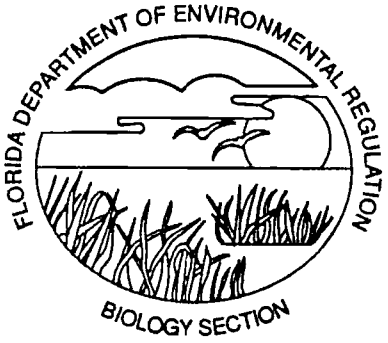



Bioassays of

**Culligan Water Conditioning Service**

Largo, Pinellas County, Florida

NPDES #FL0003069

Sampled 8/19/91

September 6, 1991

**Biology Section**
**Division of Technical Services**

Bioassays of

# Culligan Water Conditioning Service

Largo, Pinellas County, Florida

NPDES #FL0003069

**Biology Section**
**Bureau of Laboratories**
**September 6, 1991**

## Introduction

Culligan Water Conditioning Service, Largo, Pinellas County, Florida, NPDES #FL0003069, on 20 to 22 August, 1991.

This facility is located at 13075 66th Street North in Largo. It is used to regenerate spent filter tanks employed to soften water for private homes and businesses. The facility discharges less than five thousand gallons per day of process reject water to the county drainage canal, thence to Old Tampa Bay via Cross Bayou. The receiving waters are all Class III waters of the State.

The toxicity tests discussed in this report were performed in accordance with methods described by Peltier and Weber, 1985, *Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms*, 3rd Edition, and by the FDER Biology Section, 1985, *Quality Assurance Manual for Performing Acute Toxicity Tests*, 2nd Edition.

## Results and Discussion

The Biology Section performed acute toxicity screening bioassays using the bioassay test organisms, the water flea, *Ceriodaphnia dubia* and the fish, *Notropis leedsi*, on a sample of effluent from this facility. The results of the tests indicated that the sample was toxic to *C. dubia*, producing an $LC_{50} < 100\%$, but was not toxic to *N. leedsi*. The sample contained a total residual chlorine concentration of 0.06 mg/L (Hach). Ammonia was not detected in the sample. Further chemical analyses detected the metals, copper (35 µg/L), iron (389 µg/L[a]), and zinc 36 (µg/L). Organic compounds were not detected in the base neutral and acid extractables analyses. Due to the sample being used up during the semi-volatile analyses, the pesticide analysis was not performed. We attribute the mortality in the *C. dubia* test to total residual chlorine concentration of 0.06 mg/L (Hach) and to the copper concentration of 35 µg/L, since total residual chlorine concentrations as low as 0.028 mg/L and copper concentrations as low as 12.7 µg/L (at a hardness of 120 mg/L as $CaCO_3$) have produced mortality in other cladocerans (*Daphnia magna*).

## Conclusion

The sample of effluent from this facility was toxic to on 19 August, 1991. The toxicity was attributed to the total residual chlorine and the copper in the sample.

[a]Estimated values

**Table 1. Concentration Series and Volumes Used for the Static Acute Screening Bioassays of the Culligan Water Conditioning Service facility on 20 to 22 August, 1991.**

*Ceriodaphnia dubia* (water flea)

| Concentration | Dilution Water | Sample | Total Volume |
|---|---|---|---|
| Control | 20 mL | 0 mL | 20 mL |
| 100% | 0 mL | 20 mL | 20 mL |

*Notropis leedsi* (bannerfin shiner)

| Concentration | Dilution Water | Sample | Total Volume |
|---|---|---|---|
| Control | 500 mL | 0 mL | 500 mL |
| 100% | 0 mL | 500 mL | 500 mL |

Table 2. Data recorded during the static acute screening bioassay of a sample of effluent from the Culligan Water Conditioning Service facility, Largo, Pinellas County, Florida, NPDES#FL0003069, on 20 to 22 August, 1991.

| | | | | | |
|---|---|---|---|---|---|
| Facility: | Culligan Water Conditioning Service | | NPDES # | FL0003069 | Facility Type: chemical processing |
| Location: | 13075 66 St., Largo | | Contact/District: | Vishwas Sathe / SW | |
| County: | Pinellas | | Test type: | Static Screen | |
| Sample Collection Date: | 8/19/91 | Time: 1145-1215 | # tests: | 2 | Receiving Water: unnamed ditch to |
| Test Beginning Date: | 8/20/91 | Time: 1330 | Chlorination Type: | Chlorinated | Cross Bayou Canal |
| Test Ending Date: | 8/22/91 | Time: 1330 | Dechlor Method: | NA | Page 1 of 1 |

Organism: *Ceriodaphnia dubia* Life stage: <24 hours
LC50: <100%

| | SURVIVAL | | | Dissolved Oxygen | | | pH | | | Temperature | | | Conductivity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Concentrations | # at 0 hr | Live at 24 hr | Live at 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 | 5 | 5 | 5 | 9.2 | - | 9.2 | 8.1 | - | 8.2 | 21.3 | - | 21.4 | 188 | 205 |
| Control | 5 | 5 | 5 | - | - | 9.2 | - | - | 8.3 | - | - | - | - | - |
| Control | 5 | 5 | 5 | - | - | 9.2 | - | - | 8.3 | - | - | - | - | - |
| Control | 5 | 5 | 5 | - | - | 9.2 | - | - | 8.3 | - | - | - | - | - |
| 100% | 5 | 4 | 1 | 8.6 | - | 9.4 | 7.1 | - | 8.5 | 21.0 | - | 21.4 | 1029 | 1035 |
| 100% | 5 | 5 | 2 | - | - | 9.4 | - | - | 8.5 | - | - | - | - | - |
| 100% | 5 | 5 | 2 | - | - | 9.4 | - | - | 8.5 | - | - | - | - | - |
| 100% | 5 | 5 | 4 | - | - | 9.4 | - | - | 8.5 | - | - | - | - | - |

Organism: *Notropis leedsi* Age: 18 days
LC50: -

| | SURVIVAL | | | Dissolved Oxygen | | | pH | | | Temperature | | | Conductivity | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Concentrations | # at 0 hr | Live at 24 hr | Live at 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 | 5 | 5 | 5 | 9.0 | 8.8 | 9.0 | 7.8 | 8.2 | 8.3 | 21.3 | 21.4 | 20.3 | - | - |
| Control | 5 | 5 | 5 | 9.1 | 8.9 | 9.1 | 7.8 | 8.2 | 8.3 | - | - | - | 245 | 244 |
| 100% | 5 | 5 | 5 | 8.6 | 9.0 | 9.1 | 7.1 | 7.9 | 8.2 | 21.2 | 21.3 | 20.3 | - | - |
| 100% | 5 | 5 | 5 | 8.6 | 9.0 | 9.1 | 7.1 | 7.9 | 8.2 | - | - | - | 1088 | 1084 |

| Total Residual Cl2 | mg/l | Method |
|---|---|---|
| Field: | 0.02 | Hach |
| Lab: | 0.06 | Hach |

| Alk & Hardness | Alkalinity (mg/l) | Hardness (mg/l) |
|---|---|---|
| Control Water (fish): | 124 | 128 |
| Cond. Control Water (daphnids): | 68 | 84 |
| 100% Sample: | 157 | 130 |

| Ammonia | Total (mg/l) | Unionized (mg/l) |
|---|---|---|
| Control Water (fish): | 0 | 0 |
| Control Water (Mysids): | 0 | 0 |
| 100% Sample: | 0 | 0 |

Table 3. $LC_{50}$ Data for the Bioassay of the Culligan Water Conditioning Service facility on 20 to 22 August, 1991.

| Organism | Method of Data Analysis | 48 Hour $LC_{50}$ |
|---|---|---|
| **Chlorinated discharge** | | |
| *Ceriodaphnia dubia* | not calculated | <100%[a] |

[a] The $LC_{50}$ is < 100% since 55% of the organisms died in the lowest test concentration (100%).

Table 4. Results of chemical analyses on the sample of effluent from the Culligan Water Conditioning Service facility, Pinellas County, Florida.

**Organics**

| | |
|---|---|
| Acid Extractables | None detected |
| Base Neutral Extractables | None detected |

**Metals**

| | |
|---|---|
| Copper | 35 µg/L |
| Iron | 389 µg/L[a] |
| Zinc | 36 µg/L |

[a] Estimated value.

# DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Culligan Pinellas Water Conditioning
Address/City:
County: Pinellas
Contact/District: Vickers Bathe / Southwest
NPDES Permit #: FL0033069 Outfall #:

Sample Collection: Date 8/19/91 Time 1145-1215
Test Beginning: Date 8/20/91 Time 1330
Test Ending: Date 8/21/91 Time 1330
Test Organism: Ceriodaphnia dubia
Life Stage/Age: <24 hours

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

Remarks:

Instrument Calibrations:

| | pH | DO | Cond | Temp |
|---|---|---|---|---|
| 0 hr | 7.7/7.1 | 8.9/8.5 | 1384/1413 | 24.3 |
| 24 hr | 7.6/7.9 | 8.8/8.7 | 1384/1388 | 21.7 |
| 48 hr | | | | |

| Conc. | Chamber # | Number Live 0 | 24 | 48 | DO (mg/l) 0 | 24 | 48 | pH 0 | 24 | 48 | Temp. (°C) 0 | 24 | 48 | Cond. (umhos/cm) 0 | 24 | 48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | A | 5 | 5 | | 9.2 | | 9.2 | 8.1 | 8.2 | 8.2 | 21.3 | | 21.4 | 183 | | 205 |
| Control | B | 5 | 5 | | | | 9.1 | | | 8.3 | | | | | | |
| Control | C | 5 | 5 | | | | 9.2 | | | 8.3 | | | | | | |
| Control | D | 5 | 5 | | | | 9.2 | | | 8.3 | | | | | | |
| 100% | A | 5 | 4 | 1 | 8.6 | | 7.4 | 7.1 | | 8.5 | 21.0 | | 21.4 | 1021 | | 1035 |
| 100% | B | 5 | 5 | | | | 9.1 | | | 8.5 | | | | | | |
| 100% | C | 5 | 5 | | | | 9.4 | | | 8.5 | | | | | | |
| 100% | D | 5 | 5 | | | | 9.1 | | | 8.5 | | | | | | |
| Measured/Conducted by | | KP | MF | | MF | | MF | MF | | MF | MF | | MF | MF | | MF |
| Recorded by | | KP | MF | | KP | | MF | KP | | MF | KP | | MF | KP | | MF |

Z1873 91-AUG-21-02:01

BIOLOGY Matrix: W-SURF-FRH
Date Collected: 19-AUG-1991 00:00:00
Culligan-Fair Lawn Water
BSY-SN-CLD BSY-SN-FSH

Investigators' Signatures

Water-quality Parameters

| | Well Water | Cond. Water | Sample | Method | Measured by |
|---|---|---|---|---|---|
| Field Tot. Resid. Clz: | | | 0.02 | Hach | VS |
| Lab Tot. Resid. Clz: | | | 0.06 | Hach | KP |
| Alkalinity: | 52 | 52 | | | |
| Hardness | 28 | 28 | | | |
| Total Ammonia | 0.0 | 0.0 | 0.0 | Hach | MF |

Ammonia meter slope

# DER Biology Section --- Acute Bioassay Bench Sheet

Sample Source: Culligan - Pinellas Water Conditioning
Address/City:
County: Pinellas
Contact/District: Bishops Baths / S. thru T
NPDES Permit #: FL0000361 Outfall #: 001

Sample Collection: Date 5/11/11 Time 11:15 1215
Test Beginning: Date 5/12/11 Time 1330
Test Ending: Date 5/26 Time
Test Organism: Mysidopsis bahia
Life Stage/Age: 18 days

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

Remarks:

Instrument Calibrations:

| | pH | DO | Cond | Temp |
|---|---|---|---|---|
| 0 hr | 7.8/7.9 | 8.2/8.2 | 1384/1413 | 21.5/21.3 |
| 24 hr | 7.8/7.8 | 8.2/8.2 | 1384/1413 | 21.3/21.3 |
| 48 hr | | | | |

| 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 | 53 | 5 | 5 | 5 | 9.0 | 8.8 | | 7.8 | 8.2 | | 21.3 | 21.4 | | | | |
| Control | 62 | 5 | 5 | 5 | 9.1 | 8.9 | | 7.8 | 8.2 | | | | | 245 | 241 | |
| 100% | 57 | 5 | 5 | 5 | 8.6 | 9.0 | | 7.1 | 7.9 | | 21.2 | 21.3 | | | | |
| 100% | 63 | 5 | 5 | 5 | 8.6 | 9.0 | | 7.1 | 7.9 | | | | | 1088 | 1092 | |
| Measured/Loaded by: | | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF | MF |
| Recorded by: | | MF | MF | MF | KP | MF | MF | KP | MF | MF | KP | MF | MF | KP | MF | MF |

Investigators' Signatures

Kim Pearce

Reviewer

Water-quality Parameters

| | Well Water | Cond. Water | Sample | Method | Measured by |
|---|---|---|---|---|---|
| Field Tot. Resid. Cl2: | | | 0.02 | Hach | MF KP |
| Lab Tot. Resid. Cl2: | | | 0.06 | Hach | KP |
| Alkalinity: | 124 | 68 | 124 | Hach | KP |
| Hardness: | 128 | 84 | 130 | Hach | KP |
| Total Ammonia: | 0.0 | 0.0 | 0.0 | Hach | MF |

Ammonia meter slope: