

Toxicity; status quo and what's on the horizon

Pardee Technical Seminar

October 26, 2017

Overview

1. Toxicity 100
2. Toxicity testing now in Region 2
3. Changes in Region 2
4. TST
5. State Toxicity Plan
6. Threat to compliance
7. Region 2 under the State Toxicity Plan
8. What's next?

Toxicity test conducted by exposing organisms to effluent

Plants



Selenastrum capricornutum

Invertebrates



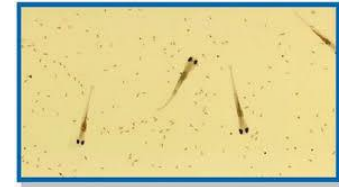
Mytilus edulis

Arbacia Punctulata



Ceriodaphnia dubia

Vertebrates



Pimphales Promelas

Orthorhynchus mykiss



Endpoints: what response do we measure?

Mortality (Acute toxicity)

Non-lethal endpoints (Chronic Toxicity)

- Growth

- Normal embryonic development

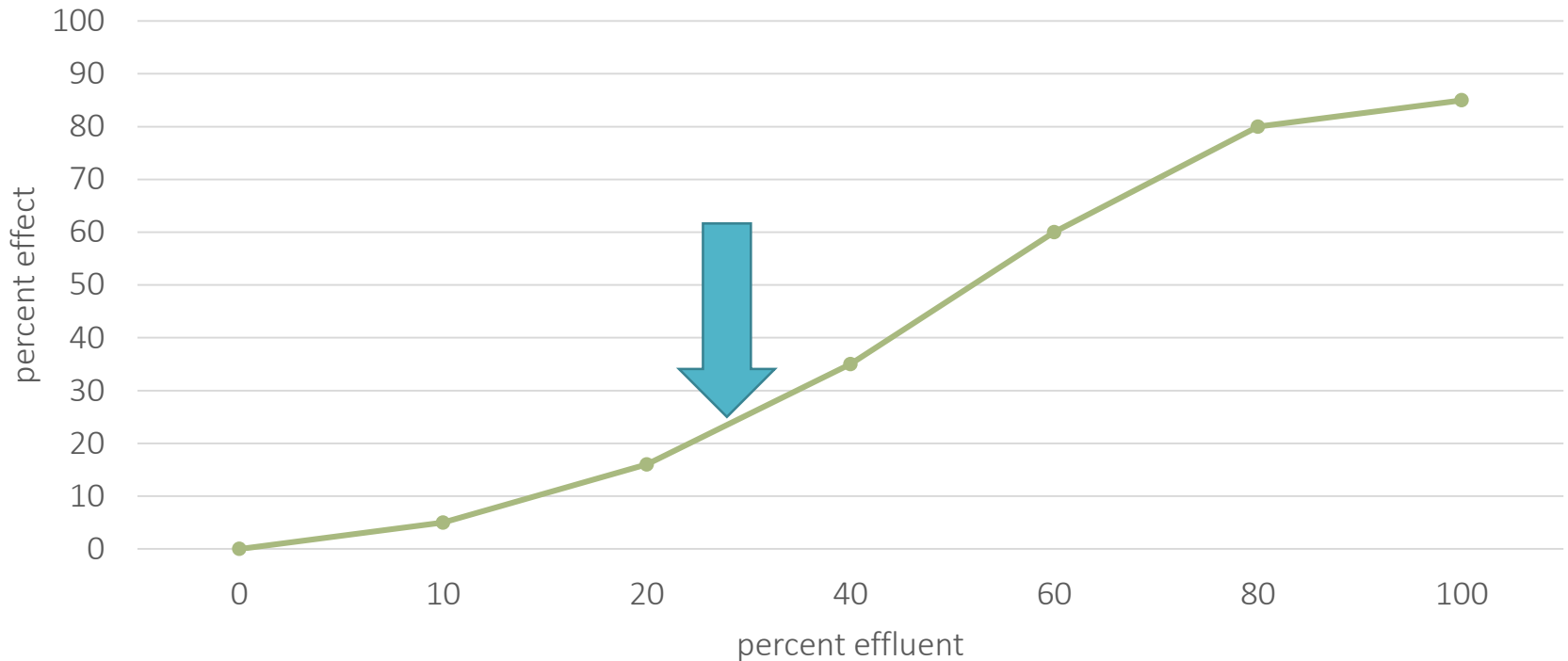
- Reproductive success

- Other responses

Toxicity 100

$$\% \text{ effect} = \frac{\text{control response} - \text{test response}}{\text{control response}} \times 100$$

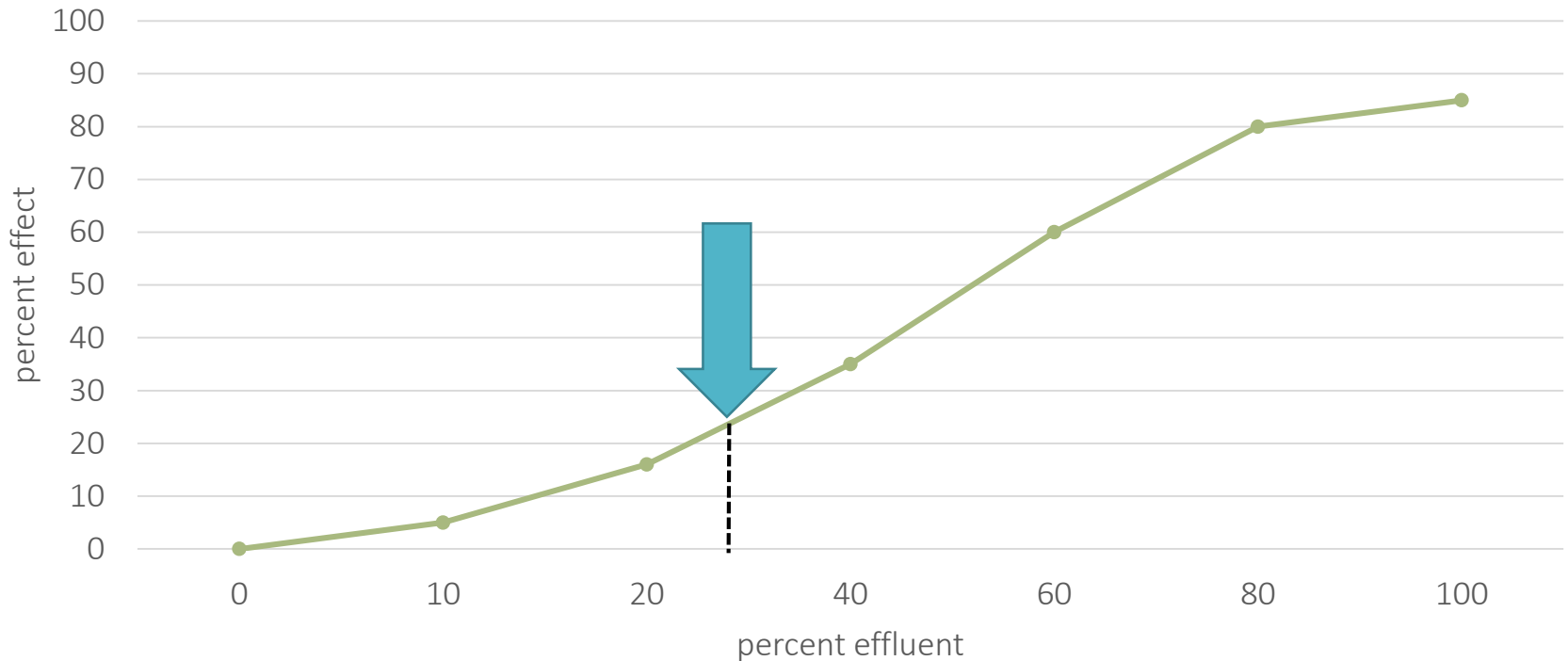
Well-behaved dose-response curve



EC25: Effective Concentration 25% - the effluent concentration that shows a 25% effect in toxicity.

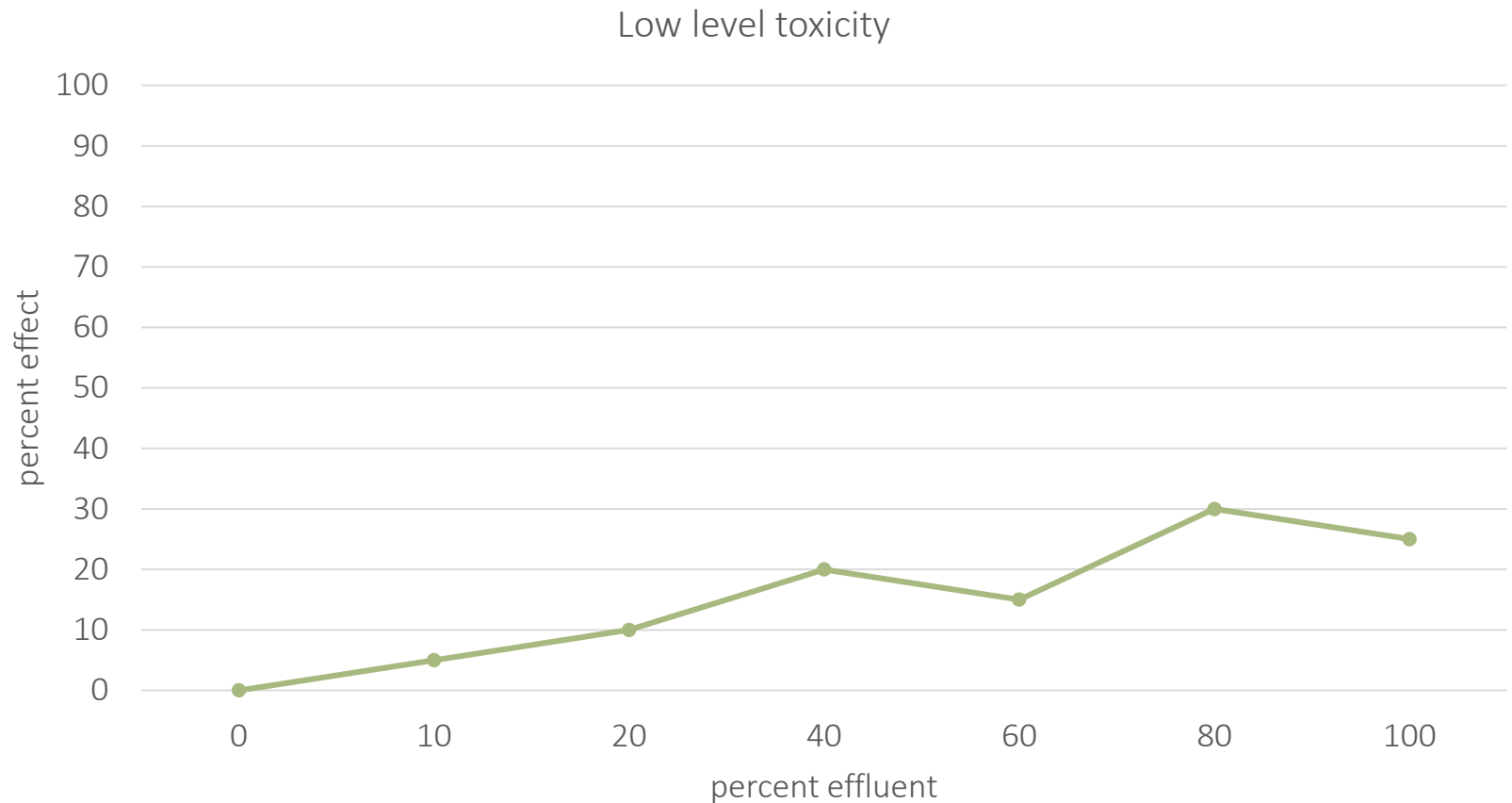
Toxicity 100

Well-behaved dose-response curve



$$TU_c = \frac{100}{\% \text{ effluent at EC}_{25}} = 3.5$$

Many agencies observe persistent, low-level toxicity



Status quo in San Francisco Bay Region

- Historically, POTWs were given chronic toxicity triggers, and acute toxicity limits
- If you observed toxicity, you accelerated monitoring, then embarked on a Toxicity Identification Evaluation/Toxicity Reduction Evaluation (TIE/TRE)
- Decades ago, TIEs would reveal toxicity caused by industrial chemicals, legacy pesticides
- Now toxicity is more likely to be low-level and difficult to identify
- BACWA agencies have spent >\$1.3M on TRE between 2010 and 2016 with no results

Changes in the San Francisco Bay Region

- At EPA's urging, agencies with Reasonable Potential are now also being given chronic toxicity limits
 - Las Gallinas
 - Rodeo
 - Pacifica
- Members are concerned that the Regional Water Board is "making it up as they go along" with respect to RPAs and effluent limits
- No TST in Region 2 yet

What's different about the TST?

- SAME toxicity test method, DIFFERENT statistical evaluation
- TST is performed only at Instream Waste Concentration (IWC), not using dose-response curve
- TST gives a “pass” or “fail”, rather than a measure of toxicity like TUC
- Agencies can input historic toxicity data at IWC into TST calculator to see if they would have passed

State Toxicity Plan - History and Background

- Nearly 15 years in the making!
- In 2003, SWRCB instructed staff to develop a statewide toxicity policy.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION
320 West 4th Street, Suite 200, Los Angeles

FACT SHEET

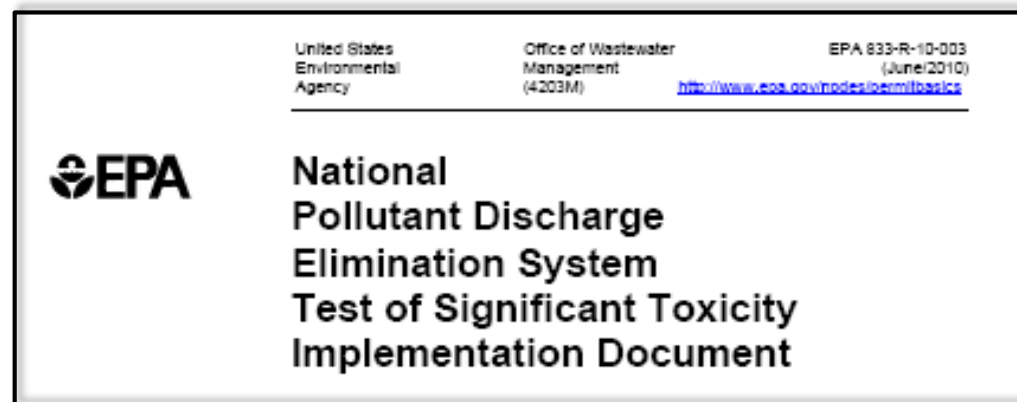
WASTE DISCHARGE REQUIREMENTS
FOR
COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY
(Los Coyotes Water Reclamation Plant)

NPDES No. CA0054011
Public Notice No.: R4-2002-0021

22. **State Implementation Plan (SIP).** Anticipating USEPA's promulgation of the CTR, the State Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (also known as the State Implementation Plan or SIP) on March 2, 2000. The SIP was amended by Resolution No. 2000-30, on April 26, 2000, and the Office of Administrative Law approved the SIP on April 28, 2000. The SIP applies to discharges of toxic pollutants to inland surface waters, enclosed bays and estuaries of California which are subject to regulation under the State's Porter-Cologne Water Quality Control Act (Division 7 of the Water Code) and the Clean Water Act. The policy provides for the following:
- a. implementation procedures for the priority pollutant criteria promulgated by USEPA through the CTR and for priority pollutant objectives established by Regional Water Quality Control Boards (RWQCBs) in their water quality control plans (Basin Plans);
 - b. monitoring requirements for priority pollutants with insufficient data to determine reasonable potential;
 - c. monitoring requirements for 2,3,7,8-TCDD equivalents; and,
 - d. chronic toxicity control provisions.

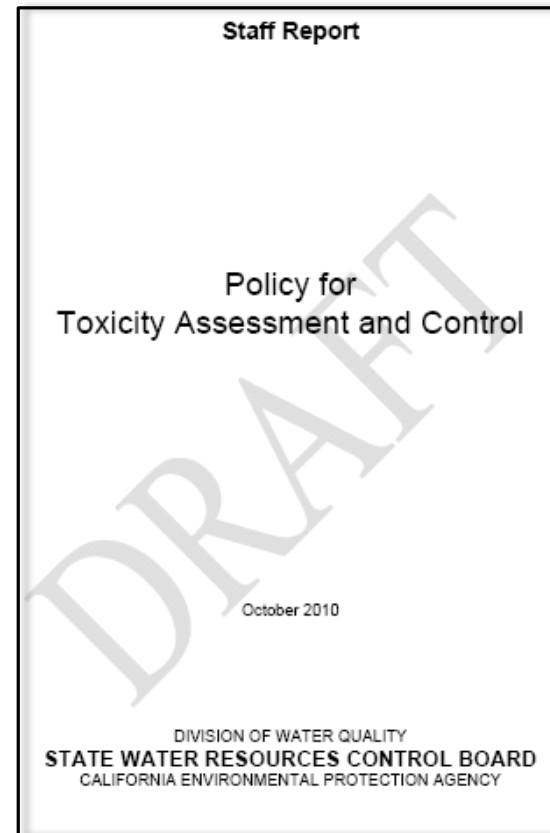
History and Background

- June 2010 – EPA Test of Significant Toxicity (TST) Document – EPA 833-R-10-003
 - An alternative statistical method that MAY be used instead of current NOEC and IC25/EC25
 - Provides guidance for states to incorporate TST into their WET Policy, but not officially promulgated



History and Background

- July and October 2010 – SWRCB released a preliminary WET Policy for “unofficial” public comment.



History and Background

- June 2012

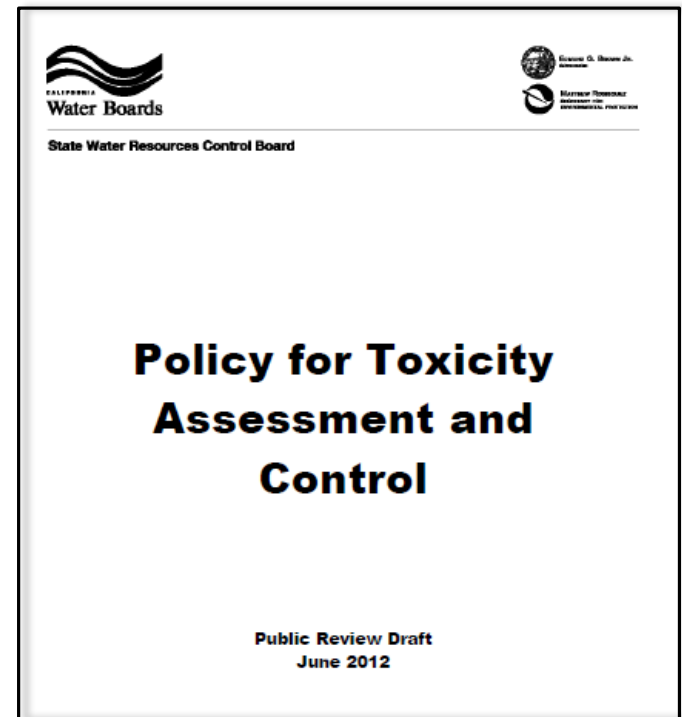
Draft Policy released for
“formal” public comment

- August 2012

SWRCB Workshop

- Revised draft Plan expected in Spring 2013

- Eventual Adoption anticipated in late 2013

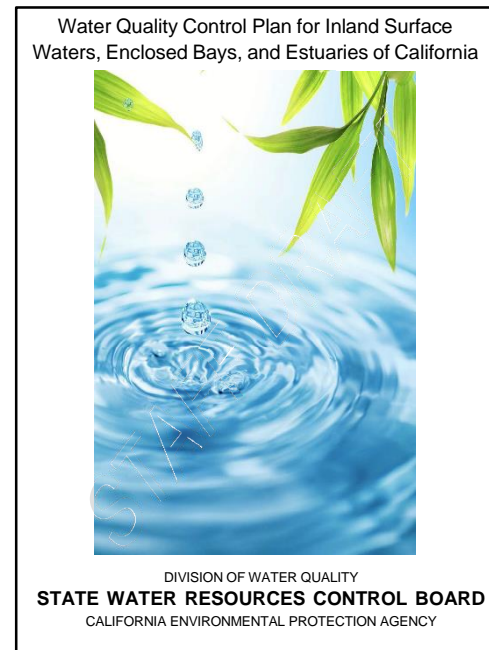


Current Status

Latest Draft Toxicity Plan
Released – April 2017

Now proposed as a component
of the State's Inland Surface
Waters, Enclosed Bays, and
Estuaries Plan

- It is to be “Provisions” in the SIP, not a “Policy”
- Will not require amending the Basin Plan



Minimum Monitoring Frequencies

For POTWs \geq 5 MGD – Chronic Testing Monthly

For POTWs \leq 5 MGD – Chronic Testing Quarterly

Most Sensitive Species Screens:

- Three toxicity tests conducted concurrently using three different species.
- Repeated four times.
 - *Quarterly for one year for continuous dischargers*
 - *Evenly spaced through out a year for non-continuous dischargers*
- At least once in ten years.

Reasonable Potential - Who Will Get Numeric Limits?

- **Spoiler Alert!!!**

EVERYONE WILL, EVENTUALLY

- For POTWs ≥ 5 MGD – You Have Assumed RP
- For POTWs ≤ 5 MGD – If any single test exhibits a 10% effect or greater, you will have RP

What Will The Limits Look Like?

- Maximum Daily Effluent Limit (MDEL)
 - A single test exhibiting a survival effect of 50% or more
 - Think of it as a single test limit.

- Monthly Median Effluent Limit (MMEL)
 - A median result of “Pass” based on the TST with no more than three tests conducted in a calendar month
 - Think of it as a multiple test limit

Reduced Compliance Monitoring Frequency

- Temporary reduction in routine monitoring allowed during a TRE
 - Twice per year (every 6 months)
- Reduction in Routine Monitoring to Annually if:
 - MDEL and MMEL has not been exceeded for five years.
 - Toxicity provisions in the NPDES Permit have been followed.
 - No treatment process change or upgrade has occurred.
 - An additional significant industrial user has not been added.

Acute Vs. Chronic Testing

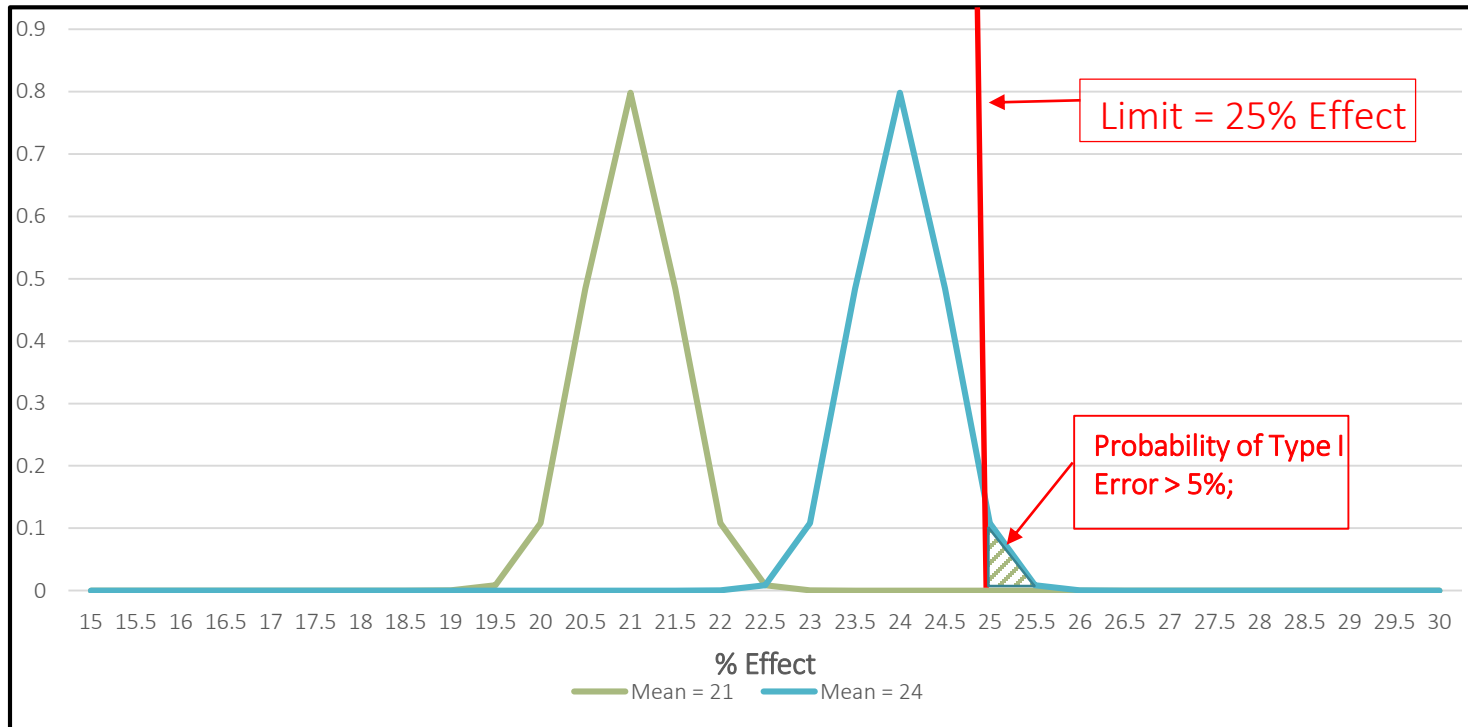
- In most instances:
 - No more acute testing
 - Chronic testing is believed to be more sensitive and will capture any “acute” excursions

How bad is the TST?

Different opinions, but two major concerns:

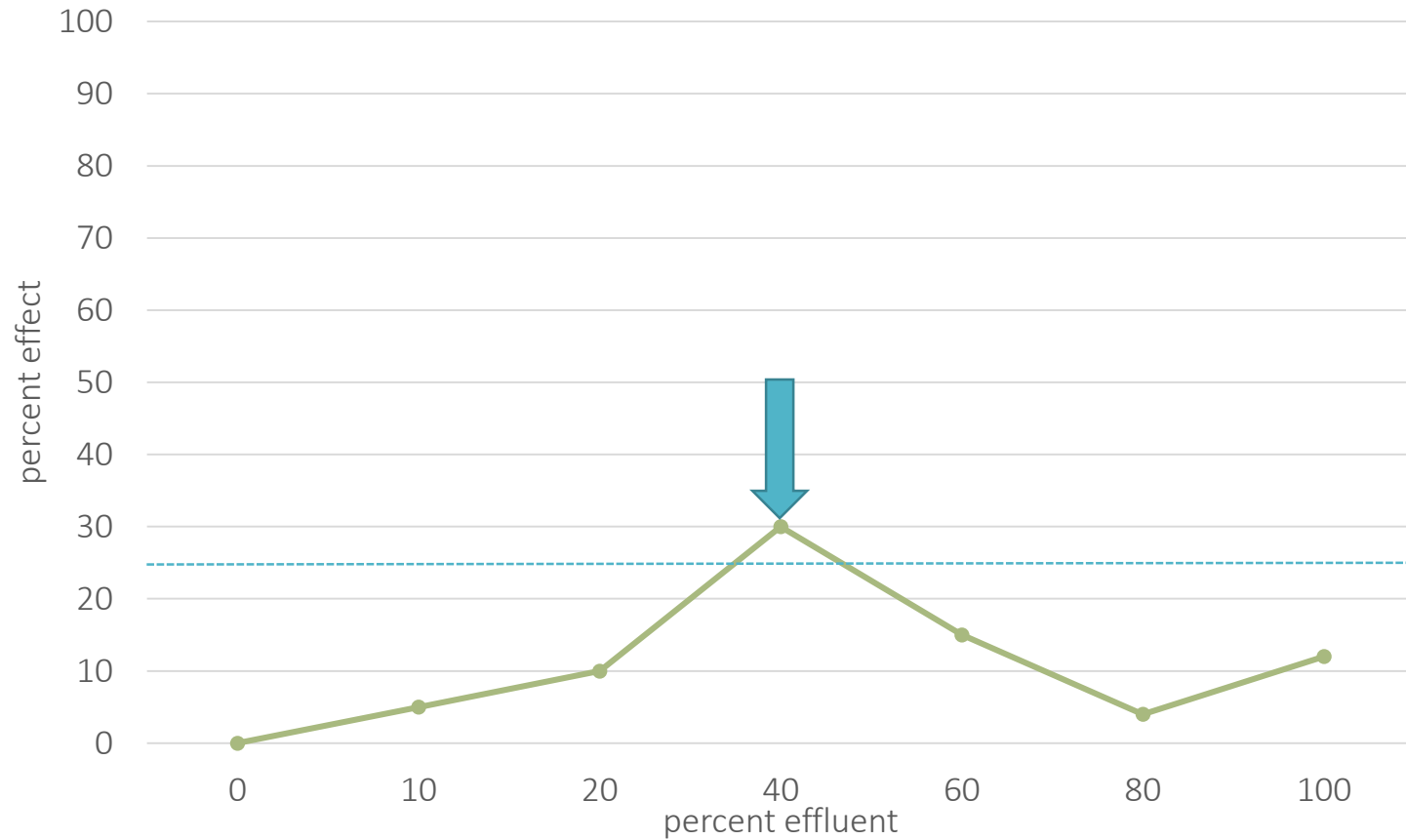
1. Increase rate of false determinations of toxicity compared to EC25, punishes high variability
 - Some species (*Ceriodaphnia dubia*) have inherently high variability
2. No recourse for anomalous dose-response curves

Margin of Error in the TST



TST only looks at the IWC

Anomalous dose-response curve



Compliance Challenge!

- Because toxicity limits are NEW, and because the TST has a higher rate of false determinations of toxicity, many agencies will violate their toxicity limits
- This threatens clean compliance records
- Agencies producing recycled water don't want their effluent labeled as "toxic"

Region 2 under the new State Toxicity Provisions

- BACWA has held discussions with the Regional Water Board throughout this process
 - Acute toxicity will likely be dropped for agencies with chronic toxicity limits
 - Full dilution credit, as allowed by the State Provisions
- Toxicity Provisions likely to be implemented as permits are renewed, not as a blanket amendment
- Regional Water Board has asked State Water Board for more discretion, and to drop sensitive species screening requirements for agencies participating in Alternate Monitoring Requirements

Next steps

- Public draft of Toxicity Provisions and public comment period scheduled to begin in November 2017
- POTW community will internally discuss response through CASA, and BACWA's Lab Committee and Permits Committee
- Continue to work with Regional Water Board to identify common issues with State Toxicity Plan
- BACWA will provide support once Toxicity Provisions are adopted.