

Biological Assessment of

New Symrna Beach Sewage Treatment Plant

Volusia County, Florida

NPDES #FL0020133

Sampled 26 September, 1990

February, 1991

Biology Section
Division of Administrative and Technical Services

Introduction

The City of New Smyrna Beach STP is a 4.0 MGD design capacity activated sludge sewage treatment facility located in Volusia County at 20 North Causeway in New Smyrna Beach, Florida. It is a Class B, Category II treatment facility that discharges into the Class III waters of the Indian River Lagoon System, a short distance from the Ponce Inlet. Due to the close proximity of the inlet, there is a strong flushing and mixing action on the discharge water as documented in a recent Florida Department of Environmental Regulation intensive survey of the area. This facility operates under FDER Permit Number D064-103760 which expires March 15, 1991.

Except for the Environmental Protection Agency (EPA) requiring a minimum dissolved oxygen content of 5.0 mg/l and biomonitoring, the state and federal effluent requirements are the same. In October 1990, the EPA required a whole effluent toxicity testing program to be implemented. They specified 48-hour acute static toxicity tests on the daphnid, *Ceriodaphnia dubia*,and 96-hour acute static renewal toxicity tests on the fathead minnow, *Pimephales promelas*.

The effluent limitations are as follows: BOD_5 should be less than 20 mg/l (annual average), TSS should be less than 20 mg/l (annual average), pH should be within the range of 6.0 to 8.5, fecal coliforms should be less than 200 colonies/100 ml, and final total residual chlorine must be less than 0.01 mg/l.

The facility serves the coastal community of New Smyrna Beach. Various commercial and residential establishments are located along the lagoon near the facility.

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 the Indian River, east of Chicken Island) and a test site (in the vicinity of the discharge). 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 *Notropis leedsi* as test organisms were performed on an effluent sample (Peltier and Weber 1985, FDER 1985). The effluent was analyzed for organic constituents (base neutrals, acid extractables, and pesticide extractables) and metals. Additionally, nutrient analyses were performed on a discharge sample. 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 multi-substrate (*e.g.*, snags, vegetation, sediment) qualitative effort. 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). Sediment from the test site was analyzed for grain size and percent organic matter (Ross 1990).

The following personnel were involved in this investigation: Philip Kane (DER Central District) and Lyn Burton, Russel Frydenborg, Kathleen Lurding, and Sandra McClure (Tallahassee Biology Laboratory).

Results and Discussion

Habitat quality at the test site (with 60 points) was very similar to that of the control (63 points) (Appendix). The Indian River system, at this point, is a highly saline, well-flushed, coast parallel estuary. Standard physical-chemical parameters, including salinity (32.6 ppt), pH (7.7 su), and dissolved oxygen (above 5.0 mg/l) were virtually identical at both sites.

Results of 48 hour static toxicity tests indicated that the freshwater effluent was acutely toxic to *Ceriodaphnia dubia*, producing complete mortality in the 100% concentration. This is a violation of State Standards (17-4.244(3)(a)FAC). The effluent did not cause significant mortality to the fish, *Notropis leedsi*.

Several organic contaminants were detected in the discharge, including Benzo (g,h,i) perylene (17 µg/l), Dibenzo (a,h) anthracene (18 µg/l), Alkyl sub-benzene (10 µg/l), and aliphatic (c9 to c20) hydrocarbons (20 µg/l). Benzo perylene and Dibenzo anthracene are acutely toxic to invertebrates at 0.2 µg/l and 0.4 µg/l, respectively (AQUIRE 1991). These two polynuclear aromatic hydrocar-

bons (PAH's) also have a high biomagnification factor, exhibitng a strong tendancy to concentrate in animal tissue. Concentrations of iron (64 µg/l) and zinc (36 µg/l) were below problem levels for saltwater organisms.

Highly elevated levels of total phosphorus (3.8 mg/l), nitrate-nitrite (4.0 mg/l), and ammonia (12 mg/l) were found in the effluent. Even after a 50% dilution in the saline, high pH receiving waters, the unionized ammonia portion (0.2 mg/l) would still be above toxic levels.

The algal growth potential of the discharge was very elevated, at 106.8 mg algal dry wt/l. When AGP levels are above 5.0 mg algal dry wt/1, algal blooms and their negative consequences are more likely to occur. Total (80 organisms/100 ml) and fecal (10 organisms/100 ml) coliforms were not found to be a problem at this facility

Due to the solely qualitative nature of the macroinvertebrate sampling, only an evaluation of differences in pollution sensitive taxa between sites was performed (see Taxa list in Appendix). Organisms known to be sensitive to PAH contamination, including *Panopeus herbstii* and *Mysidopsis bigelowi*, were recovered from the control but not the test site. Although more taxa were found at the test site, these were primarily saprophilic organisms and/or organisms less sensitive to PAH's (mostly polychaetes).

Conclusions

Numerous water quality problems were associated with the New Smyrna Beach STP discharge. The effluent was acutely toxic to the invertebrate test organism (a violation of 17-4.244(3)(a)FAC, Toxicity Requirement). Deleterious levels of polynuclear aromatic hydrocarbons (PAH's) were detected in the effluent. The very high nutrient content and algal growth potential measured in the discharge, coupled with the loss of sensitive crustaceans in the receiving waters, indicate potentially severe problems.

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.

Aquatic Toxicity Information Retrieval Data Base (AQUIRE). 1991. USEPA Environmental Research Laboratory, Duluth, Mn.

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.

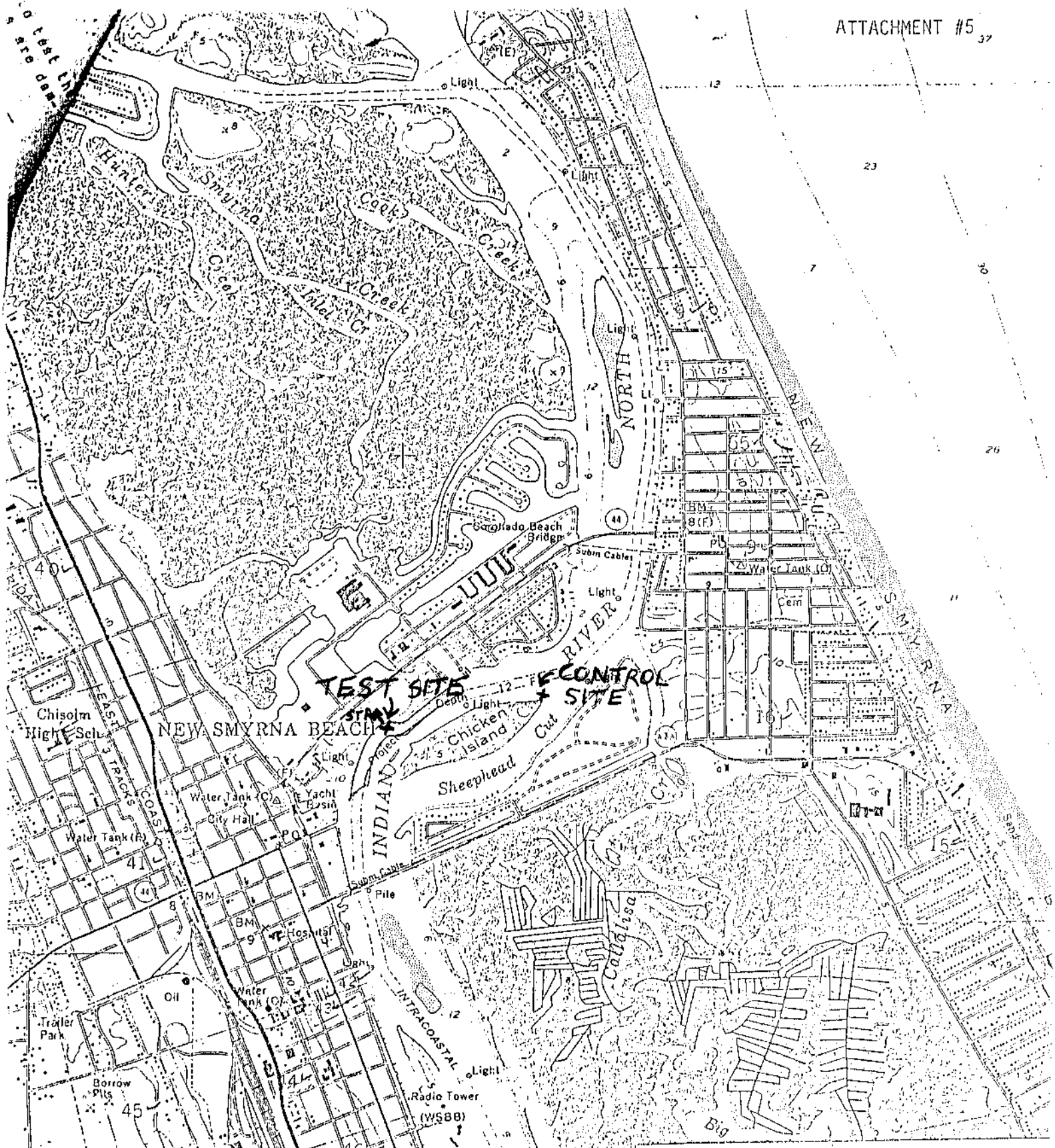
Miller, W. E., T. E. Maloney, and J. C. Greene. 1978. The *Selenastrum capricornutum* Printz algal assay bottle test. U. S. Environ. Prot. Agency, EPA-600/9-78-018. 126 p.

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.

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.

ATTACHMENT #5



LOCATION MAP FROM:

U.S. GEOLOGICAL SURVEY MAP, 1980

WATER POLLUTION CONTROL PLANT
NEW SMYRNA BEACH
VOLUSIA COUNTY

SITE! DISCHARGE

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/26/90	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: NPDES P# FL0020133 / DER P# D064-103760	LOCATION: 20 N. CAUSEWAY / NEW SMYRNA BEACH, FL 32069	FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 6	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 30	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three comunities observed from those listed. **26-37 points**	One comunity observed from those listed. **13-25 points**	No comunities observed from those listed. **0-12 points**
Tidal Fluctuation 5	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 4	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 6	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 60

COMMENTS:

ANALYSIS DATE: 09/26/90	ANALYST: PHILIP N. KANE, Ed.D	SIGNATURE: Philip N. Kane, Ed.D.

COMPARABLE SITE

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

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DIST.	STORET STATION NUMBER:	DATE (M/D/Y): 09/26/90	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS:	LOCATION: 20 N. CAUSEWAY NEW SMYRNA BEACH, FLORIDA	FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations 9	None—Unaltered shoreline. **9-10 points**	Mostly natural shoreline, but with occasional riprap. **6-8 points**	Shoreline consisting mostly of riprap and vertical seawalls. **3-5 points**	Shoreline consisting almost entirely of vertical seawalls. **0-2 points**
Community Types Observed 30	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. **38-50 points**	Two or three communities observed from those listed. **26-37 points**	One community observed from those listed. **13-25 points**	No communities observed from those listed. **0-12 points**
Tidal Fluctuation 5	>0.75 m. **4-5 points**	0.5 - 0.75 m. **3 points**	0.25 - 0.5 m. **2 points**	<0.25 m. **0-1 point**
Freshwater Discharges/ Alterations 4	Only natural runoff.. **9-10 points**	Mostly natural runoff, but with a few, small stormwater sources. **6-8 points**	Considerable stormwater discharge from local roads, parking lots, etc. **3-5 points**	Extensive manmade discharges, especially from canals draining large tracts of land. **0-2 points**
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. **9-10 points**	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. **0-2 points**
Sediment Type 6	Combination of sand, gravel, and shell. **12-15 points**	Primarily sand, with small areas of mud. **8-11 points**	Mixture of sand and mud, or well-aerated mud only. **4-7 points**	Anaerobic mud. **0-3 points**

TOTAL SCORE 63

COMMENTS:

ANALYSIS DATE: 09/26/90	ANALYST: PHILIP N. KANE, Ed.D	SIGNATURE: Philip N. Kane, Ed.D.

STATE OF FLORIDA OUTFALL
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/26/90	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: NPDES # FL0020133 / DER Permit # DO64-103760	LOCATION: 20 N. CAUSEWAY / NEW SMYRNA BEACH, FLORIDA	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
			40	40	20	

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):
CITY OF NEW SMYRNA BEACH STP

Estimated ~~Stream~~ Lagoon Width (range, m): 150-200 M | Estimated Stream Depth (range, m): | N/A Impounded ☐ yes / Channelized ☐

High Water Mark (m above bed): | Velocity (range, m/s): tidal

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

	Temp. (°C):	D.O. (mg/l):	Secchi Depth (m):	N/A
Top	27.2	6.5	pH (SU):	7.7 / 7.7 / 7.7
Mid-depth	27.0	6.2	Conductivity (µmho/cm):	49.9 / 49.9 / 49.9 X10ck
Bottom	27.0	6.2	Other Parameters: SALINITY	32.6 / 32.6 / 32.6

Stream Type (check box): N/A 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 / LIGHT CLOUDS

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

ANALYSIS DATE: 09/26/90	ANALYST: PHILIP N. KANE, Ed.D.	SIGNATURE: Philip N. Kane, Ed.D.

COMPARABLE SITE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 09/26/90	RECEIVING BODY OF WATER: INDIAN RIVER LAGOON

REMARKS: NPDES # FL0020133 DER P# D064-103760	LOCATION: 20 N. CAUSEWAY NEW SMYRNA BEACH, FLORIDA	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
			40	40	20	

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~~ Lagoon Width (range, m): 150-200	Estimated Stream Depth (range, m): 1.5M	N/A yes
High Water Mark (m above bed):	Velocity (range, m/s): tidal	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:	
Sand:		Mud/Muck (organic):	

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):	
Top	27.2	6.5	Secchi Depth (m): N/A
Mid-depth	27.2	6.5	pH (SU): 7.7/7.7/7.7
Bottom	27.2	6.5	Conductivity (µmho/cm): 49.9/49.9/49.9 X100K
			Other Parameters: SALINITY 32.6/32.6/32.6

Stream Type (check box): N/A 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/LIGHT CLOUDS

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

ANALYSIS DATE: 09/26/90	ANALYST: PHILIP N. KANE, Ed.D.	SIGNATURE: Philip N. Kane, Ed.D.

Sample Number: 90-SEP-27-20-01 Sample Status: Authorized by Liang T. Lin
Sample Location: 20N Causeway, City of New Smyrna Beach STP Matrix: Effluent
Field ID: Outfall #001 Storet Station Number:
Date/Time Collected: 26-SEP-1990 11:15:32.96
Comments:

Sample Number: 90-SEP-27-20-01 Test status: Authorized by Laura Harrison
Analysis Id: W-BNA Analysis Description: base-neutral-acid water analysis

Storet Number	Analyte	Result	Units
34205	Acenaphthene	10 U	ug/L
34200	Acenaphthylene	10 U	ug/L
39330	Aldrin	10 U	ug/L
34220	Anthracene	10 U	ug/L
34526	Benzo(a)anthracene	10 U	ug/L
34230	Benzo(b)fluoranthene	10 K	ug/L
34242	Benzo(k)fluoranthene	10 U	ug/L
34247	Benzo(a)pyrene	10 U	ug/L
34521	Benzo(g,h,i)perylene	17	ug/L
34292	Benzyl butyl phthalate	10 U	ug/L
	a-BHC	10 U	ug/L
39337	b-BHC	10 U	ug/L
39340	d-BHC	10 U	ug/L
	g-BHC	10 U	ug/L
39120	Benzidine	10 U	ug/L
34273	Bis(2-chloroethyl)ether	10 U	ug/L
34278	Bis(2-chloroethoxy)methane	15 U	ug/L
34283	Bis(2-chloroisopropyl)ether	15 U	ug/L
39100	Bis(2-ethylhexyl)phthalate	10 U	ug/L
34636	4-Bromophenyl phenyl ether	10 U	ug/L
34581	2-Chloronaphthalene	10 U	ug/L
34641	4-Chlorophenyl phenyl ether	10 U	ug/L
34320	Chrysene	10 U	ug/L
39310	4,4'-DDD	10 U	ug/L
39320	4,4'-DDE	10 U	ug/L
39300	4,4'-DDT	10 U	ug/L
34556	Dibenzo(a,h)anthracene	18	ug/L
39110	Di-n-butyl phthalate	10 U	ug/L
34536	1,2-Dichlorobenzene	10 U	ug/L
34566	1,3-Dichlorobenzene	10 U	ug/L
34571	1,4-Dichlorobenzene	10 K	ug/L
34631	3,3'-Dichlorobenzidine	10 U	ug/L
39380	Dieldrin	10 U	ug/L
34336	Diethylphthalate	10 U	ug/L
34341	Dimethylphthalate	10 U	ug/L
34611	2,4-Dinitrotoluene	10 U	ug/L
34626	2,6-Dinitrotoluene	10 U	ug/L
34596	Di-n-octyl phthalate	10 U	ug/L
34361	Endosulfan-I	10 U	ug/L

Continued

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the minimum detection limit
N/A - Not applicable NR - Not requested

Cont. from previous page for Sample Number: 90-SEP-27-20-01 Analysis_id: W-BNA

34356	Endosulfan-II	10 U	ug/L
34351	Endosulfan-sulfate	10 U	ug/L
39390	Endrin	10 U	ug/L
34366	Endrin-aldehyde	10 U	ug/L
34376	Fluoranthene	10 U	ug/L
34381	Fluorene	10 U	ug/L
39410	Heptachlor	10 U	ug/L
39420	Heptachlor-epoxide	10 U	ug/L
39700	Hexachlorobenzene	15 U	ug/L
34391	Hexachlorobutadiene	10 U	ug/L
34396	Hexachloroethane	60 U	ug/L
34386	Hexachlorocyclypentadiene	10 U	ug/L
34403	Indeno(1,2,3-cd)pyrene	10 U	ug/L
34408	Isophorone	10 U	ug/L
34696	Naphthalene	10 U	ug/L
34447	Nitrobenzene	10 U	ug/L
34438	N-Nitrosodimethylamine	50 U	ug/L
34428	N-Nitrosodi-n-propylamine	10 U	ug/L
34433	N-Nitrosodiphenylamine	15 U	ug/L
34671	PCB-1016	10 U	ug/L
39488	PCB-1221	10 U	ug/L
39492	PCB-1232	10 U	ug/L
39496	PCB-1242	10 U	ug/L
39500	PCB-1248	10 U	ug/L
39504	PCB-1254	10 U	ug/L
39508	PCB-1260	10 U	ug/L
	PCB-1262	10 U	ug/L
34461	Phenanthrene	10 U	ug/L
34469	Pyrene	10 U	ug/L
39400	Toxaphene	10 U	ug/L
34551	1,2,4-Trichlorobenzene	10 U	ug/L
34462	4-Chloro-3-methyl phenol	15 U	ug/L
34586	2-Chlorophenol	15 U	ug/L
34601	2,4-Dichlorophenol	15 U	ug/L
34606	2,4-Dimethylphenol	15 U	ug/L
34616	2,4-Dinitrophenol	30 U	ug/L
34657	2-Methyl-4,6-dinitrophenol	30 U	ug/L
34591	2-Nitrophenol	15 U	ug/L
34646	4-Nitrophenol	50 U	ug/L
39032	Pentachlorophenol	15 U	ug/L
34694	Phenol	15 U	ug/L
34621	2,4,6-Trichlorophenol	15 U	ug/L

Comments (1): Tent. ids:alkyl sub. benzene 10 ug/L, C9-20 aliphatics 20 ug/L, unidentified compound 50-100 ug/L
(2):
(3):
(4):
(5):
(6):

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-27-21-01 Sample Status: Authorized by Tim Fitzpatrick
Sample Location: 20N Causeway, Smyrna Beach STP Matrix: Effluent
Field ID: outfall #001 Storet Station Number:
Date/Time Collected: 26-SEP-1990 11:15:16.18
Comments:

Sample Number: 90-SEP-27-21-01 Test status: Authorized by Tim Fitzpatrick
Analysis Id: W-ICP-23 Analysis Description: ICP multielement analysis for water samples

Storet Number	Analyte	Result	Units
01106	Aluminum	40 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	11 T	ug/L
01045	Iron	64 A	ug/L
01051	Lead	NR	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	36 A	ug/L
	Comment	NONE	

Sample Number: 90-SEP-27-21-01 Test status: Authorized by Jack Merritt
Analysis Id: AG-G-W Analysis Description: Silver in water by furnace AA

Storet Number	Analyte	Result	Units
01077	Silver	0.2 K	ug/L

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-27-21-01 Test status: Authorized by Tim Fitzpatrick
Analysis Id: HG-H-W Analysis Description: Mercury by cold vapor using hydride sys.-water

Storet Number	Analyte	Result	Units
71900	Mercury	0.1 K	ug/L

Sample Number: 90-SEP-27-21-01 Test status: Authorized by Jack Merritt
Analysis Id: PB-G-W Analysis Description: Lead by furnace AA in water

Storet Number	Analyte	Result	Units
01051	Lead	2 U	ug/L

Sample Number: 90-SEP-27-21-01 Test status: Authorized by Jack Merritt
Analysis Id: CD-G-W Analysis Description: Cadmium by graphite furnace for water samples

Storet Number	Analyte	Result	Units
01027	Cadmium	0.2 K	ug/L

Sample Number: 90-SEP-27-21-01 Test status: Authorized by Jack Merritt
Analysis Id: SE-G-W Analysis Description: Selenium in water by furnace AA

Storet Number	Analyte	Result	Units
01147	Selenium	3 U	ug/L

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

Sample Number: 90-SEP-27-22-01 Sample Status: Authorized by Bill Coppenger
Sample Location: 20N Causeway, City of Smyrna Beach STP Matrix: Effluent
Field ID: outfall #001 Storet Station Number:
Date/Time Collected: 26-SEP-1990 11:15:50.90
Comments:

Sample Number: 90-SEP-27-22-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TP Analysis Description: Analysis for total phosphorus in water

Storet Number	Analyte	Result	Units
00665	Total-P	3.8 A	mg P/L

Sample Number: 90-SEP-27-22-01 Test status: Authorized by Yuh-Hsu Pan
Analysis Id: W-TKN Analysis Description: TKN for water sample

Storet Number	Analyte	Result	Units
00625	N KJEL TOT	12 A	mg N/L

Sample Number: 90-SEP-27-22-01 Test status: Authorized by Bill Coppenger
Analysis Id: W-NO2NO3 Analysis Description: Analysis for nitrite+nitrate in water

Storet Number	Analyte	Result	Units
00630	NO2NO3-N	4.0 A	mg N/L

Sample Number: 90-SEP-27-22-01 Test status: Authorized by Bill Coppenger
Analysis Id: W-NH3 Analysis Description: Analysis for ammonia in water

Storet Number	Analyte	Result	Units
00610	Ammonia-N	12 A	mg N/L

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 practice quantiation limit
U - Material was analyzed for but not detected; The value reported is the mimimum detection limit
N/A - Not applicable NR - Not requested

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: New Symrna Beach STP
Address/City: 20 N Causeway
County: Volusia
Contact/District: Phil Kane Central
NPDES Permit #: FL0020133 **Outfall #:** 001

Sample Collection: Date 9/20/16 Time 11:15
Test Beginning: Date 9/21/16 Time 10:30
Test Ending: Date _____ Time _____
Test Organism: Ceriodaphnia dubia
Life Stage/Age: less than 24 hr

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

Remarks:
Ø hr. parameters taken on reprivials
*Bottom slightly moved

Instrument Calibrations:

	pH	DO	Cond	Temp
0 hr	7.01 / 9.91	9.0 @ 21.1	1351 @ 21.5	21.1 @ 23.7
24 hr	7.07 / 9.99	5.5 @ 22.0	1343 @ 23.5	22.3 @ 23.6
48 hr	7.07 / 9.99			

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		5	5	5												
"		5	5	5												
"		5	5	5												
"		5	5	5												
100%		5	4	0												
"		5	0	0												
"		5	0	0												
"		5	*	0												
													21.9			
Control					8.6	8.9	8.9	8.0	8.1	8.1	21.1	21.5	21.9	313		310
100%					8.4	8.9	8.9	6.8	8.1	8.1	21.1	21.5	21.9	294		303
Measured/Loaded by:		MT	MT	LB	SMC	SMC	LB	SM	SMC	LB	SMC	SMC	LB	SMC		LB
Recorded by:		MT	MT	LB	MT	LB	LB	MT	LB	LB	MT	LB	LB	MT		LB

Investigators' Signatures

Sandy McClure
Marshall Faircloth
Lyn Buxton

Reviewer

Water-quality Parameters

	Well Water	Cond. Water	Sample	Method	Measured by
Field Tot. Resid. Cl2:			0.0	HACH	PK
Lab Tot. Resid. Cl2:			0.0	HACH	RBC
Alkalinity:	116	110	150	HACH	LB
Hardness:	145	137	174	HACH	LB
Total Ammonia:	0.015	0.022	4.50	ORION	SMC

Ammonia meter slope: -56.8

DER Biology Section — Acute Biotoxicity Definitive Data

Sample Source: New Symrna Bch STP
Address/City: 20 N. Causeway
County: Volusia
Contact/District: Phil Kane Central
NPDES Permit #: FL0020133 **Outfall #:** 001

Sample Collection: Date 9-26-96 Time 11:15
Test Beginning: Date 9-27-96 Time 10:00
Test Ending: Date _____ Time _____
Test Organism: Nitrops weedei
Life Stage/Age: 19 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	9.0@21.1	1351 @233	21.1@22.7
24 hr	7@7	8.8@22.0	1343@235°C	
48 hr	7@7 4@4	8.6@23.5	1347@235	22.1@235

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	57	5	5	5	8.5	8.5	9.1	7.5	7.8	7.8	21.8	21.5	21.5	233		
"	24	5	5	5	8.5	8.6	9.1	7.5	7.8	7.8				233		233
100%	49	5	5	5	8.3	8.2	8.5	6.5	7.8	7.8	22.8	21.7	21.5			
"	314	5	5	4	8.2	8.2	8.7	6.5	7.8	7.7				1010		992
Measured/Loaded by:		MF	MF		SMC	SMC	LB	SMC	SMC	LB	SMC	SMC	LB	SMC		LB
Recorded by:		MF	MF		MF	LB	LB	LB	LB	LB	MF	LB	LB	MF		LB

Investigators' Signatures

Scott McCleave
Mindi Faulkner
Lyn Burton

Reviewer

Water-quality Parameters

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

Ammonia meter slope: _____

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

✓	LAB PARAMETERS	UNITS	CODE	VALUE
	CHLOROPHYLL-a (CORRECTED)	µg/l	32223	
	CHLOROPHYLL-a (NON-CORRECTED)	µg/l	32210	
	CHLOROPHYLL-b	µg/l	32212	
	CHLOROPHYLL-c	µg/l	32214	
	PHAEOPHYTIN-a	µg/l	32218	
	BOD, 5-DAY CARBONACEOUS	mg/l	80082	
	BOD, 5-DAY N-INHIBITED	mg/l	00314	
	FECAL COLIFORMS, MEMBRANE	no./100 ml	31616	10
	FECAL COLIFORMS, TUBE	no./100 ml	31615	
	TOTAL COLIFORMS, MEMBRANE	no./100 ml	31501	80
	TOTAL COLIFORMS, TUBE	no./100 ml	31505	
	FECAL STREPTOCOCCI, MEMBRANE	no./100 ml	31673	10
	HETEROTROPHIC PLATE COUNT	no./1 ml	31751	
	SEDIMENT PRTCL SIZE, >2.0mm	%	80256	
	SEDIMENT PRTCL SIZE, 0.5-2.0mm	%	80254	
	SEDIMENT PRTCL SIZE, 0.125-0.5mm	%	46531	
	SEDIMENT PRTCL SIZE, 0.063-0.125mm	%	80251	
	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

✓	LAB PARAMETERS	UNITS	CODE	VALUE
	ALGAL ASSAY, GROWTH POTENTIAL	mg/l	85209	
	INVERT. DIVERSITY INDX, ART SUBST	—	61455	
	INVERT. DI, AS, 95% CONF INT	—	61456	
	INVERT. DIVERSITY INDX, NAT SUBST	—	61453	
	INVERT. DI, NS, 95% CONF INT	—	61454	
	INVERT. ART SUBST, NO. SPP.	—	61457	
	INVERT. NAT SUBST, NO. SPP.	—	61458	
	INVERT. FLORIDA INDEX	—	—	
	INVERT. SPECIES ID/COUNT	—	—	REPORT
	PERIPHYTON, SPECIES ID/COUNT	—	—	REPORT
	PHYTOPLNKTN, SPECIES ID/COUNT	—	—	REPORT
	TOXICITY ASSAY, MICROTOX	—	—	REPORT
	TOXICITY ASSAY, ACUTE, SCRNG	—	—	REPORT
	TOXICITY ASSAY, ACUTE, DFNTV	—	—	REPORT
	TOXICITY ASSAY, FLOW-THROUGH	—	—	REPORT
	TOXICITY ASSAY, CHRONIC, SCRNG	—	—	REPORT
	TOXICITY ASSAY, CHRONIC, DFNTV	—	—	REPORT

REMARKS:

NEW SYRNA BEACH INWTP 9-27-90

ANALYST(S): DATE(S): 9/27/90

REVIEWED BY: DATE:

PLEASE TYPE OR PRINT CLEARLY

LAB ID: 3a

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
BIOLOGY LABORATORY SEDIMENT BENCH SHEET

SUBMITTING AGENCY CODE: 30 SUBMITTING AGENCY NAME: Cent. Dist.	STORET STATION NUMBER:	DATE (M/D/Y): 9/26/90	RECEIVING BODY OF WATER:	DEPTH, FEET: ess, pipe

REMARKS:	LOCATION: 20 N. Causeway, City of New Smyrna Bch. STP	FIELD ID/NAME:

Aliquot #1

Sediment Wet Weight: (for 2 aliquot method of wet sieving) (a) _____

Sediment Dry Weight (105°C): (for 1 aliquot method of wet or dry sieving, or for calculating dry wt. of aliquot #2) (b) 28.21

Aliquot #2

Sediment Wet Weight: (for 2 aliquot method of wet sieving) (c) _____

Aliquot #3 (for % organics)

Crucible Weight: (d) 51.28

Crucible + Dry Sediment (105°C) Wt.: (e) 88.51

Crucible + Ashed Sediment (550°C) Wt.: (f) 87.60

Percent Organics Calculation:

Sediment Dry (105°C) Weight: (e) - (d) = 88.51 − 51.28 = (g) 37.23

Sediment Ash (550°C) Weight: (f) - (d) = 87.60 − 51.28 = (h) 36.32

$$\text{Percent Organics} = \frac{((g) - (h)) \times 100}{(g)} = \frac{(37.23 - 36.32) \times 100}{37.23} = 2.44\%$$

Size Fraction Determination:

Dry Weight Calculation:
(for 2 aliquot method of wet sieving)

$$\frac{(b)}{(a)} \times (c) = \frac{\quad}{\quad} \times \quad = (i) \quad$$

weight (gms.) of material retained by:

				% composition (divide 1st column by (n) [dry sieve] or by (b) [wet sieve; 1 aliquot] or by (l) [wet sieve; 2 aliquot], and multiply by 100)
#10 sieve	(>2.0 mm)	(j)	4.82	17.09
#35 sieve	(0.5-2.0 mm)	(k)	2.49	8.83
#60 sieve	(0.25-0.5 mm)	(l)	1.43	5.07
#120 sieve	(0.125-0.25 mm)	(m)	13.41	47.54
#230 sieve	(0.063-0.125 mm)	(n)	4.08	14.46
Pan (dry sieve only)	(<0.063 mm)	(o)		
Total (dry sieve) ((j) + (k)...+ (o))		(p)		
Total Retained (wet sieve) ((j) + (k)...+ (n))		(q)	26.23	
Wet sieve fines ((b) - (q)) [1 aliquot method], or ((i) - (q)) [2 aliquots]	(<0.063 mm)		1.98	7.02
Wet sieve coarse fraction (after fines removal)	(>0.063 mm)		26.51	

ANALYSIS DATE: 10/12/90	ANALYST: L. Burton/Hutchinson	SIGNATURE: Lyn Burton

Macroinvertebrate taxa list for City of New Symrna Beach STP, collected via qualitative methods, in the vicinity of the discharge and at a nearby control site located in the Indian River, on September 26, 1990.

	Control site	Test site
Decapoda		
Panopeus herbstii	+	–
Gastropoda		
Acteocina canaliculata	+	–
Cancellaria reticulata	–	+
Mangelia cf. sp.	+	–
Sphenia antillensis	–	+
Hemichordata		
Undetermined Hemichorda sp.	–	+
Malacostraca		
Mysidopsis bigelowi	+	–
Parahyale fascigera	+	–
Nemertia		
Undetermined Nemertia sp.	–	+
Ophiuroidia		
Undetermined Ophiuroidia sp.	+	+
Nematoda		
Undetermined Nematoda sp.	+	+
Pelecypoda		
Barbatia candida	–	+
Crassostrea virginica	–	+
Paruilucina (Lucina) multilineata	+	–
Polychaeta		
Brania sp.	–	+
Glycinde solitaria	+	–
cf. *Jasmineira* sp.	–	+
Mediomastus ambiseta	+	+
Nereis falsa	+	+
Ophelina cylindricaudata	–	+
Sabella microphtalma	–	+
Streblospio benedicti	–	+
Styllis gracilis	–	+
Terebellidae cf. *pista* sp.	–	+
Total	**11**	**17**

Department of Environmental Regulation

Results of Fifth Year Inspections

Discharger:	**City of New Smyrna Beach WWTP**
County:	**Volusia**
NPDES Number:	**FL0020133**
State Permit Expiration Date:	**15 March 1991**

Toxics Sampling Inspection (XSI)	
Date Sampled:	26 September 1990
Results:	Benzo (g,h,i) perylene (17 ug/l), Dibenzo (a,h) anthracene (18 ug/l), Alkyl sub. benzene (10 ug/l), and aliphatic (C_9 to C_{20}) hydrocarbons (20 ug/l) found in effluent. These concentrations of polyaromatic hydrocarbons are deleterious to biota, especially crustaceans, causing toxicity and biomagnification. Iron and zinc were found in non-toxic levels.

Compliance Biomonitoring Inspection (CBI)	
Date Sampled:	26 September 1990
Results:	Acutely toxic to *Ceriodaphnia dubia.* This is a violation of 17--4.244(3)(a) FAC, (Toxicity Requirement).

Impact Bioassessment Inspection (IBI)	
Date Sampled:	26 September 1990
Results:	Taxa sensitive to PAH contamination (epibenthic crustaceans) were reduced near the outfall compared to the control site. This, coupled with very high AGP and nutrient levels indicate potentially severe problems associated with the discharge.

Water Quality Inspection (WQI)	
Date Sampled:	
Results:	

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