BIOASSAYS OF SELECTED EFFLUENTS FROM THE

File - [redacted] REGIONAL AND BETHUNE POINT

SEWAGE TREATMENT PLANTS

DAYTONA BEACH, VOLUSIA COUNTY, FLORIDA

NPDES #FL0025984

SAMPLED 12/14/82

Biology Section
Bureau of Water Analysis
February 7, 1983

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EXECUTIVE SUMMARY

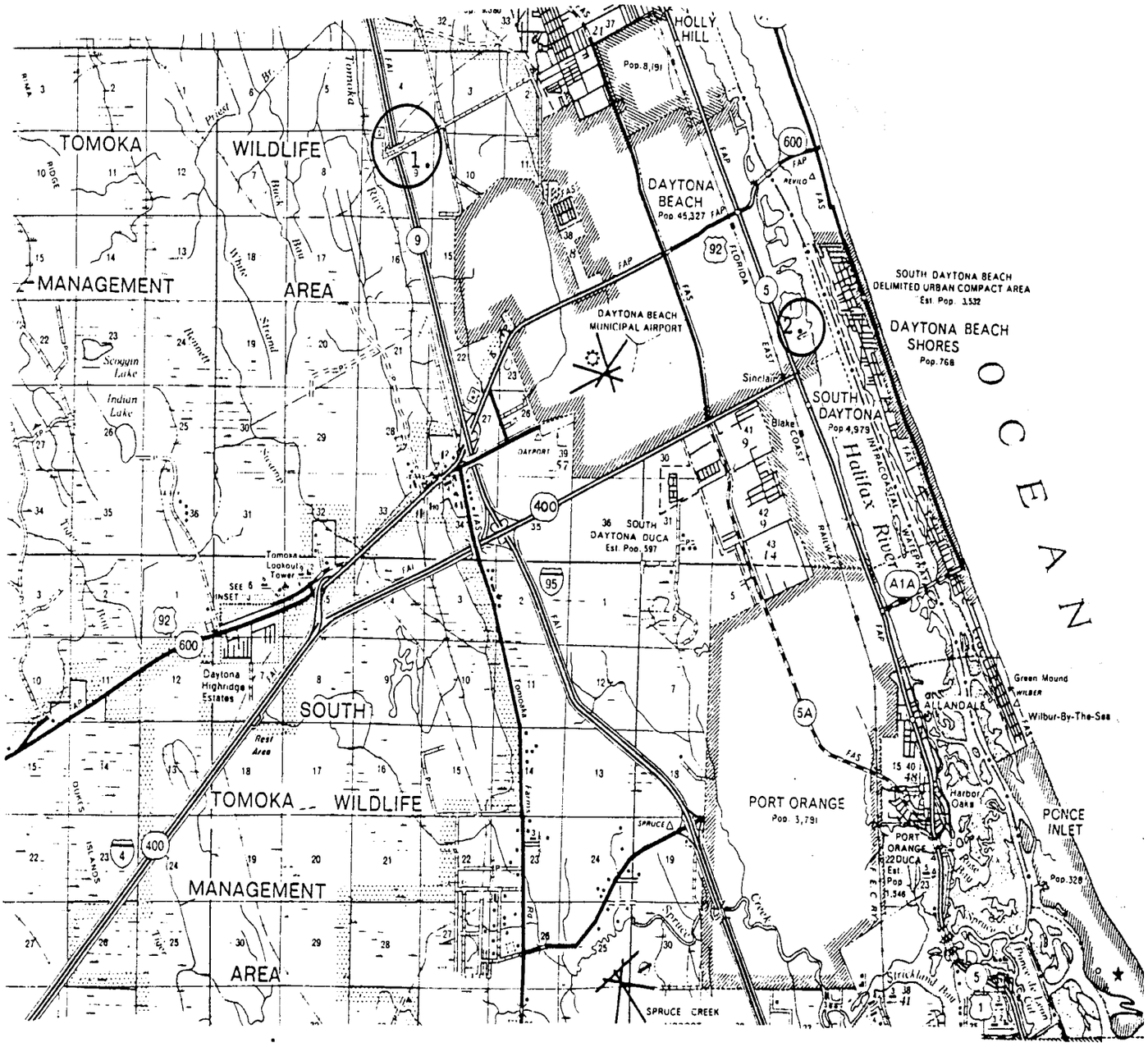
Daytona Beach Regional and Bethune Point STP's, NPDES #FL0025984, on 15 to 17 December, 1982.

Bioassays were performed on selected effluents from these two domestic waste treatment facilities, which share a common discharge to the Halifax River. Pre-chlorinated effluent from the Bethune Point STP was acutely toxic to Mysidopsis bahia, producing 24 hour LC_{50} values of 82.6% to 83.0% and 48 hour values of 46.4% to 50.6%. Pre-chlorinated effluent from the Regional STP also was acutely toxic to Mysidopsis bahia, producing 48 hour LC_{50} values of 74.8% to 75.2%. Chlorinated effluent from the Regional STP was also toxic, with a 24 hour LC_{50} of 132% and 48 hour LC_{50}'s of 68.4% to 70.3%. This slight increase in toxicity of the chlorinated effluent at 48 hours in comparison to the pre-chlorinated effluent may have been due to the added toxic effects of the total chlorine residual measured in that sample. Variable concentrations of total ammonia were measured in these effluents, up to 2.4 mg/l in the Bethune Point sample, but the amounts measured were insufficient to have caused the observed toxicity. Chemical analyses of chlorinated effluents from these facilities indicated the presence of the pesticide Lindane (g-BHC) in both effluents, at concentrations of 0.13 µg/l in the Regional effluent and 0.17 µg/l in the Bethune Point effluent. Lindane was previously detected in the Bethune Point effluent in March, 1982 (FDER 1982). Also present in the Regional effluent were small concentrations of silver (0.1 µg/l) and zinc (11 µg/l). Silver (0.3 µg/l), zinc (27 µg/l) and, additionally, mercury (0.3 µg/l) were present in the Bethune Point effluent. Therefore, the toxicities noted in these Bethune Point and Regional effluents may have been due to the combined effects of Lindane, the various metals, and, in the case of the final effluent from the Regional facility, the added toxic effects of the residual chlorine.

INTRODUCTION

The Daytona Beach Regional STP is located on the 11th Street extension, west of Daytona Beach, Volusia County, Florida (Fig. 1). This facility has a 10 MGD design flow capacity but currently is treating an average of only 3.8 MGD of domestic waste. Treatment includes two stage activated sludge, nitrification, tertiary filtration, and chlorination. The treated effluent is pumped to the Bethune Point STP, located on the Halifax River at Shady Place (Fig. 1), where it mixes with final effluent from the Bethune Point STP prior to discharge to the Halifax River through a pipe 84' offshore and 5' deep.

The Biology Section had previously performed bioassays on effluents from the Bethune Point STP in March, 1982 (FDER 1982). Since bioassays were subsequently scheduled for the Regional STP in December, 1982, it was decided to re-evaluate the toxicities demonstrated by the Bethune Point effluents (48 hour LC_{50}'s = 39.9% to 46.2%), which may have been caused by the presence of the pesticide Lindane in the Bethune Point effluent at that time. Therefore, to evaluate the separate effects that these effluents may have on the biota of the receiving waters, bioassays were performed on pre-chlorinated effluent from the Bethune Point STP and on pre-chlorinated and chlorinated effluents from the Daytona Beach Regional STP. To compliment the biological analyses, samples of final effluent from both facilities were collected prior to mixing, for a chemical analyses of certain organics and metals. The results of these tests are presented in this report.



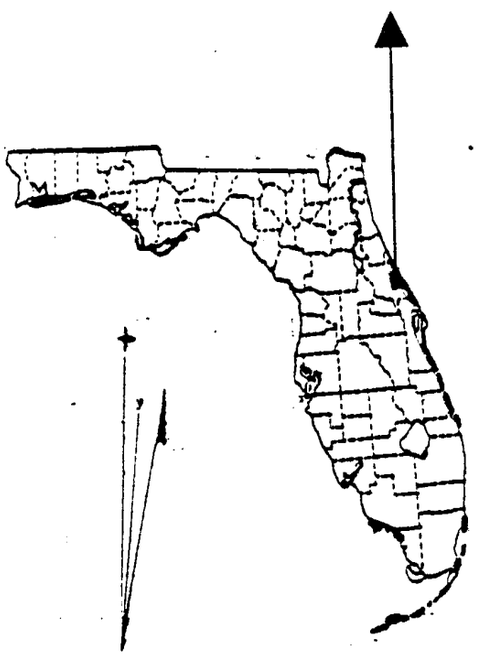


Figure 1. Portions of Volusia County, Florida, including City of Daytona Beach and sewage treatment plants.

1. Daytona Beach Regional
2. Bethune Point

METHODS AND MATERIALS

Test methods used to conduct these static bioassays are extensively described by Peltier (1978). The organism selected for this study is among those recommended by Peltier (1978) and the U.S.EPA (1978). The life history and maintenance procedures used to culture the organism are detailed below.

History and Maintenance of Bioassay Organisms

Mysidopsis bahia (mysid shrimp) - In September, 1978, approximately 300 adult mysid shrimp were obtained from the EPA laboratory in Gulf Breeze, Florida. The mysids are cultured under a 16:8 hour light-dark cycle in 10 and 15 gallon all glass aquaria equipped with undergravel filtration and aeration. The mysid shrimp are cultured over a wide range of salinities (10-30 ppt) to minimize acclimation periods to low or high salinity effluents. Seawater is obtained from the FSU Marine Laboratory located at Turkey Point, Florida (salinity range 17-31 ppt) and partial water changes are performed weekly. Freshwater, for dilution of the seawater as necessary, is obtained from a deep well near the DER laboratory. The mysids are fed twice daily with freshly hatched Artemia (brine shrimp) and are kept at a constant temperature of 22° plus or minus 1°C. Ten to fifteen day old (three-quarter adult size) mysids were used in this test.

To ensure the uniform sensitivity of these test organisms to toxic substances, the Biological Section conducts monthly standard reference toxicant bioassays using sodium lauryl sulfate as the reference toxicant.

Test Methods

Three separate 48 hour static acute toxicity bioassays were performed on pre-chlorinated effluent from the Bethune Point STP and on pre-chlorinated and chlorinated effluents from the Daytona Beach Regional STP. The tests were performed from 1120 hours on 15 December to 1130 hours on 17 December 1982. The samples were collected by Mr. Louis Ley and Mr. Guy Hadley of DER's Orlando office at 1440 hours on 14 December, 1982, using standard wastewater sampling procedures. Separate samples were obtained for chemical and biological testing. Samples for metal analyses were preserved with HNO_3. Samples for organic chemical analyses and for the bioassays were unpreserved. The samples were iced and transported to the DER laboratory in Tallahassee for analyses within 24 hours of collection.

As stated previously, the Bethune Point effluent was tested to re-evaluate the toxicity noted in an earlier test, which may have been related to the presence of Lindane. Pre-chlorinated and chlorinated effluents from the Regional STP were testd to differentiate the toxicity resulting from chlorine and the toxicity associated with some other component of the effluent.

Saltwater for dilution of the effluent samples was obtained from the FSU Marine Laboratory at Turkey Point (salinity = 30 ppt). This saltwater diluent was then adjusted to approximately 24 ppt, a moderate salinity characteristic of the receiving body of water (Halifax River) by adding an appropriate amount of DER well water. For test concentrations of 56% and below, this adjusted

diluent was mixed directly with the effluent, achieving a range of final salinities (12 ppt to 23 ppt). For the 100% effluent test concentrations, freshly autoclaved artificial sea salts (Ocean 50®) were added until salinities of approximately 7 ppt were achieved (the lower limit of mysid shrimp salinity tolerance). A series of three control groups (Table 5) was then used to ensure that any mortality in the test organisms was not the result of toxic properties associated with the diluent, the artificial sea salts, or the salinity range. The control groups included: adjusted Turkey Point seawater (salinity = 24 ppt), artificial sea salt (Ocean 50®) adjusted well water (salinity = 7 ppt), and a salinity control consisting of Turkey Point seawater and well water (salinity = 11 ppt). The concentration series selected for this study (Table 1) is that recommended by the APHA (1980).

Two replicates of each test concentration and of the controls were used to test with Mysidopsis bahia. Immediately prior to the bioassays, a suitable number of mysids were transferred by net from the 10 ppt, 15 ppt, 20 ppt and 25 ppt salinity aquaria to culture dishes for observation and selection of individuals for the tests. Ten to fifteen day old (three-quarter adult size) mysids were used in these tests. Individual mysid shrimp were siphoned using a glass tube, carefully examined for injury, and transferred to wide mouth quart jars, each containing 500 ml of the appropriate concentration. For each concentration, the mysid shrimp were pre-acclimated to within 4 ppt salinity. Five organisms were loaded per test chamber, giving ten per concentration. Based on the recommendations of EPA (1978), the mysids were fed brine shrimp (Artemia) nauplii at the rate of approximately 10 to 20 nauplii per mysid per day to minimize cannibalism.

Dissolved oxygen, pH, temperature, and the number of live organisms were recorded for each test chamber at 0 hours, 24 hours, and 48 hours. The salinity of each test concentration was recorded at the beginning and end of the test. Ammonia concentrations, including total and unionized fractions (expressed in mg/l as N and as NH_3, respectively), were recorded in a control and the 100% effluent test concentrations at the beginning of the test. Total ammonia concentrations were determined using an Orion® specific ion probe and an Orion Ionalyzer®. The unionized fraction was then determined based on the total ammonia concentration, and the pH, temperature, and salinity of the sample. These values were recorded on the bioassay data forms and are presented in Tables 2 through 5.

Table 1. Concentration Series and Volumes Used for These Static Bioassays

Mysidopsis bahia (mysid shrimp)

Concentration	Dilution Water	Effluent	Total Volume
Control	500 ml	---	500 ml
5.6%	472 ml	28 ml	500 ml
10.0%	450 ml	50 ml	500 ml
18.0%	410 ml	90 ml	500 ml
32.0%	340 ml	160 ml	500 ml
56.0%	220 ml	280 ml	500 ml
100.0%	--	500 ml	500 ml

Table 2 . Data recorded during 48 hour, Mysidopsis bahia, static acute toxicity bioassay of the Bethune Point STP, Daytona Beach, Volusia County, Florida, NPDES #FL0025984, on 15 to 17 December, 1982.

Pre-chlorinated Effluent

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			NH_3/NH_3+NH_4 (mg/l)		Salinity (ppt)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48	0	48
5.6%	5	5	5	8.1	6.5	6.7	8.3	8.2	8.0	20.0	19.8	18.0				
5.6%	5	5	5	8.1	6.4	6.7	8.3	8.2	8.0						23.0	23.0
10.0%	5	5	5	8.0	6.4	6.8	8.3	8.2	8.0	20.0	19.7	17.9				
10.0%	5	5	5	8.0	6.2	6.8	8.3	8.2	8.0						22.0	22.0
18.0%	5	5	5	8.0	6.3	6.8	8.2	8.1	8.0	19.9	19.6	17.8				
18.0%	5	5	4	8.0	6.4	6.8	8.2	8.1	8.0						20.5	20.8
32.0%	5	5	4	7.7	6.2	7.0	8.0	8.0	8.0	20.0	19.7	17.8				
32.0%	5	5	5	7.7	6.2	7.0	8.0	8.1	8.0						16.0	17.2
56.0%	5	4	3	7.5	6.1	7.3	7.8	7.9	8.0	20.0	19.7	17.8				
56.0%	5	3	1	7.5	6.2	7.3	7.8	8.0	8.0						12.0	12.2
100.0%	5	2	0	7.2	6.5	7.3	8.1	8.2	7.9	20.1	19.8	17.8	.11/2.4	--		
100.0%	5	2	0	7.2	6.5	7.3	8.1	8.2	7.9						7.5	6.2

Remarks:

Table 3 . Data recorded during 48 hour, Mysidopsis bahia, static acute toxicity bioassay of the Daytona Beach Regional STP, Volusia County, Florida, NPDES #FL0025984, on 15 to 17 December, 1982.

Pre-chlorinated Effluent

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/ℓ)			pH			Temperature (°C)			NH_3/NH_3+NH_4 (mg/ℓ)		Salinity (ppt)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48	0	48
5.6%	5	5	5	8.1	7.0	6.7	8.3	8.2	8.1	20.0	19.9	18.0				
5.6%	5	5	5	8.1	7.0	6.7	8.3	8.2	8.1						22.8	23.0
10.0%	5	5	5	8.2	6.9	7.0	8.3	8.2	8.1	20.0	19.8	18.0				
10.0%	5	5	5	8.2	6.8	7.0	8.3	8.2	8.1						22.0	19.5
18.0%	5	5	5	8.3	6.3	7.1	8.3	8.2	8.1	19.9	19.7	18.0				
18.0%	5	5	5	8.3	6.3	7.1	8.3	8.2	8.1						19.5	18.0
32.0%	5	5	5	8.3	6.3	7.2	8.3	8.2	8.2	19.9	19.7	18.0				
32.0%	5	5	4(5)[a]	8.3	6.5	7.2	8.3	8.2	8.2						16.5	16.2
56.0%	5	5	4	8.5	6.5	7.4	8.2	8.2	8.1	19.8	19.8	18.0				
56.0%	5	5	4	8.5	6.6	7.4	8.2	8.2	8.1						11.0	11.2
100.0%	5	5	1	9.0	6.7	7.5	8.7	8.5	8.4	19.8	19.8	18.0	.04/.25	--		
100.0%	5	5	1	9.0	6.7	7.5	8.7	8.5	8.4						7.0	7.0

Remarks: [a] Number in parentheses used in calculations since one organism was cannibalized between 24 and 48 hours.

Table 4 . Data recorded during 48 hour, Mysidopsis bahia, static acute toxicity bioassay of the Daytona Beach Regional STP, Volusia County, Florida, NPDES #FL0025984, on 15 to 17 December, 1982.

Chlorinated Effluent[a]

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Temperature (°C)			NH_3/NH_3+NH_4 (mg/l)		Salinity (ppt)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48	0	48
5.6%	5	5	5	8.0	6.3	6.8	8.3	8.2	8.1	19.9	19.5	18.0				
5.6%	5	5	5	8.0	6.3	6.8	8.3	8.2	8.0						23.0	23.0
10.0%	5	5	5	8.2	6.4	6.8	8.3	8.2	8.1	19.8	19.4	17.8				
10.0%	5	5	5	8.2	6.4	6.8	8.3	8.2	8.1						22.0	22.0
18.0%	5	5	5	8.3	6.5	6.5	8.3	8.2	8.0	20.0	19.4	17.8				
18.0%	5	5	5	8.3	6.6	6.5	8.3	8.2	8.0						20.0	20.0
32.0%	5	5	5	8.5	6.9	6.6	8.3	8.3	8.1	20.0	19.4	17.8				
32.0%	5	5	5	8.5	6.9	6.6	8.3	8.3	8.1						17.0	17.0
56.0%	5	3	3	8.8	7.0	6.7	8.3	8.3	8.2	20.0	19.4	17.8				
56.0%	5(4)[b]	4	3	8.8	7.2	6.7	8.3	8.3	8.2						11.5	11.2
100.0%	5	3	1	9.1	7.5	7.1	8.7	8.6	8.4	20.8	19.5	18.0	.06/.36	--		
100.0%	5	4	1	9.1	7.6	7.1	8.7	8.6	8.5						7.0	6.8

Remarks: [a] Total Residual Chlorine = 0.55 mg/l (HACH DPD Method).

[b] Number in parentheses used in calculations since one organism had jumped from container between 0 and 24 hours.

Table 5 . Data recorded during 48 hour, *Mysidopsis bahia*, static acute toxicity bioassay of the Bethune Point and Daytona Beach Regional STP's, on 15 to 17 December, 1982.

Control Series

Concentration or %	Number of Live Organisms			Dissolved Oxygen (mg/ℓ)			pH			Temperature (°C)			NH_3/NH_3+NH_4 (mg/ℓ)		Salinity (ppt)	
	0	24	48	0	24	48	0	24	48	0	24	48	0	48	0	48
Seawater Control	5	5	5	8.3	6.5	7.0	8.3	8.1	8.0	20.0	19.8	18.0				
Seawater Control	5	5	5	8.3	6.4	7.0	8.3	8.1	8.0						23.8	24.0
Sea Salts Control	5	5	4(5)[a]	8.9	7.5	7.1	8.8	8.6	8.2	21.5	19.8	18.0	0/0	--		
Sea Salts control	5	5	5	8.9	7.5	7.1	8.8	8.6	8.2						7.0	6.5
Salinity Control	5	5	5	8.7	6.7	7.4	8.2	8.1	8.1	20.5	19.8	18.0				
Salinity Control	5	5	5	8.7	6.7	7.4	8.2	8.1	8.0						11.0	11.0

Remarks: [a] Number in parentheses used since one organism was cannibalized between 24 and 48 hours.

Table 6 . LC_{50} Data for Bioassays of the Bethune Point and Daytona Beach Regional STP's, on 15 to 17 December, 1982.

Organism	Method of Data Analysis	24 LC_{50} and 95% Confidence Intervals	48 Hour LC_{50} and 95% Confidence Intervals
M. bahia	Binomial	82.6% (32 and ∞),b	50.6% (32 and 100)
Bethune Point	Moving Average	82.6% (0 and ∞),b	47.7% (36 and 66)
Pre-chlorinated	Probit	83.0% (63 and 150),b	46.4% (35 and 62)
M. bahia	Binomial	No Mortality	74.8% (32 and ∞)
Regional STP	Moving Average		74.8% (59 and 110)
Pre-chlorinated	Probit		75.2% (59 and 100)
M. bahia	Binomial	a	68.4% (32 and ∞)
Regional STP	Moving Average	a	68.8% (55 and 97)
Chlorinated	Probit	132.0% (83 and 58141),b	70.3% (54 and 95)

[a] Due to an insufficient number of dead organisms, or to the irregular distribution of mortality, an LC_{50} value cannot be calculated using this method of statistical analysis.

[b] Due to the distribution of mortality, the LC_{50} value calculated by this method of statistical analysis does not meet the criteria established by the Committee on Methods for Toxicity Tests with Aquatic Organisms.

RESULTS AND DISCUSSION

The sample of pre-chlorinated effluent from the Bethune Point STP proved to be acutely toxic to Mysidopsis bahia, producing 24 hour LC_{50} values of 82.6% to 83.0% and 48 hour values of 46.4% to 50.6% (Table 6). This toxicity was very similar to that noted for this effluent in an earlier test (48 hour LC_{50} = 44.4% to 44.8%, FDER 1982). The sample of pre-chlorinated effluent from the Daytona Beach Regional STP also was acutely toxic to Mysidopsis bahia. Although no mortality was noted at 24 hours, the 48 hour test resulted in LC_{50} values of 74.8% to 75.2% (Table 6). The chlorinated effluent from the Regional facility was slightly more toxic than the pre-chlorinated effluent, producing a 24 hour LC_{50} of 132.0% and 48 hour values of 68.4% to 70.3% (Table 6). This increase in toxicity may have been due to the added toxic effects of the total chlorine residual (0.55 mg/l, Table 4) measured in that sample. Variable concentrations of total and unionized ammonia were measured in these effluents, up to 2.4 mg/l total ammonia in the Bethune Point sample, but the concentrations measured were insufficient to have caused the observed toxicity.

The DER Chemistry Section has analyzed samples of final effluent from these two facilities for certain metals and organics (Table 7). The pesticide Lindane (g-BHC) was determined to be present in both final effluents, at concentrations of 0.13 µg/l in the Regional effluent and 0.17 µg/l in the Bethune Point effluent. Lindane was previously detected in effluent from the Bethune Point facility in March, 1982, and may have been the cause of toxicity noted in the bioassays performed at that time (FDER 1982). Also present in the Regional effluent were small concentrations of silver (0.1 µg/l) and zinc (11 µg/l). Silver (0.3 µg/l), zinc (27 µg/l) and, additionally, mercury (0.3 µg/l) were present in the Bethune Point effluent.

Since very small concentrations of Lindane have been shown to be toxic to the brown shrimp, Penaeus aztecus, and to the pink shrimp, Penaeus duorarum, (0.4 µg/l and 0.17 µg/l respectively, U.S. EPA 1976) the concentrations in these effluents, 0.13 µg/l and 0.17 µg/l, may very well have caused the toxicity to the mysid shrimp, Mysidopsis bahia, noted in these tests. Additionally, since silver has been shown to be acutely toxic to marine organisms at concentrations as low as 5.8 µg/l, and, 1.0 µg/l mercury represents a distinct threat to selected species of marine organisms (U.S. EPA 1976), these metals may have contributed to the observed toxicity. Therefore, the acute toxicities noted in these bioassays were probably due to the presence of Lindane, the various metals, and to the residual chlorine in the final effluent from the Regional facility.

Discussion of the Toxicity Criteria

The toxicity standards of Chapters 17-3 and 17-4, F.A.C., are complex. Because of this complexity, they will be briefly reviewed here so that these test results may be more readily compared with the standards. For legal purposes, however, the language of the Florida Administrative Code should be consulted directly.

The two basic concepts utilized in the standards are acute and chronic toxicity, (defined in 17-3.021(1) and (3), respectively). Simplifying the actual F.A.C. language somewhat, acute toxicity is defined as the presence of a substance in a concentration one-third as great as that concentration which kills one-half of the test organisms in 96 hours, i.e., one-third of the 96 hour LC_{50}. Chronic toxicity is similarly defined as one-twentieth of the 96 hour LC_{50}. Therefore, if a test solution kills one-half or more of a group of test organisms in 96 hours, it must contain at least three times the defined "acutely toxic" concentration and at least twenty times the "chronically toxic" concentration of some substance or substances. If a test solution causes that same mortality in less than 96 hours, (for example, in 24 or 48 hours), it is at least as toxic as the example given above, and actually is probably considerably more toxic.

The particular restrictions applied to a given discharger depend upon the existence of a mixing zone, whether as a specific part of the permit or based on the existence of a currently valid permit predating the language in Chapter 17-4 requiring mixing zone designation. In the absence of a mixing zone, the general criteria for surface waters (17-3.061) are applicable at all points, beginning at the point of discharge. This section prohibits the discharge of substances in concentrations which are chronically toxic (17-3.061(2)(o); that is, the concentrations cannot exceed one-twentieth of the 96 hour LC_{50} as discussed above. If a mixing zone does exist, then this chronic toxicity standard is only applicable from the edge of the mixing zone and beyond. Within the mixing zone, the less stringent acute toxicity standard of the minimum criteria for all waters (17-3.051(1)(d) applies: one-third of the 96 hour LC_{50}. The acute toxicity standard does not apply, however, to each point within a mixing zone not designated for dredge and fill permitting, but rather to the average of a number of points within such a mixing zone, based on the provisions of the surface water mixing zones section of Chapter 17-4 (17-4.244(4)). At the same time, though, this same rule prohibits waste concentrations within such a mixing zone (i.e., at any point within the mixing zone), from exceeding the 96 hour LC_{50}. Therefore, at any point within such a mixing zone, including the point of disharge, one-half of the test organisms cannot be killed in 96 hours. Within a mixing zone designated for dredge and fill permitting, the acute toxicity standard (one-third of the 96 hour LC_{50}) applies at all points, including the point of discharge.

From the above discussion, it should be clear that if the least stringent toxicity standard, the 96 hour LC_{50}, is exceeded at any point, from the point of discharge outwards, by any discharger, then a violation of the standards has occurred. This is an important consideration since the test

procedure here reported involves the measurement of the 50% lethal concentration, and not some fraction of that concentration. Any discharger required to meet the one-twentieth of the 96 hour LC_{50} standard is therefore being tested very leniently. Any reduction in the test period from 96 hours provides an added degree of leniency to a discharger.

A number of different dilutions were examined in order to determine by how much, if any, the discharge exceeds the 96 hour LC_{50} standard. For example, if the sample, after two-fold dilution with diluent (a 33% concentration), kills one-half of the test organisms after 96 hours, then the sample is three times as toxic as is allowed by that standard. Similarly, if a 5% solution of the sample kills 50% of the organisms, the sample is twenty times as toxic as is allowed. Toxicities are reported here in that manner, i.e., in terms of the percentage dilution of the test sample. The smaller the percentage which is reported means a correspondingly greater toxicity.

Note that even if a discharger receives a very large mixing zone not designated for dredge and fill permitting, the regulations require that the maximum toxicity at any point within the mixing zone be restricted to the 96 hour LC_{50}. The results here reported are based on actual effluent samples, representative of the effluent concentration which enters waters of the state at the point of discharge. If it is demonstrated that, under the conditions existing at the point of discharge, effluent concentrations will be less than at the actual sampling point (if the two points are different), the reported bioassay results will reflect the reduced discharge concentration.

With respect to the species of organisms used in these tests, the language of the F.A.C. indicates that they should be "significant to the indigenous aquatic community". All species used in these tests are significant to the indigenous aquatic community since they are sensitive to toxic substances which may be expected to impact the indigenous community.

The toxicity reported here is in excess of allowable limits.

Table 7. Results of Chemical Analyses Performed on Final Effluents from the Daytona Beach Regional and Bethune Point STP's, NPDES #FL0025984, collected 14 December, 1982.

Organics

	Regional STP	Bethune Point STP
Acid Extractables	N.D.	N.D.
Base Neutral Extractables	N.D.	N.D.
Pesticide Extractables	g-BHC(Lindane), 0.13 µg/l	g-BHC(Lindane) 0.17 µg/l

Metals

Arsenic	< 1 µg/l[a]	< 1 µg/l[a,b]
Cadmium	< 0.1 µg/l[a]	0.1 µg/l[b]
Chromium	N.D.	N.D.
Copper	N.D.	N.D.
Lead	N.D.	< 0.5 µg/l[a,b]
Mercury	< 0.2 µg/l[a]	0.3 µg/l
Nickel	< 50 µg/l[a]	N.D.
Selenium	< 2 µg/l[a,b]	< 2 µg/l[b]
Silver	0.1 µg/l	0.3 µg/l
Zinc	11 µg/l	27 µg/l

N.D. = None Detected

[a] Actual value is known to be less than value given.

[b] This concentration was also found in the blank sample.

LITERATURE CITED

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