An overview on the Water Framework Directive with regard to chemical monitoring requirements

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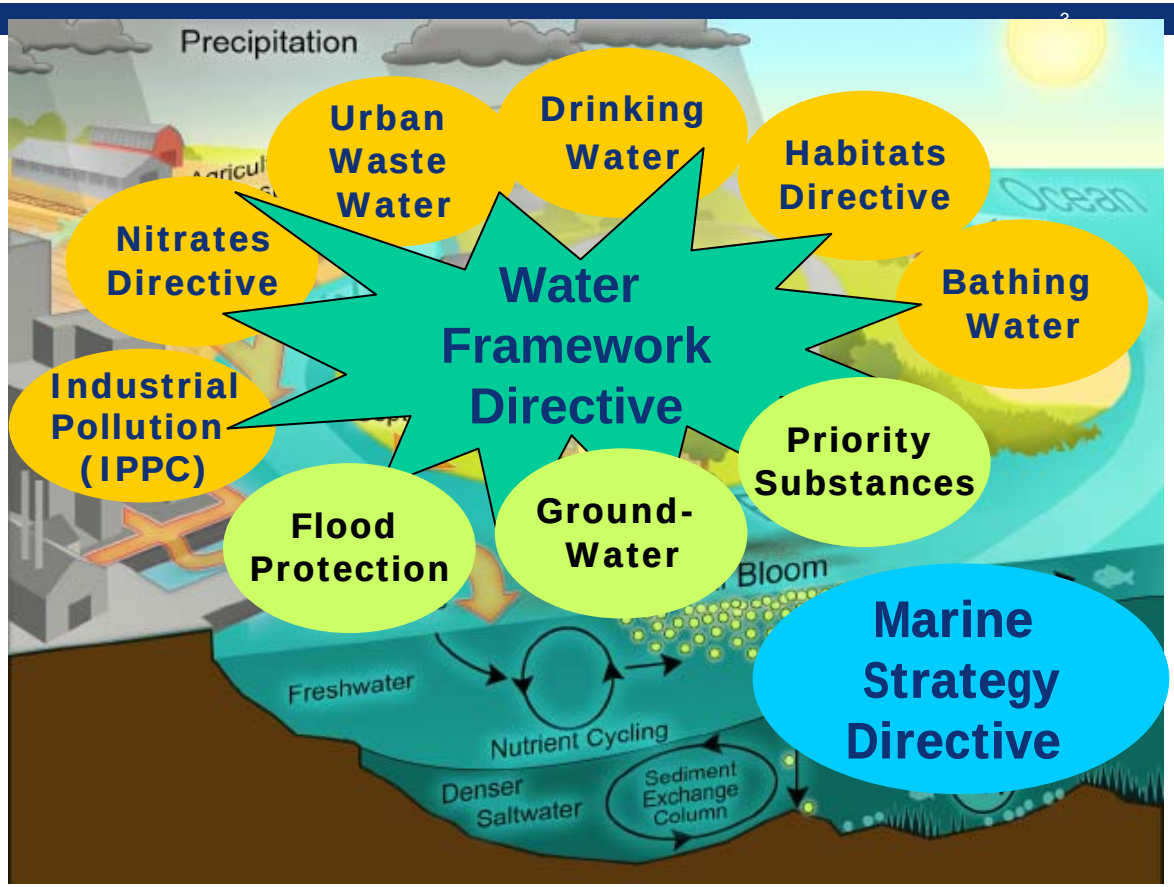
Outline

- WFD and Chemical Monitoring;
- Revising the list of Priority Substances - The EQS Directive;
- The QA/QC Directive;
- Chemical Monitoring within the Common Implementation Strategy;
- A glance into the future…

Development, implementation, and monitoring of EU Water Policies

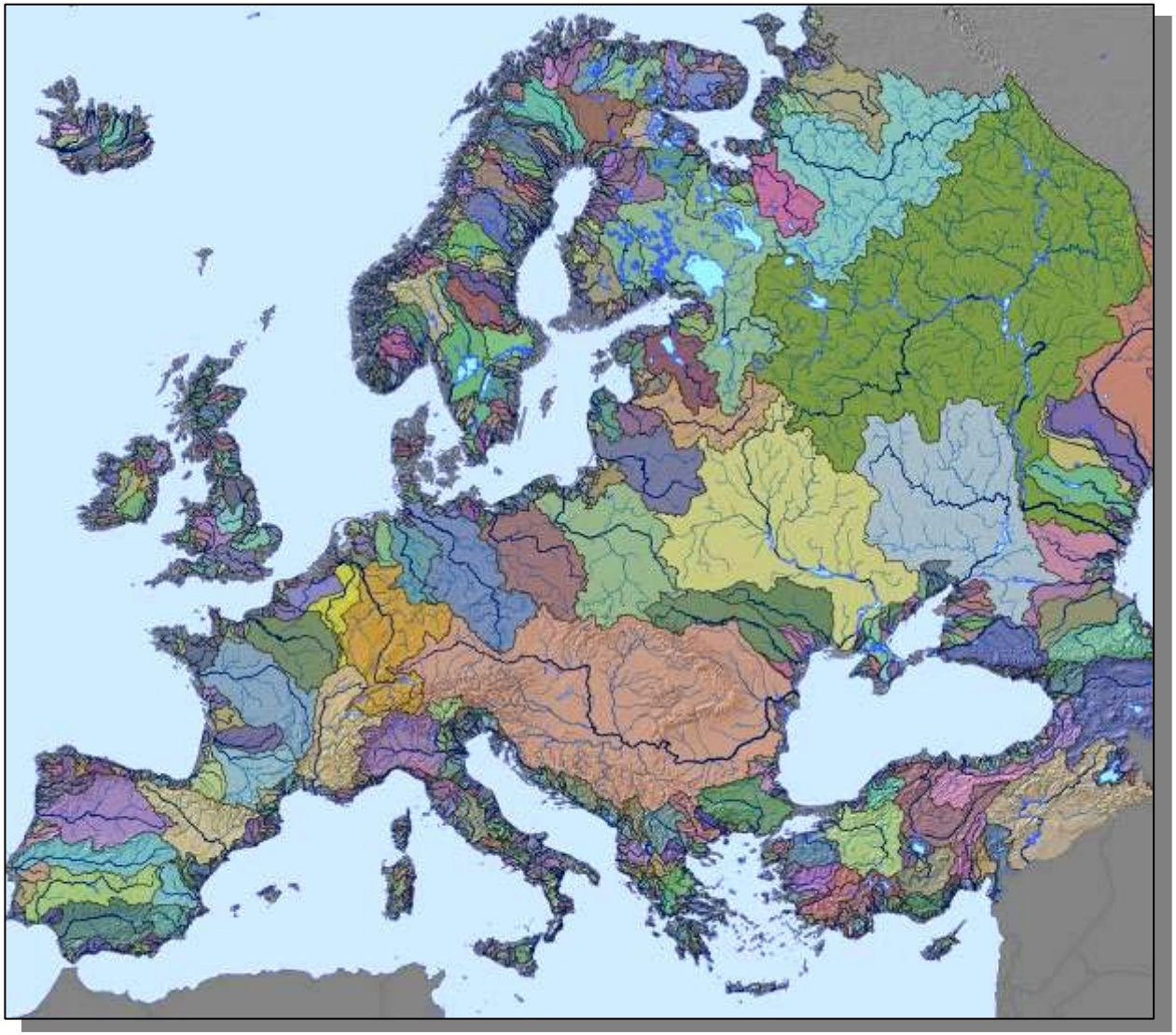
- Ecosystem functioning
- Fate of pollutants
- Indicators for ecosystem health
- Pan-European products, models, and intercalibration



Watershed drawing from Pearl (2005)

'Water has no borders'

Integrated approach from the watershed to the open ocean



Major European Rivers and their Drainage Basins
(Vogt et al. 2007. EUR 22920 EN)

Large geographical scale Enlarging EU: Complexity of the natural and political landscape in Europe

16000 river basins larger than 10 km², and 70000* water bodies and 65000 km of coastline

Novel approach: ecosystem based adaptive management

Ambitious objectives: "good status" for all waters by 2015, no deterioration

* Identified for WFD implementation

Water Framework Directive 2000/60/EC

Article 16:

- ***establish a list of priority substances (PS);***
- ***identify the priority hazardous substances (PHS);***
- ***Commission tasks***



WFD and Chemical Monitoring - Framework

Emission control

- principle sources (point and diffuse)
- product controls and emission limit values
- progressive reduction of discharges, emissions and losses for PS
- phase-out/cessation for PHS within 20 years

Quality standards (EQS)

- surface waters (inland & coastal), sediments or biota
- Good chemical status by 2015;

The Commission is asked to submit proposals for emission control measures and the EQS setting (Articles 16(6 and 7)).

Chemical classification Annex V – quality objective in relation to concentrations

	High status	Good status	Moderate status

Established on the basis of:

- **EU Risk Assessment (EU-RAR)**
- **Technical Guidance Document (TGD) according to the Regulation 793/93**

  applying "safety factors" to NOEC (Not Observed Effect Concentration) measured in ecotoxicological and/or human toxicological tests

  Directive 2008/105/EC of the European Parliament and of the Council on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council.

EQS for water

For each substance 2 EQSs for:

- **Surface internal waters**
- **Other surface waters** (transitional, coastal and territorial waters)
- **Organic pollutants**: total concentration in the whole water sample (dissolved and particulate fractions)
- **Metals** (Cd, Pb, Hg, Ni): dissolved fraction (after filtration at 0.45 µm)
- MS must take into account natural background concentrations

as

- Annual average of monthly measurements (AA-EQS)
- Maximum allowable concentration (MAC-EQS) - only for some substances characterized by seasonal discharge)

Analytical aspects:

- ✓ *Time-integrating sampling methods (e.g. passive samplers) offer important and new possibilities*
- ✓ *Methods that conform to relevant international or national standards*
- ✓ *Not standardised method, which provide data of equivalent or better scientific quality and comparability*

Article 3 – EQS

Article 5 – Inventory of emissions, discharges and losses

Article 8 – Review of priority substance

- COM shall consider *inter alia* the substances set out in Annex III of this Directive for possible identification as PS and PHS,
- COM shall report the outcome of the review,
- Relevant proposals:
  - to identify new PS as PHS

    or
  - to identify certain PS as PHS
  - to set corresponding EQS for surface water, sediment or biota.

AMPA
Bentazon
Bisphenol-A
Dicofol
EDTA
Free cyanide
Glyphosate
Mecoprop (MCPP)
Musk xylene
PFOS
Quinoxyfen
Dioxins
PCB

The QA/QC Directive

- COMMISSION DIRECTIVE laying down […] technical specifications for chemical analysis and monitoring of water status
- Minimum performance criteria for methods of analysis to be applied by Member States when monitoring water status, sediment and biota, as well as rules for demonstrating the quality of analytical results.

Minimum performance criteria

- U % (relative uncertainty, k=2) ≤ 50% at EQS level
- LOQ (quantification limit) ≤ 1/3 EQS defined according standard ISO 6107-2: 2006
- All methods of analysis, including laboratory, field and on-line methods, used for the purposes of chemical monitoring programmes are validated and documented in accordance with EN ISO/IEC-17025 standard
  (or other equivalent standards accepted at international level).

Laboratories

- **must apply quality management system practices in accordance with EN ISO/IEC-17025 or equivalent**
- **demonstrate their competences by:**

a) participation in proficiency testing programs;

b) analysis of available reference materials that are representative of collected samples which contain appropriate levels of concentrations in relation to relevant environmental quality standards.

CIS Chemical Monitoring Activity

CMA – 1 Monitoring

- Guidance on surface water monitoring
- Guidance on sediment and biota monitoring
- Sharing best practices
- CMA On-site exercises on selected topics
- Consensus building

CMA – 2 QA/QC

- Finalisation of QA/QC Directive
- "Blueprint": European strategy for quality control and assurance measures → EAQC-WISE

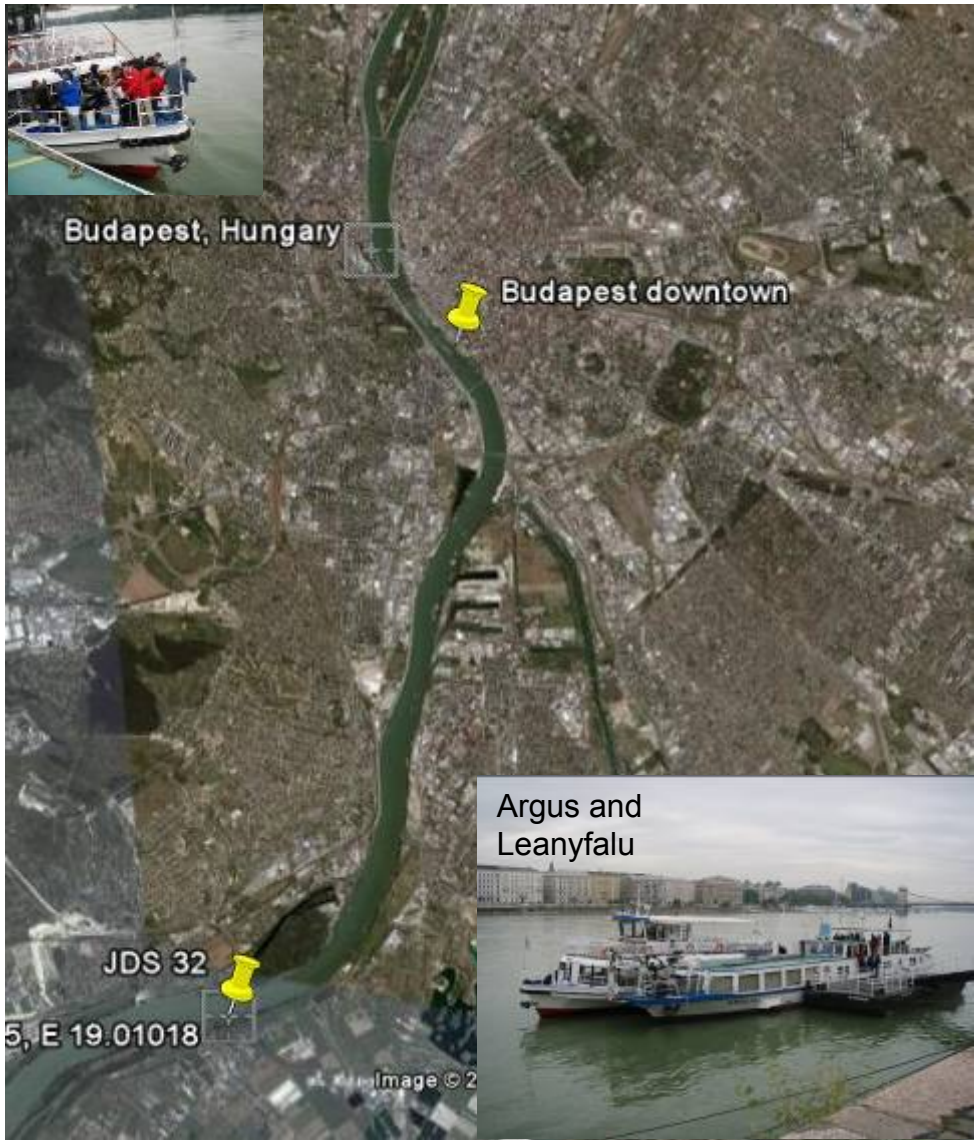
CMA – 3 Standardisation

- Drafting of Mandate to CEN (M420)
- Identification of standardisation needs → CEN TC 230
- Pre- and co-normative work incl. validation.

Official WFD Monitoring Laboratories:

- Can they measure at the low and ambitious Environmental Quality Standards set by the WFD?
- Can they produce comparable results despite different approaches?
- Can one identify best-practises?

- Budapest Location;
- 2 ships (Hungary and Serbia);
- 18 participants from 12 countries:
- Official CMA Labs;
- JRC Reference values;
- Combined Workshop and field trial exercise (publication pending);



CMA – The next mandate (2009-2011)

- **"Reference" laboratory structure on priority substances:**
  - ✓ **to create and co-ordinate a sustainable network of Member States' laboratories and Competence Centres**
  - ✓ **to promote the implementation of new analytical and detection methods**
  - ✓ **to coordinate the exchange on Best Practices/experiences on surface water chemical monitoring**
    - *Monitoring programme design*
    - *Emerging tools for monitoring (e.g. ecotoxicity)*
    - *Field trials (e.g. CMA On-site Exercises)*
    - *Testing of guidelines*

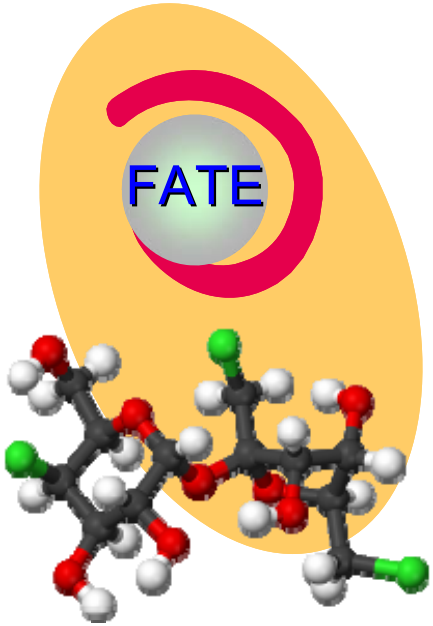
CMA – The next mandate (2009-2011)

- **Standardisation:**
  - Identification of standardisation needs
  - Following the mandate to CEN 2009-2010 and support the preparation of future mandates
- **Finalise the guidance on monitoring of sediment and biota and submit it for 2010 Autumn Water Directors meeting**
- **Support to implementation of QA/QC Directive, including development of guidance**

CMA – Emerging pollutants

New or less-investigated pollutants ("emerging")

- Provide evidence-based information on emerging pollutants for subsequent assessment
- Concern-driven assessment
  Link to cutting-edge research activities
- Co-lead JRC and NORMAN network
- EU-wide snapshot mechanism



Competence centres

Synchronised sampling

Reporting

Environmental Chemicals

Priority Substances
REACH Ecotoxcolcgy
Emerging pollutants,
Multi-matrix,
Extremely low concentrations

Dispatch logistics

Topic selection

Sampling stations

National programs

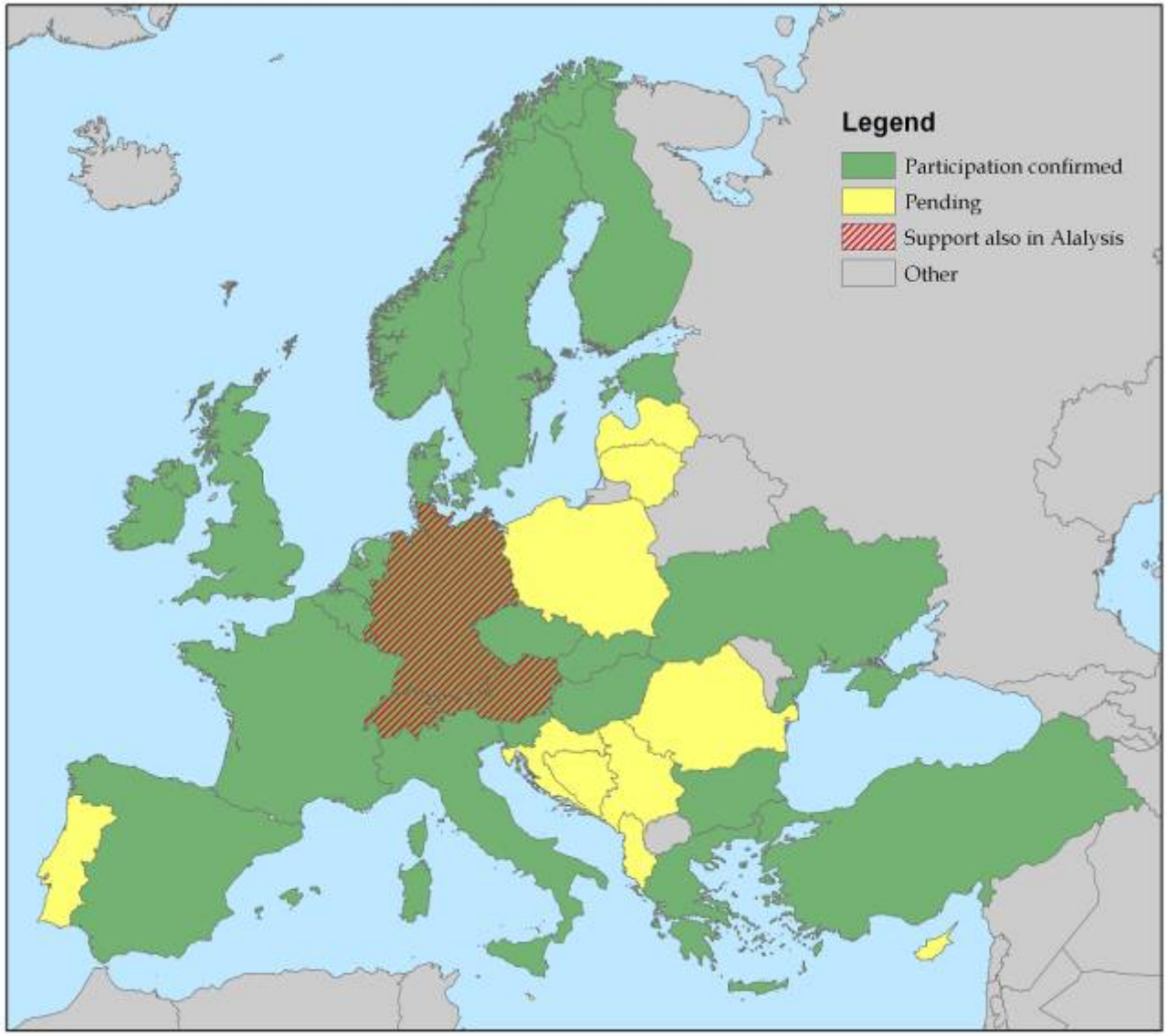
Surface waters

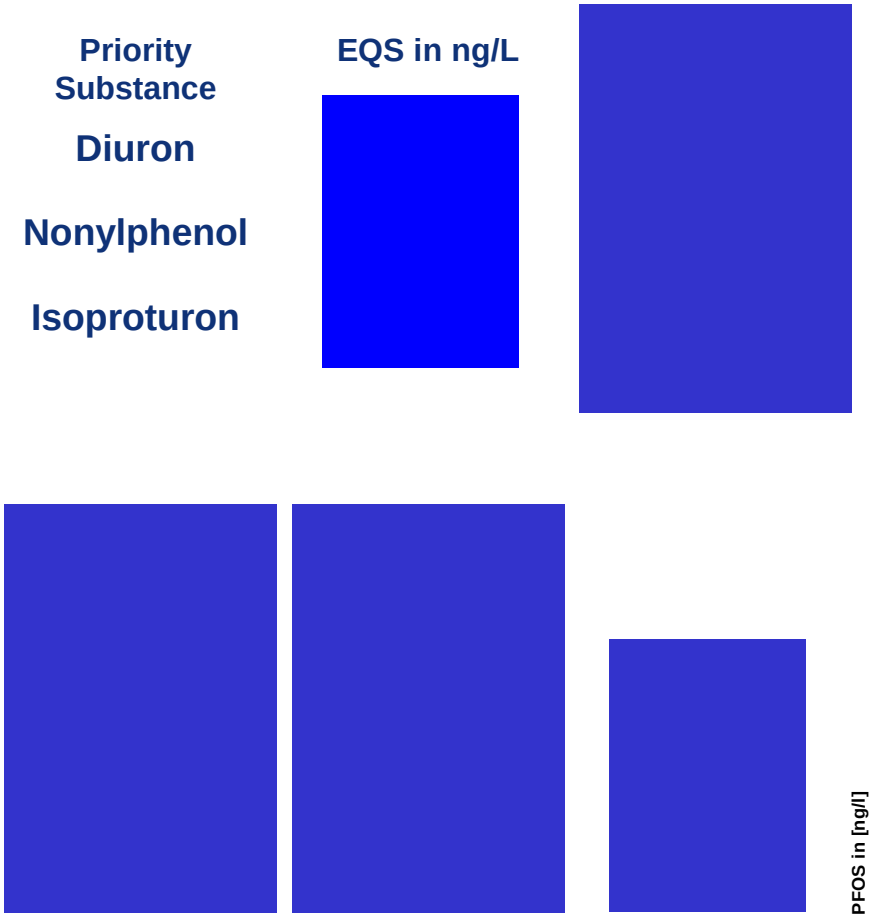
- 126 Sampling Stations across Europe including Turkey;
- Duplicate samples under cooled conditions to JRC within 48 h;
- 38 substances by JRC;
- 46 participating labs from 27 countries;
- 12 weeks from sampling the first sample until all analyses accomplished;
- Individual reporting back to the participating labs;

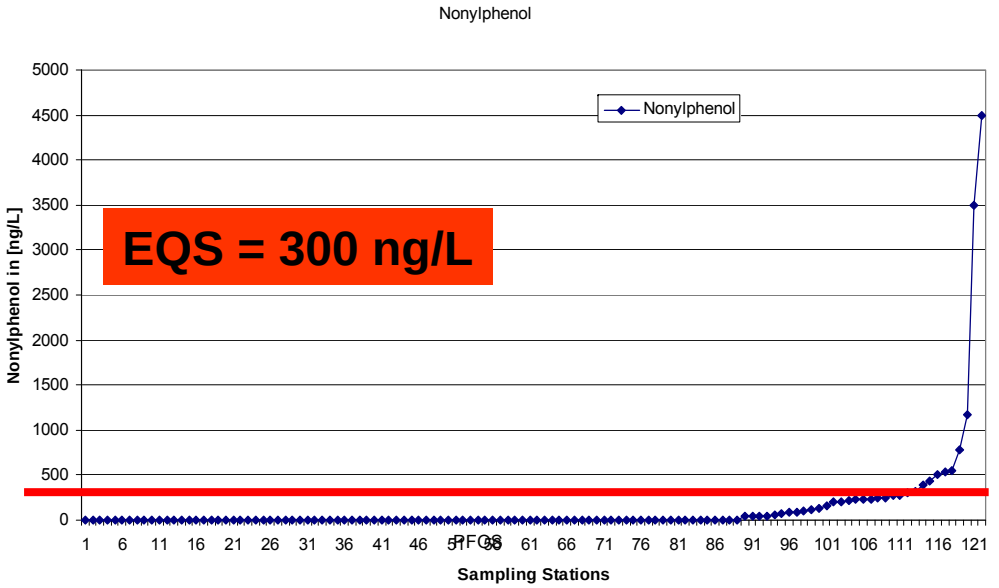
FATE EU- Wide I – Some impressions

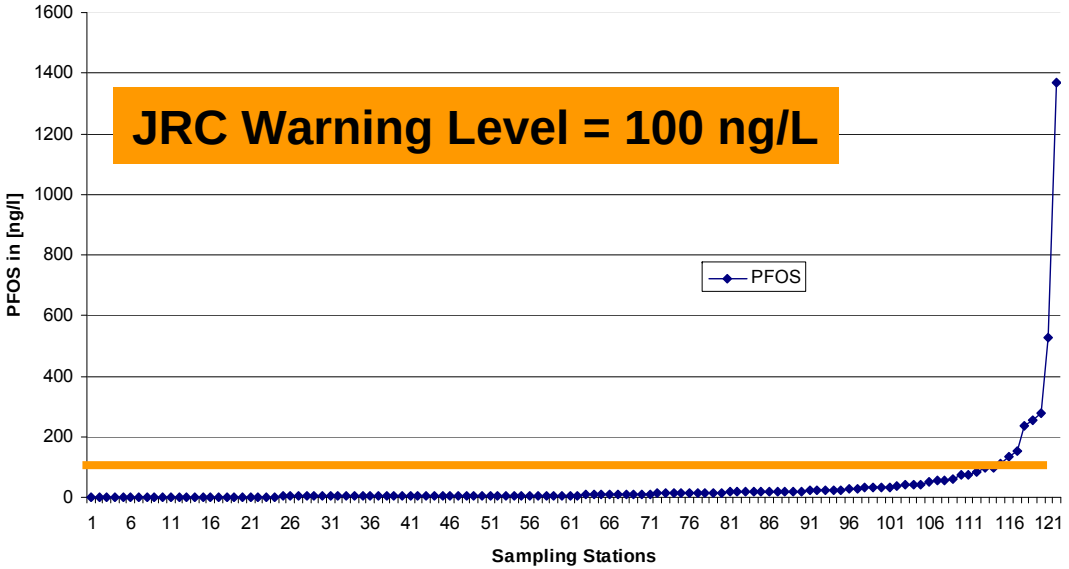
Groundwater water campaign - Overview

- **Groundwater campaign Started 15/09;**
- **27 Countries among which Iceland, Norway, Switzerland and Turkey;**
- **34 participants – 170 sampling stations – over 600 samples;**
- **4 countries give analytical support:**
  - Austria
  - **Czech Republic**
  - Germany
  - Italy;
- **84 compounds plus heavy metals;**
- **Sampling finished – analyses running;**









Results published:

R. Loos, B. M. Gawlik, G. Locoro, E. Rimaviciute, S. Contini, G. Bidoglio (2008)
Environmental Pollution, online available,
doi:10.1016/j.envpol.2008.09.020

Czech results in European Context

Results obtained on Czech Samples

River		PFOS	Ibuprofen	Bisphenol A
Elbe	AA00607	19	92	nd
Vltava	AA00605	5	85	nd
Svratka	AA00603	4	28	23
Lusatian Neisse	AA00601	81	389	323
Odra	AA00599	6	173	53

Stand-alone data

- Scientific value?
- Spatial coverage?
- Data comparability?

	Positive detection %	Max	Average	Median	Percentile 90
Bezafibrate	56	1235	32	4	58
Ibuprofen	62	31323	406	6	205
Diclofenac	82	247	17	5	43
PFNA	70	57	2	1	3
PFOS	95	1371	40	6	76
PFDA	40	7	1	0	1
PFUnA	25	3	0	0	1
Nonylphenol	30	4489	139	0	273
Bisphenol A	35	323	26	0	67
Estrone	17	81	4	0	10
tert-OP	9	557	13	0	0

European Data Set

- Results in ng/L:
- All measurements Loos, R., et al., Environ. Pollut. (2008) doi:10.1016/j.envpol.2008.09.020
- In-house LC-MS/MS Method

Next on the agenda

- **2009 Campaigns:**
  Waste water, sewage sludge, bio-waste, coastal water;

- **International Workshops:**
  - Integrated spatial assessment;
  - Emerging pollutants under the Water Framework Directive;

- **Increase measurement capabilities and link to existing Centre of Excellence;**

- **Strategy for emerging environmental risks (e.g. engineered nano-materials, fluorinated pharmaceuticals, etc.);**

- **Logistics to go beyond Europe? (Mediterranean, emerging economies).**

Community Competence Centre for Water …?

Emerging pollutants

- *EU-wide snapshots*
- *River-basin specific*
- *Case studies*
- Instrumentation

Best-practices

- *Guidances*
- *Equivalence of approaches*
- *Sampling Strategy*
- *Comparability*
- *Methodology*
- *Alternatives*

Metrology

- *Proficiency testing*
- *Reference materials*
- *Training in metrology*
- *Uncertainty determination*

Evidence-based Information and Implementation of technical requirements

Issues and Topics

- *Requirements of WFD, EQS and QA/QC*
- *Consensus building and best-practices*
- *Emerging and new pollutants*
- *Innovation and alternative approaches*

Community Competence Centre

JRC EUROPEAN COMMISSION

- *Embedded into CIS Process (CMA, WG E)*
- *European Centres of Excellence*
- *Official WFD Laboratories in the MS*

Tasks

- *Coordination of existing structures*
- *Concrete Actions and Initiatives*
- *Training and benchmarking*

Acknowledgments

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