

# Environmental quality standards for priority pesticides relevant in the aquatic environment in Slovak Republic

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Ministerstvo životného prostredia  
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# *The project PHARE-TWINNING SK 05/IB/EN/01*

*“Establishment of the Environmental Quality Standards (EQSs) for water and strengthening of regional and district environmental offices for implementation of water controls and monitoring”*

*Slovak Ministry of Environment*

*Hydrometereological Institute (SHMU) of Bratislava*

*Agenzia Cooperazione Enti Locali ACEL Torino*

# ***Dangerous Substances and Priority Dangerous Substances***

- A complete list of 59 DS (including 33 DS classified as Priority Substances and Priority Hazardous Substances by WFD) relevant for the Slovak aquatic environment has been identified in previous Projects to enforce the Slovak National Pollution Prevention Program
- 47 DS (20 of unknown origin) from point sources of 80 industrial sites
- 12 pesticides from diffuse sources

## **TASK: Establish EQS for**

- 17 substances (some plant protection products) included in the PRP still lacking of EQSs formally identified values

# Procedure set in the WFD Annex II for EQS definition

- Assessment of Pressures from Uses, Impact and Monitoring data
- Review of existing EQS and Ecotoxicological Data in international legislation, DBs, scientific literature, risk assessment studies
- Ecotoxicological Assays

# Procedure set in the WFD Annex II for EQS definition (2)

**Safety Factors vs Ecotoxicological data for EQS definition (Dir. 2000/60 EC, “Technical Guidance Document for risk assessment of new and existing chemical substances, according to Dir. 93/67/CEE”)**

<b>Type of results available</b>	<b>Safety factor</b>
At least 1 acute L(E)C50 for each of the three trophic levels above	1000
1 chronic NOEC (on fish, daphnids or equivalent)	100
2 chronic NOEC for species of two trophic levels	50
Chronic NOECs for at least three species belonging to three trophic levels	10

# An Example

*Substance:* 4-methyl-2,6-di-tertbutylphenol  
(butylhydroxytoluene)

*Ecotoxicological data:* LC0 96h, *Brachydanio rerio*  $\geq 0.57$  mg/L  
NOEC chronic *Scenedesmus subspicatus* = 400  $\mu\text{g/L}$   
NOEC chronic *Daphnia magna* 21d = 70  $\mu\text{g/L}$

*Conditions:* Three documented trophic levels  
Two data referred to chronic toxicity

*Result :* A Safety Factor 50 applied to the lowest endpoint  
(70  $\mu\text{g/L}$  the highest sensitivity observed).

$$\underline{\text{EQS : } 70 \mu\text{g/L} \div 50 = 1.4 \mu\text{g/L}}$$

# Environmental Quality Standards

The new Directive Proposal in the field of EQS for the aquatic environment  
(2006/0129(COD) Encl. COM(2006))

Standards are reported as

Annual Average EQS-AA for long-term effects

Maximum Allowable Concentration MAC-EQS for short-term effects  
for protection of aquatic ecosystems

# 17 Sunstances relevant for SR

Butylhydroxytoluen

Benzensulfonamid

Benzo(b)fluoraten

Benztiazole

Benzo(g,h,i)pyrelen

Difenyl (fenylbenzen)

Bisphenol A

Clopyralid

Desmedipham

Dibutylphthalate

Diphenylamine

Ethofumesate

Fenantren

Glyphosate

MPCA

Pendimethalin

Styrene



# Searching for EQS

- Are there EQS adopted in other EU MS?
- Are those EQS derived from approved Risk Assessment studies according to Directives 93/67/EEC and/or 91/414/EEC?
- Do they comply Dir. 2000/60 EC requirements ?

YES

Biphenyl (Denmark)

MCPA (Finland)

# Searching for EQS

- From the "Proposal for a Directive of the European Parliament and of the Council on environmental quality standards in the field of water policy and amending Directive 2000/60/EC"

Benzo(b)fluoranthene

Benzo(g,h,i)perylene

# Searching for Ecotox Data

- Are ecotox data available in literature ?
- Are GLP compliant?
- Do they refer to internationally recognised guidelines (OECD, USEPA, ISO)?
- Trophic levels tested and type of tests do allow to derive WFD compliant EQSs?

# EQS from DB (2)

	Substances	Proposed AA-EQS (µg/L)
8	Phenanthrene	0.380
9	Glyphosate	15
	Glyphosate-IPA	7290
	Glyphosate-Trimesium	72
	1 <sup>st</sup> metabolite (glyphosate acid)	64
10	Pendimethalin	0.3
11	Vinylbenzene (styrene)	0.63

# Ecotoxicological Assays

Ecotoxicological Centre of Bratislava

chronic toxicity : 2 substances

Benzensulfonamide and Benzothiazole

acute toxicity : 6 substances

4-methyl-2,6-di-terbutylphenol

(Butylhydroxytoluene)

Benzensulfonamide

Phenanthrene

Benzensulfonamide

Benzothiazole

Bisphenol A

Dibutylphtalate

# Ecotoxicological Assays (2)

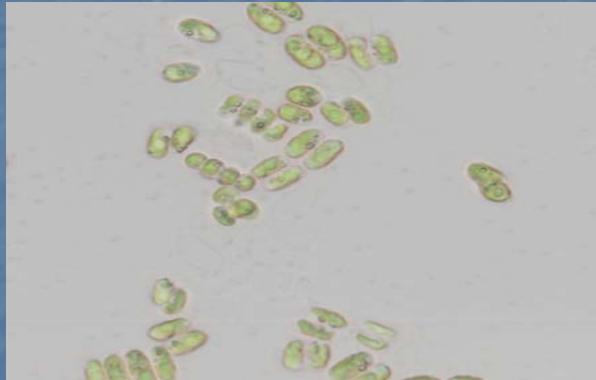
CAS	Substance	Species	Type of testing
98-10-2	Benzensulfonamide	<i>Poecilia reticulata</i>	Prolonged
			Acute
		<i>Daphnia magna</i>	Chronic
			Acute
	<i>Desmodesmus suspicatus</i>	Semichronic	
95-16-9	Benzothiazole	<i>Daphnia magna</i>	Chronic
		<i>Daphnia magna</i>	Acute
		<i>Desmodesmus suspicatus</i>	Semichronic
128-37-0	4-methy-2,6-diterbuthylphenol	<i>Poecilia reticulata</i>	Acute
80-05-7	Bisphenol A	<i>Daphnia magna</i>	Acute
		<i>Desmodesmus suspicatus</i>	Semichronic
84-74-2	Dibutylphthalate	<i>Desmodesmus suspicatus</i>	Semichronic
85-05-8	Phenanthrene	<i>Desmodesmus suspicatus</i>	Semichronic

# The Organism for Ecotoxicological Essays

*Daphnia magna*



*Desmodesmus subspicatus*



*Poecilia reticulata*



# Ecotoxicological Assays (2)

Substance	Test	Results
Benzensulphonamide	Growth inhibition test with <i>Desmodesmus subspicatus</i>	EC50 algae 184.7 mg/L (72 h) NOEC algae 100 mg/L
	Acute Toxicity Test with <i>Daphnia magna</i>	EC50 daphnia 449.9 mg/L (48h)
	Acute Toxicity Test with <i>Poecilia reticulata</i>	LC50 fish 274.33 mg/L (96h)
	Chronic Toxicity Test with <i>Daphnia magna</i>	NOEC daphnia 1 mg/L (21d)
	Chronic Toxicity Test with <i>Poecilia reticulata</i>	NOEC fish 200 mg/L (28d)
Benzothiazole	Growth inhibition test with <i>Desmodesmus subspicatus</i>	EC50 algae 149.79 mg/L (72 h) NOEC algae 100 mg/L
	Acute Toxicity Test with <i>Daphnia magna</i>	EC50 daphnia 26.98 mg/L (48h)
	Chronic Toxicity Test with <i>Daphnia magna</i>	NOEC daphnia 0.1 mg/L (21d)



# Ecotoxicological Essays (3)

Substance	Test	Results
Bisphenol A	Acute toxicity test with <i>Daphnia magna</i>	EC50 daphnia 8.54 mg/L (48h)
	Growth inhibition test with <i>Desmodesmus subspicatus</i>	EC50 algae 21.74 mg/L (72h)
Dibutylphalate	Growth inhibition test with <i>Desmodesmus subspicatus</i>	EC50 algae 8.23 mg/L (72h)
Phenanthrene	Growth inhibition test with <i>Desmodesmus suspicatus</i>	EC50 algae 4.06 mg/L (72h)
4-metyl-2,6-di-tercbutylphenol	Acute toxicity test with <i>Poecilia reticulata</i>	EC50 fish > 1 mg/L

No.	Substance	AA-EQS (µg.l-1)	MAC-EQS (µg.l-1)
1	4-metyl-2,6-di-tercbutylphenol	1.4	17
2	Benzensulfonamide	100	18470
3	<b>Benzo(b)fluoranthene</b> (as sum of Benzo(b)fluoranthene & Benzo(k) fluoranthene)	0.03(*)	<i>not applicable</i>
4	<b>Benzo(g,h,i)perylene</b> (as sum of benzo(g,h,i)perylene a indeno(1,2,3-c,d) pyrene)	0.002(**)	<i>not applicable</i>
5	Benztiazol	2	2700
6	Biphenyl	1	36
7	Bisphenol A	10	460
8	Clopyralid	700	3000
9	Desmedifam	1	15
	Metabolite EHPC	12	
10	Dibutylphthalate	10	48
11	Diphenylamine	1.6	31
12	Ethofumesate	6.4	50
13	Phenanthrene	0.380	2
14	Glyphosate	15	540
	Glyphosate-IPA	7290	
	Glyphosate-Trimesium	72	
	1st metabolite (glyphosate acid)	64	
15	MCPA	1.6	15
16	Pendimethalin	0.3	2
17	Vinylbenzene (styrene)	0.63	60

**Draft**

# Ecotoxicological Essays (2)

Where MAC-EQS values reported as “not applicable”, the AA-EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

The proposed EQS are not formally adopted as they are in the process of their approval and they still might be modified based on availability of analytical methods and estimation of expensiveness of their sampling and analytical quantification.