European Partnership on Metrology
Call 2025 – Health, Integrated European Metrology, Regulation and Research Potential

Selected Research Topic number: **SRT-n05**
Version: 1.0

Title: Establishing traceable measurements of microplastics: Implementation within the Framework of Drinking Water and Urban Wastewater Treatment Directives

Abstract

Microplastics (MPs) are persistent pollutants increasingly found in soil, water, and air. Their harmful effects are well-documented, and there are growing concerns about their potential impact on human health. In Europe the Drinking Water Directive (DWD EU 2020/2184) and the recast Urban Wastewater Treatment Directive (UWWTD EU 2024/3019) mandate the monitoring of MPs and necessitate the development of standardised methods for MP measurement. However, whilst there is currently a standardised method for detecting large size MPs in drinking water, standardised analytical methods for detecting small MPs (SMPs) and MPs in treated wastewater are lacking. To address this, research is needed to validate and standardise methods for the chemical identification, physical characterisation, and quantification of environmentally relevant MPs and SMPs in drinking water and wastewater. As part of this, reference materials need to be developed and validated through international inter-laboratory comparisons. Such comparisons also need to validate the metrological traceability and accuracy of measurement methods for MP and SMP detection.

Keywords

Drinking Water Directive, Urban Wastewater Treatment Directive, microplastics, small microplastics, drinking water, urban wastewater, environmental pollution, reference materials, automatic particle recognition

Background to the Metrological Challenges

In recent years MP pollution has become a significant concern, with international organisations such as the United Nations and World Health Organisation calling for action. In response, the European Commission has addressed the issue through key policy documents (e.g. the European Plastics Strategy) and updated legislation, via the DWD and the recast of the UWWTD. The DWD and UWWTD mandate the monitoring of MPs and advocate the development of standardised methods for MP measurement. For drinking water, the EC has established a standardised method for detecting MPs > 20 µm, using spectroscopic techniques to measure MP particle size and composition. Complementary standardisation efforts are underway in CEN/TC 230 and ISO/TC 147/SC2/JWG1, with the development of ISO/FDIS 16094-2 Water quality - Analysis of microplastic in water. Other coordinated efforts involving ISO/TC 147/SC2/JWG1, VAMAS TWA45, the Joint Research Centre (JRC), and European projects e.g. PlasticsFatE (ID: 965367), EUROqCHARM (ID: 101003805), and 21GRD07 PlasticTrace have tried to validate these methods through inter-laboratory comparisons. The results have so far demonstrated acceptable inter-laboratory variability and good accuracy for detecting MP particles down to 50 µm.

However, challenges persist in quantifying SMPs (100 µm-1 µm), which limits the ability to meet regulatory requirements, especially as evidence suggests that MPs typically exist as SMPs in the submicron range in real world samples. Sample preparation is a critical challenge that requires optimisation and the development of comprehensive guidelines. Key sources of uncertainty also include measurement repeatability, result extrapolation, and the accuracy of algorithms for detecting non-spherical or fibre-like particles and classifying polymers. In order to address these challenges, suitable MP and reference materials are needed for method validation. These reference materials must have known mass and particle number concentrations that can be used to spike real matrices and are needed to validate instrument settings and data processing, including automatic particle recognition via spectroscopic techniques.

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Aside from drinking water, attention needs to be focused on detecting MPs/SMPs in wastewater. The recast of the UWWTD emphasises the importance of standardised methods for detecting, monitoring, and quantifying MPs to support EU environmental and public health strategies. But whilst the UWWTD mandates comprehensive monitoring, it does not yet specify concentration limits for MPs in treated wastewater, and standardised analytical procedures are still under development. MP detection is also complicated by the fact that MPs in wastewater originate from diverse sources, e.g. synthetic textile washing (acrylic and polyester microfibers), personal care products (microbeads), urban runoff (road debris, tyre wear, and litter) and fragmentation of plastic products. Further to this, wastewater samples often contain organic matter and debris that can interfere with MP detection

Objectives

Proposers should address the objectives stated below, which are based on the PRT submissions. Proposers may identify amendments to the objectives or choose to address a subset of them in order to maximise the overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the protocol.

The proposal shall focus on metrology research necessary to support the regulation of MPs in drinking water, and urban wastewater.

The specific objectives are

1. To develop reference materials for MPs in drinking water and wastewater. The reference materials should cover (i) a range of MPs (e.g. synthetic textile washing, degradation and fragmentation of larger household plastics and urban runoff), (ii) a range of sizes, MPs (1000 µm-100 µm) and SMPs (100 µm-1 µm), (iii) different morphologies (e.g. polymers), and (iv) aged and biodegradable plastics. In addition, the reference materials must cover two key analytical steps: firstly, water soluble tablets with differing amounts of MPs, used for spiking and method validation; and secondly, innovative printed/ sandwiched substrates with defined MP number concentrations (e.g. non-spherical/fibre-like, mixed polymers) used for instrument and data processing validation, including automatic particle recognition via spectroscopy.
2. Using the outputs of Objective 1, (i) to establish a traceability chain for improved accuracy and reduced uncertainty using spectroscopic methods for quantifying MPs in drinking water in the size range 1000 µm-20 µm, (ii) to validate MP reference materials for spectroscopic detection of plastic particles in the range 50 µm–1 µm, and support the implementation of ISO/FDIS 16094-2.
3. To improve and validate methods for the sample preparation of MPs/SMPs in complex matrices as per ISO/WD 24899. In addition, to use inter-laboratory comparisons to improve the accuracy and reliability of (i) sample preparation processes for MPs in drinking water with small suspended particles and, (ii) methods for the characterisation of MP/SMP polymer composition, particle numbers and mass fraction in environmental matrices as per ISO/FDIS 16094-2, ISO/DIS 16094-3;
4. Using the outputs of Objective 1, to improve and validate automatic detection algorithms for non-spherical and fibre-like MP recognition, and for accurate polymer classification. This will include integrating multivariate statistical approaches with machine learning tools in order to optimise spectral analysis and to improve detection accuracy, in line with regulatory requirements for MPs monitoring in environmental and water quality assessments.
5. To support the implementation of the DWD and UWWTD, and facilitate the take up of the technology, methods and measurement infrastructure developed in the project by regulatory authorities, the measurement supply chain, standards developing organisations (CEN/TC 230, CEN/TC 444, ISO/TC 147/SC2/JWG1, ISO/TC 61/SC14/WG4, and ISO/TC 38/WG34, ASTM D19/D20, VAMAS TWA45, BIPM's CCQM Task Group on Nano- and Microplastics Measurements), stakeholders (EMN POLMO, EMN Safe and Sustainable Food) and end users.

The proposed research shall respond to documented requirements related to specific regulations and legislation or explore the background and feasibility of expected possible future regulation. To enhance the impact of the research, the involvement of the appropriate user community such as regulatory authorities, conformity assessment bodies, standardisation bodies, and industry, is strongly recommended. Where relevant, proposals are encouraged to build on, or seek collaboration with, existing projects and develop synergies with other relevant European, national or regional initiatives and funding programmes. In particular, links are encouraged with (i) the projects funded under earlier relevant topics of the Horizon Europe programme; or (ii) other relevant European Partnerships.

Proposers should establish the current state of the art and explain how their proposed research goes beyond this. In particular, proposers should outline the achievements of the Metrology Partnership project 21GRD07 PlasticTrace and how their proposal will build on those.

Proposers should note that the programme funds the activity of researchers to develop the capability, not the required infrastructure and capital equipment, which must be provided from other sources.

EURAMET expects the average EU Contribution for the selected JRPs in this TP to be 1.0 M€ and has defined an upper limit of 1.3 M€ for this proposal.

EURAMET also expects the EU Contribution to the external funded beneficiaries to not exceed 30 % of the total EU Contribution across all selected projects in this TP.

Any industrial beneficiaries that will receive significant benefit from the results of the proposed project are expected to be beneficiaries without receiving funding or associated partners.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the 'end user' community, describing how the project partners will engage with relevant communities during the project to facilitate knowledge transfer and accelerate the uptake of project outputs. Evidence of support from the "end user" community (e.g. letters of support) is also encouraged.

You should detail how your proposal's results are going to:

- Address the SRT objectives and deliver solutions to the documented needs,
- Feed into the development of urgent documentary standards through appropriate standards bodies,
- Facilitate improved industrial capability, or improved quality of life for European citizens in terms of personal health, protection of the environment and the climate, or energy security,
- Transfer knowledge to the water supply, wastewater treatment and plastic industry sectors and regulatory authorities.

You should detail other impacts of your proposed JRP as specified in the document "Guide 4: Writing Joint Research Projects (JRPs)"

You should also detail how your approach to realising the objectives will further the aim of the Metrology Partnership to develop a coherent approach at the European level in the field of metrology and include the best available contributions from across the metrology community. Specifically, the opportunities for:

- improvement of the efficiency of use of available resources to better meet metrological needs and to assure the traceability of national standards
- the metrology capacity of EURAMET Member States whose metrology programmes are at an early stage of development to be increased
- organisations other than NMIs and DIs to be involved in the work.

Timescale

The project should be of up to 3 years duration.

Additional information

The links provided in this section are only correct at the time of publication up until the end of the Call year.

These references have been provided by EURAMET.

[1]. *Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption (recast)* http://data.europa.eu/eli/dir/2020/2184/oj

[2]. Directive (EU) 2024/3019 of the European Parliament and of the Council of 27 November 2024 concerning urban wastewater treatment (recast) http://data.europa.eu/eli/dir/2024/3019/2024-12-12

[3]. 004 CEN/TC 444 Analysis of microplastics in soil, sediment and sludge https://metpart.eu/applicants-2025/regulation-call-2025-s1.html

[4]. 009 CEN/TC 230 Analysis of microplastics in water
https://metpart.eu/applicants-2025/regulation-call-2025-s1.htm

[5]. EMN Pollution Monitoring Strategic Research Agenda
https://www.euramet.org/research-innovation/metrology-partnership/strategic-research-and-innovation-agendas

[6]. EMN Safe and Sustainable Food Strategic Research Agenda
https://www.euramet.org/research-innovation/metrology-partnership/strategic-research-and-innovation-agendas