

# Texas Surface Water Quality Standards

## Whole Effluent Toxicity

*Changes to Expect in 2011*

**By**

***Peggy W. Glass, Ph.D.***

***Alan Plummer Associates, Inc.***

***Texas Water Environment Horizon***

***November 4, 2010***



# Whole Effluent Toxicity Test

## What is it?

- 💧 Uses living organisms: fish and invertebrate
- 💧 Measures lethal (death) and sublethal (growth or reproduction) effects
- 💧 Characterizes overall effects of water in stream, lake, or treated wastewater effluent



# Whole Effluent Toxicity Test EPA Position

- 💧 Two or more WET test failures in five years, even if only sublethal effects, result in lethal and sublethal permit limit.
- 💧 When there is a permit limit, every test failure, even if only sublethal, is a permit violation.
- 💧 Compliance schedule greater than one year must be justified.



# Effect of EPA Position

- 💧 Many More WET Permit Limits
- 💧 Permit Limits for Sublethal Effects



# Concerns With Sublethal Whole Effluent Toxicity Permit Limits



💧 Necessary to Protect Water Quality?



💧 Feasible to Maintain Compliance?

💧 At What Cost?



# Necessary to Protect Water Quality?

## EPA Report in 1999

“We appear to be approaching consensus that when significant lethality (and in the case of effluents, assuming accurate dilution has been considered) is seen in toxicity tests there is a very high potential of aquatic ecosystem impairment. As this connection is accepted, we continue to struggle with the idea that sublethal effects on indicator species can result in detectable adverse ecosystem response.”

[Emphasis added]

*No subsequent studies have come to a different conclusion.*

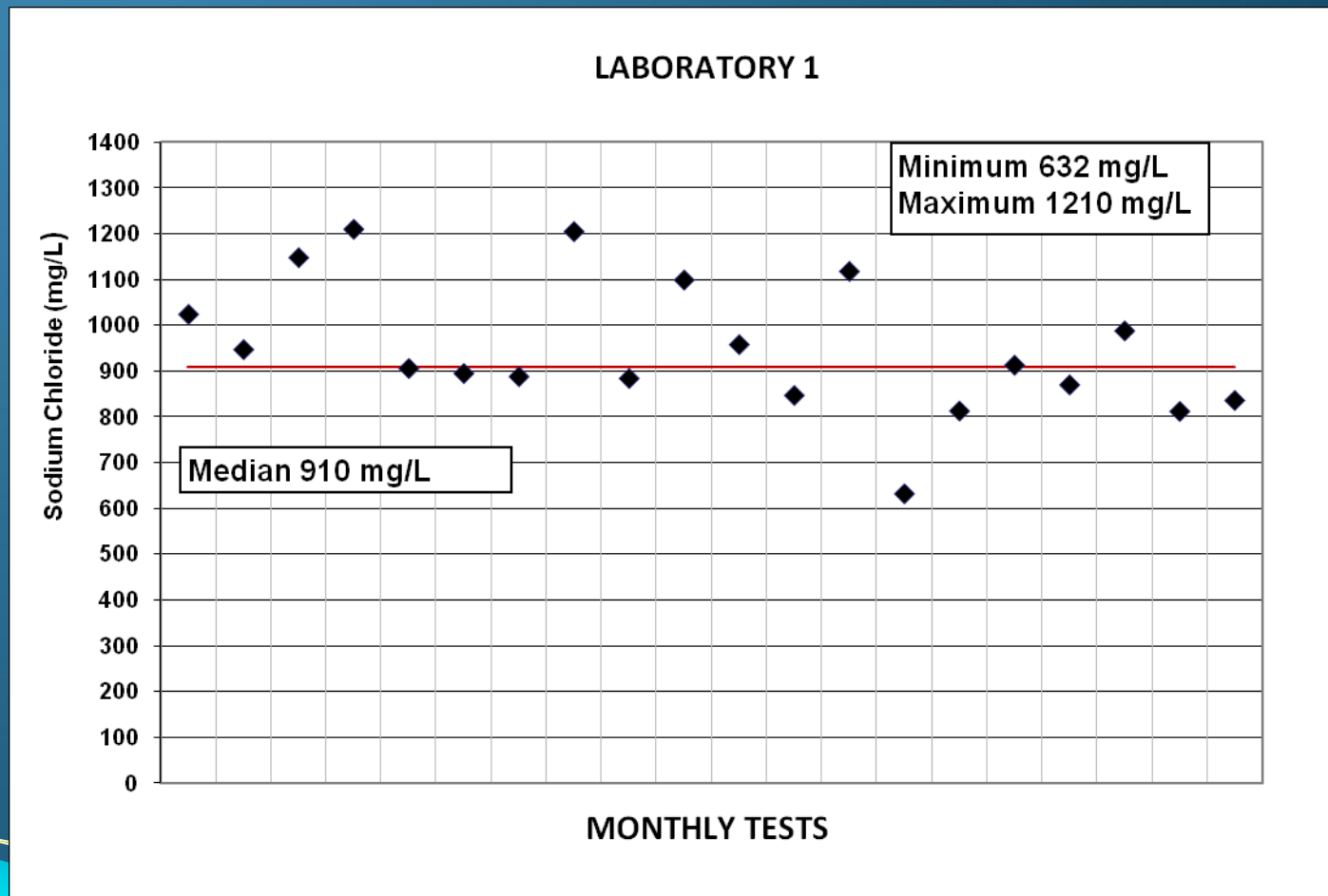


# Feasible to Maintain Compliance?

## Test Variability

### Reference Toxicant Chart

#### Water Flea Reproduction IC<sub>25</sub>

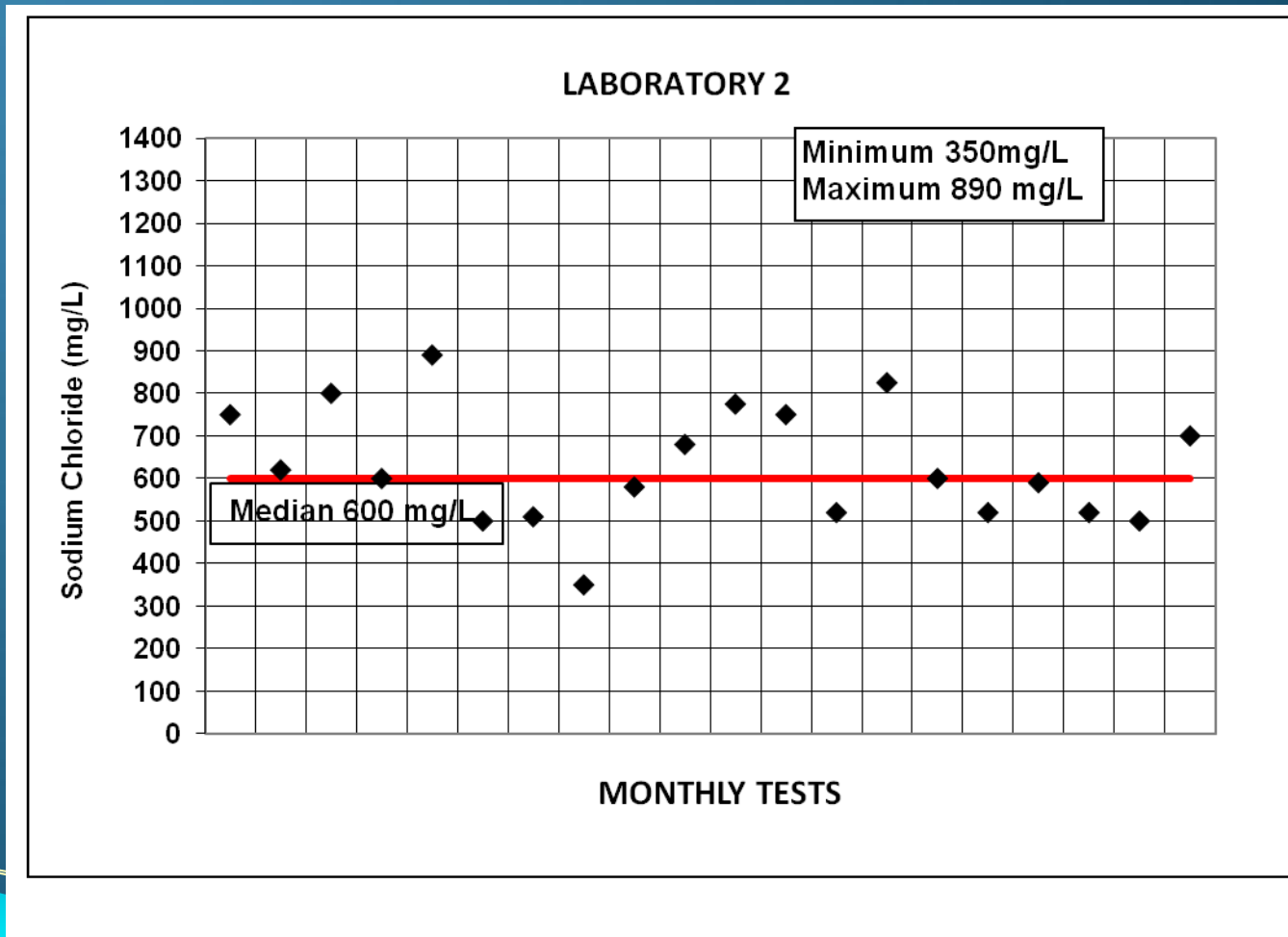


# Feasible to Maintain Compliance?

## Test Variability

## Reference Toxicant Chart

## Water Flea Reproduction IC<sub>25</sub>



# Feasible to Maintain Compliance?

Due to organism variability, concentration of sodium chloride that produces sublethal test failure varies from 350 mg/L to 1,210 mg/L depending on the laboratory and the month.



# Feasible to Eliminate Sublethal Test Failures?

Freedom of Information Act (FOIA) request filed with EPA Headquarters, Regions, and laboratories by Texas permittees in 2009 did not result in the identification of a successful study to eliminate test failures if only sublethal test failures are present.



# Time Required to Determine Cause of Test Failures

Responses to FOIA request indicated that 48% of permittees required three years or more to determine how to eliminate the cause of test failures even when lethal effects were present.



# Cost of Maintaining Compliance

- 💧 **Grand Strand Water and Sewer Authority, South Carolina (pop. 30,000)**
  - *Spent \$250,000 on studies, but could not identify the cause of WET test failures.*
  - *Building \$1.3 million pipeline.*
- 💧 **Wagener, South Carolina (pop. 800)**
  - *Spent \$100,000 on studies, but could not identify the cause of WET test failures.*
  - *Building \$2 million land application system.*



# Cost of Maintaining Compliance

## 💧 Lyman, South Carolina (pop. 2,800)

- *Specific industry concluded to be cause of test failures.*
- *Industry closed, but Lyman still has WET test failures.*

## 💧 Yakima, Washington

- *Concluded chemicals used by fruit packers caused test failures.*
- *Packers changed chemicals, but WET test failures were not eliminated.*



# Whole Effluent Toxicity Recommendations

1. Avoid permit limit, if possible.
2. Submit justification for three-year compliance schedule if limit imposed.
3. Confirm study conclusions on cause of WET test failures before expending significant capital costs.

