12th Webinar

Do you know the high sensitive ToxProtect?

Fish in a tank - best choice for a simple, affordable and effective Early Warning System

Welcome

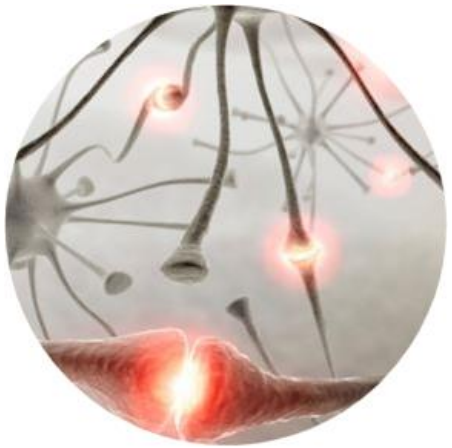
Ylva Tischler Detlev Lohse

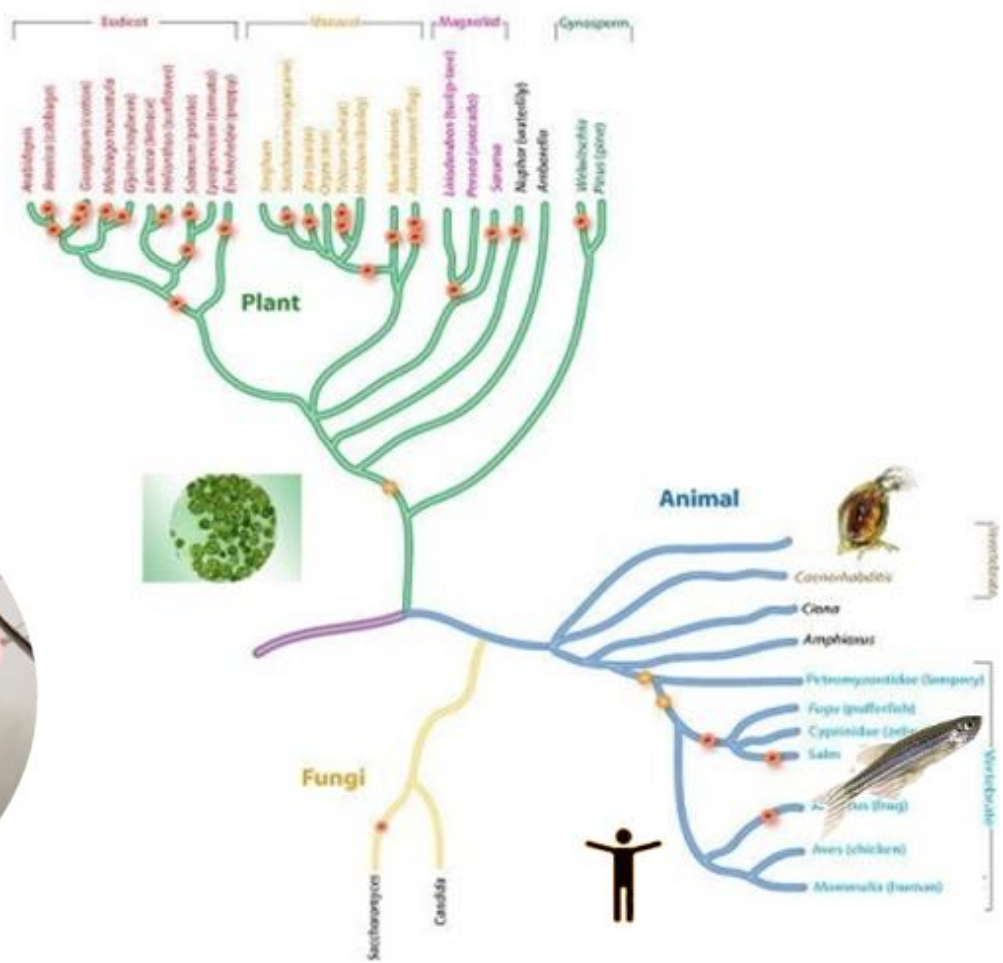
bbe Team

12th Webinar

Part 1	Why do we measure Fish toxicity?
Part 2	What is the Value of *Tox*Protect?
Part 3	Construction & Function
Part 4	Application
	Conclusion
	Feedback
	Follow up

The Testorganism in the Phylogenetic Tree





OPPTS 850.1075 EPA
Test: ACUTE TOXICITY FOR FISH

The purpose of this test is to determine the acute lethal toxicity of a substance to fish in fresh water and marine water.

Literature on Fish Toxicity

Welcome to Search and Browse for EXTOXNET...

Pesticide Information Profiles (PIPs)

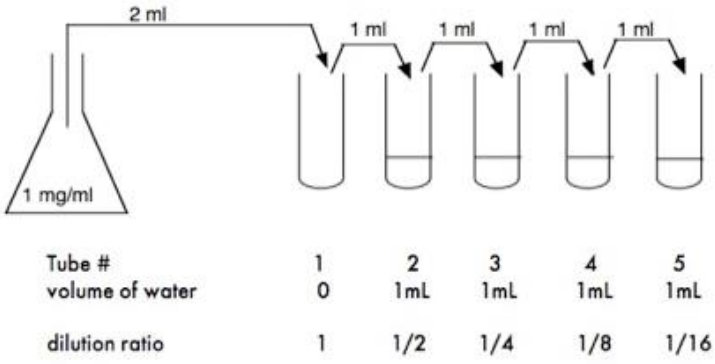
EXTOXNET is a cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University, and the University of Idaho. Primary files are maintained and archived at Oregon State University.

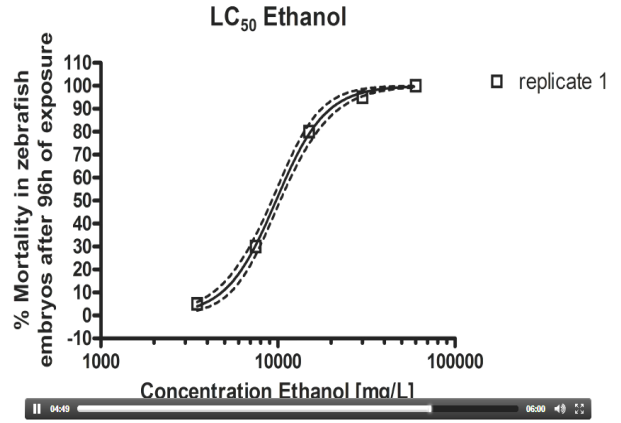
Browse... Browse these PIPs by 'clicking' on the title:

- WHAT ARE PIPs?
- 2,4-D - EXTOXNET PIP
- 2,4-DB - EXTOXNET PIP
- 4-AMINOPYRIDINE - EXTOXNET PIP
- DCPA, CHLORTHAL, CLORTHAL-DIMETHYL - EXTOXNET PIP
- MCPA - EXTOXNET PIP
- ABAMECTIN - EXTOXNET PIP
- ACEPHATE (ORTHENE) - EXTOXNET PIP
- ACETOCHLOR - EXTOXNET PIP
- ACIFLUORFEN - EXTOXNET PIP
- ALACHLOR - EXTOXNET PIP
- ALDICARB - EXTOXNET PIP
- ALLETHRIN - EXTOXNET PIP
- ALUMINUM PHOSPHIDE - EXTOXNET PIP
- AMETRYN - EXTOXNET PIP
- AMITRAZ - EXTOXNET PIP
- AMITROLE - EXTOXNET PIP
- AMMONIUM SULFAMATE - EXTOXNET PIP
- ATRAZINE - EXTOXNET PIP

…..may cause fish and aquatic invertebrate deaths [43]. Chlorpyrifos toxicity to fish may be related to water temperature. The 96-hour LC50 for chlorpyrifos is 0.009 mg/L in mature rainbow trout, 0.098 mg/L in lake trout, 0.806 mg/L in goldfish, 0.01 mg/L in bluegill, and 0.331 mg/L in fathead minnow [50]……

How does the Static Test work?



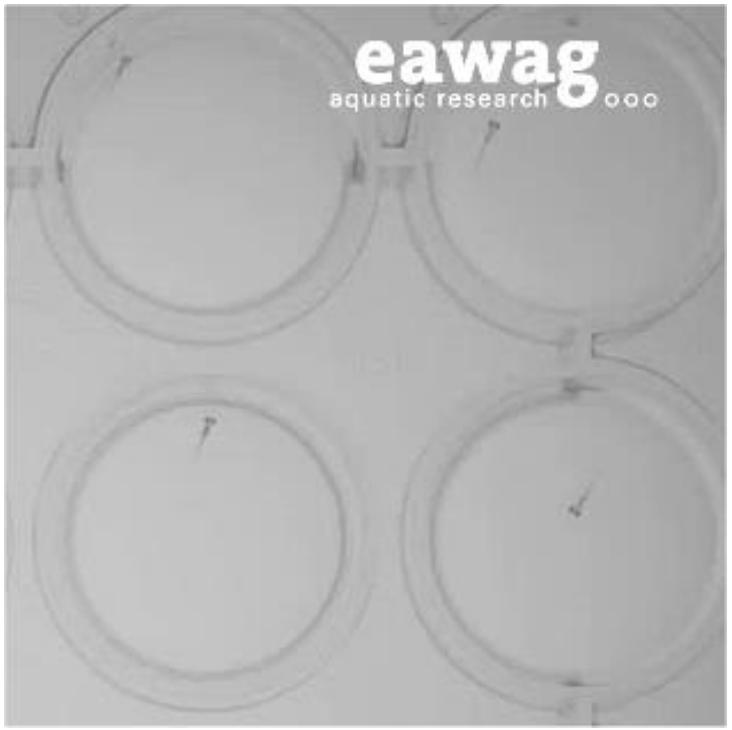


Is the Static Test an Option?

☐

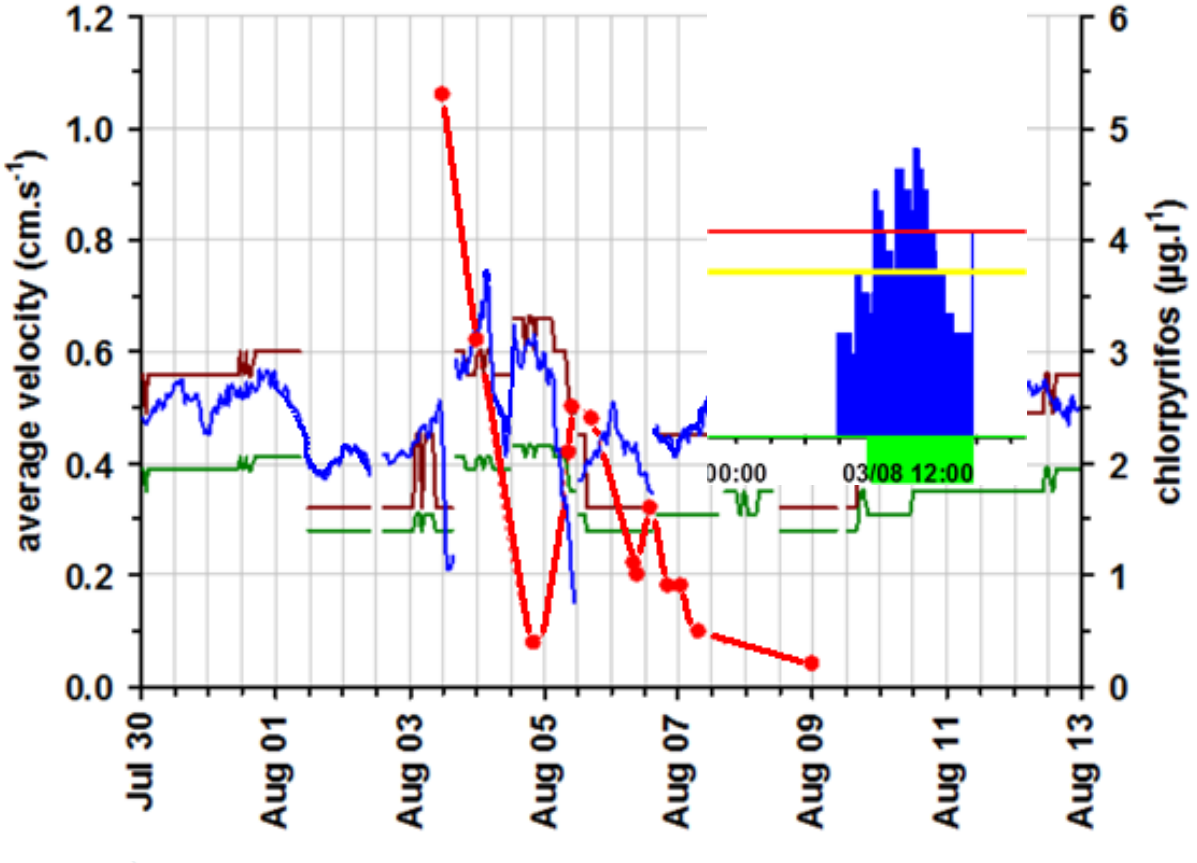
☑ No

Why not?



Online Toxicity and Pollution Wave

Toximeter signal
Pollutant concentration



The Alternative – Chemical Analysis?

*Tox*Protect 64

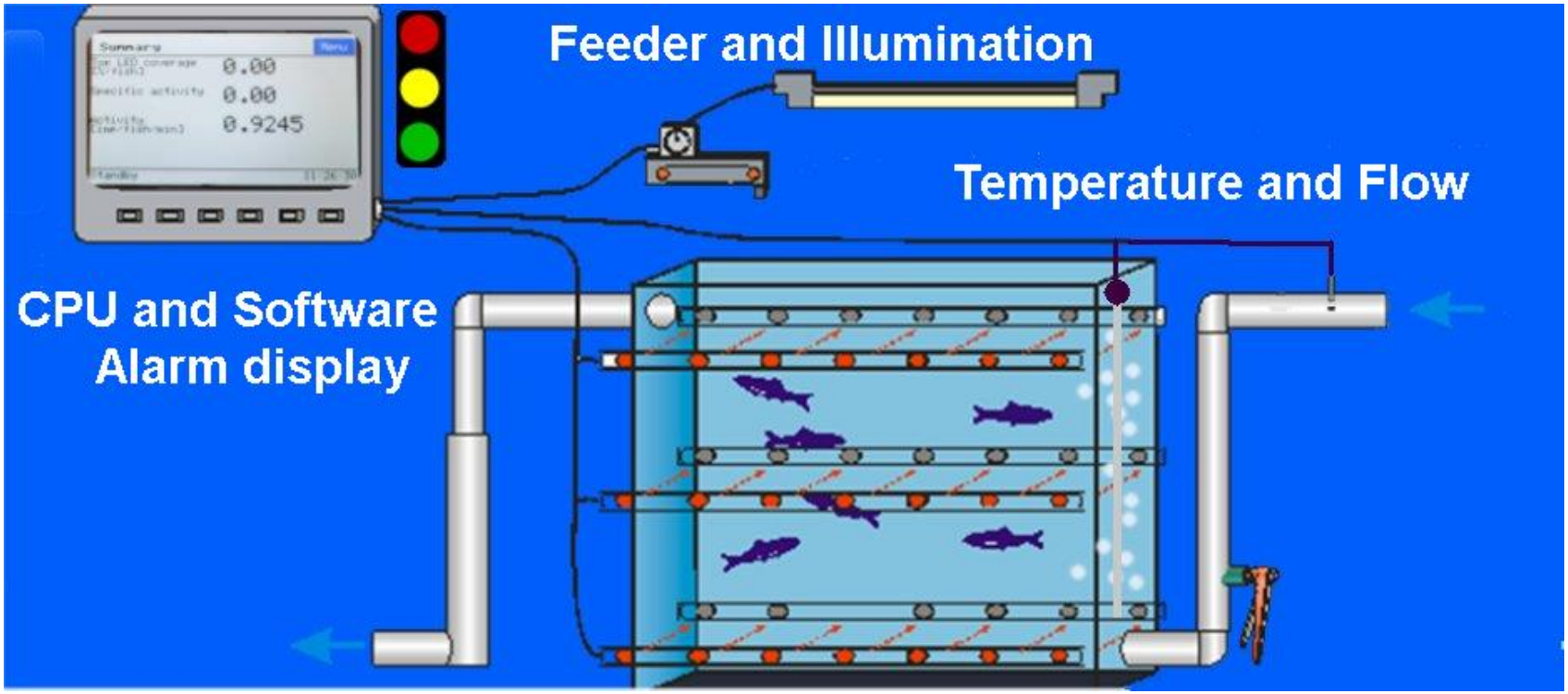
ToxProtect is a cost-effective, automated biomonitor for rapid detection of acute toxic substances in water

- detection of fish movements by an array of light barriers
- remote access to data including all optional sensors and online operation
- low maintenance
- simple installation

What makes a *Tox*Protect Attractive in Toxicity Monitoring?

- Continuous monitoring
- Ease of operation
- Sensitive vertebrate – related physiology
- Reliability of hardware
- Wide temperature range: cold & warm water fish

Set-up of the *Tox*Protect



Essential Parts of the *Tox*Protect

Essential Parts of the *Tox*Protect

To put the Items together

- **Hardware ToxProtect**
- **Fish/Testorganism**
- **AlarmSoftware**

To each Place the Suitable Fish

Medaka

Zebrafish

Dace (Leuciscus)

Tigerbarb

Blue gill

Fathead minnow

Selection for the Type of Substances

www.pesticideinfo.org/List_EcoChemSpecies.jsp?Taxa_Group='Fish'

PAN Pesticides Database - Chemical Toxicity Studies on Aquatic Organisms

Home > Ecotoxicity Search

Aquire Search Results

The 'Fish' organism group contains the following species. Click on any species listed below for a list of studies. Note that if we do nc in the results. The PAN Pesticide database only includes pesticide-related chemicals.

Common Name	Scientific Name	Number of Studies
Blue Bream	Abramis ballerus	4
Bream	Abramis brama	28
Yellowfin goby	Acanthogobius flavimanus	5
Surf bream	Acanthopagrus australis	3
Porgy	Acanthopagrus schlegeli	36
Minnow, tanago	Acheilognathus moriokae	15
Siberian Sturgeon	Acipenser baerii	47
Lake sturgeon	Acipenser fulvescens	38
Sturgeon	Acipenser gueldenstaedti colch	1
Russian sturgeon	Acipenser gueldenstaedtii	2
Sterlet	Acipenser ruthenus	1
Sevruga, stellate sturgeon	Acipenser stellatus	8
White sturgeon	Acipenser transmontanus	42
Sturgeon family	Acipenseridae	1
Minnow	Acrossocheilus paradoxus	13
Spiny rayed fish class	Actinopterygii	3
Diamond killifish	Adinia xenica	3
Hooknose	Agonus cataphractus	48
Longfin dace	Agosia chrysogaster	3
Bleak	Alburnus albidus	5
Bleak	Alburnus alburnus	119
Yelloweye mullet	Aldrichetta forsteri	9
Blueback herring	Alosa aestivalis	9
Alewife	Alosa pseudoharengus	5
American shad	Alosa sapidissima	7
Glassy, Perchlet	Ambassis commersoni	3
Bald glassy	Ambassis gymnocephalus	3

(Carboxymethoxy)butanedioic acid, Trisodium salt Show (Carboxymethoxy)butanedioic acid, Trisodium salt studies for all species

Zebra danio (Danio rerio)	Mortality	Mortality	FRY, 3 WK	96 h	LC50	2,100,000	1,700,000	2,500,000	ug/L	A	63.9 % AI	Static	Not Acutely Toxic		1982	J.Environ.Qual.of Life Report No.EUR 7549:284-295
Zebra danio (Danio rerio)	Mortality	Mortality	JUVENILE, 12 WK	96 h	LC50	2,600,000	2,500,000	2,700,000	ug/L	A	63.9 % AI	Static	Not Acutely Toxic		1982	J.Environ.Qual.of Life Report No.EUR 7549:284-295
Zebra danio (Danio rerio)	Mortality	Mortality	ADULT, 20 WK	96 h	LC50	2,500,000	1,800,000	3,100,000	ug/L	A	63.9 % AI	Static	Not Acutely Toxic		1982	J.Environ.Qual.of Life Report No.EUR 7549:284-295

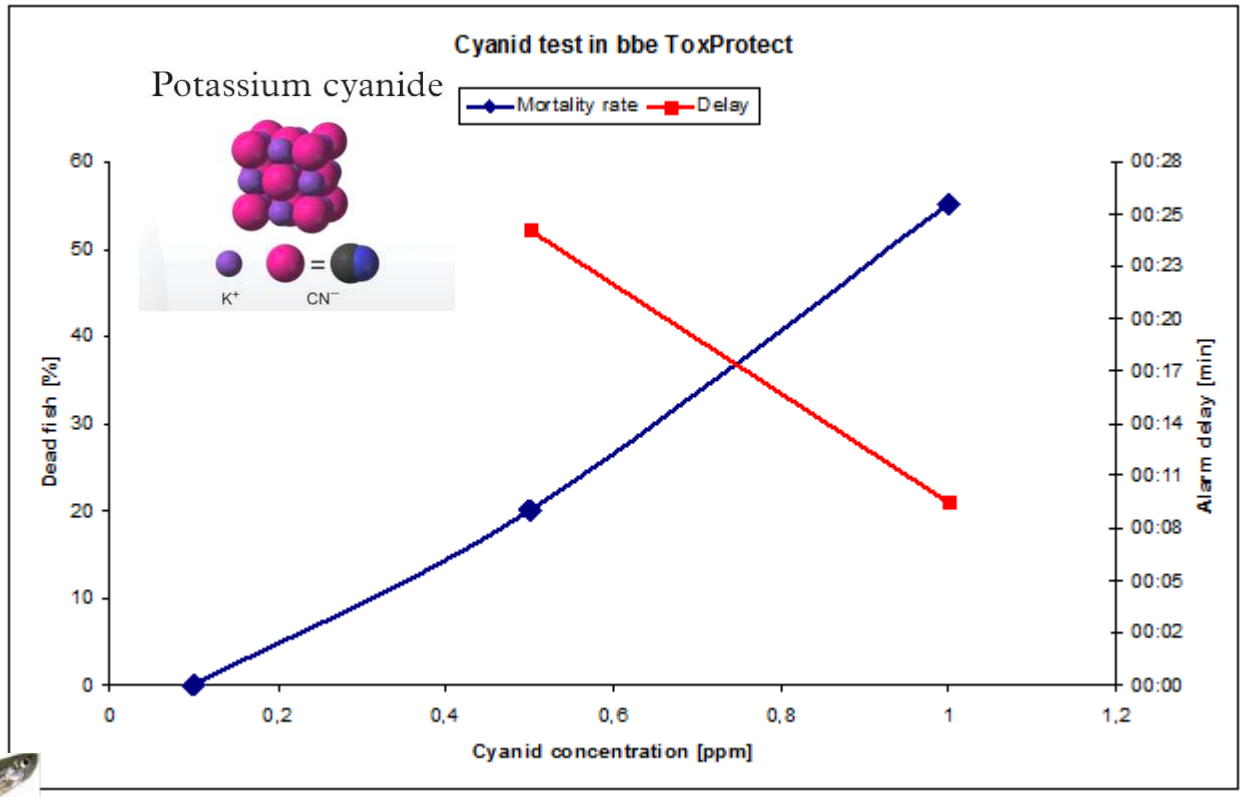
(T-4)-bis(2-Hydroxypropanoato-O'1, O2)zinc Show (T-4)-bis(2-Hydroxypropanoato-O'1, O2)zinc studies for all species

Zebra danio (Danio rerio)	Mortality	Mortality	NR	96 h	LC50	23,100	-	-	ug/L	T	NR	Static	Slightly Toxic		1998	Chemosphere 37(7):1317-1333
Zebra danio (Danio rerio)	Mortality	Mortality	NR	96 h	NOEC	12,900	-	-	ug/L	T	NR	Static			1998	Chemosphere 37(7):1317-1333

1,1,1-trichloroethane Show 1,1,1-trichloroethane studies for all species

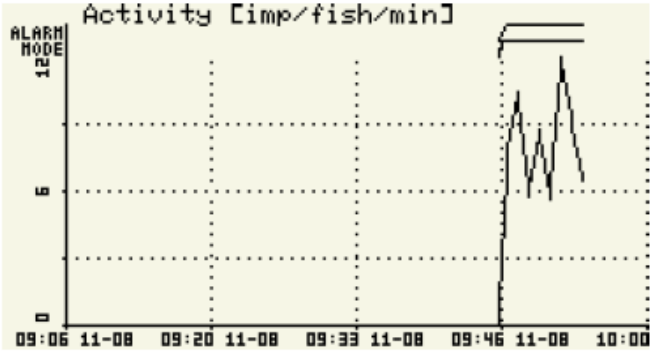
Zebra danio (Danio rerio)	Behavior	Behavioral changes, general	NR	14 d	NOEC	3,400	-	-	ug/L	F	NR	Flow through			1990	Testbericht: Wassergefahrdende Sto Fraunhofer-Institut fur Umweltchemie und Okotoxikologie, Schmallenberg (OECDG Data File)
Zebra danio (Danio rerio)	Mortality	Mortality	NR	48 h	LC50	79,000	-	-	ug/L	F	NR	Flow through	Slightly Toxic		1990	Testbericht: Wassergefahrdende Sto Fraunhofer-Institut fur Umweltchemie und Okotoxikologie, Schmallenberg (OECDG Data File)

Response Time



To put the Items together

- Hardware ToxProtect
- Fish/Testorganism
- Alarm Software



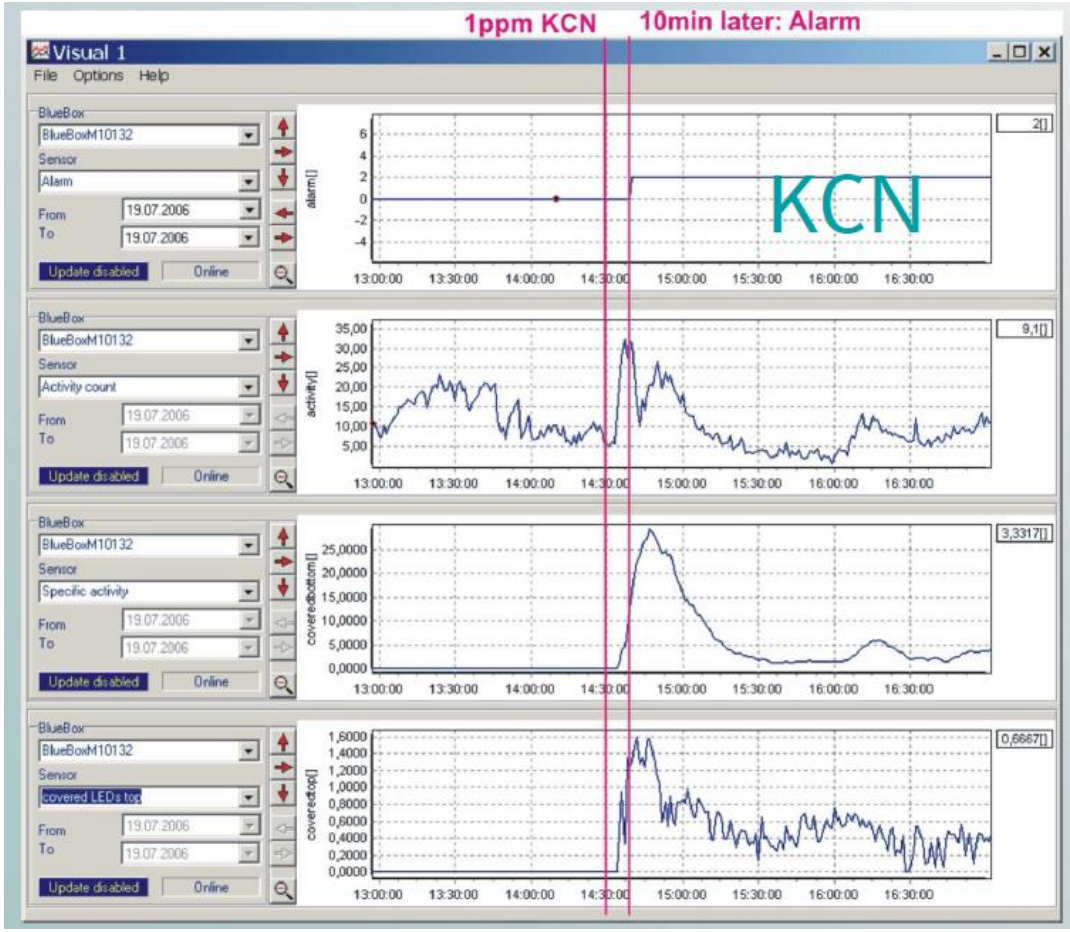
Alarm Recognition

Activity

Specific activity

Thresholds

Alarm



False Alarm Prevention

Problem:

- **false alarms occur due to the natural variation in behaviour**
- **due to the low risk of an event, alarms can be wrong**

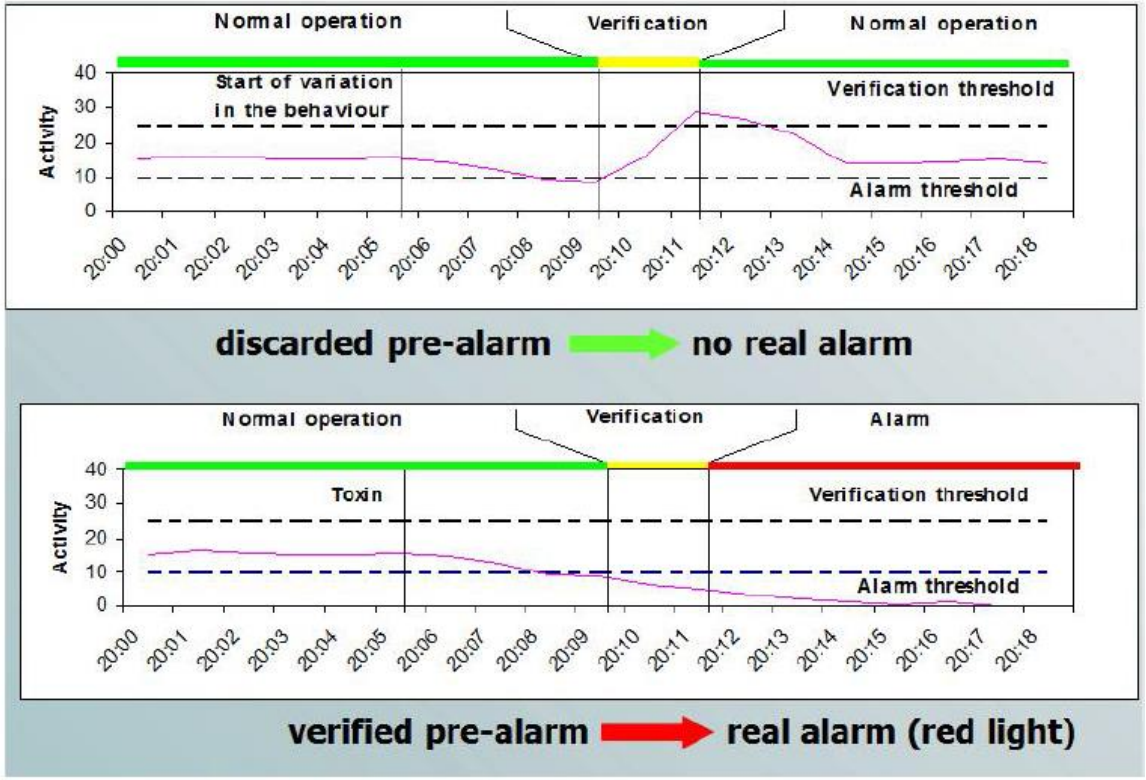
Consequence:

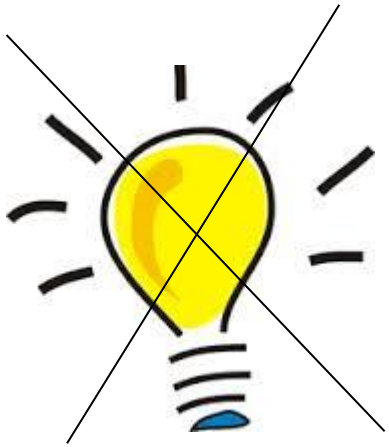
- **an alarm evaluation is required to reduce the risk**

Solutions

- **second independent instrument**
- **second type of test in the same instrument**

Alarm Verification = False Alarm Prevention



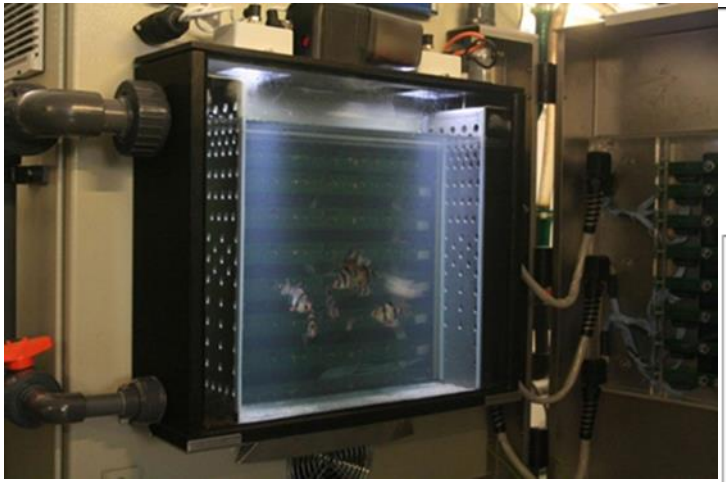


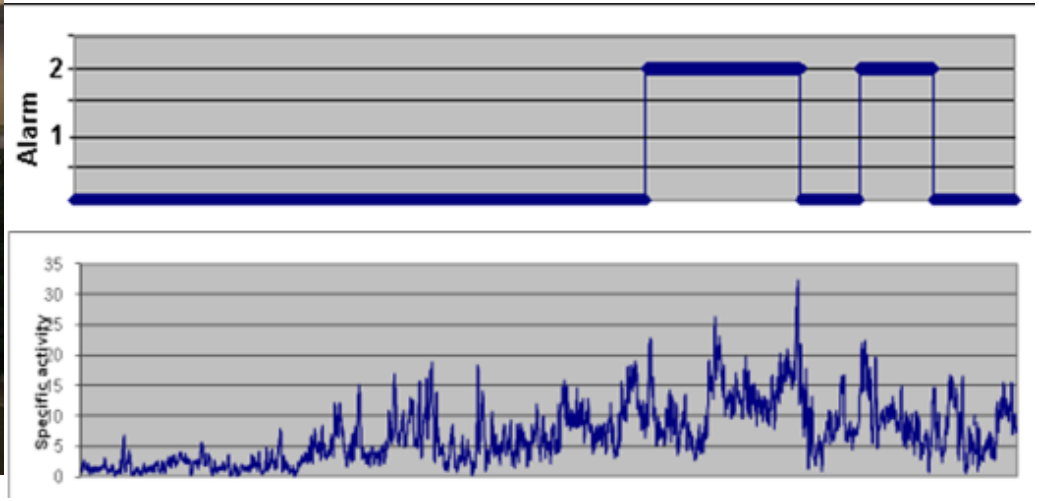
To put the Items together

- Hardware ToxProtect ☑
- Fish/Testorganism ☑
- Alarm Software ☑

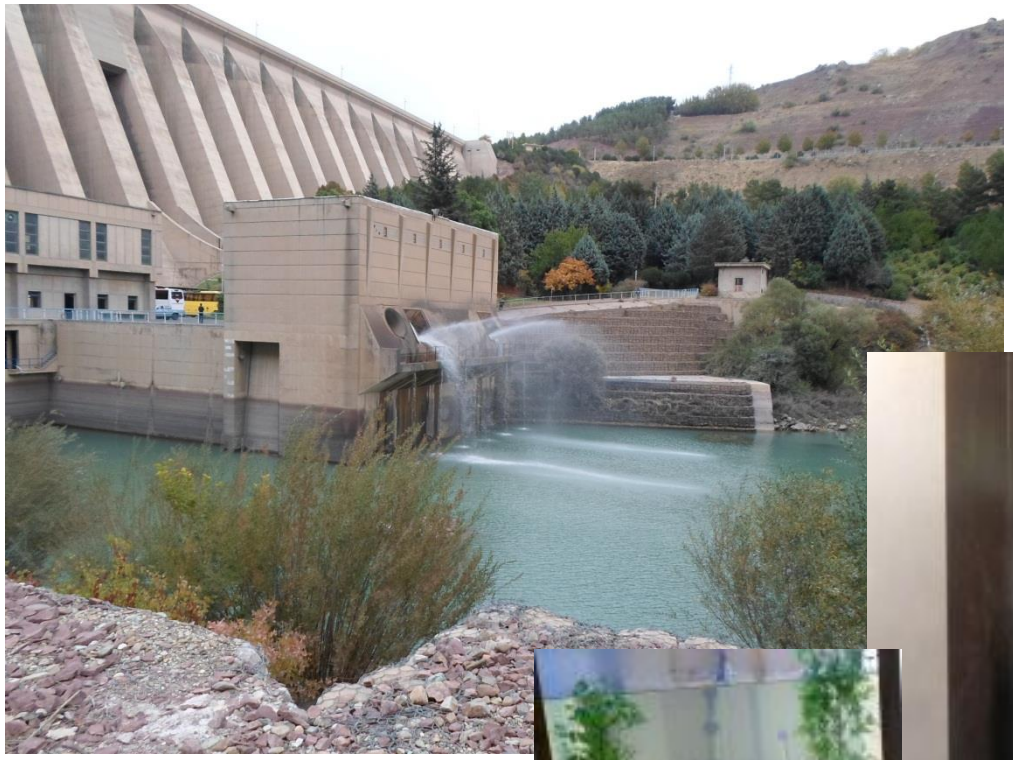
Application Measuring Station

Real alarm from pig farm faeces in Latvia





Application Water Quality Monitoring



Hydropower dam upside Tehran, Iran

Summary

ToxProtect is a qualified tool for water quality survey. It detects contaminations in short times.

ToxProtect combines the ability of fish toxity assessment with a superior alarm recognition.

ToxProtect includes an alarm verification check.

ToxProtect reduces costs and risks.

Thank you