Utilization of Large Scale Rapid Screening with Marine Plankton Toxicity Tests by a Citizen Monitoring Group

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Water Quality Monitoring Program
San Diego Coastkeeper

- We balance community outreach, education, and advocacy to promote stewardship of clean water and a healthy coastal ecosystem.

- MPA’s
- Marine Debris
- School Curriculum
- Water Supply
- Sewage Discharges
- Urban Runoff
Water Quality Monitoring Program

- Engage over 250 volunteers a year
- Monthly Sampling from 43 sites throughout 9 of 11 Watersheds in San Diego County
- Bi- Monthly trainings for Field and Lab methods
- Data sharing with CEDEN for TMDL and 305b & 303d
- Primarily State funded, internal funds and partner organizations
Water Quality Monitoring Program

Field
- Air temp
- Water Temp
- Conductivity
- Dissolved Oxygen
- pH

Lab
- Indicator Bacteria
- Nitrate
- Total Phosphorous
- Ammonia
- Toxicity

Brief assessment of physical habitat and ecological conditions
Look for illegal discharges and confirm beneficial uses of water body

Metals
- Zinc
- Copper
- Lead
Rapid Assessment Screening of Toxicity

ASTM E1924

Bioluminescent Dinoflagellate *Pyrocystis lunula*

Receive and light phase of Plankton for testing

Plankton from same culture are shipped already in similar light phase at uniform density
Salinity adjustment of Samples

Measure sea salt and keep in micotube for adding pre-determined amount for proper adjustment.

Record initial and final levels.

30-36 ppt salinity range is reached in all fresh water and brackish samples.
Cuvettes of plankton are gently mixed with salinity adjusted samples and respective controls for each sub-watershed group.
Water Samples with Plankton

Samples are aliquoted into 6 individual cuvettes per cartridge.

Care is given to ensure even distribution.
Prepared samples

Times are recorded and samples are placed in light box to incubate 24h, go through 12 hour dark and 12 hour light cycle ending 3 hr prior to testing.
Air agitates plankton, causing bioluminescence, lens records light emitted from cuvette. 6 readings taken 3h after samples have been in 12h light phase readings are taken. Light output from samples is compared against control to determine if there is inhibition in sample, likely due to toxicity.
Determining BIN Values from Light Readings

Percentage of sample light output compared to control at 100%

Biological Index Number level inverse to percentage of sample bioluminescence

Simple 1-10 scale for results
Rapid Toxicity Assessment (RTA) Jan 17 2010

0 to 4 Normal  4 to 7 Review Further  7 to 10 Effect Detected

Site locations plus Controls

BIN (Biological Index Number)
• Rapid Screening tool for toxicity at a fraction of the cost of other tests
• Effective with volunteer workflow even for large scale applications
• Tool for initial sites and continued assessment for follow up
• Potential tool for sediment testing, comparability study underway
Special Thanks

EPA
Tetra Tech,
Assure Controls
& all of our volunteers