EDC WFD

A project to deliver reliable measurements of estrogens for better monitoring surveys and risk assessments

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CONTEXT

- **Endocrine disrupting chemicals (EDC):** exogenous substances or mixtures which alter function(s) of the endocrine system and consequently cause adverse health effects in an intact organism, or its progeny, or (sub) populations.
- **Estrogens:** group of chemicals of similar structure mainly responsible for female sexual development and reproduction.
  - **Pseudo-ubiquitous** and occur at **ultra-trace level** (< ng L^{-1})

Substance	EQS (ng L^{-1}) (inland waters)
17-alpha-ethinylestradiol	0.035
17-beta-estradiol	0.4
Estrone	0.4

… level at which they can have effects in natural species ⇨ threat to **biodiversity**

Included in the first Watch List

- **No EN or ISO standard for MS-based methods** currently available or in progress
- (Accredited) testing laboratories **develop and validate in-house methods** according to internal criteria
- Most of (accredited) testing laboratories **failed to achieve the very low LOQ** to enable monitoring of estrogens at EQS level
- **Metrological endpoints** have been highlighted of particular importance if effect-based method (EBM) results are to be used in a regulatory context
- **Lack/absence of reference materials and proficiency tests**

Insufficient quality of measurements / data generated at EU level to support WFD process (risk assessment + prioritisation)

THE PROJECT

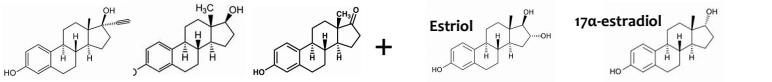
AIMS:

- ❖ Address the standardisation lack for harmonised measurement methods for key EDC in whole water
- ❖ Ensure that measurements of EDC are traceable, well defined, meet the requirements of the WFD, and thus comparable across Europe

- Collaboration between National Metrology Institutes and advanced research institutes from 6 European countries
- **A Balance of expertise:** development and certification of RM, proficiency tests / interlaboratory comparison design, method development and validation, standardisation
- **A 3 years project:** September 2019- August 2022
- Strong engagement with stakeholders (Advisory Group)

SCIENTIFIC & TECHNICAL PROGRAMME ⇨ OBJECTIVES

Targeted substances



Stability + cross reactivity of EBM

Specificity of MS-based method + cross reactivity of EBM

Matrix

- Inland freshwaters: surface water and ground water
- Representative of European inland waters panel

WP1: Optimisation & evaluation of sample preparation methods

- **Stabilisation** of substances between sampling and analysis
- Optimisation of complementary extraction methods (LLE, SPE on-line/off-line, SPE-Disk)
- Evaluation of the ability of optimised sample preparation method to address **whole water**

Comparison / Evaluation

WP3: Evaluation & Demonstration of fitness for purpose of the methods

- Feasibility and preparation of a synthetic **real-matrix reference material(s)** for selected estrogens
- **Interlaboratory comparison**
- Demonstration of **methods' validity** and **equivalency of measurements**

DEVELOPMENT

WP2: Optimisation & evaluation of detection methods

- **Purity assessment** of calibrants/analytical standards
- Optimisation of complementary MS-based methods (GC- or LC- hyphenated to MS^2 or HRMS)
- Optimisation of selected EBM in vitro bioassays (ER-Calux©, A-YES, L-YES, ERA)
- Comparison of optimised detection methods

Evaluation / Comparison

Focus on key metrological endpoints

- ***Fully validated MS-based reference methods:***
  - Validated MS-based reference methods in whole water samples at EQS levels with:
    - ❖ 30% EQS ≤ LOQ ≤ EQS
    - ❖ **U ≤ 50% at EQS**
  - Specified capability of developed methods to address the different fractions of matrix
- ***Comprehensive study on the partitioning of estrogens in water:***
  - Knowledge of interaction and partitioning between water and suspended particulate matter
- ***Well characterised effect-based methods and measurements:***
  - ❖ **Definition of measurand**
  - ❖ 30% EQS ≤ LOQ ≤ EQS or eq.
  - ❖ **U ≤ 50% at EQS**
- ***Traceability to SI***

IMPACT TO:

- STANDARDISATION-CEN TC/230 and ISO TC/147: recommendations, technical report(s), technical specification(s)
- TESTING LABORATORIES: quick uptake of the methods, support for accreditation, improved capabilities
- SCIENTIFIC COMMUNITY: knowledge gain in metrology
- REGULATORY BODIES AT NATIONAL AND EUROPEAN LEVELS: fit for purpose methods, improved level of confidence, scientific support to the revision of WFD

KNOWLEDGE TRANSFER / CAPABILITIES BUILDING

- ❖ Trainings (**Winter 2021**)
- ❖ Interlaboratory comparison (**Spring 2022**)
- ❖ Open final meeting (**August 2022**)
- ❖ Briefs for stakeholders
- ❖ Engagements with main stakeholders

✓ **If you wish to collaborate, participate to our programme of activities or**

✓ **For more information**

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EMPIR EURAMET

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