

Biological Assessment of

Occidental Chemical Corp.

Hamilton County

NPDES #FL0036226

NPDES # FL0000655

Sampled February 1992

July 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Occidental Chemical Corp.
County: Hamilton
NPDES Numbers: FL0036226 and FL0000655
State Permit Expiration Date: 31 October 1992

Toxics Sampling Inspection (XSI)

Date Sampled: 3 February 1992

Results: Aliphatic compounds (34 µg/L), iron (106 µg/L), and aluminum (228 µg/L), were detected at levels above quantitation limits in the discharge. These concentrations are not high enough to be of concern. Gross alpha radiation, radium-226, and radium-228 measured in Swift Creek were below levels found in the upper Suwannee River during a two year study (FDER 1985), and were within the facility's permit limits.

Results:

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 3 February 1992

Results: The sample of Occidental's effluent was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 3 February 1992

Results: The periphyton community in Swift Creek suffered from nutrient enrichment, exhibiting increased biomass, reduced taxa richness, and high dominance of an organism which is a known indicator of eutrophic conditions. These changes in the algal community are interpreted as a violation of imbalances of aquatic flora (17-302.560(29) FAC). While most measures of macroinvertebrate health indicated that the discharge was not adversely affecting the benthic community, the almost complete elimination of mayflies in Swift Creek was cause for concern. Previous studies (Four Point Agreement) have shown that Occidental's mining discharge has had detrimental effects on ephemeropterans in Hunter's Creek, predominantly due to high ammonia concentrations.

Water Quality Inspection (WQI)

Date Sampled: 3 February 1992

Results: Extreme nutrient enrichment was observed in Swift Creek, exhibited by concentrations of ortho-phosphorus (0.64 mg/L), total phosphorus (6.0 mg/L), nitrate-nitrite (1.7 mg/L), and ammonia (0.63 mg/L) which were higher than 95 % of all other Florida streams. Test site AGP results were indicative of inhibition, possibly due to the very elevated levels of total soluble inorganic nitrogen present. Past studies (FDER 1985) have shown that the average AGP in the Suwannee River downstream of Swift Creek to be in excess of the 5 mg dry weight/L "problem threshold".

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

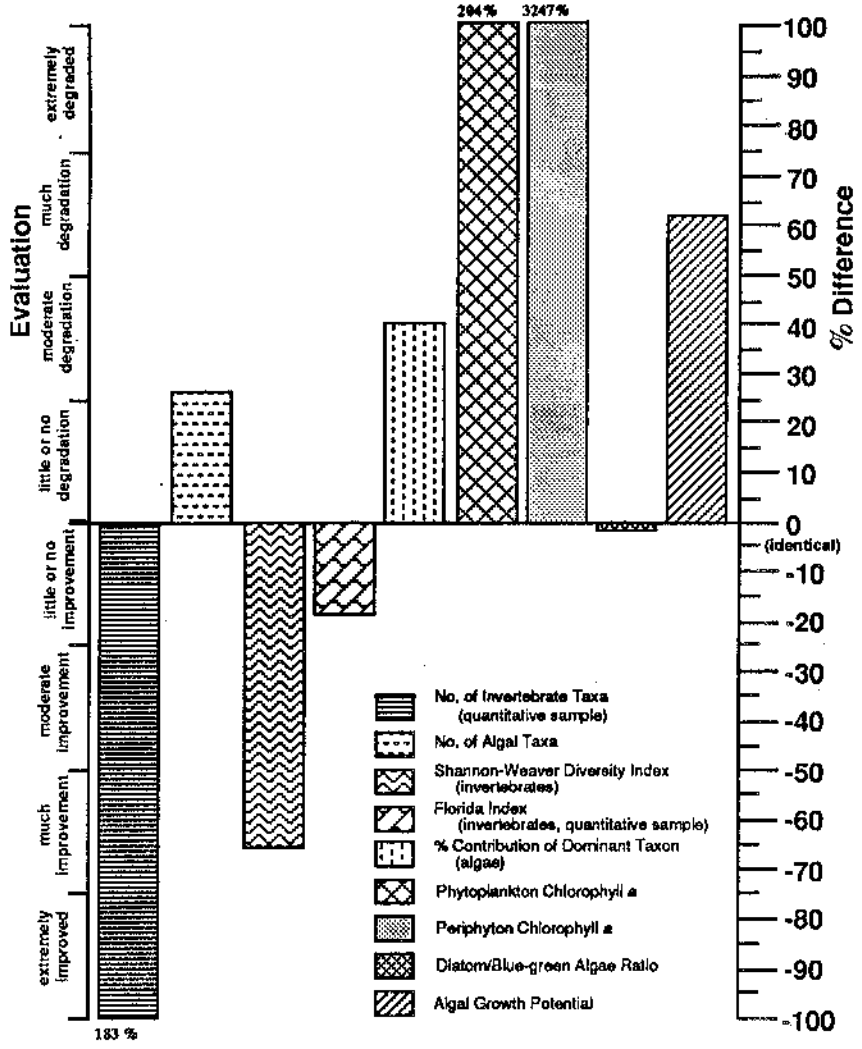
Occidental Chemical Corporation operates two large phosphate mining and fertilizer manufacturing complexes in Hamilton County, Florida, near the town of White Springs (see maps in Appendix). The company mines phosphate rock and produces liquid fertilizers (merchant grade and super phosphoric acid), granular fertilizers (di-ammonium phosphate, mono-ammonium phosphate, and triple super phosphate), and animal feeds (pollyphos and dical phosphate).

The Swift Creek Chemical Complex includes a process water treatment area, gypsum stack, cooling pond and associated process water recirculation system, and a contaminated non-process water retention system. Non-process water consists of vacuum seal water, filter vacuum, scrubber water, evaporator condensate, filter skirt sprays, and stormwater run-off from the chemical complex. Discharge of treated (double limed) process water and contaminated non-process water is permitted through Swift Creek canal, through Eagle Lake (outfall spillway 001-18 to Swift Creek, in-stream sampling point 001). The Swift Creek Chemical Complex has never had a discharge of its treated process water, therefore it contributes only non-process water to Swift Creek.

The Swift Creek Mine includes mining and beneficiation operations which includes a phosphatic clay settling system with recirculation to the mine's hydraulic system. Excess waters, accumulated primarily from extreme rainfall events, are discharged through Eagle Lake, and

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	34	32
Florida Index	17	13
% Contribution of Dominant Taxon	21.1	21.2
% Malacostraca	10.5	6.1
% Diptera	27.4	75.8
% Ephemeroptera	40.0	0
% Trichoptera	2.1	4.0
% Pelecypoda	0	5.0
% Coleoptera	11.6	6.1
% Other	8.4	3.0
% Predators	27.7	24.5
% Collector-Gatherers	41.6	40.8
% Collector-Filterers	5.5	13
% Scrapers	16.0	4.1
% Shredders	9.2	17.6
Macroinvertebrate Hester-Dendy		
Number of Taxa	12	34
Florida Index	16	19
Shannon-Weaver Diversity	2.0	3.3
% Oligochaeta	0	0.8
% Diptera	65.9	81.2
% Ephemeroptera	27.1	0.2
% Trichoptera	5.0	16.7
% Malacostraca	0	0.6
% Megaloptera	1.2	0
% Other	0.8	0.5
% Predators	4.2	21.1
% Collector-Gatherers	22.9	25.6
% Collector-Filterers	57.7	36.8
% Scrapers	13.7	1.1
% Shredders	1.5	15.4
Periphyton Algae		
Number of Taxa	15	11
% Contribution of Dominant Taxon	51.7	72.4
Chlorophyll a (mg/sq. m)	0.2	5.7
Diatom/Diatom + B-G Abundance Ratio	0.97	0.99
% Blue-green	3.3	1.3
% Green	2.2	0.3
% Diatoms	94.5	98.4
Algal Growth Potential (mg dry wt/l)	0.21	0.34



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

then to Swift Creek. A new mining discharge has been permitted to Camp Branch (outfall spillway 004-1). The discharge will consist of rainfall run-off which falls on the watershed and de-watering operations during mining. The excess water is routed to previously mined pits or reclaimed areas for settling prior to discharge.

The Suwannee River Chemical Complex consists of a process water treatment area, the CTC and Dorr-Oliver gypsum stacks, cooling ponds and associated process water recirculation systems, and a contaminated non-process water retention system. Discharge of treated (double-limed) process water and contaminated non-process water is through outfalls 001-17, 001-8 and 001-4 to Swift Creek (in-stream sampling point 001). Discharge of treated process water occurs infrequently from extreme rainfall events.

The Suwannee River Mine consists of mining and beneficiation operations which include a phosphatic clays settling system with recirculation to the mine's hydraulic system. Excess mining waters are accumulated primarily from rainfall events and discharged through various outfalls to Swift Creek and Hunters Creek (in-stream sampling point 002-A).

No violations of discharge limits (see Appendix) have been recorded in the past year, and Monthly Operating Report data have been satisfactory. A chemical and biological study conducted under the "Four Point Agreement" between Occidental and the EPA indicated significant reductions in ephemeropteran (mayfly) populations in Hunters Creek, attributed to ammonia concentrations in the mining discharge.

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 in Deep Creek) and a test site (located in Swift Creek at the facility's 001 instream sampling point) (see maps in Appendix). For this particular study, since the test site in Swift Creek was composed primarily of effluent, the effluent sampling point and test site were considered to be synonymous. Conditions at the test site represent the combined influences of the Swift Creek Mine and Chemical Complex and the Suwannee River Mine and Chemical Complex. 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 *Notropis leedsi* as test

organisms, were performed on an effluent sample (Weber 1991). The effluent/test site was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). 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. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. 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 and phytoplankton 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

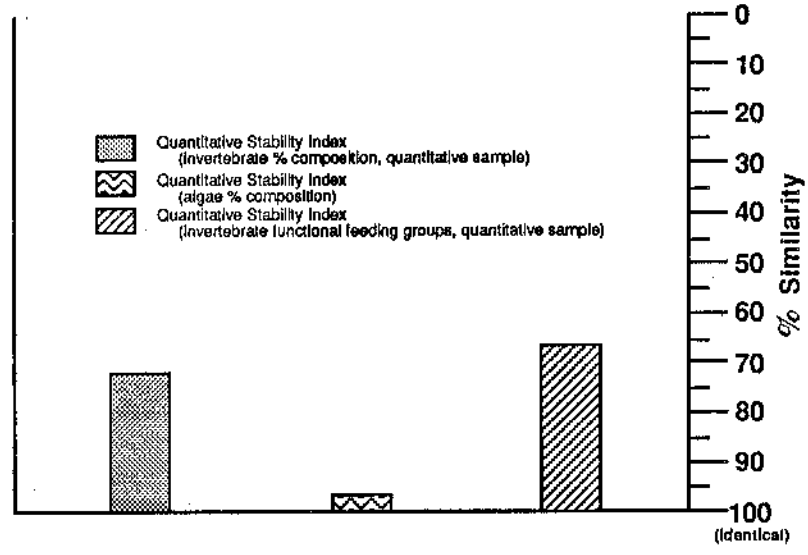
Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver Diversity Index, and chlorophyll *a* are well known. Others are briefly explained here. The Florida Index assigns points to stream-dwelling macroinvertebrates 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 bluegreen 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 reference and test sites involving the number of taxa, the diversity index, Florida Index and the diatom to bluegreen algae ratio are measured as the reference site minus test site divided by the reference 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 reference site divided by the reference site.

The following personnel were involved in this investigation: Scott Bulgrin (DER Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Sandy McClure, and Kim Pearce (Tallahassee Biology Laboratory).

Results and Discussion

Habitat quality ratings at the reference site (Deep Creek = 82 points) and at the test site (Swift Creek = 83 points), were virtually



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

identical. Both streams were moderately large (4 to 5 m wide) with substantial water velocity (above 0.3 m/sec). Dissolved oxygen was high (above 8.5 mg/L) at the two sampling sites, although water at the reference site was much more acidic (pH = 4.6 at the reference, and 7.4 at the test site). Conductivity was slightly higher at the reference station (500 µmhos/cm, versus 333 µmhos/cm in Swift Creek).

The instream effluent sample was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*, although 20 % mortality was observed in the fish test. Aliphatic compounds (34 µg/L), iron (106 µg/L), and aluminum (228 µg/L), were detected at levels above quantitation limits in the discharge. These concentrations are not high enough to be of concern. Gross alpha radiation (1.6 pCu/L), radium-226 (0.8 pCu/L), and radium-228 (0.7 pCu/L) measured in Swift Creek were below levels found in the upper Suwannee River during a two year study (FDER 1985), and were within the facility's permit limits.

Total coliform bacteria were measured to be 273 organisms/100 ml at the reference site, and 370 organisms/100 ml at the test site. Fecal coliforms were 81 organisms/100 ml and 153 organisms/100 ml at the reference and test sites, respectively. None of these values are considered troublesome.

Extreme nutrient enrichment was observed in Swift Creek. Concentrations of ortho-phosphorus (0.64 mg/L), total phosphorus (6.0 mg/L), nitrate-nitrite (1.7 mg/L), and ammonia (0.63 mg/L), were higher than 95 % of all other Florida streams (see Table of Typical Water Quality Values in Appendix). In contrast, nitrogen species were low or undetected at the reference site, while phosphorus concentrations measured there (*e.g.*, TP = 0.14 mg/L) were slightly higher than average streams.

Algal growth potential results were as follows: 0.21 mg algal dry wt/l at the reference site and 0.34 mg algal dry wt/l at the test site. In light of the nutrient results, these findings suggest growth inhibition at the test site, which was probably related to the very elevated inorganic nitrogen present in the sample. While total soluble inorganic nitrogen is a necessary plant nutrient, excessive amounts have been shown to inhibit the growth of *Selenastrum* (Don Schultz, U.S. Environmental Protection Agency, personal communication). While *Selenastrum* growth inhibition may be a factor associated with the very high TSIN concentrations in Swift Creek, this has not the case in the Suwannee River downstream of Swift Creek, where the mean AGP has been 15 mg dry weight/L (FDER 1985). Correspondingly, the mean TSIN in the Suwannee downstream of Swift Creek was 0.5 mg/L. This indicates that after dilution with river water, the nutrients are such that the AGP is well in excess of the 5 mg dry weight/L "problem threshold", above which eutrophication effects are likely (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 reference 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.

In the Hester-Dendy samples, the test site scored better than the reference site with respect to taxa richness, diversity, and Florida Index. However, in the discrete dip net samples, macroinvertebrate indices at the reference site were the same as, or slightly higher than, the test site. Ephemeropteran populations were virtually nonexistent at the Swift Creek test site, but were well represented at the reference site. As mentioned earlier, past studies have shown that Occidental's mining discharge has had detrimental effects on mayflies in Hunter's Creek. Mayflies are especially susceptible to ammonia toxicity, and relatively high ammonia concentrations are characteristic of Occidental's discharge.

Periphyton at the Swift Creek test site was characterized by a 27% reduction in taxa richness, a 40% increase in the contribution of the dominant taxon, and a 3247% increase in chlorophyll *a*, compared to the reference site. Free water chlorophyll *a* in Swift Creek was 204% higher than that found in Deep Creek. The increase in algal biomass, coupled with the observation that 72.4% of the periphytic population was made up of a single organism (*Cocconeis placentula*), indicates that "imbalances in aquatic flora" are occurring in Swift Creek (17-302.560(29) FAC). Based upon correlations between the Trophic State Index and diatom assemblages in Florida aquatic systems, *Cocconeis placentula* has been categorized as an indicator of eutrophic conditions (Whitmore 1989). The high dominance of an alga which is known to be characteristic of nutrient polluted waters supports the interpretation that the test site suffered from nutrient induced imbalances.

Conclusions

The sample of Occidental's effluent was not toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. The concentrations of metals and organics detected in the discharge were below problem levels. Gross alpha radiation, radium-226, and radium-228 measured in Swift Creek were less than that found in the upper Suwannee River during a two year study (FDER 1985), and were within the facility's permit limits. Fecal and total coliform densities were also within standards.

Extreme nutrient enrichment was observed in Swift Creek, exhibited by concentrations of ortho-phosphorus, total phosphorus, nitrate-nitrite, and ammonia which were higher than 95 % of all other Florida streams. Test site AGP results were indicative of inhibition, possibly due to the very high inorganic nitrogen present in the sample. Past studies (FDER 1985) have shown that the average AGP in the Suwannee River downstream of Swift Creek to be in excess of the 5 mg dry weight/L "problem threshold".

While most measures of macroinvertebrate health indicated that the discharge was not adversely affecting the community, the almost complete elimination of mayflies in Swift Creek was cause for concern. Previous studies have shown that Occidental's mining discharge has had detrimental effects on ephemeropterans in Hunter's Creek, predominantly due to high ammonia concentrations.

The periphyton community in Swift Creek suffered from the observed nutrient enrichment, exhibiting increased biomass, reduced taxa richness, and high dominance of an organism which is a known indicator of eutrophic conditions. These adverse changes in the algal community are interpreted as a violation of imbalances of aquatic flora (17-302.560(29) FAC).

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.

FDER. 1985. Limnology of the Suwannee River. Fla. Dept. Environ. Reg. Biology Section. 407 p.

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.

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

Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

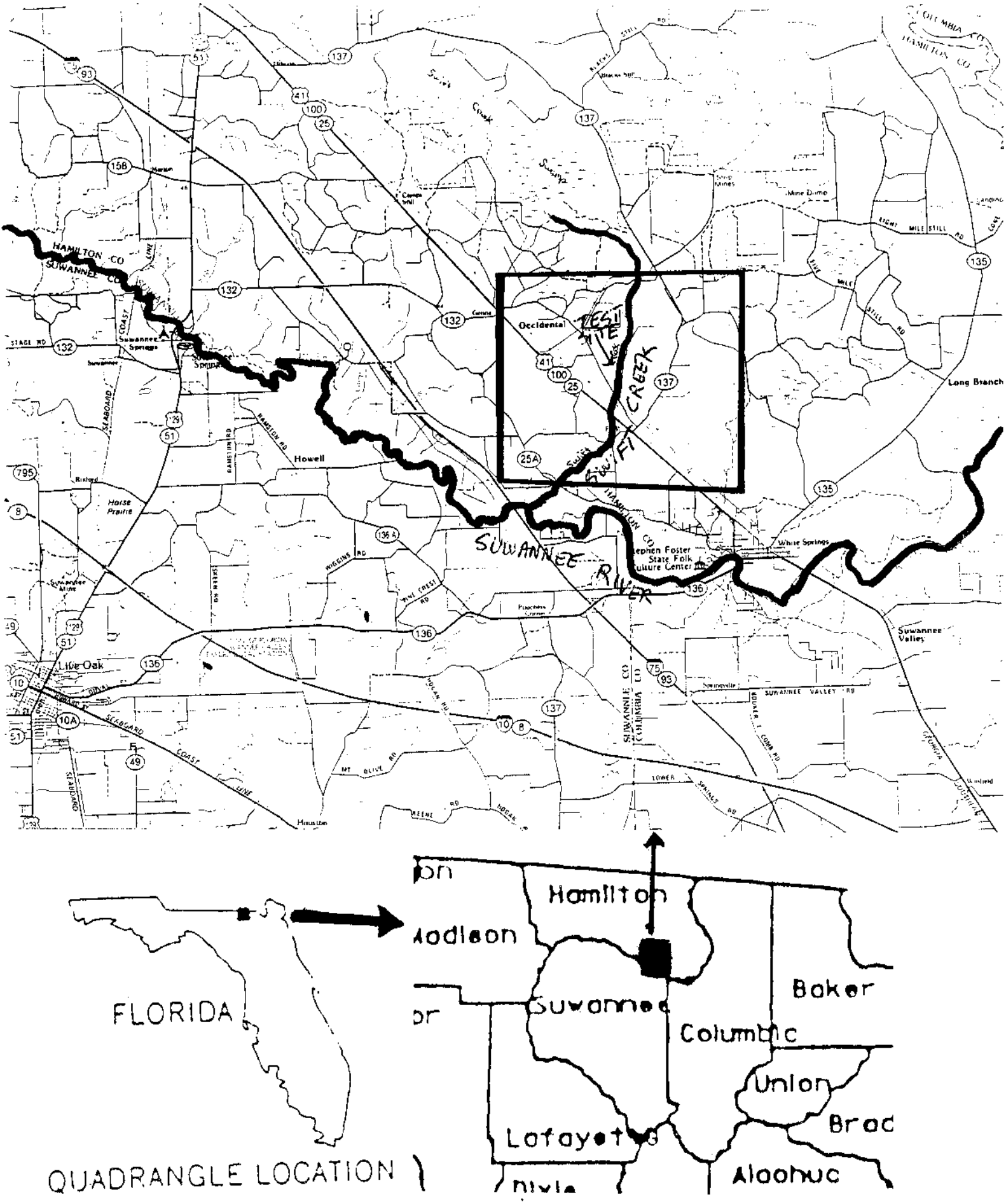
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Whitmore, T. J. 1989. Florida diatom assemblages as indicators of trophic state and pH. Limnol. Oceanogr. 34(5): 882-895.

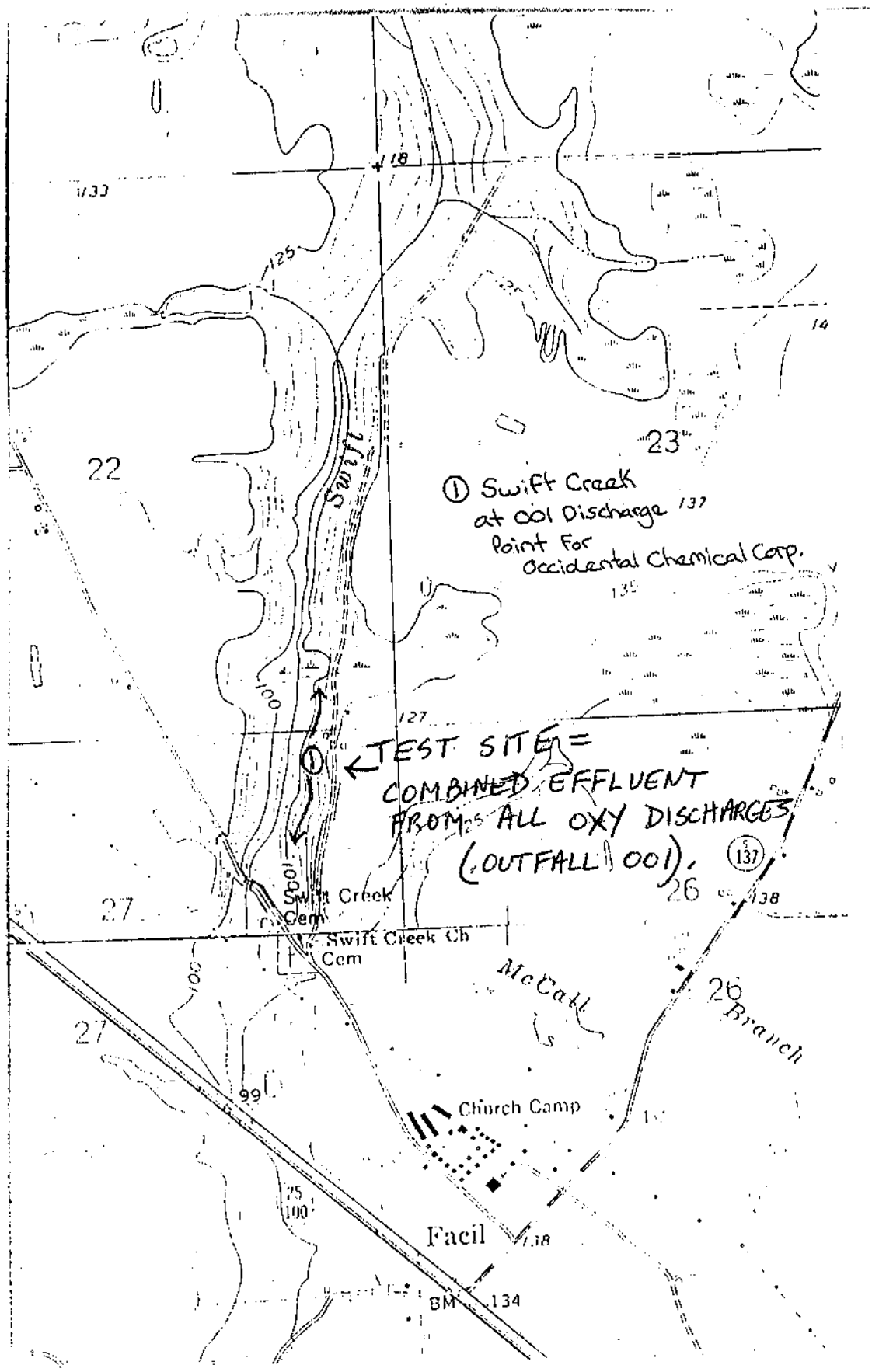
Chemistry summary table for Occidental Chemical Corp.

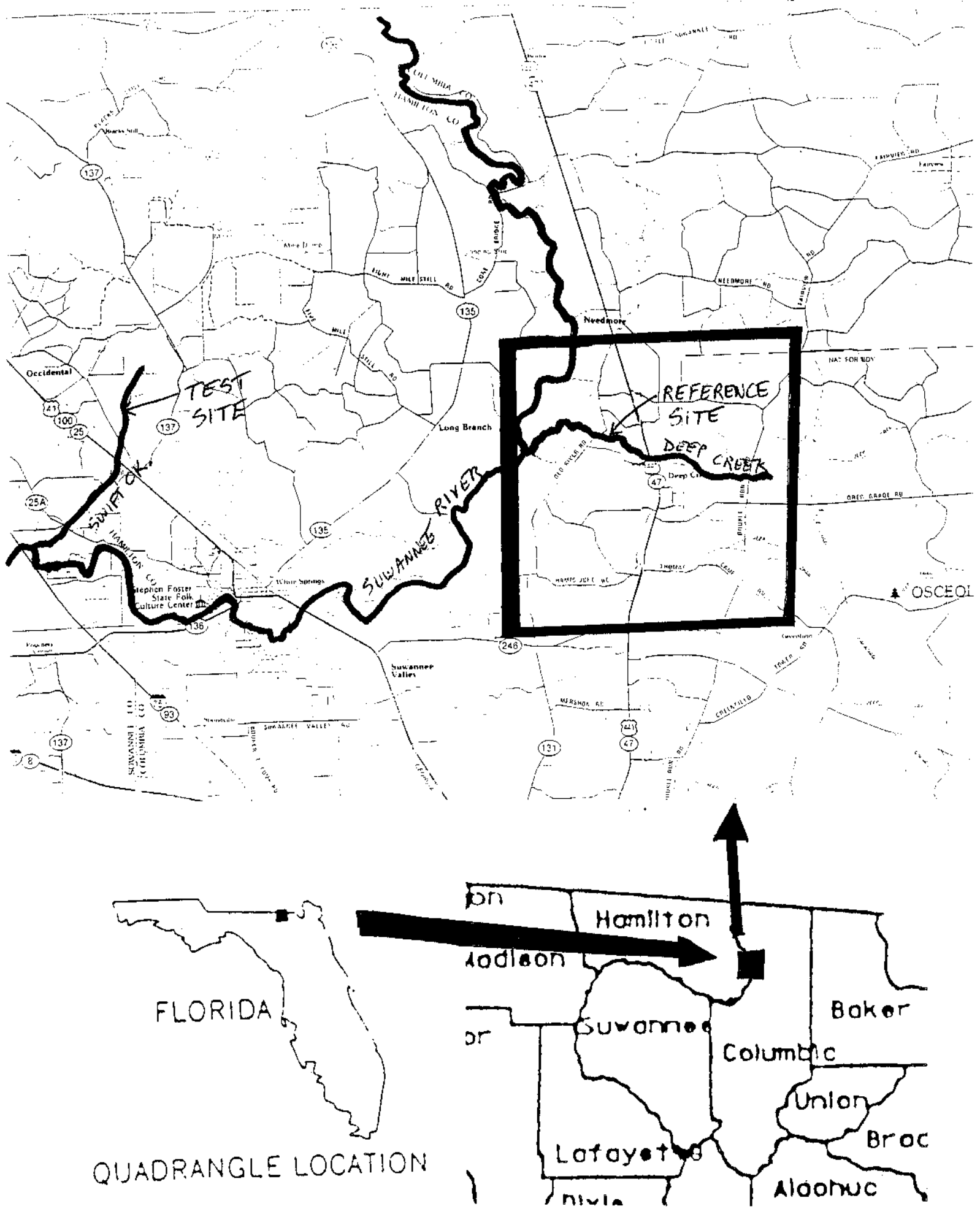
	Effluent/ Test Site	Reference Site
Organic Constituents (ug/L)		
Aliphatic compounds	34	
Metals (ug/L)		
Aluminum	228 A	
Arsenic	20 U	
Cadmium	0.11 T	
Copper	5 U	
Chromium	10 U	
Iron	106 A	
Lead	1.3 U	
Mercury	0.1 U	
Nickel	5 U	
Silver	0.13 U	
Zinc	5 U	
Nutrients (mg/L)		
Ortho-phosphorus	0.64	0.12
Total phosphorus	6.0	0.14
Ammonia	0.63 A	0.05 A
Nitrate+Nitrite	1.7 A	0.04 U
TKN	1.8	1.1
Other Parameters		
Habitat Assessment	83	82
D.O. (mg/L)	8.5	9.2
pH (SU's)	7.4	4.6
Conductivity(µmhos/cm)	333	500
Temperature (°C)	12.7	11.5
Phytoplankton Chlorophyll a (µg/L)	22.2	7.3
Gross Alpha (pCu/L)	1.6	
Rad-226 (pCu/L)	0.8	
Rad-228 (pCu/L)	0.7	
Flouride	2.6	
Sulfate	120	
Bioassay Fish-Unchlorinated	not toxic	
Bioassay Invertebrate-Unchlorinated	not toxic	
Fecal coliform (org/100 ml)	153	81
Total coliform (org/100 ml)	370 J	273
BOD	4.7	4.6
TSS	11	2

A - Value reported is the mean of two or more determinations
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
T - Value reported is less than the practical quantitation limit
U - Material analyzed for but not detected; value reported is the minimum detection limit

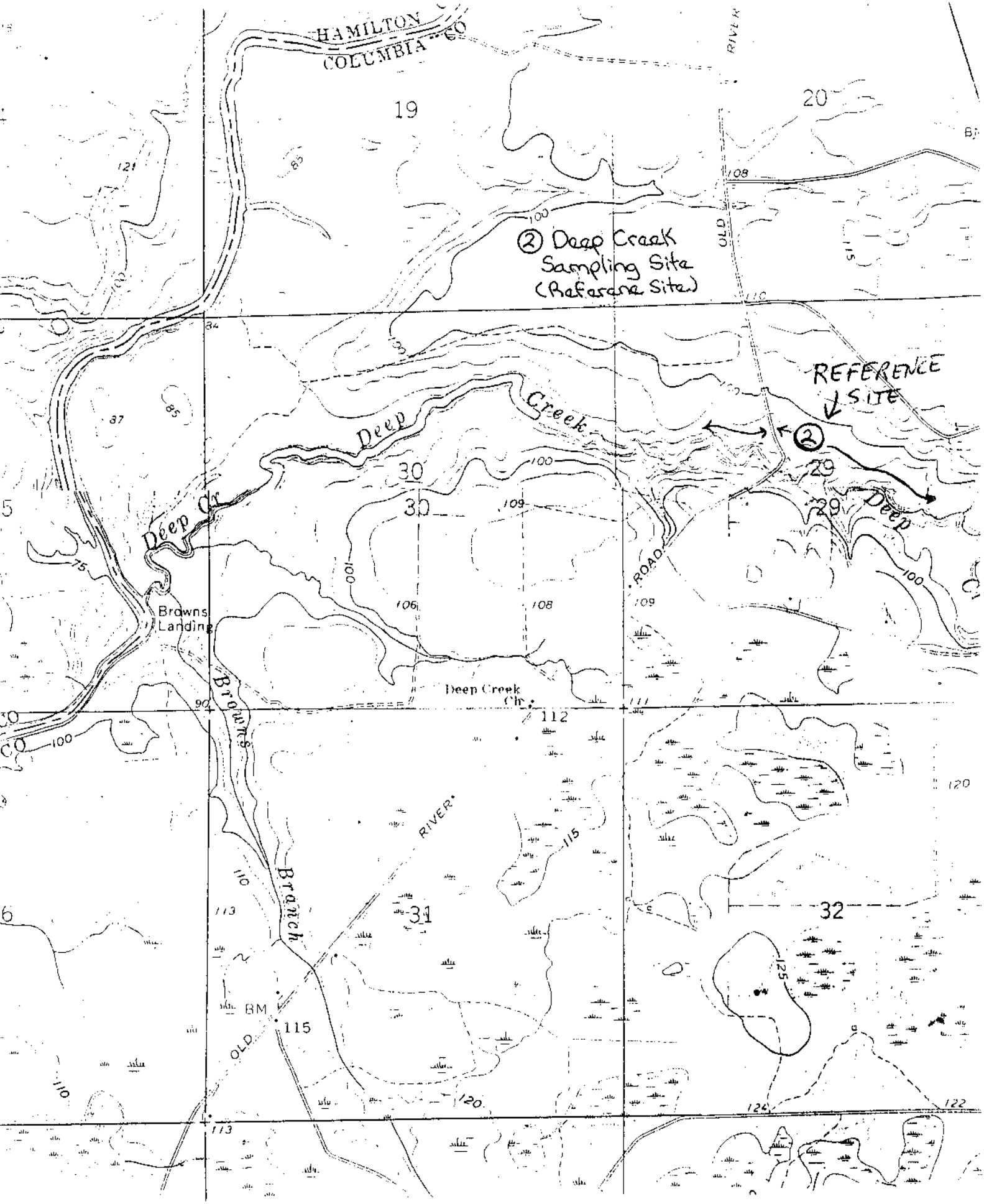


AREA of Study for Swift Creek Sample


① Swift Creek at 001 Discharge Point For Occidental Chemical Corp.
TEST SITE = COMBINED EFFLUENT FROM ALL OXY DISCHARGES (OUTFALL 001).
Swift Creek Cem
Swift Creek Ch Cem
McCall
Church Camp
Facil
BM
Swift
Branch
22
23
26
27
18
14
125
133
127
135
137
138
134
100
99
75



AREA OF STUDY FOR DEEP CREEK SAMPLING



AREA OF STUDY FOR REFERENCE SITE IN OCCIDENTAL CHEMICAL STUDY

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Occidental Chemical Corporation Swift Creek Chemical Complex and Mines	**Prepared by:** SCOTT BELGRIN **Date:** 02/12/92	
Location (attach detailed map): 7 miles north of White Springs, Florida, adjacent to US Highway 41.	**County** Hamilton	**District** Fla. D.E.R. NorthEast District
Federal Permit # and expiration date: FL0026226	**State GMS # and State expiration date:** 3124P00322 IC24-165633 Category B 1992	**Facility Type:** (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Mining Activities. Occidental Chemical Corporation produces phosphatic fertilizers, superphosphoric acid and associated by-products at the Swift Creek Chemical and Mining Complex.

Description of treatment process: For the operations at the Swift Creek Chemical Complex including the process water treatment area, the gypsum stack and cooling pond with the associated water recirculation systems, and the contaminated non-process water retention system. Discharge of treated process water or contaminated non-process water is to Swift Creek Canal (sampling point 001-S) or to Swift Creek (in stream sampling point 001) through Eagle Lake Catfall spillway 001-18).

Receiving waters: Swift Creek to the Suwannee River.	**Classification:** Class III
Design Flow:	**Actual Mean Flow:**

Discharge is: (Continuous) Intermittent Seasonal Rainfall dependent
Other (describe) * Swift Creek is Occidental Chemical Corporation's Effluent
therefore, the best time to sample is: Anytime

If facility has a mixing zone, give details (size, parameters affected, etc.): Facility has No Mixing Zone

List effluent limits:

Parameter	Limit (units)
For the various monitoring points the effluent limitations are the same as limitations for A. The State Permit B. The NPDES Permit.	

Describe special permit conditions and permit modifications:
From the [illegible] with the applicable effluent limitations [illegible] 17-3, FAC at in stream sampling point 001 (Swift Creek) and at the Swift Creek

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): Discharges of treated process wastewater, non-process wastewater, and stormwater from Mosaic Fertilizer, LLC, Riverview Complex, Hillsborough County, Florida

Monitoring Point

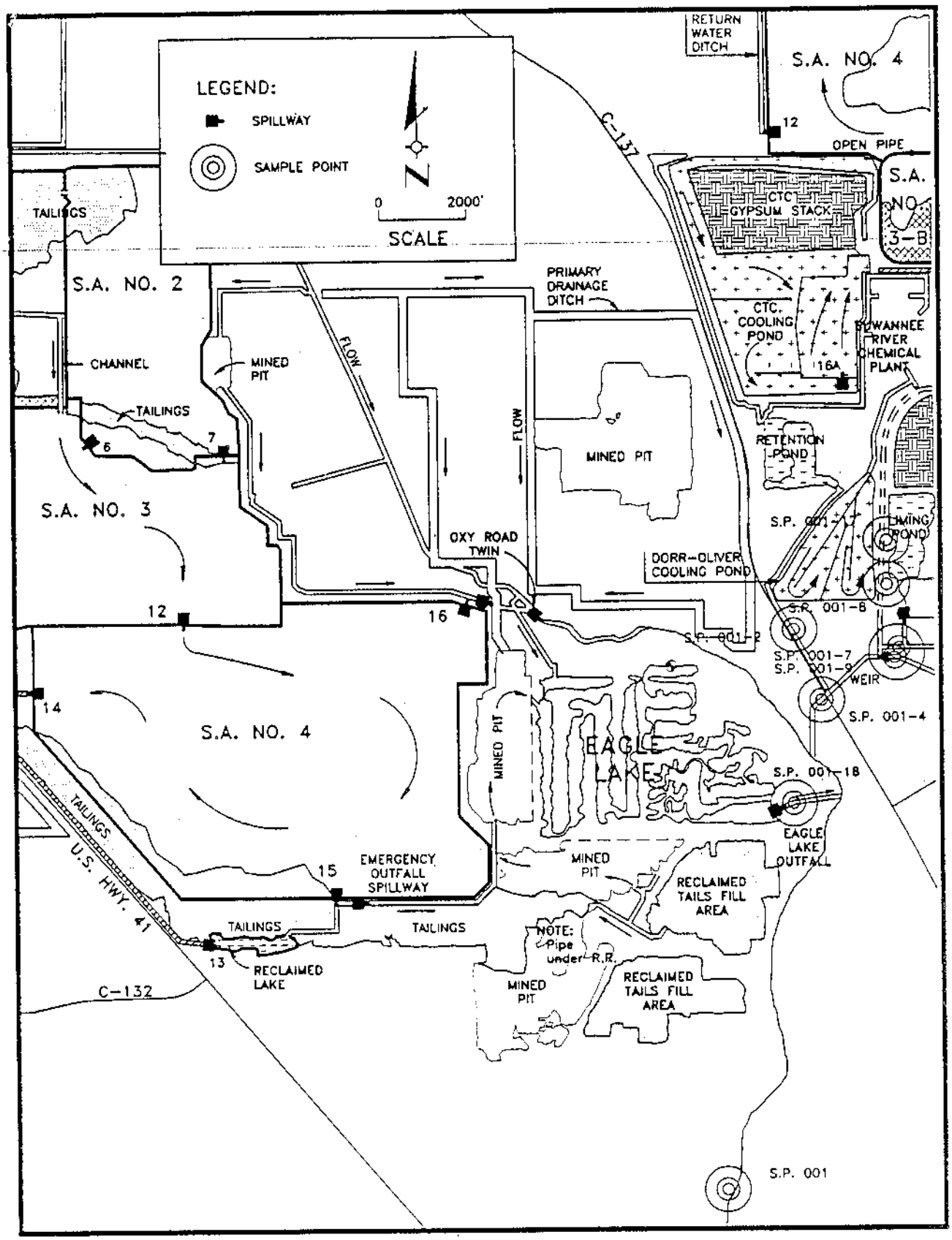
CC-1, Instream sampling point, Scott Creek LAT 27°54'N LONG 82°47'W
CC-2A Treated process water
CC-2B Contaminated process water
CC-13 outfall spillway from Eagle Lake to Scott Creek
CC-15 Eagle Lake discharge to Scott Creek

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:

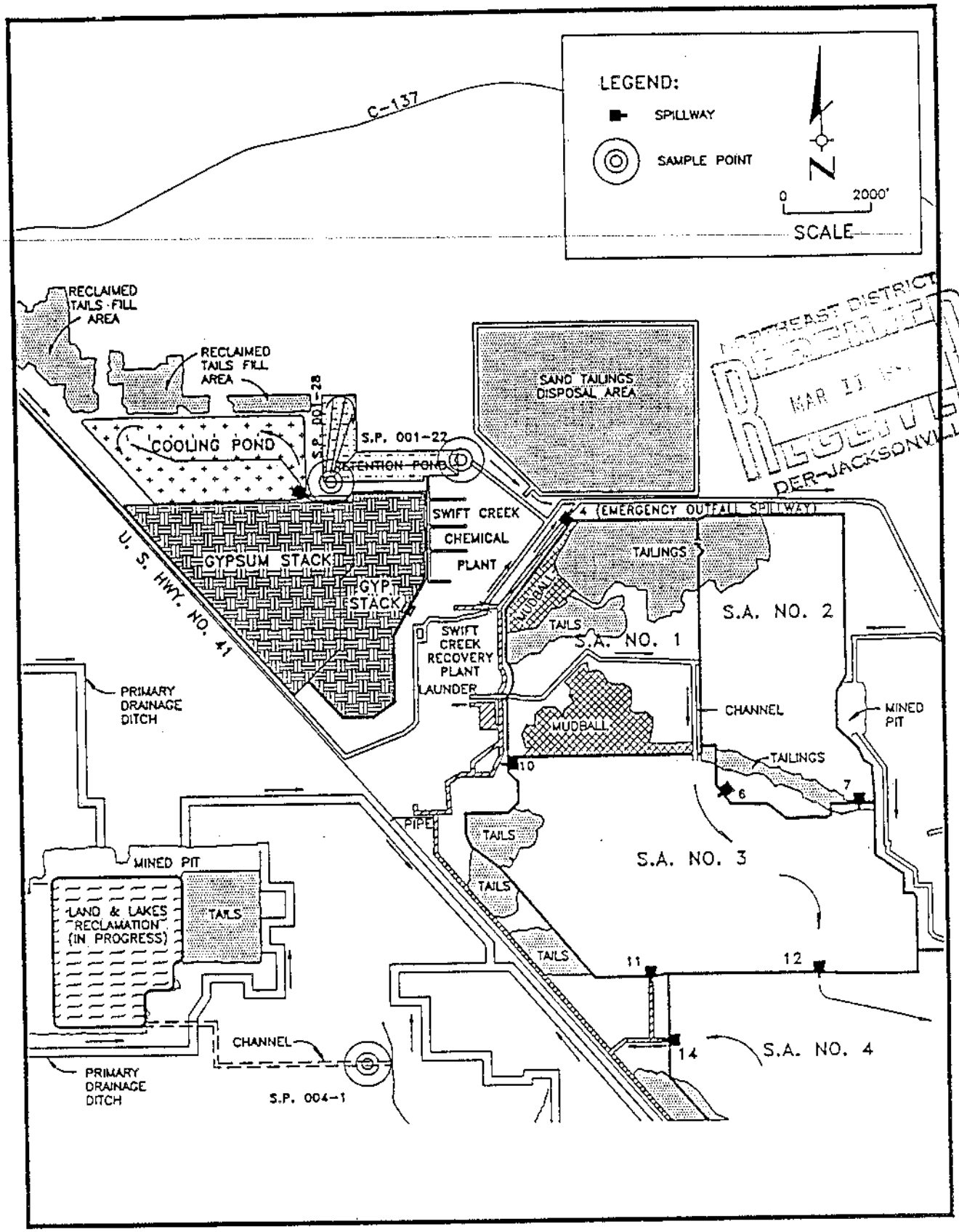
Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:

Additional information:



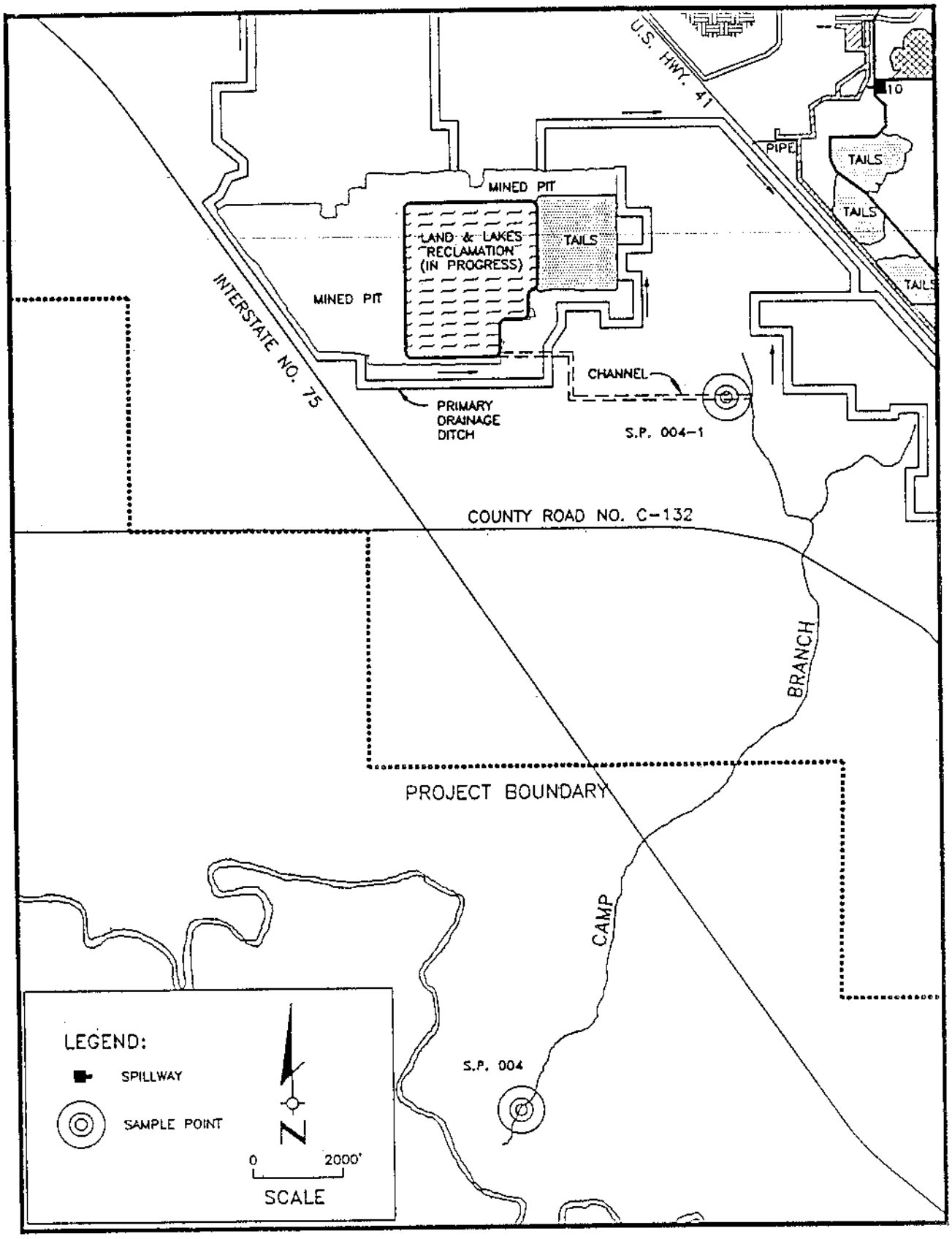
LOCATION OF SAMPLING POINT 001-18

PREPARED BY ENVIRONMENTAL SERVICES & PERMITTING, INC. 3/91



LOCATION OF SAMPLING POINTS 001-22, 001-28, AND 004-1

PREPARED BY ENVIRONMENTAL SERVICES & PERMITTING, INC. 3/91



LOCATION OF SAMPLING POINTS 004 AND 004-1

PREPARED BY ENVIRONMENTAL SERVICES & PERMITTING, INC. 3/91

PERMITTEE:

Occidental Chemical Agricultural Products, Inc.

I.D. Number: GMS 3124P00322
Permit/Certification Number: IO24-130294
Date of Issue: February 5, 1988
Expiration Date: October 31, 1992

SPECIFIC CONDITIONS:
4. (continued)

Monitoring Point	Parameters	Minimum Applicable Water Qual. Standards	Measurement Frequency	Sample Type
***				
001, instream sampling point, Swift Creek	Flow (MGD)	---	Continuous	--
	BOD (mg/l)	See 17-3.061(2)(b)	1/week*	24 hr. composite
Lat: 30°27'04"N	Total Phosphorus P (mg/l)	See 17-3.061(2)(J) & 17-3.121(19)	1/week*	24 hr. composite
Long: 82°47'50"E	TKN, as N (mg/l)	See 17-3.061(2)(j) & 17-3.121(19)	1/week*	24 hr. composite
	Total Nitrogen, as N (mg/l)	See 17-3.061(2)(j) & 17-3.121(19)	1/week*	24 hr. composite
	Ammonia (ionized & unionized) as N (mg/l)	unionized, 0.02 mg/l	1/week*	24 hr. composite
	Total Sulfates (mg/l)	---	1/week*	24 hr. composite
	Fluoride (mg/l)	10.0 mg/l (Max.)	1/week*	24 hr. composite
	Oil & Greases (mg/l)	5.0 mg/l (Max.)	1/week*	24 hr. composite
	D.O. (mg/l)	5.0 mg/l (Min.)	1/week*	In-Situ, mid-depth, mid-stream
	Turbidity (NTU)	See Spec. Condition 6	1/week*	24 hr. composite
	TSS (mg/l)	---	1/week*	24 hr. composite
	Conductivity (unho/cm)	See Spec. Condition 6	1/week*	24 hr. composite
	Radium 226 & 228** (pCi/l)	5 pCi/l (Max.)	1/month	24 hr. composite
	Gross Alpha** Radiation (pCi/l)	15 pCi/l (Max.)	1/month	24 hr. composite
	pH	See Spec. Condition 6	1/week*	24 hr. composite

*Except for daily for the first week of every second month.

ERMITTEE:

ccidental Chemical Agricultural Products, Inc.

I.D. Number: GMS 3124PC 322
Permit/Certification Number: IO24-130294
Date of Issue: February 5, 1988
Expiration Date: October 31, 1992

**The Permittee shall first analyze for gross alpha particle including radium 226, but excluding radon and uranium. If the gross alpha particle activity exceeds five picocuries per liter, the Permittee will be required to analyze an aliquot of the same sample for radium 226 and 228.

**Parameters, minimum applicable water quality standards, measurement frequencies and sampling point 001 are the same as contained in Permit IO24-88927 (Suwannee River Mine Industrial Wastewater Treatment Discharge System) and are repeated here for clarity.

onitoring oint	Parameters	Effluent Limitations 1 day max.	30 day avg.	Measurement Frequency	Sample Type
01-28, reated rocess ater	Flow (MGD)	--	--	Continous	Recorder
	Total Phosphorus P (mg/l)	105	35	2/week	24 hr. composite
	Fluoride (mg/l)	75	25	2/week	24 hr. composite
	Total Suspended* Solids, TSS (mg/l)	150	50	2/week	24 hr. composite
	Turbidity (NTU)	--	--	2/week	24 hr. composite
	pH (S.U.)	6.0-9.5	6.0-9.5	2/week	24 hr. composite
	Ammonia (unionized & ionized) as N (mg/l)	--	--	2/week	24 hr. composite
	Gross Alpha** Radiation (pCi/l)	15	--	1/month	Grab
	Radium 226 & 228** (pCi/l)	5	--	1/month	Grab
01-22, ontaminated rocess ater	Flow (MGD)	--	--	Continuous	Recorder
	Total Phosphorus P (mg/l)	105	35	2/week	24 hr. composite
	Fluoride (mg/l)	75	25	2/week	24 hr. composite
	pH (S.U.)	6.0-9.5	6.0-9.5	2/week	Grab

*Total suspended solid limitation above shall be waived for process wastewater which is chemically treated and settled to meet other pollutant limitations.

**The Permittee shall first analyze for gross alpha particle activity including Radium 226 but excluding radon and uranium. If gross alpha particle activity exceeds 5 pCi/l, the Permittee shall analyze an aliquot of the same sample for Radium 226 and 228.

PERMITTEE:

Occidental Chemical Agricultural Products, Inc.

I.D. Number: GMS 3124P00322
Permit/Certification Number: IO24-130294
Date of Issue: February 5, 1988
Expiration Date: October 31, 1992

Monitoring Point	Parameters	Effluent Limitations 1 day max.	30 day avg.	Measurement Frequency	Sample Type
* 001-18, outfall spillway from Eagle Lake to Swift Creek, combined wastewaters	Flow (MGD)	--	--	Continous	Recorder
	Total non-volatile non-filterable residue (mg/l)	25	12	2/week	24 hr. composite
	Total non-filterable Residue (mg/l)	60	30	2/week	24 hr. composite
	Total Phosphorus P** (mg/l)	5	3	2/week	24 hr. composite
	pH (S.U.)	6.0-9.0	6.0-9.0	2/week	Grab
*** 001-5, Eagle Lake diversion structure, combined wastewaters	--	--	--	--	----

*Monitoring parameters, effluent limitations, measurement frequencies, sample type for sampling point 001-18 are the same as contained in DER Permit No. IO24-72049 (phosphoric clays settling system, outfall spillway 001-18) and are repeated here for clarity. Combined wastewaters include process generated and mine dewatering discharges from the mining and beneficiation of phosphate rock, contaminated non-process and treated process wastewaters from the chemical plant, and treated sanitary wastewaters.

**Subject to the conditions of Section 17-6.310(5), Florida Administrative Code.

***Water quality limitations and monitoring requirements for station 001-5, including diversion of flow to Eagle Lake shall be in accordance with the settlement agreement between Occidental and DER, Case No. 78-2101, and NPDES Permit FL0036226 issued December 30, 1986.

REVISED
DRAFT

JUL 30 1986

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from outfall(s) Serial Number(s) 001-18 combined wastewater stream consisting of process generated and mine dewatering discharges from the mining and beneficiation of phosphate rock, contaminated non-process and treated process wastewaters from the chemical plant, and treated sanitary wastewaters.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
	kg/day (lbs/day)		Other Units (Specify)			
	Daily Average	Daily Maximum	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow, M^3/Day (MGD)	-	-	-	-	Continuous	Recorder
Total non-volatile, non-filterable residue	-	-	12 mg/l	25 mg/l	1/Week	Grab
Total non-filterable residue	-	-	30 mg/l	60 mg/l	1/Week	Grab
Total Phosphorus (as P)	-	-	-	-	1/Week	Grab

* Total Phosphorus shall be for monitoring and reporting only, except as provided in Part III-B.

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week during discharge with a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): nearest accessible point after final treatment but prior to actual discharge or mixing with the receiving streams.

JUL 30 1986

PART I

REVISED
DRAFT

B. WATER QUALITY LIMITATIONS AND MONITORING REQUIREMENTS for Station 001.

1. During the effective term of this permit, the permittee shall sample at point 001 in Swift Creek (as identified in the attached sketch) the parameters listed below. These parameters shall be in compliance at all times with the water quality standards set forth in Chapter 17-3, Florida Administrative Code (F.A.C.). Any exceedence of the conditions shall be a violation of this permit and subject to the enforcement provisions of the Clean Water Act.

Such parameters shall be monitored by the permittee as specified below:

PARAMETER	MONITORING REQUIREMENTS	
	Measurement Frequency	Sample Type
Flow (MGD)(a)	Continuous	Recorder
Total P	Weekly	24-Hr. Composite
Total N	Weekly	24-Hr. Composite
Ammonia (un-ionized)(b)	Weekly	Grab
Fluorides (c)	Weekly	24-Hr. Composite
Dissolved Oxygen (d)	Weekly	Grab
Gross alpha particle activity including radium 226, but excluding radon and uranium (e)	Monthly	24-Hr. Composite

a) Continuous flow monitoring in Swift Creek will be provided by the USGS station where Swift Creek crosses U.S. Highway 41.

(b) The water at Station 001 shall not exceed the un-ionized ammonia standard of 0.02 mg/l. (Ref. Chapter 17-3.121(3), F.A.C.). Grab samples for pH and temperature shall be taken simultaneously with the ammonia sample. Un-ionized ammonia shall be calculated in accordance with Table 2 (attached). When the pH is less than 6.0 standard units, sampling for un-ionized ammonia is not required and should be so noted on the DMR.

(c) The water at Station 001 shall not exceed the fluorides standard of 10 mg/l. (Ref. Chapter 17-3.061(2)(h), F.A.C.)

(d) The dissolved oxygen of the water at Staion 001 shall not be less than the dissolved oxygen standard of 5 mg/l minimum. Normal daily and seasonal fluctuations above 5 mg/l shall be maintained. (Ref. Chapter 17-3.121(13), F.A.C.)

(e) The water at Station 001 shall not exceed the gross alpha particle activity including radium 226, but excluding radon and uranium, standard of 15 pCi/l. (Ref. Chapter 17-3.06(n) 2, F.A.C.). If the gross alpha particle activity exceeds 15 pCi/l, combined radium 226 and 228 shall be sampled and reported. The water at Station 001 shall not exceed the combined radium 226 and 228 standard of 5 pCi/l. (Ref. Chapter 17-3.061(n) 1. F.A.C.).

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 02/03/92	TIME: 1130	RECEIVING BODY OF WATER: Swift Creek to Suwannee River.

REMARKS: Swift Creek is accidental Chemical Corporations effluent. Forest Areas around Sampling site	LOCATION: Swift Creek at ccl Discharge Monitoring Point	FIELD ID/NAME: (Test Site, Downstream)

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
90%		10%				

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): Occidental Chemical Corporation

Road Runoff From Highway Downstream

Estimated System Width (range, m): 4 - 5	Estimated System Depth (range, m): 0.6 - 1.5	yes
High Water Mark (m above bed): 2.0	Velocity (range, m/s): 0.33	Impounded ☐ / Channelized ☒ NATURAL

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 Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☒ Shell: ☐ Other: ☒ Leaf Packs Detritus

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	20	5	DIPNET	Rock or Shell Rubble			
Leaf Packs	10	3	DIPNET	Sand	30	2	DIPNET
Aquatic Vegetation	5	1	DIPNET	Mud/Muck	5	1	DIPNET
Submerged Roots	15	4	DIPNET	Other:			
Undercut Banks	15	4	DIPNET	Other:			

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m):
Top	12.7	8.5	7.37	333				0.2
Mid-depth	13	8.5	7.37	333				
Bottom	13	8.5	7.37	333				

System Type : Stream: ☒ (Surficial Aquifer Fed / Deep Aquifer Fed / Alluvial / Blackwater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐ From Swift Creek Swamp

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): Slight Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐ _____

Weather Conditions: Cool, Sunny, 60's. Clear Skies

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

ANALYSIS DATE: 02/03/92	ANALYST: SCOTT BULGRIN	SIGNATURE: Scott L. Bulgrin

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 3)

SUBMITTING AGENCY CODE: EC 31 / SUBMITTING AGENCY NAME: FL Dept Environ Protection	STORET STATION NUMBER:	DATE (M/D/Y): 02/11/92	TIME: 1600	RECEIVING BODY OF WATER:

REMARKS: Area used for recreational fishing and other activities. A complex restoration project is underway. Area is impacted by water level manipulations.	LOCATION: Deep Creek at CR 1 Rural Road	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
95						5

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): No Point-Source Outfalls observed. Recreational Resort WWTP.

Estimated System Width (range, m): 4 - 5	Estimated System Depth (range, m): 2 - 3	yes
High Water Mark (m above bed): 2 - 3	Velocity (range, m/s):	Impounded ☒ Channelized ☒

Canopy Cover %: Open: ☐ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☒ 75% 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	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	20	3	V	Rock or Shell Rubble			
Leaf Packs	5	3	V	Sand	8	1	
Aquatic Vegetation				Mud/Muck	2	2	
Submerged Roots	3	3	V	Other: Limestone	30	2	
Undercut Banks	30	3	V	Other: Algae on Rocks	2	2	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	pH (SU):	Cond. (µmho/cm):				Secchi (m):
Top	11.5	9.2						
Mid-depth	11.6	9.2						
Bottom	11.6	9.2						

System Type: Stream: ☒ (Surficial Aquifer Fed ☐ Alluvial ☐ / Deep Aquifer Fed ☐ Blackwater ☐) Lake: ☐ Wetland: ☐ Estuary: ☐ 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: WARM Sunny.

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

ANALYSIS DATE: 02/11/92	ANALYST: SCOTT BUCKNER	SIGNATURE: Scott C Buckner

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER Northeast District	STORET STATION NUMBER:	DATE (M/D/Y): 02/11/92	RECEIVING BODY OF WATER: Deep Creek to Suwannee River

REMARKS: weather warm, Sunny Pristine area with little impact on floral fauna.	LOCATION: Deep Creek off Old River Road	FIELD ID/NAME: (Reference Site)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 21	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 27	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 15	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 6	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 8	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 5 — Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.

TOTAL SCORE 82

COMMENTS: Area used for Recreational fishing and activities. A couple of pastures near. Dirt Rd Runoff near Rd. Area is Pristine and is a fast moving creek.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
02/11/92	SCOTT BULGRIN	Scott Bulgrin

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FL DER NorthEast District	STORET STATION NUMBER:	DATE (M/D/Y): 02/03/92	RECEIVING BODY OF WATER: Swift Creek to Suwannee Road

REMARKS: Weather 60°, clear Area mostly forest and is in a suitable habitat for aquatic life.	LOCATION: Swift Creek at 001 Discharge Monitoring Point	FIELD ID/NAME: (Test Site, Downstream)

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 22	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 26	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 15	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 7	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 5	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	**TOTAL SCORE** 83

COMMENTS: Swift Creek is Occidental Chemical Corporation's effluent. Flowing from the Chemical Plant the creek enters the Suwannee River. Forest area around site.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
02/03/92	SCOTT BULGRIN	Scott Bulgrin

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: OCCIDENTAL CHEMICAL
Address/City: SWIFT CREEK
County: HAMILTON
Contact/District: SCOTT BULGRIN / NE
NPDES Permit #: FL0036286 M Outfall #: 001

Sample Collection: Date 2/3/92 Time 1130
Test Beginning: Date 2/4/92 Time 1400
Test Ending: Date 2/6/92 Time 10
Test Organism: C. DUBIA
Life Stage/Age: < 24 HRS

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

Remarks:
28136
92-F26-04-11-01

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7;9@9	8.8@22	23.2@23.4	1344@ 23.3
24 hr	7@7,9@9	8.6@23.5	23.2@23.5	1359@ 23.7
48 hr	7@7,9@9	8.8@22.0	22.0@22.1	1340@ 23.1

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
control	A	5	5	4	8.2		8.2	23.5		23.2	8.7		8.6	163		180
control	B	5	4	4			8.2						8.6			
control	C	5	5	5			8.2						8.6			
control	D	5	5	5			8.2						8.6			
25%	A	5	5	5	8.0		8.3	23.5		23.2	8.7		8.7	230		245
25%	B	5	5	5			8.3						8.7			
25%	C	5	5	5			8.3						8.7			
25%	D	5	5	5			8.3						8.7			
50%	A	5	5	5	7.8		8.3	24.0		23.1	8.7		8.8	295		300
50%	B	5	5	5			8.3						8.8			
50%	C	5	5	5			8.3						8.8			
50%	D	5	5	5			8.3						8.8			
75%	A	5	5	5	7.6		8.3	24.0		22.8	8.8		8.9	356		364
75%	B	5	5	5			8.3						8.9			
75%	C	5	5	5			8.3						8.9			
75%	D	5	4	4			8.3						8.9			
100%	A	5	5	5	7.5		8.3	24.0		23.0	8.8		8.9	419		415
100%	B	5	5	5			8.3						8.9			
100%	C	5	5	5			8.3						8.9			
100%	D	5	5	5			8.3						8.9			
Measured/Loaded by:		SG/MB	AJ	MB/KP	KP		MF	KP		MF	KP		MF	KP		MF
Recorded by:		KP	AJ	MF	KP		AJ	KP		AJ	KP		AJ	KP		AJ

Investigators' Signatures

Kim Pearce
Ellen Gregory Daniels
E. J. E. Ellis
Margaret E. Walker
Reviewer Marshall Brown

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			n/m		
Lab Tot. Resid. Cl2:	0	0	0	Hach	KP
Alkalinity:	120	72	79	Hach	KP
Hardness:	136	83	181	Hach	KP
Total Ammonia:	0.48	0.48	1.92	Hach	KP

Ammonia Meter Slope: ____ Ammonia Blank: ____ Salinity Sample: ____

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: OCCIDENTAL CHEM
Address/City: SWIFT CREEK
County: HAMILTON
Contact/District: SCOTT BULGRIN / NE
NPDES Permit #: FL0036226 Outfall #: 001

Sample Collection: Date 2/3/92 Time 1130
Test Beginning: Date 2/4/92 Time 1400
Test Ending: Date 2/6/92 Time
Test Organism: N. LEEDSI
Life Stage/Age: 19 DAYS

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

Remarks: 28136
92-Feb-04-11-01

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr				
24 hr				
48 hr				

Conc.	Chamber #	Number Live 0	24	48	pH 0	24	48	Temp. (°C) 0	24	48	DO (mg/L) 0	24	48	Cond. (µmhos/cm) 0	24	48
CONTROL	50	5	5	5	7.8	8.1	8.3	20.5	23.0	22.9	8.3	8.3	8.7			
CONTROL	86	5	5	5	7.8	8.2	8.3				8.3	8.4	8.7	227	243	244
50%	48	5	5	5	7.6	8.0	8.2	23.5	23.0	22.8	8.7	8.4	8.5			
50%	4	5	5	5	7.6	8.0	8.2				8.7	8.4	8.5	337	336	334
100%	73	5	4	3	7.4	7.8	8.0	26.0	23.0	22.8	9.0	8.2	8.2			
100%	120	5	5	5	7.4	7.8	8.0				9.0	8.3	8.2	456	425	424
				3 in #73 w water 2/6/92												
Measured/Loaded by:		TE	AJ	AJ	KP	SG	MF	KP	SG	MF	KP	SG	MF	KP	SG	MF
Recorded by:		KP	AJ	MF	KP	MW	BJ	KP	MW	BJ	KP	MW	BJ	KP	MW	BJ

Investigators' Signatures

Kim Pearce
Norm E. Dorsett
Eulpe E. Alvord
Margaret E. Walsh
Alison Jordan
Reviewer Mark Farrell

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:					
Lab Tot. Resid. Cl2:					
Alkalinity:					
Hardness:					
Total Ammonia:			1.92	Hach	KP

Ammonia Meter Slope: _____ Ammonia Blank: _____ Salinity Sample: 0 ppt

Macroinvertebrate taxa list for Occidental Chemical Corp., collected via Hester-Dendy samplers from Swift Creek (Test Site) and Deep Creek (Reference Site) on 3 March 1992.

	Reference Site	Test Site
Coleoptera		
Dubiraphia sp.	–	1
Hydroporus sp.	–	1
Microcylloepus pusillus	–	2
Microcylloepus sp.	–	2
Diptera		
Chironomus (Lobochironomus) sp.	–	5
Conchapelopia sp.	1	–
Corynoneura sp.	–	14
Cricotopus/Orthocladius grp.	–	9
Hemerodromia sp.	4	45
Nanocladius distinctus	–	7
Paramerina sp.	–	5
Parametriocnemus sp.	–	7
Pentaneura inconspicua	–	89
Polypedilum convictum grp.	11	775
Polypedilum illinoense	–	15
Polypedilum scalaenum	–	14
Rheocricotopus robacki	1	69
Rheotanytarsus distinctissimus grp.	–	99
Rheotanytarsus exiguus grp.	1	189
Rheotanytarsus sp.	–	45
Simulium sp.	136	45
Stratiomys sp.	–	2
Tanytarsus sp.	–	9
Thienemanniella sp.	18	107
Tvetenia discoloripes grp.	–	5
Undetermined dipteran pupa	–	71
Ephemeroptera		
Caenis sp.	–	4
Stenonema mexicanum integrum	71	–
Gastropoda		
Undetermined ancylid	–	3
Malacostraca		
Hyalella azteca	–	11
Megaloptera		
Corydalus cornutus	3	–
Odonata		
Argia sp.	1	–
Oligochaeta		
Nais communis	–	1
Nais elinguis	10	
Slavina appendiculata	–	5

Trichoptera		
Cheumatopsyche sp.	9	228
Chimarra sp.	4	–
Hydropsyche sp.	–	99
Neureclipsis sp.	–	1
Undetermined trichopteran pupa	–	7

Macroinvertebrate taxa list for Occidental Chemical Corp., collected on multiple benthic substrates via 20 discrete dip net sweeps from Swift Creek (Test Site) and Deep Creek (Reference Site) on 11 February 1992.

	Reference Site	Test Site
Coleoptera		
Dineutus discolor	6	–
Dineutus sp.	3	–
Helobata sp.	–	24
Hygrotus sp.	–	24
Hydaticus sp.	3	–
Microcylloepus sp.	6	96
Scirtes sp.	3	–
Stenelmis sp.	3	–
Suphisellus sp.	9	–
Diptera		
Chironomus (Lobochironomus) sp.	12	48
Cladotanytarsus sp.	3	–
Conchapelopia sp.	3	–
Corynoneura sp.	–	24
Cricotopus bicinctus	–	48
Cricotopus/Orthocladius grp.	–	48
Helopelopia sp.	3	–
Hemerodromia sp.	9	96
Labrundinia pilosella	3	–
Limonia sp.	–	24
Nanocladius rectinervis	–	24
Palpomyia grp. sp.	3	48
Parakiefferiella sp. B Epler	–	48
Paramerina sp.	9	–
Pentaneura inconspicua	–	72
Polypedilum convictum grp.	–	264
Polypedilum halterale grp.	–	24
Polypedilum illinoense	3	48
Polypedilum scalaenum	–	504
Pseudosmittia sp.	–	48
Rheotanytarsus distinctissimus grp.	6	72
Simulium sp.	3	–
Smittia sp. B Epler	–	24
Stenochironomus sp.	3	–
Tabanus sp.	3	–
Tanytarsus sp.	6	48
Thienemanniella sp.	3	48
Tipula sp.	3	–
Tribelos fuscicorne	–	24
Tribelos jucundum	3	–
Undetermined dipteran pupa	–	216

Ephemeroptera		
Paraleptophlebia volitans	33	–
Stenonema mexicanum integrum	60	–
Stenonema smithae	18	–
Gastropoda		
Micromenetus dilatatus	–	24
Hemiptera		
Ranatra buenoi	21	–
Malacostraca		
Hyalella azteca	18	120
Procambarus fallax	12	–
Procambarus sp.	–	24
Odonata		
Argia sp.	3	–
Oligochaeta		
Eclipidrilus palustris	3	–
Limnodrilus hoffmeisteri	–	48
Pelecypoda		
Corbicula manilensis	–	72
Elliptio sp.	–	48
Trichoptera		
Cheumatopsyche sp.	3	–
Cyrnellus fraternus	–	48
Hydropsyche decalda	3	48

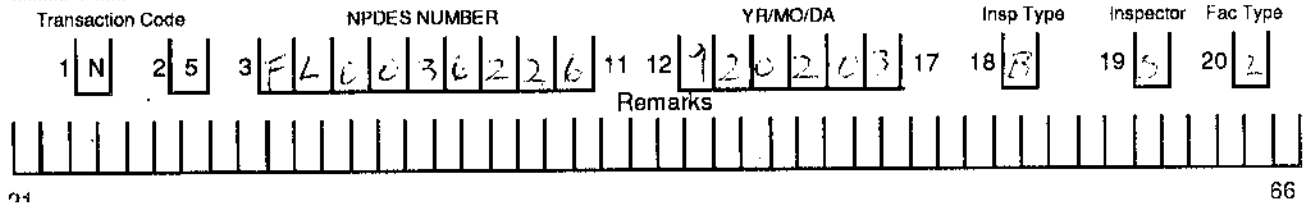
Periphyton taxa list for Occidental Chemical Corp., collected via periphytometers from Swift Creek (Test Site) and Deep Creek (Reference Site) on 4 March 1992.

	Reference Site	Test Site
Diatoms		
Achnanthes affinis	0.3	–
A. exigua	0.3	–
A. lanceolata	0.3	–
A. lanceolata v. *dubia*	2.3	119.5
A. linearis	–	1.8
Caloneis ventricosa	0.3	–
Cocconeis placentula	5.1	412.1
Cyclotella sp.	–	12.5
Eunotia sp.	–	1.8
E. curvata	8.7	–
E. naegelii	2.0	–
E. pectinalis	26.1	–
Fragilaria sp.	0.8	–
Gomphonema parvulum	0.3	5.4
Navicula cf. *festiva*	–	1.8
N. radiosa	–	5.4
Nitzschia palea	1.1	–
Pinnularia subcapitata	0.3	–
Chlorophyta		
Mougeotia sp.	1.1	–
Protoderma sp.	–	1.8
Cyanophyta		
Chroococcus sp.	–	3.6
Microcystis sp.	1.7	3.6

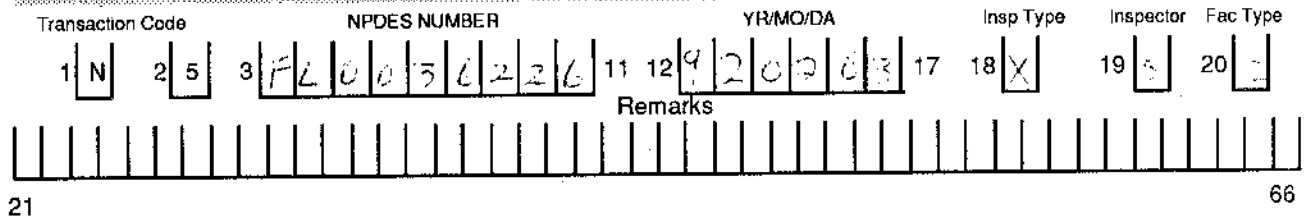
Phytoplankton taxa list for Occidental Chemical Co., collected in Swift Creek on 3 February 1992.

	Reference Site	Test Site
Diatoms		
Achnanthes sp.	19	–
Cyclotella sp.	19	2257
Melosira sp.	76	–
Navicula sp.	–	51
Nitzschia sp.	–	154
Pinnularia sp.	19	–
Stephanodiscus sp.	–	872
Chlorophyta		
Chlamydomonas sp.	–	359
Chlorococcum sp.	–	769
Crucigenia sp.	–	51
Golenkinia sp.	–	154
Kirchneriella sp.	–	975
Oocystis sp.	–	154
Pediastrum sp.	–	51
Scenedesmus sp.	–	462
Tetraedron sp.	–	154
Unknown chlorophyte filament	–	1385
Unknown chlorophyte flagellate	113	–
Cryptophyta		
Cryptomonas sp.	–	205
Cyanophyta		
Anabaena sp.	19	–
Aphanocapsa sp.	–	769
Chroococcus sp.	95	821
Dactylococcopsis sp.	–	359
Euglenophyta		
Phacus sp.	–	51

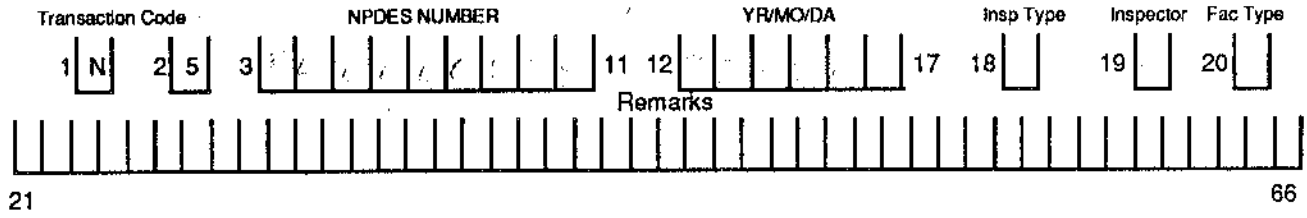
Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)



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