

Bioassays of

New Smyrna Beach Sewage Treatment Plant

New Smyrna, Volusia County, Florida

NPDES #FL0020133

Sampled 10/24/94

February 1995

Biology Section

Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan #870346G

Bioassays of

New Smyrna Beach Sewage Treatment Plant

New Smyrna, Volusia County, Florida

NPDES #FL0020133

Biology Section
Bureau of Laboratories
February 1995

Introduction

New Smyrna Beach STP, New Smyrna Beach, Volusia County, Florida, NPDES #FL0020133, tests performed on 25 to 27 October, 1994.

This facility, located at 230 North Causeway (SR 44) in New Smyrna Beach, is a sewage treatment plant having a design capacity of 4 MGD. Wastewater receives secondary treatment, then basic disinfection with chlorine, followed by dechlorination with sulfur dioxide. Treated wastewater is discharged to the Indian River lagoon.

Due to a reported equipment malfunction at the plant on the day the effluent was sampled, the effluent still contained total residual chlorine, even after treatment with sulfur dioxide (facility summary provided by Dr. Phil Kane, FDEP Orlando).

The toxicity tests discussed in this report were performed in accordance with methods described by Weber, 1993, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 4th Edition, EPA/600/4-90/027F.

Results and Discussion

The FDEP Biology Section performed two 48-hour static acute screening toxicity bioassays with a sample of effluent from this facility. Two additional 48-hour screening bioassays were performed on aliquots of the sample that were dechlorinated in the laboratory using 0.025N sodium thiosulfate at the rate of 0.15 mL/L. The tests species used for these bioassays were the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*.

The chlorinated and dechlorinated test results indicated that the sample was toxic to the waterfleas, producing 100% mortality in 24 hours and 48 hours, respectively. No deaths occurred in either the chlorinated or dechlorinated fish tests (Table 1). Total residual chlorine of the sample was 0.13 mg/L in the laboratory and 2.9 mg/L in the field. Total residual chlorine levels as low as 0.028 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates (EPA *Quality Criteria for Water*, 1986).

Total ammonia of the sample was 10.15 mg/L. The calculated unionized ammonia (CUA) concentration in the *Ceriodaphnia dubia* chlorinated test was 0.05 mg/L at zero hour and 1.44 mg/L at 24 hours. The CUA concentration, in the *Ceriodaphnia dubia* dechlorinated test was 0.14 mg/L at zero hour and 1.85 mg/L at 48-hours. The CUA concentration was not determined at 24-hours in the dechlorinated *Ceriodaphnia dubia* test because some *C. dubia* were still alive in the test vessels. The increase in CUA, for both the chlorinated and dechlorinated tests, was due to an increase in the sample pH which occurred during the testing period. Unionized ammonia concentrations as low as 0.08 mg/L and 0.5 mg/L have been found to be acutely toxic to some freshwater fish and invertebrates, respectively (EPA *Quality Criteria for Water*, 1986).

Further chemical analyses were performed on the sample and several pesticides and metals were identified (Table 2). The metals do not appear to be present in concentrations known to be toxic to the test species. The concentration of the pesticide,

chlorpyrifos (0.20 µg/L) exceeded a concentration (0.12 µg/L) shown to cause death to another waterflea species, *Daphnia pulex* (EPA *AQUIRE Database*, 1994).

Conclusion

The sample of effluent collected from this facility on 24 October, 1994, was toxic to *Ceriodaphnia dubia* with no survival in 100% effluent. We partially attribute the toxicity to each of the following: the total residual chlorine, the unionized ammonia, and the pesticide, chlorpyrifos. The sample did not exhibit toxicity to the *Cyprinella leedsi*.

Table 1. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the New Symrna Beach STP, New Symrna Beach, Volusia County, Florida, NPDES# FL0020133, performed on 25 to 27 October, 1994.

Dechlorinated Test

Facility:	**New Symrna Beach STP**			NPDES #	**FL0020133**	Facility Type:	**Sewage Treatment Plant**
Location:	New Symrna Beach			Contact/District:	P. Kane/Central		
County:	Volusia			Test type:	static acute screen		
Sample Collection Date:	10/24/94	Time:	0951	# tests:	2	Receiving Water:	Indian River Lagoon
Test Beginning Date:	9/27/94	Time:	1530	Chlorination Type:	*Sample collected after dechlorination		
Test Ending Date:	9/29/94	Time:	1530			**Page 1 of 2**	

*Sample was further dechlorinated in the laboratory with 0.15 mL/L of 0.025 N sodium thiosulfate.

Total Residual CL2	mg/L	Method
Field:	2.90	DR-100
Lab:	0.04	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.017	0.00
20% Dilute Mineral Water (cladocerans):	< 0.017	0.00
100% Sample:	10.15	0.14

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	75	80
100% Sample:	200	195

Salinity	(ppt)
Control Water:	0
100% Sample:	0

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours old

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature			Dissolved Oxygen			Uncorrected Conductivity	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/20	5	5	5	8.3	-	8.3	23.9	-	23.7	7.8	-	7.9	165	175
Control B	0/20	5	5	5	-	-	8.3	-	-	23.8	-	-	7.9	-	180
Control C	0/20	5	5	5	-	-	8.3	-	-	23.8	-	-	7.9	-	180
Control D	0/20	5	5	5	-	-	8.3	-	-	23.7	-	-	8.0	-	185
100% A	20/0	5	2	0	7.3	-	8.5	23.8	-	23.8	7.6	-	7.8	875	825
100% B	20/0	5	0	0	-	-	8.5	-	-	23.8	-	-	7.9	-	885
100% C	20/0	5	2	0	-	-	8.5	-	-	23.9	-	-	7.9	-	880
100% D	20/0	5	1	0	-	-	8.5	-	-	23.7	-	-	7.9	-	875

Organism: ***Cyprinella leedsi*** Age: 11 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature			Dissolved Oxygen			Uncorrected Conductivity	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/500	5	5	5	7.8	8.2	8.4	23.7	23.6	23.1	8.2	8.5	8.2	245	255
Control B	0/500	5	5	5	7.8	8.2	8.4	-	-	23.0	8.2	8.5	8.2	250	250
Control C	0/500	5	5	5	7.8	8.2	8.4	-	-	22.9	8.2	8.5	8.3	245	250
Control D	0/500	5	5	5	7.8	8.2	8.4	-	-	23.1	8.2	8.6	8.3	250	250
100% A	500/0	5	5	5	7.1	7.8	8.0	24.8	23.7	23.2	7.7	7.9	6.6	925	890
100% B	500/0	5	5	5	7.1	7.8	8.0	-	-	23.0	7.7	7.8	6.5	925	890
100% C	500/0	5	5	5	7.2	7.8	8.0	-	-	23.0	7.6	7.9	6.5	925	890
100% D	500/0	5	5	5	7.2	7.8	8.0	-	-	23.2	7.6	7.9	6.2	930	890

Table 1. Continued. Data recorded during the 48-hour acute screening bioassays of a sample of effluent from the New Symrna Beach STP, New Symrna Beach, Volusia County, Florida, NPDES# FL0020133, performed on 25 to 27 October, 1994.

Chlorinated Test

Facility:	**New Symrna Beach STP**			**NPDES #**	**FL0020133**	Facility Type:	**Sewage Treatment Plant**
Location:	New Symrna Beach			Contact/District:	P. Kane/Central		
County:	Volusia			Test type:	static acute screen		
Sample Collection Date:	**10/24/94**	Time:	0951	# tests:	2	Receiving Water:	Indian River Lagoon
Test Beginning Date:	9/27/94	Time:	1530	Chlorination Type:	***Sample collected after dechlorination**		
Test Ending Date:	9/29/94	Time:	1530			**Page 2 of 2**	

*Incomplete chlorine removal due to plant equipment malfunction.

Organism: ***Ceriodaphnia dubia*** Life stage: < 24 hours old

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature			Dissolved Oxygen			Uncorrected Conductivity	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/20	5	5	-	8.2	8.2	-	23.6	24.1	-	7.9	8.2	-	170	170
Control B	0/20	5	5	-	-	8.2	-	-	24.1	-	-	8.2	-	-	170
Control C	0/20	5	5	-	-	8.2	-	-	24.2	-	-	8.3	-	-	175
Control D	0/20	5	5	-	-	8.2	-	-	23.9	-	-	8.3	-	-	170
100% A	20/0	5	0	-	6.9	8.4	-	23.7	24.0	-	7.8	8.5	-	880	855
100% B	20/0	5	0	-	-	8.4	-	-	23.9	-	-	8.4	-	-	860
100% C	20/0	5	0	-	-	8.4	-	-	23.8	-	-	8.5	-	-	860
100% D	20/0	5	0	-	-	8.4	-	-	23.7	-	-	8.5	-	-	860

Organism: ***Cyprinella leedsi*** Age: 11 days

	Sample/Diluent	SURVIVAL # Alive			pH			Temperature			Dissolved Oxygen			Uncorrected Conductivity	
Concentrations	Volume(mL)	0 hr	24 hr	48 hr	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	24 hour	48 hour	0 hour	48 hour
Control A	0/500	5	5	5	7.8	8.2	8.4	23.6	23.6	23.0	8.0	8.5	8.2	250	255
Control B	0/500	5	5	5	7.8	8.2	8.4	-	-	22.9	8.0	8.5	8.2	250	250
Control C	0/500	5	5	5	7.8	8.2	8.4	-	-	22.8	8.0	8.5	8.4	250	250
Control D	0/500	5	5	5	7.8	8.2	8.4	-	-	22.9	8.0	8.6	8.3	250	245
100% A	500/0	5	5	5	6.9	7.5	7.9	24.8	23.6	23.1	7.0	7.9	6.8	925	885
100% B	500/0	5	5	5	6.9	7.6	7.9	-	-	22.9	7.0	7.8	6.7	925	885
100% C	500/0	5	5	5	6.9	7.5	7.9	-	-	22.8	7.0	7.8	6.7	925	880
100% D	500/0	5	5	5	6.9	7.5	7.9	-	-	22.9	7.0	7.8	6.7	925	885

Total Residual CL2	mg/L	Method
Field:	2.90	DR-100
Lab:	0.13	DR-100

Ammonia	Total (mg/L)	Unionized (mg/L)
Control Water (fish):	< 0.017	0.00
20% Dilute Mineral Water (cladocerans):	< 0.017	0.00
100% Sample:	10.15	0.05

Alk & Hardness	Alkalinity (mg/L)	Hardness (mg/L)
Control Water (fish):	120	125
20% Dilute Mineral Water (cladocerans):	75	80
100% Sample:	200	195

Salinity	(ppt)
Control Water:	0
100% Sample:	0

Table 2. Results of chemical analyses on the effluent from the New Smyrna Beach Sewage Treatment Plant sampled on October 24, 1994.

Metals

Calcium	57.2	mg/L[A]
Copper	5	µg/L [I]
Iron	117	µg/L [A]
Magnesium	9.47	mg/L[A]
Silver	0.182	µg/L [A]
Zinc	27	µg/L [I]

Pesticides and Herbicides

Atrazine	0.10	µg/L [T]
Chlorpyrifos Ethyl	0.20	µg/L [T]

Base-Neutral & Acid Extractables

none detected

[A] Value reported is the mean of two or more determinations.

[I] Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.

[T] Value reported is less than the practical quantitation limit.

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: New Smyrna Beach WWTP
County: Volusia
Contact/District: P. Kane / Central
NPDES Permit #: FL0020133
LIMS Sample #: 92363 LIMS Job #: 94-OCT-25-06-01

Sample Collection: Date 10/24/94 Time 0951
Test Beginning: Date 10/25/94 Time 1130
Test Ending: Date 10/27/94 Time 1530
Organism Batch #: 42 Diluent Batch #: 41
Organism Age: <24 hrs.
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 4

Remarks:
DeCl

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm.
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	21.5 @ 21.6	8.4 @ 23.6 °C	100.7 @ 98.6 1024 @ 1047 @ 23.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.1 @ 24.3	8.4 @ 23.7 °C	103.3 @ 98.6 1043 @ 1047 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.3 @ 24.2 °C	1037 @ 1047 109.4 @ 102.6 @ 23.9 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control	A	5	5	5	8.3		8.3	23.9		23.7	7.8		7.9	1165		175
Control	B	5	5	5			8.3			23.8			7.9			180
Control	C	5	5	5			8.3			23.8			7.9			180
Control	D	5	5	5			8.3			23.7			8.0			185
100%	A	5	2	0	7.3		8.5	23.8		23.8	7.6		7.8	875		825
100%	B	5	0	0			8.5			23.8			7.9			885
100%	C	5	2	0			8.5			23.9			7.9			880
100%	D	5	1	0			8.5			23.7			7.9			875
	*JAS 10/25/94 wrote in wrong place!			1 pm stopped MF 10/27/94												
Recorded by:		TM	TM	MF	JAS		MF	JAS		OW	JAS		OW	JAS		OW
Measured/Loaded by:		JAS	TM	MF	TM		OW	TM		MF	TM		MF	TM		MF

Investigators' Signatures

Reviewer

form updated 10/05/94

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			2.9	—	PK
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	.04	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	125	75	200	HACH	JAS
Hardness (mg/L as $CaCO_3$):	125	80	195	HACH	JAS
Total ammonia (mg/L as N):	<0.017	<0.017	1015	ORION	TM

Ammonia Meter #98136 Meter Slope: -57.2 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: New Smyrna Beach WWTP
County: Volusia
Contact / District: Phil Kane / Central
NPDES Permit #: FL0020133
LIMS Sample #: 92363 LIMS Job #: 94-OCT-25-06-01

Sample Collection: Date 10/24/94 Time 0951
Test Beginning: Date 10/25/94 Time 1530
Test Ending: Date 10/27/94 Time 1530
Organism Batch #: 43 Diluent Batch #: well
Organism Age: 11 days old
Test Organism: Cyprinella leedsi

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

Test Number: 2 of 4

Remarks:
DeCl-

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	21.5 @ 21.6	8.4 @ 23.6 °C	100.7 @ 98.6 1024 @ 1047 @ 23.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.1 @ 24.3	8.4 @ 23.7 °C	1033 @ 986 1043 @ 1047 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.3 @ 24.2 °C	1037 @ 1047 109.4 @ 102.6 @ 23.9 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) ~~Cond. (µmhos/cm)~~		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	174	5	5	5	7.8	8.2	*5 8.4	23.7	23.6	23.1	8.2	8.5	8.2	245	250	255
Control B	380	5	5	5	7.8	8.2	8.4			23.0	8.2	8.5	8.2	250	250	250
Control C	38	5	5	5	7.8	8.2	8.4			22.9	8.2	8.5	8.3	245	250	250
Control D	116	5	5	5	7.8	8.2	8.4			23.1	8.2	8.6	8.3	250	250	250
100% A	45	5	5	5	7.1	7.8	8.0	24.8	23.7	23.2	7.7	7.9	6.6	925	900	890
100% B	333	5	5	5	7.1	7.8	8.0			23.0	7.7	7.8	6.5	925	900	890
100% C	87	5	5	5	7.2	7.8	8.0			23.0	7.6	7.9	6.5	925	900	890
100% D	476	5	5	5	7.2	7.8	8.0			23.2	7.6	7.9	6.2	930	905	890
						*wrote in correct number MF 10/27/94										
Recorded by:		TM	TM	MF	JAS	MF	OW	JAS	MF	OW	JAS	MF	OW	JAS	MF	OW
Measured/Loaded by:		TR	TM	MF	TM	TM	MF	TM	TM	MF	TM	TM	MF	TM	TM	MF

Investigators' Signatures

Tina McKulsky
Jennifer Paraparu
Marshall Faircloth
Reviewer

form updated 10/05/94

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L)			2.9	—	PK
Lab Total Residual Cl2 (mg/L)	<0.03	<0.03	.04	DR-100	TM
Alkalinity (mg/L as $CaCO_3$)	125	75	200	HACH	JAS
Hardness (mg/L as $CaCO_3$)	125	80	195	HACH	JAS
Total ammonia (mg/L as N)	<0.017	<0.017	10.15	Orion	TM

Ammonia Meter #98136 Meter Slope: -57.2 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: New Smyrna Beach WWTP
County: Volusia
Contact / District: Phil Kane / Central
NPDES Permit #: FL0020133
LIMS Sample #: 92363 LIMS Job #: 94-OCT-25-06-01

Sample Collection: Date 10/24/94 Time 0951
Test Beginning: Date 10/25/94 Time 1530
Test Ending: Date 10/26/94 Time 1530
Organism Batch #: 42 Diluent Batch #: 41
Organism Age: <24 hrs Old
Test Organism: Ceriodaphnia dubia

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

Test Number: 3 of 4

Remarks:

Cl-

Test Terminated @ 24 hrs

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	21.5 @ 21.6	8.4 @ 23.6 °C	1007 @ 98.6 1024 @ 1047 @ 23.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.1 @ 24.3	8.4 @ 23.7 °C	1033 @ 98.6 1043 @ 1047 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.3 @ 24.2 °C	1037 @ 1047 1024 @ 102.6 @ 23.9 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control	A	5	5		8.2	8.2		23.6	24.1		7.9	8.2		170	170	
Control	B	5	5			8.2			24.1			8.2			170	
Control	C	5	5			8.2			24.2			8.3			175	
Control	D	5	5			8.2			23.9			8.3			170	
100%	A	5	0	—	6.9	8.4		23.7	24.0		7.8	8.5		880	855	
100%	B	5	0	—		8.4			23.9			8.4			860	
100%	C	5	0	—		8.4			23.8			8.5			860	
100%	D	5	0	—		8.4			23.7			8.5			860	
Recorded by:		TM	TM		JLS	MF		JLS	MF		JLS	MF		JLS	MF	
Measured/Loaded by:		JLS	TM		TM	TM		TM	TM		TM	TM		TM	TM	

Investigators' Signatures

Tina Mikulski
Marshall Faircloth
Jennifer Sargent
Reviewer

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			2.9	—	PK
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	0.13	DR-100	TM
Alkalinity (mg/L as $CaCO_3$):	125	75	200	Hach	JLS
Hardness (mg/L as $CaCO_3$):	125	80	195	Hach	JLS
Total ammonia (mg/L as N)	<0.017	<0.017	10.15	Orion	TM

Ammonia Meter #98136 Ammonia Meter Slope: -57.2 Ammonia Blank: <0.017 Control Salinity: ( ) ppt Sample Salinity: ( ) ppt

form updated 10/05/94

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: New Smyrna Beach WWTP
County: Volusia
Contact / District: Phil Kane / Central
NPDES Permit #: FL00 20133
LIMS Sample #: 92363 LIMS Job #: 94-Oct-25-06-01

Sample Collection: Date 10/24/94 Time 0951
Test Beginning: Date 10/25/94 Time 1530
Test Ending: Date 10/27/94 Time 1530
Organism Batch #: 43 Diluent Batch #: well
Organism Age: 11 days old
Test Organism: Cyprinella leedsi

Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Test Number: 4 of 4
Remarks:
CO-

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	21.5 @ 21.6	8.4 @ 23.6 °C	100.7 @ 98.6 1024 @ 1047 @ 23.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.1 @ 24.3	8.4 @ 23.7 °C	103.3 @ 98.6 1043 @ 1047 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.1 @ 23.1	8.3 @ 24.2 °C	1037 @ 1047 1094 @ 1026 @ 23.9 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) (Cond. (µmhos/cm)) 0 hr	24 h	48 h
Control A	44	5	5	5	7.8	8.2	8.4	23.0	23.6	23.0	8.0	8.5	8.2	250	250	255
Control B	76	5	5	5	7.8	8.2	8.4			22.9	8.0	8.5	8.2	250	250	250
Control C	62	5	5	5	7.8	8.2	8.4			22.8	8.0	8.5	8.4	250	250	250
Control D	775	5	5	5	7.8	8.2	8.4			22.9	8.0	8.6	8.3	250	250	245
100% A	57	5	5	5	6.9	7.5	7.9	24.8	23.6	23.1	7.0	7.9	6.8	925	900	885
100% B	30	5	5	5	6.9	7.6	7.9			22.9	7.0	7.8	6.7	925	900	885
100% C	412	5	5	5	6.9	7.5	7.9			22.8	7.0	7.8	6.7	925	900	880
100% D	209	5	5	5	6.9	7.5	7.9			22.9	7.0	7.8	6.7	925	900	885
Recorded by:		TM	TM	MF	JS	MF	DW	JS	MF	DW	JS	MF	DW	JS	MF	DW
Measured/Loaded by:		TR	TM	MF	TM	TM	MF	TM	TM	MF	TM	TM	MF	TM	TM	MF

Investigators' Signatures

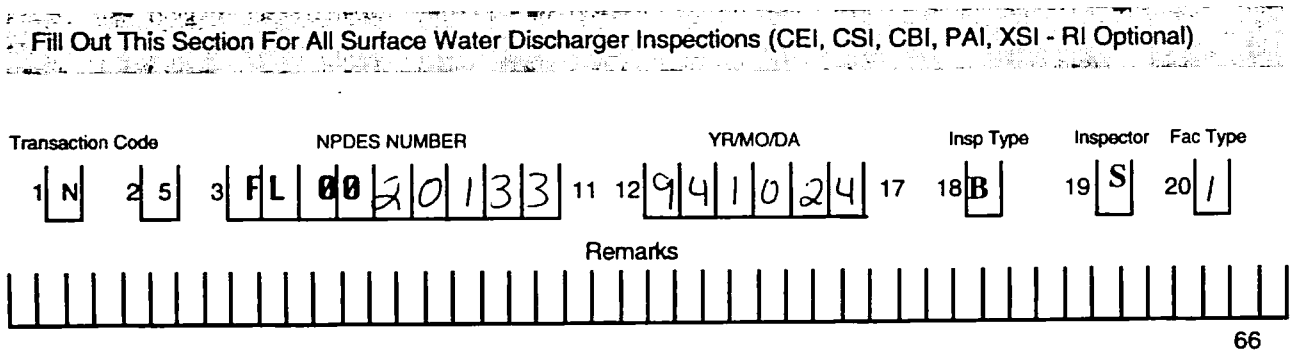
Julia Mikulski
Jennifer Wiegand
Marshall Faircloth
D. O. Gillette
Reviewer

Water Quality Parameters	Salt Water / (Well Water) 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):		2.9	—	MF
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	DR-100 .13	TM
Alkalinity (mg/L as $CaCO_3$):	125	75	200	Hach JLS
Hardness (mg/L as $CaCO_3$):	127	80	195	Hach JLS
Total ammonia (mg/L as N):	<0.017	<0.017	10.15	Orion TM

Ammonia Meter #98136 Ammonia Meter Slope: 57.2 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

form updated 10/05/94

The Bioassay of the New Smyrna Beach STP effluent sampled on October 24, 1994, NPDES #FL0020133.



The Priority Pollutants Analysis for the Bioassay of the New Smyrna Beach STP effluent sampled on October 24, 1994, NPDES #FL0020133.

