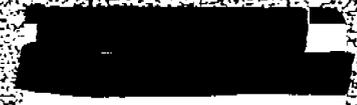


Smarrin

N.A.S. JAX



BIOASSAYS OF USN JACKSONVILLE NAVAL AIR STATION SEWAGE
TREATMENT PLANT AND LANDFILL LEACHATE
JACKSONVILLE, DUVAL COUNTY, FLORIDA

NPDES #FL0000957

Biological Section
Bureau of Water Analysis
June 12, 1981

32212-000

19.01.00.0002

BICASSAYS OF USN JACKSONVILLE NAVAL AIR STATION SEWAGE
TREATMENT PLANT AND LANDFILL LEACHATE
JACKSONVILLE, DUVAL COUNTY, FLORIDA

NPDES #FL0000957

Biological Section
Bureau of Water Analysis
June 12, 1981

INTRODUCTION

The USN Jacksonville Naval Air Station is a U.S. Government facility located in Jacksonville, Duval County, Florida (Figure 1). The associated sewage treatment plant treats waste from the air station, including domestic waste, water from industrial cooling systems, boiler wash, vehicle and equipment cleaning operations, and other miscellaneous sources. Drums of oil, solvents and other substances are disposed of in the landfill. The plant has a design capacity of 3.0 MGD and is currently operating near this level, at 2.6 MGD. Discharge is to the St. Johns River (NPDES Outfall #001), however, a ditch near the landfill (not permitted) also empties into the St. Johns River. Leachate from the landfill may, at times of heavy rainfall, enter this ditch.

The NPDES permit for this facility contains discharge limits for many potentially toxic substances, including chromium, zinc, copper, cyanide and phenol. Additionally, this facility has received notices for exceeding its permit limitations and for the inadequate disposal of sludges and solids.

On 27 to 29 May, 1981, the Biological Section performed static, acute toxicity bioassays on samples of effluent from the sewage treatment plant and on water taken from the ditch near the landfill, to determine their effects on the biota of the receiving water. The results of these tests are presented in this report.

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 them are detailed below.

History and Maintenance of Bioassay Organisms

Daphnia pulex (water flea) - A breeding culture of Daphnia pulex was obtained from the EPA laboratory in Athens, Georgia in March, 1979. This culture has been maintained since its arrival, in 2½ gallon all glass aquaria filled with unchlorinated DER well water, using a 16:8 hour light-dark cycle. Organisms are fed a liquified blend of Purina Trout Chow ® and Cerophyl ® twice daily, and are kept at a constant temperature of 22° + 1°C. The aquaria are cleaned weekly by siphoning off half the water along with the detritus and excess daphnids. They are then refilled with fresh aerated well water. Additional measures are taken and/or new cultures started in the event of abnormal circumstances such as: declining populations, ephippia formation, or excessive fungal or bacterial growth.

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

Four separate 48 hour static bioassays were conducted from 0945 hours on 27 May, 1981 to 0945 hours on 29 May, 1981. Grab samples of chlorinated effluent (Outfall #001), of effluent collected prior to chlorination and from the ditch near the landfill were obtained by Mr. Dennis Murrin of DER's St. Johns River Subdistrict at 0945 to 1100 hours on 26 May, 1981, using standard wastewater sampling procedures. Separate samples were obtained for chemical and biological testing. Samples for metals analysis were preserved with nitric acid. The samples for organic chemical analysis and for the bioassays were unpreserved. The samples were iced and transported to the DER laboratory in Tallahassee within 24 hours of collection.

To differentiate between the toxicity resulting from chlorine and the toxicity associated with some other component of the effluent from the sewage treatment plant, the Biological Section adopted the following test procedure:

Test #1. Pre-Chlorinated Effluent (Table 2). This test was performed on an effluent sample collected at the end of the treatment process but prior to chlorination. And, it was intended to evaluate the toxicity of the effluent without the added toxic effects of chlorine.

Test #2. Chlorinated Effluent (Table 3). This test was performed on an effluent sample collected at the point of discharge.

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

Water Flea (Daphnia pulex)

<u>Concentration</u>	<u>Dilution Water</u>	<u>Effluent</u>	<u>Total Vol.</u>
Control	200 ml	---	200 ml
5.6%	188.8 ml	11.2 ml	200 ml
10.0%	180 ml	20 ml	200 ml
18.0%	164 ml	36 ml	200 ml
32.0%	136 ml	64 ml	200 ml
56.0%	88 ml	112 ml	200 ml
100%	---	200 ml	200 ml

Table 3. Data recorded during 40 hour, *Daphnia pulex*, static acute toxicity bioassay of USN Jacksonville Naval Air Station Sewage Treatment Plant, Jacksonville, Duval County, Florida, NPDES #FL0000957, Outfall #001 on 27 to 29 May, 1981.

Test 12. Chlorinated Sample.

Conc. or %	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH			Total Alkalinity (mg/l as CaCO ₃)		Total Hardness (mg/l as CaCO ₃)		Temperature (°C)			NH ₃ /NH ₃ ·NH ₄ (mg/l)		Conductivity (µmhos)
	0	24	48	0	24	48	0	24	48	0	48	0	48	0	24	48	0	48	
Control	10	10	9	8.5	8.7	8.6	7.9	8.1	8.2	102	114	21.5	20.5	20.7	0/.02	-			0
Control	10	10	10	8.5	8.8	8.6	7.9	8.1	8.2										198
5.6%	10	0	0	8.4	8.8	8.7	7.8	8.1	8.2			21.4	20.5	20.5					
5.6%	10	0	0	8.3	8.8	8.8	7.8	8.1	8.2										228
10.0%	10	0	-	8.2	8.9	-	7.8	8.1	-			21.3	20.5	-					
10.0%	10	0	-	8.2	9.0	-	7.8	8.1	-										240
18.0%	10	0	-	7.9	8.9	-	7.6	8.1	-			21.1	20.5	-					
18.0%	10	0	-	7.9	8.9	-	7.6	8.1	-										272
32.0%	10	0	-	7.3	8.9	-	7.5	8.0	-			20.9	20.5	-					
32.0%	10	0	-	7.3	8.9	-	7.5	8.0	-										315
56.0%	10	0	-	6.5	8.9	-	7.3	7.9	-			20.2	20.6	-					
56.0%	10	0	-	6.3	8.9	-	7.3	7.9	-										395
100%	10	0	-	5.1 ^a	8.9	-	7.1	7.9	-	91	204	19.8	20.8	-	.02/4.2				
100%	10	0	-	4.9 ^a	8.9	-	7.1	7.9	-										580

Remarks: a. These chambers were aerated to above 6.0 mg/l dissolved oxygen prior to loading of the test organisms.

Total Chlorine (NACH DPD)

5.6%-.15 mg/l 32%-.40 mg/l
 10.0%-.20 mg/l 56%-.65 mg/l
 18.0%-.20 mg/l 100%-1.1 mg/l

Table 5. Data recorded during 48 hour, *Daphnia pulex*, static acute toxicity bioassay of USN Jacksonville Naval Air Station ditch adjacent to the landfill, Jacksonville, Duval County, Florida, on 27 to 29 May, 1981.

Conc. or %	Number of Live Organisms			Dissolved Oxygen (mg/L)			pH			Total Alkalinity (mg/L as CaCO ₃)		Total Hardness (mg/L as CaCO ₃)		Temperature (°C)			NH ₃ /NH ₃ OH/NO ₂ -N (mg/L)		Conductivity (µmhos)
	0	24	48	0	24	48	0	24	48	0	48	0	48	0	24	48	0	48	
Control	10	10	9	0.5	0.0	0.6	7.9	8.1	8.2	102	114	21.5	20.5	20.4	0/.02	-			0
Control	10	10	10	0.5	0.0	0.6	7.9	8.1	8.2										202
5.6%	10	10	10	0.3	0.0	0.6	7.8	8.1	8.2			21.5	20.5	20.4					
5.6%	10	10	10	0.3	0.7	0.7	7.0	8.1	8.2										228
10.0%	10	10	10	0.2	0.7	0.7	7.8	8.1	8.2			21.5	20.4	20.3					
10.0%	10	10	9	0.2	0.7	0.7	7.8	8.1	8.2										242
10.0%	10	10	10	7.0	0.7	0.7	7.0	8.1	8.2			21.7	20.3	20.2					
10.0%	10	10	10	7.0	0.7	0.7	7.8	8.1	8.2										270
32.0%	10	10	10	7.6	0.7	0.7	7.7	8.1	8.2			21.8	20.2	20.1					
32.0%	10	10	10	7.5	0.7	0.8	7.7	8.1	8.2										310
56.0%	10	10	10	6.0	0.6	0.7	7.6	8.0	8.2			21.8	20.2	20.0					
56.0%	10	10	10	6.0	0.5	0.8	7.6	8.0	8.2										300
100%	10	10	10	5.9	0.5	0.8	7.5	8.0	8.2	126	232	22.0	20.1	20.0	0/.28	.01/.08			
100%	10	10	10	5.9	0.5	0.8	7.5	8.0	8.2										530

Remarks:

Table 6. LC₅₀ Data for Bioassay of USN Jacksonville Naval Air Station Sewage Treatment Plant and Landfill, NPDES #FLO000957.

<u>Organism</u>	<u>Method of Data Analysis</u>	<u>24 hour LC₅₀ and 95% confidence intervals</u>	<u>48 hour LC₅₀ and 95% confidence intervals</u>
<u>Daphnia pulex</u> Test #1. Pre-Chlorinated Sample.	Binomial Moving Average Probit	No Mortality	No Mortality
<u>Daphnia pulex</u> Test #2. Chlorinated Sample.	Binomial Moving Average Probit	<5.6% A <5.6% A <5.6% A	<5.6% A <5.6% A <5.6% A
<u>Daphnia pulex</u> Test #3. De-Chlorinated Sample.	Binomial Moving Average Probit	No Mortality	No Mortality
<u>Daphnia pulex</u> Landfill ditch sample.	Binomial Moving Average Probit	No Mortality	B B B

A. Accurate LC₅₀ values cannot be calculated since every organism died in every test chamber (except controls) within 24 hours. Therefore, the LC₅₀'s are expressed as <5.6%.

B. Due to an insufficient number of dead organisms (only one organism died) an LC₅₀ value cannot be calculated using this method of statistical analysis.

LITERATURE CITED

American Public Health Association. 1976. Standard Methods for the Examination of Water and Wastewater. 14th ed. 1193 pp.

Peltier, William. 1978. Methods for measuring the acute toxicity of effluents to aquatic organisms. Environmental Research Laboratory Athens, Georgia. EPA-600/4-78-012 (Revised July 1978). 51 pp.

U.S. Environmental Protection Agency. 1978. Bioassay procedures for the Ocean Disposal Permit Program. Environmental Research Laboratory. Gulf Breeze, Florida. EPA-600/9-78-010.

U.S. Environmental Protection Agency. 1976. Quality Criteria for Water. U.S. EPA, Washington, D.C. 256 pp.

Site #33. Base service station

Source of the problem at the service station was loose pipe fittings on the gasoline delivery pipes to the service station island. The fittings leaked gasoline to the ground beneath the island when the pipe was under pressure. Gasoline in the ground found its way to a sanitary manhole near the island via an abandoned broken tile pipe to the manhole which acted as a conduit. The gasoline/sewage mix in the manhole was sent to a lift station and thence to the Sewage Treatment Plant leaving gasoline vapors at the lift station and several buildings along the route. A large perforated corrugated pipe wrapped in a fabric filter was set in an excavation made between the island and the gasoline storage tank. A gasoline scavenger and a ground water depression pump were installed in the tube. The depression pump lowered the groundwater level in the tube and the gasoline scavenger pump retrieved gasoline from the depressed surface and pumped it to a bowse.

The underground gasoline storage tanks, pipes and fittings were thoroughly checked, fittings were tightened and the entire system pressure checked by Law Engineering.

The gasoline scavenger recovered a small amount of gasoline (~~20 to 30 gallons~~) and the flow the gasoline to the tube ceased. The scavenger pump, depression pump and controls were removed and shipped to California for use at other Navy activities. The tube is fitted with a manhole and both this tube and the sanitary manhole are checked for gasoline. None has been found to date. This mornings check revealed no odor and no visible sheen.

Site #38

OTTO II fuel manifested to various disposal sites such as Chem Waste Mgt. Kettleman Hills Ca, and Delmore, Green Cove Springs Fl.

Site No. 10. Tank 119K paint waste storage tank.

Tank 119K is a 27,000 gallon underground tank used for storage of paint waste consisting of a blend of cold carbon remover, vapor degreasing solvents and paint residues. The blend is a hazardous waste, flammable and toxic. It is disposed of by contract.

There is no way to determine if the tank leaks to the adjacent ground. It is therefore proposed that a hydrostatic holding test be made at the tank.

Site No. 13. Radium Paint Waste Disposal Pit.

Location of the former 40' x 50' pit has been determined to be beneath what was the Helo rotor blade test and balance stand. As soon as this site is verified a one time sandpoint sample will be analyzed for radionuclides. The sampling procedure would be ~~identified~~ to procedures used by DER

Site No. 18. Radioactive Waste Fill Area.

According to Mr. Roland Byrd retired head of Industrial Hygiene has volunteered to locate the disposal area at site No. 18. When located, a sandpoint sample in the surficial aquifer will be taken for radionuclides analysis. The sampling procedure will be identical to procedures used by DER.

Sites 22 and 23. "Fort Dix" Old Skeet Range

Two responsible agencies, the Weapons Department and Personal Services both agree that target and skeet range ammunition was discharged not buried.

Site #25. Building 2038

Three hundred drums of low level radioactive waste from the Naval Hospital were disposed of by the South West Nuclear Corporation, 906 Montgomery St. Laurel Maryland, in June of 1982 under direction of the Radiological Affairs Support Office. The disposal site is Richland Washington.

Site #32. Base Landfill

It is proposed that a monitor will be installed downgradient at this site and the surficial aquifer be analyzed quarterly for TOC and organic carbons for one year.