


Bioassays of

**Pakhoed Dry Bulk Terminal, Inc.**

Tampa, Hillsborough County, Florida

NPDES #FL0122904

Sampled 7/23/01

November 2001

**Biology Section**

**Division of Resource Assessment & Management**

Comprehensive Quality Assurance Plan #870346G

Bioassays of

# **Pakhoed Dry Bulk Terminal, Inc.**

Tampa, Hillsborough County, Florida

NPDES #FL0122904

**Biology Section**
**Bureau of Laboratories**
**November 2001**

## Introduction

Pakhoed Dry Bulk Terminal, Inc., 4310 Pendola Point Road, Tampa, Hillsborough County, Florida, NPDES #FL0122904, tests performed on 24 to 25 July 2001.

This facility is a transfer terminal and warehouse for fertilizer and fertilizer compounds. The facility has two percolating stormwater holding ponds that are tidally influenced. The holding ponds were designed to retain the first inch of rainwater before overflowing into Hillsborough Bay. The water within the holding ponds is discharged through two outfalls: Outfall 1 and Outfall 2. Outfall 1 is located south of the facility, and Outfall 2 is located north of the facility. The average flows for Outfall 1 and 2, respectively are 0.031 MGD and 0.013 MGD. The wastewater is discharged into the Class III marine waters of Hillsborough Bay (facility summary provided by Andrea Grainger, FDEP, Tampa).

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 a total of six 48-hour static acute screening toxicity bioassays on two samples of effluent, one collected from Outfall 1 and one collected from Outfall 2. Two bioassays were performed for each outfall sample using the freshwater test species, the water flea, *Ceriodaphnia dubia*, and the bannerfin shiner, *Cyprinella leedsi*. At the request of the district personnel, a saltwater test was also performed using the saltwater test species the mysid shrimp, *Americamysis bahia.* The test results indicate acute toxicity to all test species (Tables 1, 2, 3 and 4).

### Outfall 1

Total residual chlorine (TRC) concentration in the sample from Outfall 1 was less than the laboratory detection limit for TRC ($\leq$0.03 mg/L) in the laboratory. Total and unionized ammonia were 152 mg/L and 2.02 mg/L, respectively. Total and unionized ammonia at 24 hours were 213 mg/L and 4.19 mg/L, respectively. The apparent salinity of this sample was approximately 3 ppt based on conductivity and temperature. Chemical analyses were performed on the sample, and several metals, pesticides, hydrocarbons, and nutrients were identified (Table 5). Concentrations of aluminum (3,440 µg/L), copper (11.9 µg/L), iron (1,380 µg/L), and zinc (182 µg/L) within the sample from Outfall 1 exceeded the State of Florida water quality criteria for aluminum ($\leq$1.50 mg/L), copper ($\leq$ 2.90 µg/L), iron ($\leq$ 300 µg/L) and zinc ($\leq$86.0 µg/L) concentrations in Class III marine waters.

The test results for Outfall 1 showed toxicity to the test species *C. dubia*, *C. leedsi*, and *A. bahia* causing 100% mortality in the 100% sample within 24 hours, 20 minutes, and one hour, respectively. The toxicity for the sample from Outfall 1 is primarily attributed to the unionized ammonia in the sample. Unionized ammonia levels 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*, EPA 44015-86-001, 1986), and levels as low as 0.28 mg/L have been shown to cause toxicity to the test species *A. bahia* at a pH range of 7.0-7.4 standard units (EPA

*Ambient Water Quality Criteria for Ammonia 1989,* EPA440/5-88-004.). The concentration of aluminum in the sample from Outfall 1 has been reported to be acutely toxic to freshwater species similar to the test species, *C. dubia* and *C. leedsi* (EPA AQUIRE database). The concentration of zinc in the sample from Outfall 1 has been reported to be acutely toxic to the test species *C. dubia* and *A. bahia* (EPA *Quality Criteria for Water 1986,* EPA 44015-86-001, 1986).

**Outfall 2**

Total residual chlorine concentration in the sample from Outfall 2 was 0.06 mg/L in the laboratory. Total and unionized ammonia were 326 mg/L and 2.68 mg/L, respectively. The apparent salinity of this sample was approximately 8 ppt based on conductivity and temperature. Chemical analyses were performed on the sample, and several metals, pesticides, hydrocarbons, an organic compound, and nutrients were identified (Table 6). Concentrations of aluminum (6,920 µg/L), copper (40.4 µg/L), iron (7,300 µg/L), lead (14.3 µg/L), nickel (15.2 µg/L) and zinc (1,550 µg/L) within the sample from Outfall 2 exceeded the State of Florida water quality criteria for aluminum (≤1.50 mg/L), copper (≤ 2.90 µg/L), iron (≤ 300 µg/L), lead (<5.60 ug/L), nickel (8.30 µg/L), and zinc (≤86.0 µg/L) concentrations in Class III marine waters.

The test results for Outfall 2 showed toxicity to the test species, *C. dubia, C. leedsi*, and *A. bahia*, causing 100% mortality in the 100% sample within 20 minutes, 24 hours, and one hour, respectively. The toxicity of the sample from Outfall 2 is also primarily attributed to the unionized ammonia in the sample. The concentration of aluminum in the sample from Outfall 1 has been reported to be acutely toxic to freshwater species similar to the test species, *C. dubia* and *C. leedsi* (EPA AQUIRE database). The concentration of zinc in the sample from Outfall 1 has been reported to be acutely toxic to the test species *C. dubia* and *A. bahia* (EPA *Quality Criteria for Water 1986,* EPA 44015-86-001, 1986).

## Conclusion

Both samples of effluent collected from Outfall 1 and Outfall 2 of this facility on July 23, 2001 showed acute toxicity to all test species within 24 hours. The noted acute toxicity was primarily attributed to the unionized ammonia concentrations in the samples; however, the concentrations of several other constituents in the samples were sufficiently high enough to have caused the observed toxicity. Concentrations of aluminum, iron, and zinc in the sample from Outfall 1 exceeded the State of Florida water quality criteria for Class III marine waters. Concentrations of aluminum, copper, iron, lead, nickel, and zinc in the sample from Outfall 2 exceeded the State of Florida water quality criteria for Class III marine waters.

**Table 1.** Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Outfall 1 of the Pakhoed Dry Bulk Terminal, Inc., 4310 Pendola Point Road, Tampa, Hillsborough County, Florida, NPDES# FL0122904, performed on 24 to 25 July 2001.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Facility: | **Pakhoed Dry Bulk Terminal, Inc.** | **NPDES #** | **FL0122904** | Facility Type: | **Tranfer terminal** | **Analysts:** | Della Parker-Hanson |
| Location: | 4310 Pendola Point Road | Contact/District: | Grainger/Southwest | | **and warehouse** | | Marshall Faircloth |
| County: | Hillsborough | Test type: | static acute screen | | | | Joshua Ayres |
| Sample Collection Date: | 7/23/01 Time: 1100 | # tests: | 2 | Receiving Water: | Hillsborough Bay | | Shannon Gerardi |
| Test Beginning Date: | 7/24/01 Time: 1415 | Chlorination Type: | Non-chlorinated | | | | |
| Test Ending Date: | 7/25/01 Time: 1325 | | | | **Page 1 of 1** | **Reviewer:** | David Whiting |

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

| | Sample/Diluent | SURVIVAL # Alive | | | pH | | | Temperature[C] | | | Dissolved Oxygen | | | Conductivity Uncorrected mmhos/cm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 24 hour |
| Control A | 0/20 | 5 | 5 | - | 8.5 | 8.1 | - | 25.2 | 24.3 | - | 6.4 | 8.0 | - | 0.165 | 0.214 |
| Control B | 0/20 | 5 | 5 | - | - | 8.3 | - | - | 24.0 | - | - | 8.2 | - | - | 0.195 |
| Control C | 0/20 | 5 | 5 | - | - | 8.3 | - | - | 23.9 | - | - | 8.2 | - | - | 0.180 |
| Control D | 0/20 | 5 | 5 | - | - | 8.3 | - | - | 24.0 | - | - | 8.2 | - | | 0.178 |
| 100% A | 20/0 | 5 | 0 [A] | - | 7.3 | 7.3 | - | 25.0 | 24.3 | - | 6.3 | 8.2 | - | 4.88 | 5.12 |
| 100% B | 20/0 | 5 | 0 [A] | - | - | 7.4 | - | - | 24.1 | - | - | 8.3 | - | - | 5.15 |
| 100% C | 20/0 | 5 | 0 [A] | - | - | 7.5 | - | - | 24.0 | - | - | 8.3 | - | - | 5.08 |
| 100% D | 20/0 | 5 | 0 [A] | - | - | 7.6 | - | - | 24.2 | - | - | 8.3 | - | - | 5.06 |

[A] Test terminated at 24 hours due to complete mortality in the 100% sample.

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.5°C.
Incubator #2 temperature range for the test period was 24.5-25.0°C.

| **Data Transcription Verification** | |
|---|---|
| date: | 10/29/01 |
| by: | Della Parker-Hanson |
| | Frances Moore |

| **Total Residual CL2** | mg/L | Method |
|---|---|---|
| Field: | - | - |
| Lab: | <0.03 | Hach |

| **Ammonia** | Total (mg/L) | Unionized (mg/L) |
|---|---|---|
| Control Water (fish): | < 0.017 | <0.017 |
| 20% Dilute Mineral Water (cladocerans): | < 0.017 | <0.017 |
| 100% Sample: | 152.00 | 2.02 |
| Sample at 24 hours: | 213 | 4.22 |

Organism: ***Cyprinella leedsi*** Life stage: 14 days

| | Sample/Diluent | SURVIVAL # Alive | | | pH | | | Temperature[D] | | | Dissolved Oxygen | | | Conductivity Uncorrected mmhos/cm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | - | 8.2 | - | - | 25.4 | - | - | 6.5 | - | - | 0.270 | - |
| Control B | 0/500 | 5 | 5 | - | 8.2 | - | - | 25.4 | - | - | 6.6 | - | - | 0.270 | - |
| Control C | 0/500 | 5 | 5 | - | 8.2 | - | - | 25.4 | - | - | 6.6 | - | - | 0.290 | - |
| Control D | 0/500 | 5 | 5 | - | 8.2 | - | - | 25.3 | - | - | 6.7 | - | - | 0.270 | - |
| 100% A | 500/0 | 5 | 0 [B] | - | 7.3 | - | - | 25.1 | - | - | 6.7 | - | - | 4.95 | - |
| 100% B | 500/0 | 5 | 0 [B] | - | 7.3 | - | - | 25.0 | - | - | 6.2 | - | - | 5.14 | - |
| 100% C | 500/0 | 5 | 0 [B] | - | 7.3 | - | - | 24.8 | - | - | 6.1 | - | - | 5.16 | - |
| 100% D | 500/0 | 5 | 0 [B] | - | 7.3 | - | - | 24.8 | - | - | 5.9 | - | - | 5.17 | - |

[B] Test terminated at 0 hour due to complete mortality in the 100% sample within 20 minutes of test initiation.

[D] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.5°C.
Incubator #3 temperature range for the test period was 25.0-25.0°C.

| **Alk & Hardness** | Alkalinity (mg/L) | Hardness (mg/L) |
|---|---|---|
| Control Water (fish): | 144 | 137 |
| 20% Dilute Mineral Water (cladocerans): | 81 | 83 |
| 100% Sample: | 82 | - |

| **Salinity[E]** | (ppt) |
|---|---|
| Control Water (fish): | <1 |
| 20% Dilute Mineral Water (cladocerans): | <1 |
| 100% Sample: | ~3 |

[E] Salinity based on conductivity and temperature measurements.

**Table 2.** Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Outfall 1 of the Pakhoed Dry Bulk Terminal, Inc., 4310 Pendola Point Road, Tampa, Hillsborough County, Florida, NPDES# FL0122904, performed on 24 July 2001.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Facility: | **Pakhoed Dry Bulk Terminal, Inc.** | **NPDES #** | **FL0122904** | Facility Type: | **Tranfer terminal** | **Analysts:** | Della Parker-Hanson |
| Location: | 4310 Pendola Point Road | Contact/District: | Grainger/Southwest | | **and warehouse** | | Marshall Faircloth |
| County: | Hillsborough | Test type: | static acute screen | | | | Joshua Ayres |
| Sample Collection Date: | 7/23/01 Time: 1100 | # tests: | 2 | Receiving Water: | Hillsborough Bay | | Shannon Gerardi |
| Test Beginning Date: | 7/24/01 Time: 1455 | Chlorination Type: | Non-chlorinated | | | | |
| Test Ending Date: | 7/24/01 Time: 1540 | | | | **Page 1 of 1** | **Reviewer:** | David Whiting |

Organism: ***Americamysis bahia*** Life stage: 3 days

| | Sample/Diluent | SURVIVAL # Alive | | | pH | | | Temperature[B] | | | Dissolved Oxygen | | | Conductivity Uncorrected µmhos/cm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 24 hour |
| Control A | 0/500 | 5 | 5 | - | 8.1 | - | - | 25.6 | - | - | 5.8 | - | - | 15.96 | - |
| Control B | 0/500 | 5 | 5 | - | 8.1 | - | - | 25.5 | - | - | 5.6 | - | - | 16.41 | - |
| 100% A | 500/0 | 5 | 0 [A] | - | 7.6 | - | - | 25.0 | - | - | 5.5 | - | - | 16.79 | - |
| 100% B | 500/0 | 5 | 0 [A] | - | 7.6 | - | - | 24.9 | - | - | 5.4 | - | - | 16.80 | - |

[A] Test terminated at 0 hour due to complete moratility in the 100% sample within one hour of test initiation.

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.5°C.
Incubator #3 temperature range for the test period was 25.0-25.0°C.

| **Data Transcription Verification** | |
|---|---|
| date: | 10/29/01 |
| by: | Della Parker-Hanson |
| | Frances Moore |

| **Total Residual CL2** | mg/L | Method |
|---|---|---|
| Field: | - | - |
| Lab: | <0.03 | Hach |

| **Ammonia** | Total (mg/L) | Unionized (mg/L) |
|---|---|---|
| Control Water : | < 0.051 | <0.051 |
| 100% Sample: | 152.00 | 2.02 |

| **Alk & Hardness** | Alkalinity (mg/L) | Hardness (mg/L) |
|---|---|---|
| Control Water : | 169 | - |
| 100% Sample: | 82 | - |

| **Salinity**[C] | (ppt) |
|---|---|
| Control Water: | ~10 |
| 100% sample: | ~3 |
| Salt adjusted sample: | ~10 |

[C] Salinity based on conductivity and temperature measurements.

**Table 3.** Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Outfall 2 of the Pakhoed Dry Bulk Terminal, Inc., 4310 Pendola Point Road, Tampa, Hillsborough County, Florida, NPDES# FL0122904, performed on 24 to 25 July 2001.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Facility: | **Pakhoed Dry Bulk Terminal, Inc.** | **NPDES #** | **FL0122904** | Facility Type: | **Tranfer terminal and warehouse** | **Analysts:** | Della Parker-Hanson |
| Location: | 4310 Pendola Point Road | Contact/District: | Grainger/Southwest | | | | Marshall Faircloth |
| County: | Hillsborough | Test type: | static acute screen | | | | Joshua Ayres |
| Sample Collection Date: | 7/23/01 Time: 1010 | # tests: | 2 | Receiving Water: | Hillsborough Bay | | Shannon Gerardi |
| Test Beginning Date: | 7/24/01 Time: 1415 | Chlorination Type: | Non-chlorinated | | | | |
| Test Ending Date: | 7/25/01 Time: 1330 | | | | **Page 1 of 1** | **Reviewer:** | David Whiting |

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

| | Sample/Diluent | SURVIVAL # Alive | | | pH | | | Temperature[C] | | | Dissolved Oxygen | | | Conductivity Uncorrected Mmhos/cm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 24 hour |
| Control A | 0/20 | 5 | 5 | - | 8.4 | - | - | 25.2 | - | - | 6.2 | - | - | 0.180 | - |
| Control B | 0/20 | 5 | 5 | - | - | - | - | - | - | - | - | - | - | - | - |
| Control C | 0/20 | 5 | 5 | - | - | - | - | - | - | - | - | - | - | - | - |
| Control D | 0/20 | 5 | 5 | - | - | - | - | - | - | - | - | - | - | | - |
| 100% A | 20/0 | 5 | 0 [A] | - | 7.1 | - | - | 25.1 | - | - | 6.3 | - | - | 13.78 | - |
| 100% B | 20/0 | 5 | 0 [A] | - | - | - | - | - | - | - | - | - | - | - | - |
| 100% C | 20/0 | 5 | 0 [A] | - | - | - | - | - | - | - | - | - | - | - | - |
| 100% D | 20/0 | 5 | 0 [A] | - | - | - | - | - | - | - | - | - | - | - | - |

[A] Test terminated at 0 hour due to comple mortality in the 100% sample within 20 minutes of test.

[C] Temperatures of room and test incubator were continuously recorded on a strip chart recorder. Room Temperature range for the test period was 23.5-25.5°C. Incubator #2 temperature range for the test period was 24.5-25.0°C.

Organism: ***Cyprinella leedsi*** Life stage: 14 days

| | Sample/Diluent | SURVIVAL # Alive | | | pH | | | Temperature[D] | | | Dissolved Oxygen | | | Conductivity Uncorrected Mmhos/cm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 24 hour |
| Control A | 0/500 | 5 | 5 | - | 8.2 | 8.4 | - | 25.4 | 25.2 | - | 6.5 | 7.9 | - | 0.270 | 0.276 |
| Control B | 0/500 | 5 | 5 | - | 8.2 | 8.4 | - | 25.4 | 24.7 | - | 6.6 | 7.9 | - | 0.280 | 0.271 |
| Control C | 0/500 | 5 | 5 | - | 8.2 | 8.4 | - | 25.3 | 24.5 | - | 6.6 | 7.9 | - | 0.270 | 0.269 |
| Control D | 0/500 | 5 | 5 | - | 8.2 | 8.4 | - | 25.3 | 24.7 | - | 6.7 | 7.8 | - | 0.270 | 0.278 |
| 100% A | 500/0 | 5 | 0 [B] | - | 7.2 | 7.1 | - | 25.9 | 24.8 | - | 6.6 | 5.7 | - | 6.11 | 6.07 |
| 100% B | 500/0 | 5 | 0 [B] | - | 7.2 | 7.0 | - | 26.0 | 24.9 | - | 6.1 | 5.7 | - | 6.35 | 6.37 |
| 100% C | 500/0 | 5 | 0 [B] | - | 7.2 | 7.0 | - | 26.0 | 24.7 | - | 6.1 | 5.4 | - | 6.36 | 6.19 |
| 100% D | 500/0 | 5 | 0 [B] | - | 7.2 | 7.1 | - | 26.0 | 24.4 | - | 6.0 | 5.2 | - | 6.33 | 6.09 |

[B] Test terminated at 24 hours due to complete mortality in the 100% sample.

[D] Temperatures of room and test incubator were continuously recorded on a strip chart recorder. Room Temperature range for the test period was 23.5-25.5°C. Incubator #3 temperature range for the test period was 25.0-25.0°C.

| **Data Transcription Verification** | |
|---|---|
| date: | 10/29/01 |
| by: | Della Parker-Hanson<br>Frances Moore |

| **Total Residual CL2** | mg/L | Method |
|---|---|---|
| Field: | - | - |
| Lab: | 0.06 | Hach |

| **Ammonia** | Total (mg/L) | Unionized (mg/L) |
|---|---|---|
| Control Water (fish): | < 0.017 | <0.017 |
| 20% Dilute Mineral Water (cladocerans): | < 0.017 | <0.017 |
| 100% Sample: | 326.00 | 2.68 |

| **Alk & Hardness** | Alkalinity (mg/L) | Hardness (mg/L) |
|---|---|---|
| Control Water (fish): | 144 | 137 |
| 20% Dilute Mineral Water (cladocerans): | 81 | 83 |
| 100% Sample: | 79 | - |

| **Salinity[D]** | (ppt) |
|---|---|
| Control Water (fish): | <1 |
| 20% Dilute Mineral Water (cladocerans): | <1 |
| 100% Sample: | ~8 |

[D] Salinity based on conductivity and temperature

**Table 4.** Data recorded during the 48-hour acute screening bioassays of a sample of effluent from Outfall 2 of the Pakhoed Dry Bulk Terminal, Inc., 4310 Pendola Point Road, Tampa, Hillsborough County, Florida, NPDES# FL0122904, performed on 24 July 2001.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Facility: | **Pakhoed Dry Bulk Terminal, Inc.** | **NPDES #** | **FL0122904** | Facility Type: | **Tranfer terminal** | **Analysts:** | Della Parker-Hanson |
| Location: | 4310 Pendola Point Road | Contact/District: | Grainger/Southwest | | **and warehouse** | | Marshall Faircloth |
| County: | Hillsborough | Test type: | static acute screen | | | | Joshua Ayres |
| Sample Collection Date: | 7/23/01 Time: 1010 | # tests: | 2 | Receiving Water: | Hillsborough Bay | | Shannon Gerardi |
| Test Beginning Date: | 7/24/01 Time: 1455 | Chlorination Type: | Non-chlorinated | | | | |
| Test Ending Date: | 7/24/01 Time: 1540 | | | | **Page 1 of 1** | **Reviewer:** | David Whiting |

Organism: ***Americamysis bahia*** Life stage: 3 days

| | Sample/Diluent | SURVIVAL # Alive | | | pH | | | Temperature[B] | | | Dissolved Oxygen | | | Conductivity Uncorrected µmhos/cm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 24 hour |
| Control A | 0/500 | 5 | 5 | - | 7.9 | - | - | 25.4 | - | - | 5.7 | - | - | 22.00 | - |
| Control B | 0/500 | 5 | 5 | - | 7.9 | - | - | 25.4 | - | - | 5.7 | - | - | 22.30 | - |
| 100% A | 500/0 | 5 | 0 [A] | - | 7.8 | - | - | 24.9 | - | - | 5.7 | - | - | 23.20 | - |
| 100% B | 500/0 | 5 | 0 [A] | - | 7.8 | - | - | 24.8 | - | - | 5.7 | - | - | 23.20 | - |

[A] Test terminated at 0 hour due to 100% mortality within one hour of test initation.

[B] Temperatures of room and test incubator were continuously recorded on a strip chart recorder.
Room Temperature range for the test period was 23.5-25.5°C.
Incubator #3 temperature range for the test period was 25.0-25.0°C.

| **Data Transcription Verification** | |
|---|---|
| date: | 10/29/01 |
| by: | Della Parker-Hanson |
| | Frances Moore |

| **Total Residual CL2** | mg/L | Method |
|---|---|---|
| Field: | - | - |
| Lab: | 0.06 | Hach |

| **Ammonia** | Total (mg/L) | Unionized (mg/L) |
|---|---|---|
| Control Water: | <0.051 | <0.051 |
| 100% Sample: | 326.00 | 2.68 |

| **Alk & Hardness** | Alkalinity (mg/L) | Hardness (mg/L) |
|---|---|---|
| Control Water: | 169 | - |
| 100% Sample: | 79 | - |

| **Salinity**[C] | (ppt) |
|---|---|
| Control Water: | ~14 |
| 100% Sample: | ~8 |
| Salt adjusted Sample: | ~14 |

[C] Salinity based on conductivity and temperature measurements.

**Table 5. Results of chemical analyses on the effluent from Outfall 001 of Pakhoed Dry Bulk Terminal, Inc. sampled on July 23, 2001.**

### Metals

| | | | |
|---|---|---|---|
| Aluminum | 3440 | µg/L | |
| Arsenic | 13 | µg/L | |
| Cadmium | 0.32 | µg/L | |
| Calcium | 137 | mg/L | |
| Chromium | 9.1 | µg/L | |
| Copper | 11.9 | µg/L | |
| Iron | 1380 | µg/L | |
| Lead | 4.62 | µg/L | |
| Magnesium | 31.2 | mg/L | |
| Nickel | 4.2 | µg/L | I |
| Selenium | 1.4 | µg/L | I |
| Silver | 0.092 | µg/L | I |
| Zinc | 182 | µg/L | |

### Pesticides and Herbicides

| | | | |
|---|---|---|---|
| Bromacil | 1.3 | µg/L | |
| Hexazinone | 0.61 | µg/L | |

### Base, Neutral, & Acid Extractable Organics

None detected

### Petroleum Hydrocarbons

| | | | |
|---|---|---|---|
| TRPH | 3 | mg/L | I |

### Nutrients

| | | | |
|---|---|---|---|
| Ammonia-N | 200 | mg N/L | A |
| NO2NO3-N | 54 | mg N/L | |
| O-Phosphate-P | 0.63 | mg P/L | A |
| N_KJEL_TOT | 210 | mg N/L | J |
| Total-P | 1.7 | mg P/L | |

continued

**Table 5 cont. Results of chemical analyses on the effluent from Outfall 001 of Pakhoed Dry Bulk Terminal, Inc. sampled on July 23, 2001.**

[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.
[J] Value reported is an estimated value.

concluded

**Table 6. Results of chemical analyses on the effluent from Outfall 002 from Pakhoed Dry Bulk Terminal, Inc sampled on July 23 2001.**

| | | | |
|---|---|---|---|
| **Metals** | | | |
| Calcium | 188 | mg/L | |
| Aluminum | 6920 | µg/L | |
| Arsenic | 23 | µg/L | |
| Cadmium | 0.59 | µg/L | |
| Chromium | 27 | µg/L | |
| Copper | 40.4 | µg/L | |
| Iron | 7300 | µg/L | |
| Lead | 14.3 | µg/L | |
| Magnesium | 51.4 | mg/L | |
| Nickel | 15.2 | µg/L | |
| Selenium | 1.7 | µg/L | I |
| Silver | 0.15 | µg/L | I |
| Zinc | 1550 | µg/L | |
| **Pesticides and Herbicides** | | | |
| Bromacil | 4.4 | µg/L | |
| **Base, Neutral, & Acid Extractable Organics** | | | |
| Bis(2-ethylhexyl)phthalate | 28 | µg/L | I |
| **Petroleum Hydrocarbons** | | | |
| TRPH | 2.8 | mg/L | I |

continued

**Table 6 cont. Results of chemical analyses on the effluent from Outfall 002 from Pakhoed Dry Bulk Terminal, Inc sampled on July 23 2001.**

**Nutrients**

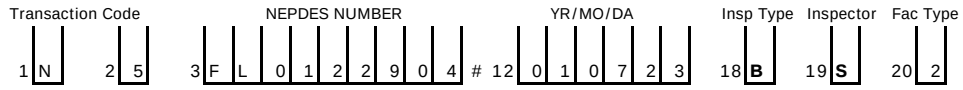
| | | |
|---|---|---|
| Ammonia-N | 180 | mg N/L |
| NO2NO3-N | 150 | mg N/L |
| O-Phosphate-P | 1.3 | mg P/L |
| N_KJEL_TOT | 190 | mg N/L [J] |
| Total-P | 3.3 | mg P/L |

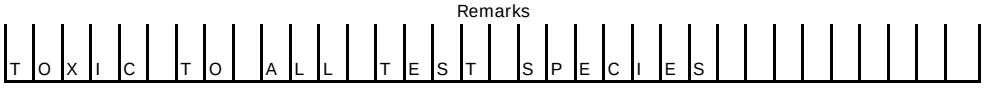
[I] Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit.
[J] Value reported is an estimated value.

concluded

## The Bioassay of Pakhoed Dry Bulk Terminal Inc. from Outfall 001, effluent sampled on July 23, 2001, NPDES #FL0122904.

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

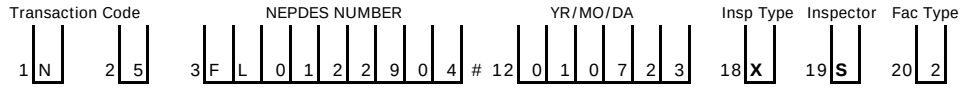


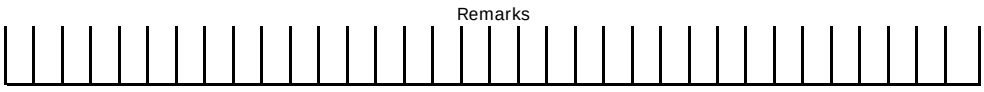




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## The Priority Pollutants Analysis for Bioassay of Pakhoed Dry Bulk Terminal Inc. from Outfall 001, effluent sampled on July 23, 2001, NPDES #FL0122904.

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

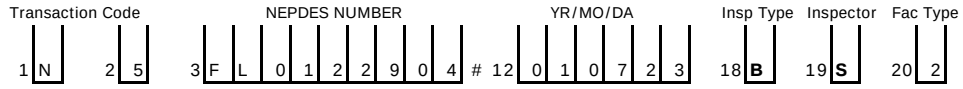


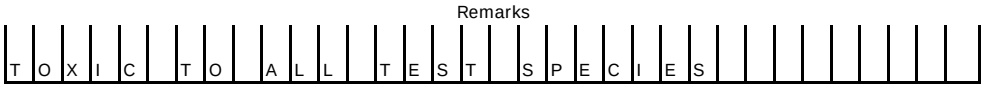




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## The Bioassay of Pakhoed Dry Bulk Terminal Inc. from Outfall 002, effluent sampled on July 23, 2001, NPDES #FL0122904.

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

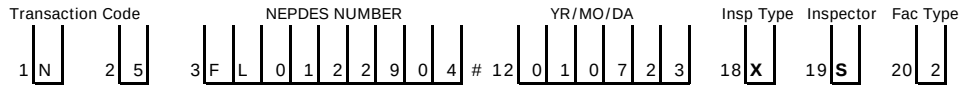


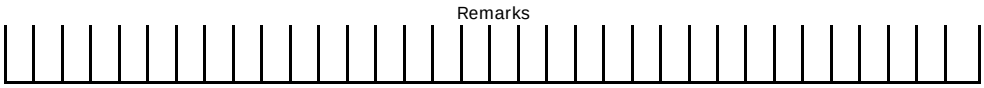




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## The Priority Pollutants Analysis for Bioassay of Pakhoed Dry Bulk Terminal Inc. from Outfall 002, effluent sampled on July 23, 2001, NPDES #FL0122904.

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




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