior to analysis.

Storet#	Analyte	Value	Units
00665	Total-P	0.2 U	mg P/L

********** END OF REPORT **********

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

CHEMICAL ANALYSIS REPORT

Job ID: 91-APR-22-01
Date Received: 22-APR-1991
Authorized: 4-JUN-1991
Submitted By: Russ Frydenborg DER Biology Lab

Project: BIOASSAY
Customer ID: BIOLOGY
By: Bill Coppenger

OPO4
Effluent, Up+Dwn

For Additional Information, Please Contact
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Certified By: bCw Date: 6-11-91

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T - Value reported is less than the practical quantitation limit
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NA - Not applicable
NR - Not requested

Sample ID: 17794/91-APR-22-01-01 Matrix: W-EFFLUENT
Location: Olin
Field ID:
Collected: 22-APR-1991 00:00 By: R.B. Frydennborg
Authorized: 29-MAY-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 23-APR-1991 By: Foster Parks Kirby
Authorized: 29-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.077 A	mg P/L

Sample ID: 17795/91-APR-22-01-02 Matrix: W-SURF-FRH
Location: Olin Upstream
Field ID: 001
Collected: 22-APR-1991 11:00 By: R.B. Frydennborg
Authorized: 29-MAY-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 23-APR-1991 By: Foster Parks Kirby
Authorized: 29-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.14 A	mg P/L

Sample ID: 17796/91-APR-22-01-03 Matrix: W-SURF-FRH
Location: Olin Downstream
Field ID: 002
Collected: 22-APR-1991 10:00 By: R.B. Frydennborg
Authorized: 29-MAY-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

17796/91-APR-22-01-03 Continued on Page 3

17796/91-APR-22-01-03 Continued from Page 2

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 23-APR-1991 By: Foster Parks Kirby
Authorized: 29-MAY-1991 By: Tim Fitzpatrick

OLIN DOWNSTREAM

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.18 A	mg P/L

Sample ID: 17797/91-APR-22-01-04 Matrix: W-TRIP-BLK
Location: Olin
Field ID:
Collected: 22-APR-1991 00:00 By:
Authorized: 29-MAY-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments: BLANK

Analysis ID: W-PO4
Orthophosphate analysis for water samples
Analyzed: 23-APR-1991 By: Foster Parks Kirby
Authorized: 29-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
70507	O-Phosphate-P	0.02 U	mg P/L

********** END OF REPORT **********

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

CHEMICAL ANALYSIS REPORT

Job ID: 91-APR-22-04
Date Received: 22-APR-1991
Authorized: 3-JUN-1991
Submitted By: Russ Frydenborg DER Biology Lab

Project: BIOASSAY
Customer ID: BIOLOGY
By: Bill Coppenger

OLIN - NO ORGANICS DETECTED

For Additional Information, Please Contact
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Yuh-Hsu Pan, Ph.D.
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(904) 487-2571

Certified By: _____ Date: 6-4-91

Abbreviations & Storet Codes:

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Q - Evidence that analyte was present in sample is equivocal
NA - Not applicable
NR - Not requested

Sample ID: 17804/91-APR-22-04-01 Matrix: W-EFFLUENT
Location: Olin
Field ID:
Collected: 22-APR-1991 09:30 By: R.B. Frydennborg
Authorized: 31-MAY-1991 By: Liang T. Lin
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: W-BNA
base-neutral-acid water analysis
Analyzed: 29-APR-1991 By: Laura Harrison
Authorized: 15-MAY-1991 By: Laura Harrison

Storet#	Analyte	Value	Units
34205	Acenaphthene	2 U	ug/L
34200	Acenaphthylene	2 U	ug/L
39330	Aldrin	3 U	ug/L
34220	Anthracene	2 U	ug/L
34526	Benzo(a)anthracene	2 U	ug/L
34230	Benzo(b)fluoranthene	2 U	ug/L
34242	Benzo(k)fluoranthene	2 U	ug/L
34247	Benzo(a)pyrene	4 U	ug/L
34521	Benzo(g,h,i)perylene	5 U	ug/L
34292	Benzyl butyl phthalate	2 U	ug/L
	a-BHC	3 U	ug/L
39337	b-BHC	3 U	ug/L
39340	d-BHC	3 U	ug/L
	g-BHC	3 U	ug/L
39120	Benzidine	25 U	ug/L
34273	Bis(2-chloroethyl)ether	2 U	ug/L
34278	Bis(2-chloroethoxy)methane	2 U	ug/L
34283	Bis(2-chloroisopropyl)ether	2 U	ug/L
39100	Bis(2-ethylhexyl)phthalate	2 U	ug/L
34636	4-Bromophenyl phenyl ether	2 U	ug/L
34581	2-Chloronaphthalene	2 U	ug/L
34641	4-Chlorophenyl phenyl ether	2 U	ug/L
34320	Chrysene	2 U	ug/L
39310	4,4'-DDD	3 U	ug/L
39320	4,4'-DDE	3 U	ug/L
39300	4,4'-DDT	3 U	ug/L
34556	Dibenzo(a,h)anthracene	5 U	ug/L
39110	Di-n-butyl phthalate	2 U	ug/L
34536	1,2-Dichlorobenzene	2 U	ug/L
34566	1,3-Dichlorobenzene	2 U	ug/L
34571	1,4-Dichlorobenzene	2 U	ug/L
34631	3,3'-Dichlorobenzidine	5 U	ug/L
39380	Dieldrin	3 U	ug/L
34336	Diethylphthalate	2 U	ug/L
34341	Dimethylphthalate	2 U	ug/L
34611	2,4-Dinitrotoluene	2 U	ug/L
34626	2,6-Dinitrotoluene	2 U	ug/L

Continued on Page 3

17804/91-APR-22-04-01/W-BNA Continued from Page 2

Storet#	Analyte	Value	Units
34596	Di-n-octyl phthalate	2 U	ug/L
34361	Endosulfan-I	3 U	ug/L
34356	Endosulfan-II	3 U	ug/L
34351	Endosulfan-sulfate	3 U	ug/L
39390	Endrin	3 U	ug/L
34366	Endrin-aldehyde	3 U	ug/L
34376	Fluoranthene	2 U	ug/L
34381	Fluorene	2 U	ug/L
39410	Heptachlor	3 U	ug/L
39420	Heptachlor-epoxide	3 U	ug/L
39700	Hexachlorobenzene	2 U	ug/L
34391	Hexachlorobutadiene	2 U	ug/L
34396	Hexachloroethane	2 U	ug/L
34386	Hexachlorocyclypentadiene	5 U	ug/L
34403	Indeno(1,2,3-cd)pyrene	5 U	ug/L
34408	Isophorone	2 U	ug/L
34696	Naphthalene	2 U	ug/L
34447	Nitrobenzene	2 U	ug/L
34438	N-Nitrosodimethylamine	2 U	ug/L
34428	N-Nitrosodi-n-propylamine	2 U	ug/L
34433	N-Nitrosodiphenylamine	2 U	ug/L
34671	PCB-1016	1.0E+03 U	ug/L
39488	PCB-1221	1.0E+03 U	ug/L
39492	PCB-1232	1.0E+03 U	ug/L
39496	PCB-1242	1.0E+03 U	ug/L
39500	PCB-1248	1.0E+03 U	ug/L
39504	PCB-1254	1.0E+03 U	ug/L
39508	PCB-1260	1.0E+03 U	ug/L
	PCB-1262	1.0E+03 U	ug/L
34461	Phenanthrene	2 U	ug/L
34469	Pyrene	2 U	ug/L
39400	Toxaphene	1.0E+03 U	ug/L
34551	1,2,4-Trichlorobenzene	2 U	ug/L
34462	4-Chloro-3-methyl phenol	2 U	ug/L
34586	2-Chlorophenol	2 U	ug/L
34601	2,4-Dichlorophenol	2 U	ug/L
34606	2,4-Dimethylphenol	2 U	ug/L
34616	2,4-Dinitrophenol	15 U	ug/L
34657	2-Methyl-4,6-dinitrophenol	15 U	ug/L
34591	2-Nitrophenol	2 U	ug/L
34646	4-Nitrophenol	15 U	ug/L
39032	Pentachlorophenol	5 U	ug/L
34694	Phenol	2 U	ug/L
34621	2,4,6-Trichlorophenol	2 U	ug/L

Comments (1)
(2)
(3)
(4)
(5)
(6)

17804/91-APR-22-04-01 Continued from Page 3

Analysis ID: W-PEST-CL
Chlorinated pesticide in water and waste
Analyzed: 14-MAY-1991 By: Adrian Niculescu
Authorized: 30-MAY-1991 By: Adrian Niculescu

Storet#	Analyte	Value	Units
39330	Aldrin	0.01 U	ug/L
39337	Alpha-BHC	0.01 U	ug/L
39338	Beta-BHC	0.01 U	ug/L
34259	Delta-BHC	0.01 U	ug/L
39340	Gamma-BHC	0.01 U	ug/L
39350	Chlordane	0.2 U	ug/L
39460	Chlorobenzilate	N	ug/L
39360	DDD-p,p'	0.02 U	ug/L
39365	DDE-p,p'	0.02 U	ug/L
39370	DDT-p,p'	0.05 U	ug/L
39380	Dieldrin	0.02 U	ug/L
	Endosulfan I	0.01 U	ug/L
	Endosulfan II	0.01 U	ug/L
34351	Endosulfan sulfate	0.05 U	ug/L
39390	Endrin	N	ug/L
34366	Endrin aldehyde	0.01 U	ug/L
39410	Heptachlor	0.01 U	ug/L
39420	Heptachlor epoxide	0.01 U	ug/L
39430	Isodrin	0.03 U	ug/L
39480	Methoxychlor	0.02 U	ug/L
	PCNB	0.05 U	ug/L
39400	Toxaphene	0.5 U	ug/L

Comment (1):
(2):

Sample ID: 17805/91-APR-22-04-02 Matrix: W-TRIP-BLK
Location: Olin
Field ID:
Collected: 22-APR-1991 00:00 By:
Authorized: 31-MAY-1991 By: Liang T. Lin
Type: Grab Sample
Lab Comments:
Field Comments:

17805/91-APR-22-04-02 Continued on Page 5

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

CHEMICAL ANALYSIS REPORT

Job ID: 91-APR-22-03
Date Received: 22-APR-1991
Authorized: 27-JUN-1991

Project: BIOASSAY
Customer ID: BIOLOGY
By: Yuh-Hsu Pan

Submitted By: DER Biology Lab

Effluent Metals

For Additional Information, Please Contact
G. William Coppenger, Ph.D.
Yuh-Hsu Pan, Ph.D.
Suncom 277-2571
(904) 487-2571

Certified By: YHan Date: 6-28-91

Abbreviations & Storet Codes:

A - Value reported is the mean of two or more determinations
E - Scientific notation
J - Estimated value
K - Actual value is known to be less than value given
L - Actual value is known to be greater than value given
N - Not analyzed for this compound
T - Value reported is less than the practical quantitation limit
U - Material was analyzed for but not detected;
The value reported is the minimum detection limit
Q - Evidence that analyte was present in sample is equivocal
NA - Not applicable
NR - Not requested

Sample ID: 17802/91-APR-22-03-01 Matrix: W-EFFLUENT
Location: Olin
Field ID:
Collected: 22-APR-1991 09:30 By: R.B. Frydennborg
Authorized: 26-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

Analysis ID: AG-G-W
Silver in water by furnace AA
Analyzed: 6-JUN-1991 By: Jack Merritt
Authorized: 13-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01077	Silver	0.1 U	ug/L

Analysis ID: CD-G-W
Cadmium by graphite furnace for water samples
Analyzed: 10-JUN-1991 By: Jack Merritt
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01027	Cadmium	0.3 U	ug/L

Analysis ID: HG-H-W
Mercury by cold vapor using hydride sys.-water
Analyzed: 1-MAY-1991 By: Laurie Roughton
Authorized: 3-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
71900	Mercury	0.2 U	ug/L

Analysis ID: SE-G-W
Selenium in water by furnace AA
Analyzed: 14-JUN-1991 By: Kate Brackett
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01147	Selenium	3 U	ug/L

 Continued on Page 3

17802/91-APR-22-03-01 Continued from Page 2

Analysis ID: W-ICP-23
ICP multielement analysis for water samples
Analyzed: 17-MAY-1991 By: Kate Brackett
Authorized: 26-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01106	Aluminum	24 T	ug/L
01002	Arsenic	20 U	ug/L
01097	Antimony	NR	ug/L
01007	Barium	NR	ug/L
01012	Beryllium	NR	ug/L
01027	Cadmium	NR	ug/L
00916	Calcium	NR	mg/L
01034	Chromium	10 U	ug/L
01037	Cobalt	NR	ug/L
01042	Copper	5 U	ug/L
01045	Iron	70	ug/L
01051	Lead	15 U	ug/L
00927	Magnesium	NR	mg/L
01055	Manganese	NR	ug/L
01067	Nickel	5 U	ug/L
00937	Potassium	NR	mg/L
01147	Selenium	NR	ug/L
01077	Silver	NR	ug/L
00929	Sodium	NR	mg/L
01082	Strontium	NR	ug/L
01059	Thallium	NR	ug/L
01087	Vanadium	NR	ug/L
01092	Zinc	38	ug/L
Comment	NONE		

Sample ID: 17803/91-APR-22-03-02 Matrix: W-TRIP-BLK
Location: Olin
Field ID:
Collected: 22-APR-1991 00:00 By:
Authorized: 26-JUN-1991 By: Tim Fitzpatrick
Type: Grab Sample
Lab Comments:
Field Comments:

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17803/91-APR-22-03-02 Continued from Page 3

Analysis ID: AG-G-W
Silver in water by furnace AA
Analyzed: 6-JUN-1991 By: Jack Merritt
Authorized: 13-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01077	Silver	0.1 U	ug/L

Analysis ID: CD-G-W
Cadmium by graphite furnace for water samples
Analyzed: 10-JUN-1991 By: Jack Merritt
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01027	Cadmium	0.3 U	ug/L

Analysis ID: HG-H-W
Mercury by cold vapor using hydride sys.-water
Analyzed: 1-MAY-1991 By: Laurie Roughton
Authorized: 3-MAY-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
71900	Mercury	0.2 U	ug/L

Analysis ID: SE-G-W
Selenium in water by furnace AA
Analyzed: 14-JUN-1991 By: Kate Brackett
Authorized: 14-JUN-1991 By: Tim Fitzpatrick

Storet#	Analyte	Value	Units
01147	Selenium	3 U	ug/L

17803/91-APR-22-03-02 Continued on Page 5

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DY):	RECEIVING BODY OF WATER:
		4-22-91	Big Bogue Ck

REMARKS:	LOCATION:	FIELD ID/NAME:
Natural in process	Olin Downstream	OC2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
80 (Swamp Hardwoods)					20	

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

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

Point-Source Pollution (list location and describe): OLIN DISCHARGE SPRAY FIELDS

Estimated Stream Width (range, m): 10 M	Estimated Stream Depth (range, m): .5		yes
High Water Mark (m above bed): .75	Velocity (range, m/s): .05	Impounded ☐ / Channelized ☒	

Canopy Cover % (check box): Open: ☒ Lightly Shaded: ☒ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☒ Other: ☐ H_2S

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☒ Sand: ☒ Shell: ☒ Other: ☐

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	30
Consolidated Clay:		Clay/Silt (inorganic):	30
Gravel/Shell	5	Coarse Organic Debris:	5
Sand:		Mud/Muck (organic):	30

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	19.5	5.7	Secchi Depth (m):	0.5
Mid-depth			pH (SU):	7.5
Bottom	19.5	5.5	Conductivity (µmho/cm):	690
			Other Parameters:	

Stream Type (check box): Blackwater: ☒ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐

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

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

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

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

Weather Conditions: SUNNY WD. COOL

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
[illegible] 91	K. FRYDENBORG	[signature]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 4-27-91	RECEIVING BODY OF WATER: BIG POGGY CK

REMARKS:	LOCATION: OLIN UPSTREAM	FIELD ID/NAME: 001

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
50					50	

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

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

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m): 1-3 M	Estimated Stream Depth (range, m): .1-.3	Impounded	yes ☐
High Water Mark (m above bed): .4	Velocity (range, m/s): .05	Channelized	☒

Canopy Cover % (check box): Open: ☒ Lightly Shaded: ☐ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☐ Shell: ☐ Other: ☐

Substrate Types (estimated % surface coverage):

Limestone:	10	Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	10	Coarse Organic Debris:	5
Sand:	70	Mud/Muck (organic):	5

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	20.8	6.8	Secchi Depth (m):	.5
Mid-depth			pH (SU):	7.9
Bottom	20.4	6.8	Conductivity (µmho/cm):	440
			Other Parameters:	

Stream Type (check box): Blackwater: ☒ Deep Aquifer Fed: ☒ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐ _____

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

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

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

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

Weather Conditions: PART SUN/ [illegible]

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

ANALYSIS DATE: 4-27-91	ANA: R. FRIEMBLE	SIGNATURE: Russell [illegible]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		4-23-91	B/G [illegible]

REMARKS:	LOCATION:	FIELD ID/NAME:
11 CC IE	UPSTREAM OLIN	001

Habitat Parameter score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 15	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 5	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 3	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 2	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 5	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
\	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	30

COMMENTS: [illegible]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4-23-91	[illegible]	[illegible]

11 0 0

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		4/22/91	TO [illegible]

REMARKS:	LOCATION: OLIN sump	FIELD ID/NAME: effluent

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other

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

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☐ Obvious sources ☐

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m):	Estimated Stream Depth (range, m):	yes Impounded ☐
High Water Mark (m above bed):	Velocity (range, m/s):	Channelized ☐

Canopy Cover % (check box): Open: ☐ Lightly Shaded: ☐ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☐ Shell: ☐ Other: ☐

Substrate Types (estimated % surface coverage):

Limestone:		Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	
Sand		Mud/Muck (organic):	

WATER QUALITY

Sump	Temp. (°C):	D.O. (mg/l):	Secchi Depth (m):	
Top	23.0	10.5	pH (SU):	8.7
Mid-depth			Conductivity (µmho/cm):	130
Bottom			Other Parameters:	

Stream Type (check box): Blackwater: ☐ Deep Aquifer Fed: ☐ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐ _____

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

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

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

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

Weather Conditions:

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4-22-91	RBF	[signature]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		4-22-91	BIG BOGGY CR

REMARKS:	LOCATION:	FIELD ID/NAME:
1000 HRS	DOWN STREAM OLIN SPRAY FIELDS	002

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 10	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 5	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 3	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 8	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 10	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
5	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	41

COMMENTS: SWIM

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4-22-91	J. FRYDENBORG	

Sample Source: OLIN CORP. | Sample Collection: Date 4-22-91 Time 0930
Address/City: ST. MARKS | Test Beginning: Date 4-23-91 Time 1110
County: WAKULLA | Test Ending: Date 4-25-91 Time 0830
Contact/District: RUSS FRYDENBORG/TALL | Test Organism: ~~C. VARIEGATUS~~ P. PROMELAS
NPDES Permit #: _____ Outfall #: _____ | Life Stage/Age: 13 DAYS

Test Number: 2 of 2 | Test Type: (Screening) Definitive | (Static) Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7@7.9@9	8.7@23	1394@ 24.3@1389	21.9@23.9
24 hr	7@7.9@9	8.7@23	1401@24.3	20@24.1
48 hr	7@7.9@9	8.9@21.5	1386@24.0	21@23.8

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
CONTROL	76	5	5	5	8.7	8.1	10.3	7.6	7.9	8.2	20.5	21.4	20.5			
CONTROL	7	5	5	5	8.9	8.2	10.2	7.7	7.9	8.2				239	239	244
100% Cl⁻	47	5	5	5	11.1	8.1	10.1	8.6	8.3	8.2	17.5	21.5	20.5			
100% Cl⁻	39	5	5	5	11.0	8.2	10.2	8.6	8.3	8.2				1650	1881	1813
100% DeCl	48	5	5	5	11.0	8.1	10.0	8.7	8.3	8.3	18.5	21.5	21.0			
DeCl 100%	25	5	5	5	10.3	8.1	10.0	8.7	8.3	8.3				1715	1884	1832
Measured/Loaded by:		MF	MF	MF	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP
Proceed by:		MF	MF	MF	LB	MF	MF	LB	MF	MF	LB	MF	MF	LB	MF	MF

Investigators' Signatures

Kim Peace
Michael Kimbrough
Lynn Burton
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:			.06	HACH	RF
Alkalinity:	127	62	132	Acid	MF
Hardness:	128	70	165	Hard	MF
Total Ammonia:	0.0	0.0	0.20	Nessler	MF

Ammonia meter slope: _____

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: OLIN CORP. — Sample Collection: Date 4-22-91 Time 0930
Address/City: ST. MARKS — Test Beginning: Date 4-23-91 Time 1110
County: WAKULLA — Test Ending: Date 4-25-91 Time 0920
Contact/District: ROSS FRYDENBORG / TALL — Test Organism: Ce. DUBIA
NPDES Permit #: _____ Outfall #: _____ — Life Stage/Age: < 24 HRS

Test Number: 1 of 2 — Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through

Remarks:

Instrument Calibrations:

	pH	DO	Cond @ 1394	Temp
0 hr	7@7; 9@9	8.7@23	24.3@1389	21.9@23.9
24 hr	7@7; 9@9	8.7@23	1401@24.3	21@24.1
48 hr	7@7; 9@9	8.9@21.5	1386@24.0	21@23.8

Conc.	Chamber #	Number Live 0	24	48	DO (mg/l) 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	Cond. (µmhos/cm) 0	24	48
CONTROL	A	5	5	5	9.0	8.4	10.9	6.6	8.2	7.4	21.0	22.3	21.5	156	162	164
CONTROL	B	5	5	5												
CONTROL	C	5	5	5												
CONTROL	D	5	5	5												
100%	A	5	5	5	10.7	8.4	11.0	8.6	8.3	8.1	19.0	22.1	21.5	1630	1716	1686
100%	B	5	4	4												
100%	C	5	5	5												
100%	D	5	5	5												
DeCl 100%	A	5	4	4	10.7	8.5	11.0	8.6	8.3	8.3	19.5	22.1	21.5	1719	1811	1851
DeCl ↓	B	5	5	5												
DeCl ↓	C	5	5	5												
DeCl ↓	D	5	5	5												
Measured/Loaded by:		MF	MF	MF	KP	MF	KP	KP	MF	KP	KP	MF	KP	KP	MF	KP
Recorded by:		MF	MF	MF	LB	MF	MF	LB	MF	MF	LB	MF	MF	LB	MF	MF

Investigators' Signatures

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl:					
Lab Tot. Resid. Cl:			.06	HACH	KF
Alkalinity:	127	62	132	Titr	MF
Hardness:	128	70	165	Titr	MF
Total Ammonia:	0.0	0.0	0.0	Titr	MF

Ammonia meter slope: _____

JOB ID: _____

SAMPLE ID: _____

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY SAMPLE SUBMITTAL FORM
PAGE 1

COLLECTION TIME A — GRAB SAMPLE

COLLECTION TIME B — COMPOSITE SAMPLE
BEGIN: _____
END: _____

SUBMITTING AGENCY CODE:	SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	COLLECTION DATE (M/D/Y):	DEPTH, FEET:
			4/22/91	

COUNTY OF SAMPLE ORIGIN:	SAMPLE LOCATION:	FIELD ID/NAME:
Wakulla		Olin Dorn

WATER
- ☐ SURFACE (FRESH)
- ☐ GROUND
- ☐ SURFACE (SALT)
- ☐ EFFLUENT
- ☐ DRINKING
- ☐ TRIP BLANK
- ☐ FIELD BLANK
- ☐ EQUIPMENT BLANK

SOIL/SEDIMENT
- ☐ SOIL
- ☐ FRESHWATER SEDIMENT
- ☐ MARINE SEDIMENT
- ☐ SLUDGE

TISSUE
- ☐ PLANT
- ☐ FISH
- ☐ SHELLFISH
- ☐ OTHER

CHEMICAL WASTE
- ☐

PRGRM. MOD. #	NPDES NUMBER (& OUTFALL NO., IF APPLICABLE) (required for all discharge related samples)

FIELD PARAMETERS MEASURED BY (NAME): _____

(SIGNATURE): _____

SAMPLED BY (NAME): Russ Frydenborg, Kathy Frydenborg, Sandy & Lynn

(SIGNATURE): _____

FIELD REPORT, IF ANY, PREPARED BY (NAME): _____

(SIGNATURE): _____

FIELD PARAMETERS	UNITS	CODE*	VALUE
CHLORINE, TOTAL RESIDUAL	mg/l	50060	
DISSOLVED OXYGEN (PROBE)	mg/l	00299	
pH	stnd. units	00400	
SALINITY	PPTh	00480	
SECCHI DEPTH	m	00078	
SPECIFIC CONDUCTANCE	µmho/cm	00094	
TEMPERATURE	°C	00010	

ANALYSIS/METHOD REQUESTED	SAMPLE CONTAINER DESCRIPTION	NO. OF CONTAINERS SUBMITTED	PRESERVATIVE USED

NOTE, FILL OUT PAGE 2 (REVERSE) IF ANY LAB PARAMETERS LISTED THERE ARE DESIRED

SEND COPIES OF ANALYSIS REPORT TO: ☐ SUBMITTING AGENCY

☐ _____ ☐ _____

☐ _____ ☐ _____

*STORET CODES MAY ONLY APPLY TO FIELD MEASUREMENTS ☐ SUBMITTING OFFICE FILL IN SHADED AREAS

PLEASE TYPE OR PRINT CLEARLY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY SAMPLE SUBMITTAL FORM
PAGE 2

✓	LAB PARAMETERS	UNITS	CODE	VALUE	✓	LAB PARAMETERS	UNITS	CODE	VALUE
	CHLOROPHYLL-a (CORRECTED)	µg/l	32223			ALGAL ASSAY, GROWTH POTENTIAL	mg/l	85209	
	CHLOROPHYLL-a (NON-CORRECTED)	µg/l	32210			INVERT, DIVERSITY INDX, ART SUBST	—	61455	
	CHLOROPHYLL-b	µg/l	32212			INVERT, DI, AS, 95% CONF INT	—	61456	
	CHLOROPHYLL-c	µg/l	32214			INVERT, DIVERSITY INDX, NAT SUBST	—	61453	
	PHAEOPHYTIN-a	µg/l	32218			INVERT, DI, NS, 95% CONF INT	—	61454	
	BOD, 5-DAY CARBONACEOUS	mg/l	80082			INVERT, ART SUBST, NO. SPP.	—	61457	
	BOD, 5-DAY N-INHIBITED	mg/l	00314			INVERT, NAT SUBST, NO. SPP.	—	61458	
✓	FECAL COLIFORMS, MEMBRANE	no./100 ml	31616	80		INVERT, FLORIDA INDEX	—	—	
	FECAL COLIFORMS, TUBE	no./100 ml	31616			INVERT, SPECIES ID/COUNT	—	—	REPORT
✓	TOTAL COLIFORMS, MEMBRANE	no./100 ml	31501	800		PERIPHYTON, SPECIES ID/COUNT	—	—	REPORT
	TOTAL COLIFORMS, TUBE	no./100 ml	31505			PHYTOPLNKTN, SPECIES ID/COUNT	—	—	REPORT
	FECAL STREPTOCOCCI, MEMBRANE	no./100 ml	31673			TOXICITY ASSAY, MICROTOX	—	—	REPORT
	HETEROTROPHIC PLATE COUNT	no./1 ml	31751			TOXICITY ASSAY, ACUTE, SCRNG	—	—	REPORT
	SEDIMENT PRTCL SIZE, >2.0mm	%	80256			TOXICITY ASSAY, ACUTE, DFNTV	—	—	REPORT
	SEDIMENT PRTCL SIZE, 0.5-2.0mm	%	80254			TOXICITY ASSAY, FLOW-THROUGH	—	—	REPORT
	SEDIMENT PRTCL SIZE, 0.125-0.5mm	%	46531			TOXICITY ASSAY, CHRONIC, SCRNG	—	—	REPORT
	SEDIMENT PRTCL SIZE, 0.063-0.125mm	%	80251			TOXICITY ASSAY, CHRONIC, DFNTV	—	—	REPORT
	SEDIMENT PRTCL SIZE, <0.063mm	%	80250						
	SEDIMENT PRTCL SIZE, 0.25-0.5mm	%	80253						
	SEDIMENT PRTCL SIZE, 0.125-0.25mm	%	80252						
	SEDIMENT ORGANIC FRACTION	%	80096						
	ALGAL ASSAY, LIMITING NUTRIENT	—	—	REPORT					

Down

REMARKS: OLIN DOWN STREAM

ANALYST(S): [signature] DATE(S): 4/25/91

REVIEWED BY: [signature] DATE: 4/25/91

PLEASE TYPE OR PRINT CLEARLY

JOB ID: _____

SAMPLE ID: _____

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY SAMPLE SUBMITTAL FORM
PAGE 1

COLLECTION TIME A — GRAB SAMPLE

COLLECTION TIME B — COMPOSITE SAMPLE
BEGIN: _____
END: _____

SUBMITTING AGENCY CODE:	SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	COLLECTION DATE (M/D/Y):	DEPTH, FEET:
			4/22/91	

COUNTY OF SAMPLE ORIGIN:	SAMPLE LOCATION:	FIELD ID/NAME:
Walkulla		Alum Up

WATER
- ☐ SURFACE (FRESH)
- ☐ GROUND
- ☐ SURFACE (SALT)
- ☐ EFFLUENT
- ☐ DRINKING
- ☐ TRIP BLANK
- ☐ FIELD BLANK
- ☐ EQUIPMENT BLANK

SOIL/SEDIMENT
- ☐ SOIL
- ☐ FRESHWATER SEDIMENT
- ☐ MARINE SEDIMENT
- ☐ SLUDGE

TISSUE
- ☐ PLANT
- ☐ FISH
- ☐ SHELLFISH
- ☐ OTHER

CHEMICAL WASTE
- ☐

PROGRM. MCO. #	NPDES NUMBER (& OUTFALL NO., IF APPLICABLE): (required for all discharge related samples)

FIELD PARAMETERS MEASURED BY (NAME):

(SIGNATURE):

SAMPLED BY (NAME): Russ Frydenborg, Kelley Fielding, Sandy St. Lyn

(SIGNATURE):

FIELD REPORT, IF ANY, PREPARED BY (NAME):

(SIGNATURE):

FIELD PARAMETERS	UNITS	CODE*	VALUE
CHLORINE, TOTAL RESIDUAL	mg/l	50060	
DISSOLVED OXYGEN (PROBE)	mg/l	00299	
pH	stnd. units	00400	
SALINITY	PPTh	00480	
SECCHI DEPTH	m	00078	
SPECIFIC CONDUCTANCE	µmho/cm	00094	
TEMPERATURE	°C	00010	

ANALYSIS/METHOD REQUESTED	SAMPLE CONTAINER DESCRIPTION	NO. OF CONTAINERS SUBMITTED	PRESERVATIVE USED

NOTE, FILL OUT PAGE 2 (REVERSE) IF ANY LAB PARAMETERS LISTED THERE ARE DESIRED

SEND COPIES OF ANALYSIS REPORT TO: ☐ SUBMITTING AGENCY
☐ _____ ☐ _____
☐ _____ ☐ _____

*STORET CODES MAY ONLY APPLY TO FIELD MEASUREMENTS ☐ SUBMITTING OFFICE FILL IN SHADED AREAS

PLEASE TYPE OR PRINT CLEARLY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
CENTRAL LABORATORY SAMPLE SUBMITTAL FORM
PAGE 2

✓	LAB PARAMETERS	UNITS	CODE	VALUE	✓	LAB PARAMETERS	UNITS	CODE	VALUE
	CHLOROPHYLL-a (CORRECTED)	µg/l	32223			ALGAL ASSAY, GROWTH POTENTIAL	mg/l	86209	
	CHLOROPHYLL-a (NON-CORRECTED)	µg/l	32210			INVERT, DIVERSITY INDX, ART SUBST	—	61456	
	CHLOROPHYLL-b	µg/l	32212			INVERT, DI, AS, 95% CONF INT	—	61456	
	CHLOROPHYLL-c	µg/l	32214			INVERT, DIVERSITY INDX, NAT SUBST	—	61453	
	PHAEOPHYTIN-a	µg/l	32218			INVERT, DI, NS, 95% CONF INT	—	61454	
	BOD, 5-DAY CARBONACEOUS	mg/l	80082			INVERT, ART SUBST, NO. SPP.	—	61457	
	BOD, 5-DAY N-INHIBITED	mg/l	00314			INVERT, NAT SUBST, NO. SPP.	—	61458	
✓	FECAL COLIFORMS, MEMBRANE	no./100 ml	31616	30		INVERT, FLORIDA INDEX	—	—	
	FECAL COLIFORMS, TUBE	no./100 ml	31615			INVERT, SPECIES ID/COUNT	—	—	REPORT
✓	TOTAL COLIFORMS, MEMBRANE	no./100 ml	31501	300		PERIPHYTON, SPECIES ID/COUNT	—	—	REPORT
	TOTAL COLIFORMS, TUBE	no./100 ml	31505			PHYTOPLNKTN, SPECIES ID/COUNT	—	—	REPORT
	FECAL STREPTOCOCCI, MEMBRANE	no./100 ml	31673			TOXICITY ASSAY, MICROTOX	—	—	REPORT
	HETEROTROPHIC PLATE COUNT	no./1 ml	31751			TOXICITY ASSAY, ACUTE, SCRNG	—	—	REPORT
	SEDIMENT PRTCL SIZE, >2.0mm	%	80256			TOXICITY ASSAY, ACUTE, DFNTV	—	—	REPORT
	SEDIMENT PRTCL SIZE, 0.5-2.0mm	%	80254			TOXICITY ASSAY, FLOW-THROUGH	—	—	REPORT
	SEDIMENT PRTCL SIZE, 0.125-0.5mm	%	46531			TOXICITY ASSAY, CHRONIC, SCRNG	—	—	REPORT
	SEDIMENT PRTCL SIZE, 0.063-0.125mm	%	80251			TOXICITY ASSAY, CHRONIC, DFNTV	—	—	REPORT
	SEDIMENT PRTCL SIZE, <0.063mm	%	80250						
	SEDIMENT PRTCL SIZE, 0.25-0.5mm	%	80253						
	SEDIMENT PRTCL SIZE, 0.125-0.25mm	%	80252						
	SEDIMENT ORGANIC FRACTION	%	80096						
	ALGAL ASSAY, LIMITING NUTRIENT	—	—	REPORT					

REMARKS: OLIN UPSTREAM

ANALYST(S): [signature] DATE(S): 4/23/91

REVIEWED BY: [signature] DATE: 4/25/91

PLEASE TYPE OR PRINT CLEARLY

Walnulla C

MICROTOX™ Data Reduction Sheet

SOURCE: Olin (Down)

GRAPH CALC EC 50 (15 MIN, 15 °C) = Stimulatory %SAMPLE mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.):

DATE ASSAYED: 4/23/91 TIME: 2:30 pm

VISUAL COLOR: slightly yellow CORRECTION REQUIRED: YES, NO

VISUAL TURBIDITY: SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS DRY NaCl OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: [signature] REAGENT VIAL LOT NO. M- N/A

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	Γ5	Γ15	NOTES
A1	0	58	45	X	X	77
B1		57	52			74
C1		57	52			74
A2	12.38	67	50		.01	80
B2		65	49			86
C2		68	52			90
A3	24.75	68	52		.01	91
B3		64	48			86
C3		63	48			83
A4	49.5	70	54		-.10	88
B4		73	57			92
C4		69	53			81
A5	99	72	59		-.16	86
B5		75	61			88
C5		73	57			88
EC_{50} (MIN, °C)				Stimulatory		

REVIEWED BY: [signature]
DATE: 4/25/91

MICROTOX™ Data Reduction Sheet

SOURCE: Olin (upstream)

GRAPH CALC EC 50 (15 MIN, 15 °C) = stimulatory %SAMPLE mg/L

SAMPLE DATA:

SAMPLE TYPE (EFFLUENT, LEACHATE, ETC.):

DATE ASSAYED: 4/23/91 TIME: 2:30 p.m.

VISUAL COLOR: clear CORRECTION REQUIRED: YES NO

VISUAL TURBIDITY: SEPARATION REQUIRED: YES NO

INITIAL pH: pH ADJUSTED TO: WITH:

OSMOTICALLY ADJUSTED WITH: MOAS DRY NaCl OTHER

PRIMARY DILUTION OF SAMPLE:

OPERATOR: MS Cauger REAGENT VIAL LOT NO. M- X11/A

REMARKS:

MICROTOX™ TEST

SAMPLE CUVETTE	% SAMPLE	READINGS 5 MIN	READINGS 15 MIN	T5	T15	NOTES 0
A1	0	62	50			83
B1		58	47			76
C1		65	51			80
A2	12.38	70	52		-0.05	87
B2		69	53			87
C2		64	50			86
A3	24.75	68	54		-0.10	89
B3		74	55			91
C3		64	53			83
A4	49.5	67	53		-0.03	87
B4		65	50			87
C4		71	50			89
A5	99	80	50		-0.16	96
B5		80	63			90
C5		70	63			95
EC_{50} (MIN, °C)		Stimulatory				

REVIEWED BY: AN Wolfe

DATE: 4/29/91

Taxa list for Olin Corp., collected on Hester-Dendy samplers above and below the discharge on 20 May, 1991.

	Control Site	Test Site
Acarina		
Torrenticola sp.	0	1
Coleoptera		
Dubiraphia bivittata	0	1
Stenelmis sp.	1	0
Diptera		
Ablabesmyia cinctipes ?	1	0
Ablabesmyia mallochi	4	2
Chironomus decorus grp.	33	0
Cladotanytarsus sp.	2	2
Cryptochironomus sp.	3	2
Dicrotendipes modestus	2	6
Dicrotendipes neomodestus	8	2
Goeldichironomus holoprasinus	18	1
Labrundinia pilosella	0	1
Larsia sp.	0	1
Orthocladius annectens	1	0
Palpomyia grp. sp.	1	2
Parachironomus carinatus	0	1
Polypedilum fallax grp.	1	0
Polypedilum illinoense	1	0
Polypedilum scalaenum	1	0
Procladius bellus	0	1
Undetermined dipteran pupae	10	1
Tanytarsus sp.	12	14
Tribelos jucundum	1	0
Tribelos sp.	1	0
Ephemeroptera		
Caenis sp.	0	24
Callibaetis floridanus	1	0
Stenonema floridense	0	2
Gastropoda		
Hebetancyclus excentricus	4	19
Micromenetus dilatus	1	0
Micromenetus floridensis	0	2
Neritina reclivata	0	7
Physella sp.	1	5
Planorbella duryi	0	6
Hirudinea		
Helobdella fusca	0	3
Helobdella sp.	5	0
Helobdella triserialis	0	2
Malacostraca		
Asellus sp.	0	1
Hyalella azteca	2	541

Odonata		
Argia moesta	1	1
Enallagma cardenium	1	0
Enallagma signatum	0	6
Enallagma sp.	1	0
Epitheca princeps	0	1
Ischnura posita	0	6
Ischnura ramburii	0	3
Platyhelminthes		
Dugesia sp.	0	6
Trichoptera		
Orthotrichia sp.	0	1
Oxyethira sp.	2	0
Undetermined trichoptera pupa	1	0

Taxa list for Olin. Corp. collected via timed qualitative method above and below the discharge on 22 April, 1991.

	Control Site	Test Site
Acarina		
Arrenurus sp.	0	4
Neumania sp.	0	8
Undetermined acarina sp.	0	4
Coleoptera		
Undetermined curculionidae	12	8
Hydrobius sp.	24	0
Undetermined noteridae	0	8
Peltodytes sexmaculata	0	8
Peltodytes sp.	0	4
Diptera		
Ablabesmyia mallochi	12	0
Asheum beckae	0	4
Chironomus decorus grp.	42	4
Cladotanytarsus sp.	108	12
Clinotanypus sp.	6	4
Culex sp.	0	4
Conchapelopia sp.	6	0
Cricotopus bicinctus	192	0
Cryptotendipes sp.	0	12
Cryptochironomus sp.	6	0
Dicrotendipes modestus	0	4
Dicrotendipes sp.	0	4
Einfeldia natchitocheae	0	4
Labrundinia johannseni	0	4
Labrundinia pilosella	0	4
Larsia sp.	6	48
Meropelopia sp.	6	0
Palpomyia grp. sp.	0	28
Polypedilum halterale grp.	6	0
Polypedilum illinoense	60	36
Polypedilum scalaenum	6	0
Procladius bellus	6	0
Procladius sp.	6	32
Undetermined dipteran pupae	36	8
Undetermined tabanid sp.	0	4
Tanytarsus sp.	30	48
Tanypus neopunctipennis	12	0
Ephemeroptera		
Caenis sp.	0	12
Cloeon sp.	0	4

Gastropoda		
Hebetancyclus excentricus	24	0
Neritina reclivata	0	16
Physella cubensis	78	8
Planorbella duryi	0	20
Pseudosuccinea columella	36	0
Hemiptera		
Immature corixidae	0	12
Mesovelia mulsanti	0	4
Lepidoptera		
Munroessa sp.	6	0
Undetermined noctuidae sp.	12	0
Malacostraca		
Hyalella azteca	18	500
Odonata		
Ischnura ramburii	18	20
Ischnura sp.	0	8
Orthemis ferruginea	6	0
Oligochaeta		
Aulodrilus pigueti	42	0
Dero digitata	6	0
Limnodrilus angustipenis	6	0
Limnodrilus hoffmeisteri	30	4
Limnodrilus sp.	84	0
Lumbriculus inconstans	12	0
Pelecypoda		
Undetermined sphaeriid	72	0
Trichoptera		
Cheumatopsyche sp.	6	0
Oxyethira sp.	6	0

Periphyton taxa list and abundances (#/L) for Olin Corporation, collected 20 May 1991.

	Control Site	Test Site
Diatoms		
Achnanthes exigua	0	32
Achnanthes hauckiana	0	12
Achnanthes hungarica	0	8
Achnanthes hustedtii	506	0
Achnanthes lanceolata	169	48
Achnanthes linearis	1161	12
Achnanthes minutissima	74	8
Amphora ovalis	0	4
Amphipleura rutilans	0	2
Cocconeis placentula	0	48
Cyclotella meneghiniana	95	0
Cymbella minuta	21	0
Eunotia pectinalis	11	107
Fragilaria capucina	0	12
Fragilaria construens	42	26
Gomphonema parvulum	200	36
Melosira italica	11	28
Navicula confervacea	11	0
Navicula cryptocephala	21	6
Navicula decussis	0	2
Navicula elginensis	21	0
Navicula minima	0	12
Navicula pupula	0	2
Navicula radiosa	0	2
Navicula viridula	0	10
Neidium affine	0	2
Nitzschia amphibia	137	20
Nitzschia linearis	0	2
Nitzschia palea	348	14
Rhopalodia gibberula	42	0
Rhopalodia gibba	169	0
Chlorophyta		
Characium sp.	127	109
Cladophora sp.	21	0
Gloeocystis sp.	32	0
Golenkinia sp.	0	18
Mougeotia sp.	137	0
Oedogonium sp.	11	2
Pediastrum sp.	11	0
Protoderma sp.	0	4
Scenedesmus sp.	11	28
Spirogyra sp.	21	0
Ulothrix sp.	42	0

Chrysophyta		
Dinobryon sp.	0	20
Mallomonas sp.	0	2
Stipitococcus sp.	0	2
Cyanophyta		
Anabaena sp. 1	696	4
Anabaena sp. 2	53	16
Calothrix sp.	84	0
Chroococcus sp.	21	0
Lyngbya sp. 1	84	0
Lyngbya sp. 2	106	14
Oscillatoria sp.	0	4
Phormidium sp.	42	0
Euglenophyta		
Phacus sp.	0	2
Trachelomonas sp.	0	2

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0002518 11	12 910422 17	18 X	19 3	20 2

Remarks

21 2 1 M C = 3 8 4 G 66

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

Transaction Code	NPDES NUMBER	YR/MO/DA	Insp Type	Inspector	Fac Type
1 N 2 5	3 FL0002518 11	12 910422 17	18 B	19 5	20 2

Remarks

21 M O T T O X I C 66