

Biological Assessment of

Volusia County (Tomoka Farms) Landfill

Volusia County

NPDES #FL0037877

Sampled September 1991

March 1992

Biology Section
Division of Technical Services

Department of Environmental Regulation
Results of Fifth Year Inspections

Discharger: Volusia County Landfill (Tomoka Farms)
County: Volusia
NPDES Number: FL0037877
State Permit Expiration Date:

Toxics Sampling Inspection (**XSI**)	
Date Sampled:	23 September 1991
Results:	The only organics found in water collected at the test site were 34 µg/L of aliphatic compounds. The concentrations of the three metals detected were within Class III standards.

Results:

Compliance Biomonitoring Inspection (**CBI**)	
Date Sampled:	23 September 1991
Results:	The water from the Tomoka Farms test site was not toxic to the fish, *Notropis leedsi*, or to the water flea, *Ceriodaphnia dubia*, in 48 hour acute screening bioassays.

Impact Bioassessment Inspection (**IBI**)	
Date Sampled:	23 September 1991
Results:	Benthic macroinvertebrate communities were stressed at both sites, although conditions were somewhat worse at the test site. This may be explained by the fairly substantial differences in morphology between the two sites (borrow pit vs. ditch) and the very low D.O. at the test site. Although not measured, it is possible that the BOD of the leachate contributed to this low dissolved oxygen.

Water Quality Inspection (**WQI**)	
Date Sampled:	23 September 1991
Results:	Dissolved oxygen at the test site (0.5 mg/L) was below Class III standards. Fecal and total coliform densities were above standards, but holding times were exceeded. Nutrients were somewhat elevated.

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. **Please note that the water and biota sampled from the test site during this present study may or may not represent conditions that actually occur when the facility does discharge. Furthermore, since many necessary parameters were not sampled during this investigation, the results must be viewed with caution.**

Introduction

The Volusia County (Tomoka Farms) Sanitary Landfill is located on Tomoka Farms Road, South of Interstate 4, in Volusia County, Florida (see map in Appendix). Although this facility has a permitted surface water outfall, it has not had an active discharge in approximately the past two years.

Leachate is treated in two settling ponds, a marsh system, and a holding pond. A flow of 2.5 MGD is permitted from the facility into the Tomoka River and Spruce Creek, both Outstanding Florida Waters. Permit limits are equivalent to Class III surface water standards.

Please note that the water and biota sampled from the test site during this present study may or may not represent conditions that actually occur when the facility does discharge. Furthermore, since many necessary parameters were not sampled during this investigation, the results must be viewed with caution.

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 a borrow pit up gradient of the landfill) and a test site (located in a ditch which receives runoff from the facility during episodes of pumping). A habitat assessment was performed in situ to establish comparability between sites. Supplemental physical/chemical data were also collected on the study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Notropis leedsi* as test organisms, were performed on a test site sample (Weber 1991). The 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.

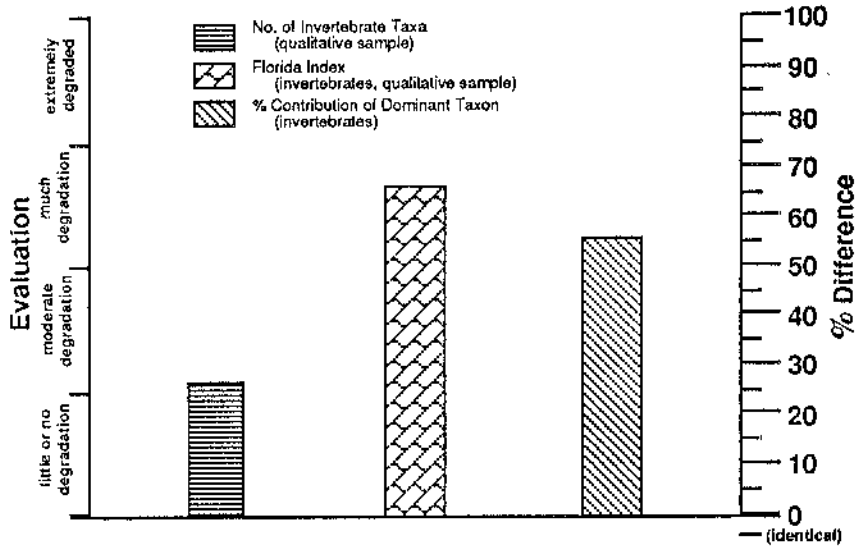
Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (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 community health have been employed. Many of these, such as the number of taxa and Shannon-Weaver Diversity Index 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 distur-

Major characteristics of community structure of control and test sites.

	Control Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	15	11
Florida Index	3	1
% Contribution of Dominant Taxon	32.6	51.1
% Oligochaeta	45.7	53.3
% Diptera	30.4	13.3
% Ephemeroptera	8.7	8.9
% Trichoptera	0	11.1
% Odonata	8.7	4.4
% Coleoptera	0	4.4
% Other	6.5	4.4
% Predators	34.4	68.9
% Collector-Gatherers	46.0	17.8
% Collector-Filterers	2.2	11.1
% Scrapers	3.6	2.2
% Shredders	13.8	0
% Parasites	0	0
Algal Growth Potential (mg dry wt/l)		31.1



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

bance. 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, and Florida Index 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 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: Phillip Kane (DER Central District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandy McClure (Tallahassee Biology Laboratory).

Results and Discussion

Habitat quality at the Tomoka Farms Landfill was poor at both the test site (48 points) and the reference site (36 points). Both sites were manmade water bodies with no flow. The outfall site was a mud and muck bottomed ditch at the edge of a marsh which receives runoff from the facility during episodes of pumping. The reference site was an impounded borrow pit located up-gradient of all landfill runoff and groundwater flow. Substrate there consisted of a sand, silt, and clay mix, coarse organic debris, and mud/muck. Another major difference between the two sites was dissolved oxygen concentrations. Dissolved oxygen at the reference site was an adequate 6.9 mg/L, while D.O. at the test site was a low 0.5 mg/L. This is below Class III standards. Conductivity was measured only at the reference site (80 umhos/cm). Neither site was tested for pH.

The water from the test site was not toxic to the fish, *Notropis leedsi*, nor to the water flea, *Ceriodaphnia dubia*, in 48 hour acute screening bioassays. Results of organics analyses indicated that 34 µg/L of aliphatic compounds were found in water samples collected at the test site. Aluminum (161µg/L), cadmium (0.2 µg/L), and iron (671 µg/L) were detected at the test site. These concentrations were within Class III standards.

Bacteriological populations were high at the test site. Fecal and total coliforms measured there were 1,800 organisms/100 ml and 3,000 organisms/100 ml, respectively. These levels would have constituted violations of ambient standards, but holding times were exceeded.

Some nutrient levels were elevated in the test site samples. Ortho and total phosphorus concentrations were both 0.8 mg/L. Ammonia (4.7 mg/L) and TKN (6.1 mg/L) were high, although nitrate-nitrite was undetected. AGP values (31.1 mg algal dry wt/L) were above the 5.0 mg algal dry wt/L "problem threshold". It is difficult to determine how detrimental these enrichment effects would be during a discharge event, due to the dilution that would presumably oc-

cur before contact with Waters of the State.

Benthic macroinvertebrate communities were stressed at both sites, although some measures indicated that conditions were worse at the test site. This may be explained by the fairly substantial differences in morphology between the two sites (borrow pit vs. ditch) and the very low D.O. at the test site. 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 this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

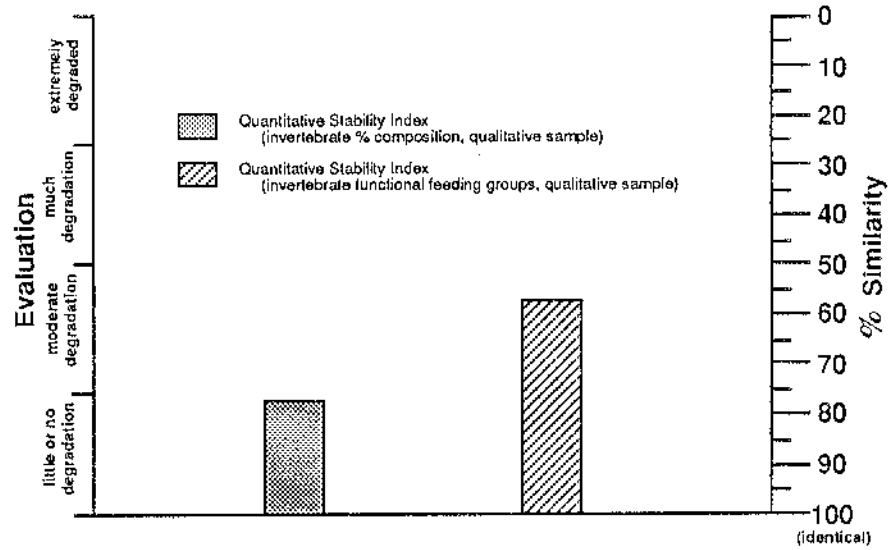
Taxa richness decreased from 15 taxa to 11 taxa (26%), and Florida Index dropped from 3 to 1 (66%), when comparing the reference site to the test site. It should be noted that the absolute values involved in these decreases were not large. Percent composition of the dominant taxon increased at the test site by 56%. This was due to the presence of the ubiquitous phantom midge, *Chaoborus* sp. The Quantitative Stability Index for functional feeding groups showed additional dissimilarities between the two sites involving trophic functioning. As mentioned earlier, the very low dissolved oxygen at the test site was one factor that contributed to the observed biological degradation. It is likely that this low D.O. was a function of the system morphology (a stagnant, man-made ditch) and possibly due to the BOD of the leachate entering the ditch, or of the sediment oxygen demand in the ditch.

Conclusions

The water from the Tomoka Farms test site was not toxic to the fish, *Notropis leedsi*, nor to the water flea, *Ceriodaphnia dubia*, in 48 hour acute screening bioassays. The only organics found in water collected at the test site were 34 µg/L of aliphatic compounds. The concentrations of the three metals detected were within Class III standards. However, dissolved oxygen at the test site (0.5 mg/L) was below Class III standards. Fecal and total coliforms were above standards, although holding times were exceeded. Nutrients and AGP were also elevated at the test site.

Benthic macroinvertebrate communities were stressed at both sites, although conditions were somewhat worse at the test site. This may be explained by the fairly substantial differences in morphology between the two sites (borrow pit vs. ditch) and the very low D.O. at the test site. Although not measured, it is possible that the BOD of the leachate, or the sediment oxygen demand of the ditch, contributed to this low dissolved oxygen.

Please note that the water and biota sampled from the test site during this present study may or may not represent conditions that actually occur when the facility does discharge. Furthermore, since many necessary parameters were not sampled during this investigation, the results must be viewed with caution.



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

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.

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.

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

Weber, C. I. 1991. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

Chemistry summary table for Tomoka farms landfill.

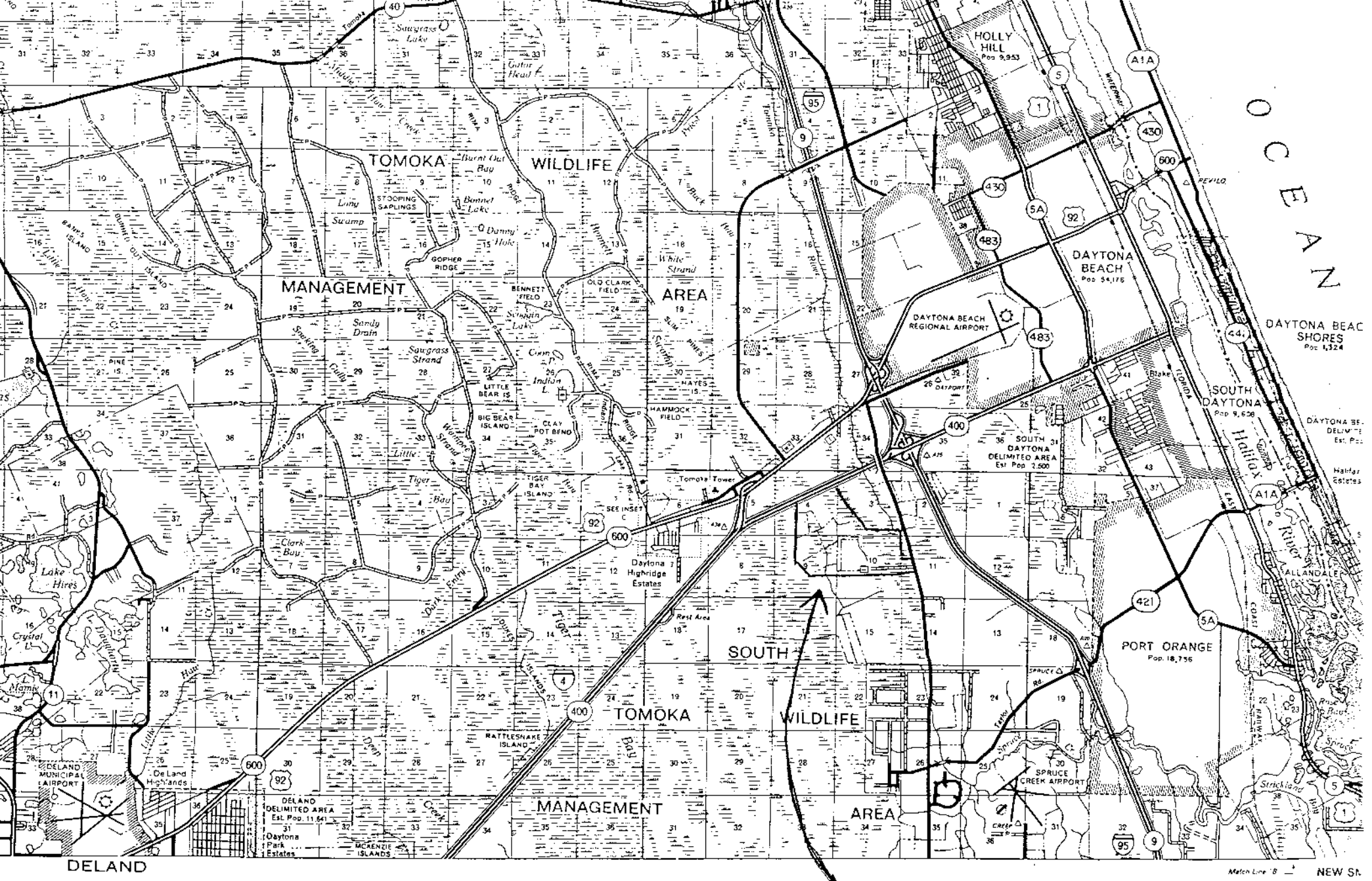
	Control Site	Test Site
Organic Constituents (ug/L)		
Aliphatic Compounds		34
Metals (ug/L)		
Aluminum		161
Arsenic		20U
Cadmium		0.2
Copper		5U
Chromium		10U
Iron		671
Lead		1.0U
Mercury		0.1U
Nickel		5U
Silver		NR
Zinc		5U
Nutrients (mg/L)		
Ortho-phosphorus		0.8A
Total phosphorus		0.8A
Ammonia		4.7A
Nitrate+Nitrite		0.04U
TKN		6.1
TOC		26
Other Parameters		
Habitat Assessment	36	48
D.O. (mg/L)	6.4	0.5
pH (SU's)	-	-
Conductivity (µmhos/cm)	80	-
Temperature (°C)	26.0	26.0
Bioassay Fish-Dechlorinated		Not toxic
Bioassay Invertebrate-Dechlorinated		Not toxic
Fecal coliform (org/100 ml)		1,800
Total coliform (org/100 ml)		3,000
AGP		31.1

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

L - Actual value is known to be greater than value given

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

NR - Not requested



GENERAL

VOLUSI

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EXHIBIT A

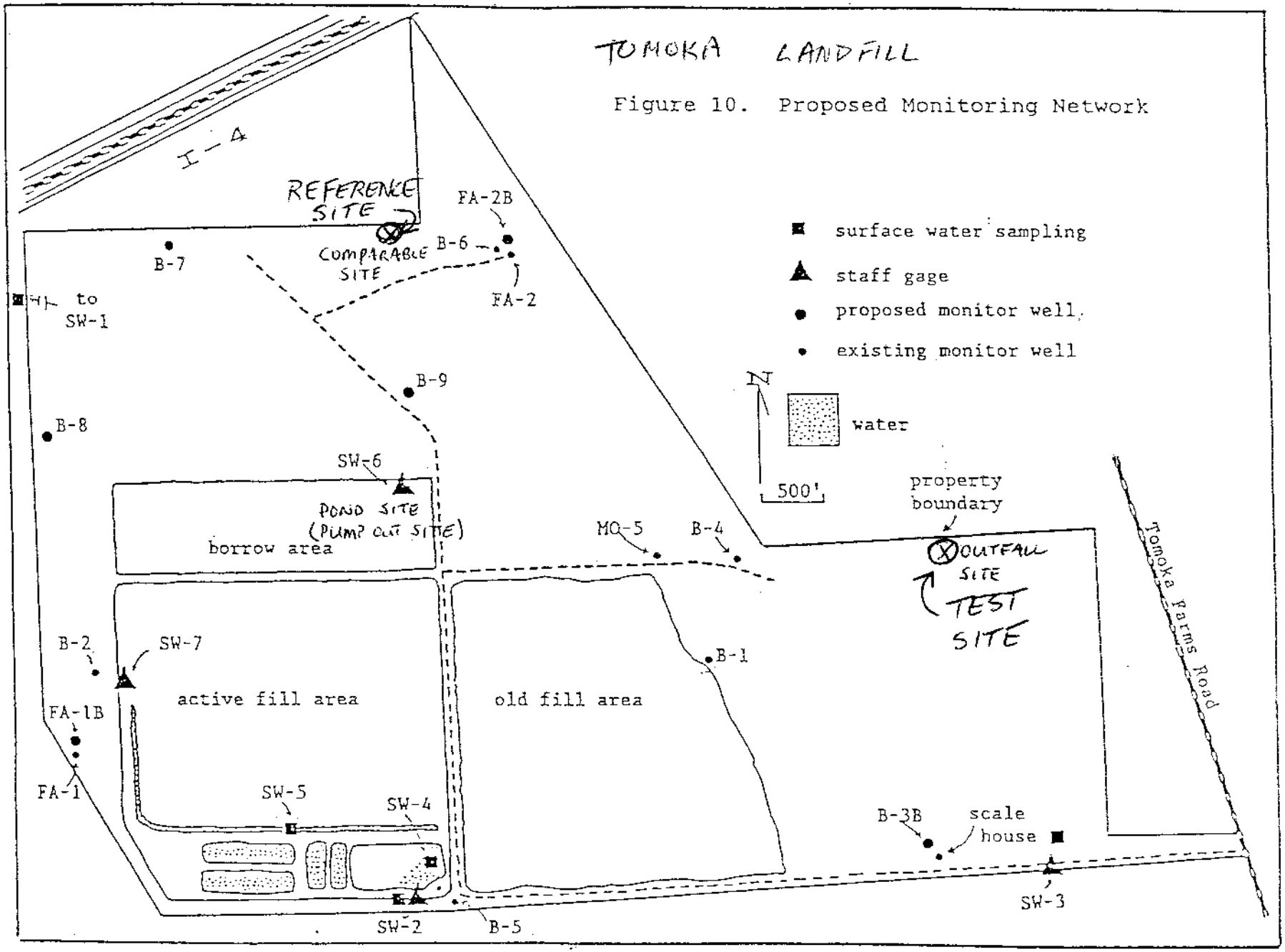


Figure 10. Proposed Monitoring Network

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: TOMOKA FARMS ROAD LANDFILL - DISCHARGE PERMIT		Prepared by: A KAZI Date:
Location (attach detailed map): ATTACHED	County: VOLUSIA	District: CENTRAL (CD)
Federal Permit # FL0037877 and expiration date: Sept 30, 1994	State GMS # and 3064C00810 State expiration date: July 1, 1992	Facility Type: Industrial Municipal Federal Agricultural Other (list): County Landfill

Function of facility:
dewatering and surface run-off for landfill

Description of treatment process:
Treatment system consisting of two (2) setting ponds and a marsh area treatment and holding pond.

Receiving waters: Tomoka River + Spruce Creek	Classification: Class III
Design Flow: 2.5 MGD	Actual Mean Flow: N/A

Discharge is: Continuous Intermittent Seasonal (Rainfall dependent)
Other (describe)

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.): N/A

List effluent limits:

Parameter	Limit (units)
See attached sheets	

Describe special permit conditions and permit modifications:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

2

permitted outfall(s):

SW-1
SW-2
SW-3
SW-4
SW-5
SW-6
SW-7

for location see attached map

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

N/A

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

N/A

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

N/A

Additional information:

VOLUSIA CO. LANDFILL

PART I

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - Final

During the period beginning on the effective date and lasting through the expiration date of permit, the permittee is authorized to discharge from outfall 001, stormwater from the land perimeter ditch (no leachate collection).

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

ARAMETERS	DISCHARGE LIMITATIONS	MONITORING REQUIREMENTS		
	Daily Maximum	Measurement Frequency (During Discharge)	Sample Type	Sampl Point
Flow, MGD	Report	Monthly	Instantaneous	Efflu
COD, mg/l	Report	Quarterly	Grab	Efflu
Total Cadmium, mg/l	Report	Quarterly	Grab	Efflu
Total Lead, mg/l	Report	Quarterly	Grab	Efflu
Total Chromium, mg/l	Report	Quarterly	Grab	Efflu
Total Iron, mg/l	Report	Quarterly	Grab	Efflu
Total Copper, mg/l	Report	Quarterly	Grab	Efflu
Total Zinc, mg/l	Report	Quarterly	Grab	Efflu
Total Mercury, mg/l	Report	Quarterly	Grab	Efflu
Specific Conductance micromhos/cm	Report	Quarterly	Grab	Efflu
Total Organic Carbon,(TOC), mg/l	Report	Quarterly	Grab	Efflu

PART I (CONTINUATION)
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. The effluent shall not cause a visible sheen on the receiving water.

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

4. Any bypass of the treatment facility which is not included in the effluent monitored above is to be monitored for flow and reported on a Discharge Monitoring report (DMR) Form (3320-1).

5. The pH of the effluent shall not be less than 6.0 standard units nor greater than 8.5 standard units and shall be monitored once per month by a grab sample.

6. Samples taken in compliance with the monitoring requirements specified in this permit shall be taken at the nearest accessible point after final treatment but prior to the actual discharge or mixing with the receiving waters.

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

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/23/91	RECEIVING BODY OF WATER: TOMOKA RIVER

REMARKS:	LOCATION: TOMOKA FARMS ROAD VOLUSIA COUNTY LANDFILL PUBLIC WORKS DEPARTMENT 123 WEST INDIANA AVENUE DELAND, FLORIDA 32720	FIELD ID/NAME:
COMPARABLE		TOMOKA FARMS CANOCIN

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 1	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 9	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		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.	36

COMMENTS: "UPSTREAM" IMPOUNDED BORROW PIT

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/23/91	PHILIP N. KANZ, Ed.D.	Philip N. Kanz

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: SJ SUBMITTING AGENCY NAME: FDER CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/23/91	RECEIVING BODY OF WATER: TOMOKA RIVER

REMARKS:	LOCATION: TOMOKA FARMS ROAD VOLUSIA COUNTY LANDFILL PUBLIC WORKS DEPARTMENT 123 WEST ORANGE AVENUE ORMOND, FLORIDA 32720	FIELD ID/NAME: TOMOKA FARMS LANDFILL
COMPARABLE		

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): 100M	Estimated Stream Depth (range, m): 5M		yes
High Water Mark (m above bed): 0.5M	Velocity (range, m/s): 0	Impounded ☑ 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:	25%
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell		Coarse Organic Debris:	25%
Sand		Mud/Muck (organic):	50%

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	0.75M
Mid-depth	26°C	6.9	pH (SU):	
Bottom			Conductivity (µmho/cm):	80
			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: SUN / CLOUD

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

ANALYSIS DATE:	ANALYST:	SIGNATURE:
09/23/91	PHILIP N. KANE, Ed.D.	Philip N. Kane, Ed. D.

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/23/91	RECEIVING BODY OF WATER: TOMOKA RIVER

REMARKS: OUTFALL	LOCATION: TOMOKA FARMS ROAD VOLUSIA COUNTY PUBLIC WORKS DEPARTMENT 123 W. INDIANA AVENUE DELAND, FLORIDA 32720	FIELD ID/NAME: TOMOKA FARMS LANDFILL

Habitat Parameter score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 25	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 1	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 10	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 9	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	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
		48

COMMENTS: "OUTFALL" AT END OF TERRESTRIAL DOWNSTREAM FLOW

ANALYSIS DATE: 09/23/91	ANALYST: PHILIP N KANE, Ed.D.	SIGNATURE: Philip N. Kane, Ed.D.

DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDER	STORET STATION NUMBER:	DATE (M/DAY): 09/23/91	RECEIVING BODY OF WATER: TOMOKA RIVER
REMARKS: OUTFALL	LOCATION: Tomoka Farms Road Landfill, 123 W. Indian Avenue, Deland, Florida 32720		FIELD ID NAME: TOMOKA FARMS LANDFILL

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
100%						

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): 5M	Estimated Stream Depth (range, m): 2M		yes
High Water Mark (m above bed): 0.5M	Velocity (range, m/s): 0	Impounded ☑ / 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:	10%
Sand:		Mud/Muck (organic):	90%

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top			Secchi Depth (m):	0.5M
Mid-depth	26°C	0.5M	pH (SU):	
Bottom			Conductivity (umho/cm):	
			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: SUN/CLOUD

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

ANALYSIS DATE: 09/23/91	ANALYST: PHILIP W. KANE, Ed.D.	SIGNATURE: Philip W. Kane, Ed.D.

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: TOMOKA FARMS LANDFILL
Address/City: _____
County: VOLUSIA
Contact/District: DR. PHIL KANE - CENTRAL
NPDES Permit #: FL0037877 Outfall #: 001

Sample Collection: Date 9-23-91 Time 1030
Test Beginning: Date 9-24-91 Time 1300
Test Ending: Date _____ Time _____
Test Organism: CERIODAPHNIA DUBIA
Life Stage/Age: < 24 HOURS

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

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond
0 hr	7@7, 9@9	8.9@21.5	20.9@23.9	138@24@ 1381
24 hr	7@7, 9@9	8.9@21.5	20.2@23.2	1361@23.6
48 hr	7@7, 9@9	8.8@22	20.5@23.5	1366@23.8 1375

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	5	8.2		8.2	20.2		20.8	8.4		8.6	179		188
control	B	5	5	5			8.2						8.6			
control	C	5	5	5			8.2						8.6			
control	D	5	5	5			8.2						8.6			
100%	A	5	5	5	7.3		8.3	20.2		20.9	5.5		8.6	276		285
100%	B	5	5	5			8.3						8.6			
100%	C	5	5	5			8.3						8.6			
100%	D	5	5	5			8.3						8.6			
Measured/Loaded by:		MF	MF	1	JM		MF	TM		MF	TM		MF	TM		MF
Recorded by:		MF	TM	TM	JM		TM	JM		TM	JM		TM	JM		TM

Investigators' Signatures

Kim Pearce
Alison Jordan
Thomas Mann
Marshall Faircloth
Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]		n/m		
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	126	73	109	Hach	TM
Hardness:	130	70	103	Hach	JM
Total Ammonia:	0	0	7.5	Hach	TM

Ammonia Meter Slope: _____
Ammonia Blank: 0.0
Salinity Sample: _____ ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: TOMOKA FARMS LANDFILL
Address/City:
County: VOLUSIA
Contact/District: DR. PHIL KANE
NPDES Permit #: FL00 37877 Outfall #: 001

Sample Collection: Date 9-23-91 Time 1030
Test Beginning: Date 9-24-91 Time 1330
Test Ending: Date _____ Time _____
Test Organism: NOTROPIS LEEDSI
Life Stage/Age: 24 DAYS

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

Remarks:

Instrument Calibrations:

	pH	DO	Temp	Cond.
0 hr	7@7,9@9	8.9@21.5	20.9@23.9	1368@24° / 1381
24 hr	7@7,9@9	8.9@21.5	20.2@23.2	1361@23.6
48 hr	7@7,9@9	8.5@22	20.5@23.5	1366@23.8 / 1375

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	47	5	5	5	7.9	8.1	8.2	21.0	21.0	~~8.0~~	8.7	7.6	8.0			
control	3	5	5	5	7.9	8.1	8.2			20.1	8.7	7.8	8.0	243	246	246
100%	48	5	5	5	7.1	7.7	7.9	19.9	20.5	~~7.9~~	3.7	6.5	7.4			
100%	14	5	5	5	7.1	7.6	7.9			20.0	3.5	6.5	7.4	283	289	288
								wrong column 9/26/91								
Measured/Loaded by:		MF	KP	TM	AZ	KP	MF	AZ	KP	MF	AZ	KP		AZ	KP	MF
Recorded by:		MF	GD	TM	AZ	GD	TM	AZ	GD	TM	AZ	GD		AZ	GD	TM

Investigators' Signatures

Kim Pearce
Thomas Tracom
Alison Fowler
Marshall Faircloth
Reviewer

Water-quality Parameters

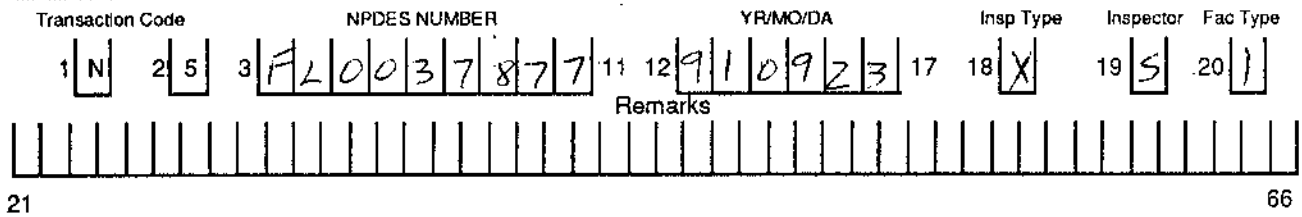
	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:	[illegible]		n/m		
Lab Tot. Resid. Cl2:	0.0	0.0	0.0	Hach	MF
Alkalinity:	126	73	109	Hach	TM
Hardness:	130	70	103	Hach	TM
Total Ammonia:	0	0	2.5	Hach	TM

Ammonia Meter Slope: _____ Ammonia Blank: 0.0 Salinity Sample: _____ ppt

Taxa list for Tomoka Farms Landfill, collected via discrete dip net sweeps of multiple substrates on 23 September 1991.

	Test Site	Reference Site
Coleoptera		
Bagous sp.	0	1
Berosus sp.	0	1
Undetermined Dytiscidae	0	1
Suphisellus sp.	2	1
Diptera		
Chaoborus sp.	23	0
Cryptochironomus sp.	0	2
Guttipelopia guttipennis	1	0
Polypedilum scalaenum	0	15
Procladius sp.	0	1
Tanytarsus sp.	0	2
Tanypus carinatus	0	1
Ephemeroptera		
Caenis sp.	0	2
Gastropoda		
Physella sp.	1	0
Hemiptera		
Undetermined Naucoridae	1	0
Malacostraca		
Palaemonetes paludosus	2	0
Odonata		
Erythemis simplicicollis	3	0
Pachydiplax longipennis	1	4
Oligochaeta		
Dero digitata	6	12
Lumbriculus inconstans	0	1
Nais variabilis	0	1
Pelecypoda		
Elliptio sp.	1	0
Musculium sp.	4	0
Trichoptera		
Polycentropus sp.	0	1

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



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

