EMRP Call 2013 – Energy and Environment

Selected Research Topic number: **SRT-v15**
Version: 1.0

Title: Metrology for radiological early warning networks in Europe

Abstract

The basic safety standards for the protection of public health against the dangers of ionising radiation are laid down in the Council Directive 96/29/EURATOM and are mandatory for all EU Member States. During a radiological emergency with trans-boundary implications in Europe, the European Commission will issue recommendations to EU Member States based on data from the national early warning networks. The metrologically sound measurement of dose rates and radioactivity concentrations in air has still not been achieved fully. Metrologically sound monitoring data of ambient dose rate and airborne radionuclide activity concentrations, co-ordinated with data from international radiological networks, are a prerequisite for adequate environmental radiation monitoring in Europe.

Conformity with the Work Programme

This Call for JRPs conforms to the EMRP Outline 2008, section on “Grand Challenges” related to Energy and Environment on pages 10 and 24.

Keywords

Radiation protection, ionising radiation, airborne radioactivity, area dose rate, contamination level, environmental radiation monitoring, radon, early warning networks, reference field stations, soil moisture.

Background to the Metrological Challenges

All European countries operate airborne radioactivity and dose rate early warning networks. There are about 4500 dose rate monitoring stations operational in Europe, which transmit hourly data to the European Radiological Data Exchange Platform (EURDEP). However, only 240 of these stations are equipped with on-line particulate and/or gaseous airborne monitoring. In case of a major radiological incident, the information collected by EURDEP will be used to inform the European Commission (EC) which will initiate responses to national authorities. National networked monitoring systems also perform the quantification of air contamination levels by informal rapid cross-border data dissemination, like the “Ring of 5”, the International Monitoring System (IMS), the Comprehensive Nuclear Test-Ban-Treaty Organisation (CTBTO) and other bodies. From 2004 to 2006, the European Commission (EC) and the Joint Research Centre (JRC) performed the AIRDOS-Project (Evaluation of Existing Standards of Measurement of Ambient Dose Rate; and of Sampling, Sample Preparation and Measurement for Estimating Radioactivity Levels in Air). Although progress in harmonising the procedures used by early warning networks in Europe has been achieved by AIRDOS and follow-up campaigns, the metrologically sound measurement of dose rates and radioactivity concentrations in air has still not been achieved.

Besides the importance of accurate dose rate and air-contamination measurements required for the radiation protection of the public and the protection of the environment, the economic and sociological damages caused by a nuclear power plant accident can be disastrous. The cost, arising from the large-scale contamination of farmland, is immense. This can be reduced by improving metrology for low-dose-rate, airborne-contamination measurements and determining contamination levels in real-time.

Scientific and Technological 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

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overall impact, or address budgetary or scientific / technical constraints, but the reasons for this should be clearly stated in the JRP-Protocol.

The JRP shall focus on improving the metrological foundation of measurements (devices and methods) for monitoring airborne radioactivity.

The specific objectives are:

1. To develop novel and improved instrumentation for field station use in order to measure dose rates and collect nuclide-specific information.
2. To validate common, sound metrological procedures for traceable calibration of detector systems that are used for supplying data to monitoring networks. This should enhance on-site evaluation of the diverse environmental and radiological conditions and measurement techniques.
3. To validate new detection principles for the calculation of dose rates and contamination levels from in-situ spectra by Monte Carlo simulations and bench mark experiments.
4. To develop novel traceable reference materials and standard sources (especially for large-area aerosol filters) in order to quantify airborne radioactivity and dosimetry field station performance.
5. To develop new and more sophisticated data analysis protocols to enable rapid information dissemination and that are in a data format suitable for input in a European database (e.g. EURDEP) and to design information transfer protocols.
6. To provide accurate and traceable background level estimations (e.g. radon-in-air) on-site at the field stations and to develop appropriate correction methods for background.

These objectives will require large-scale approaches that are beyond the capabilities of single National Metrology Institutes and Designated Institutes. To enhance the impact of the R&D work, the involvement of the user community such as industry, and standardisation and regulatory bodies, as appropriate, is strongly recommended.

Proposers should establish the current state of the art, and explain how their proposed project goes beyond this.

EURAMET expects the average size of JRPs in this call to be between 3.0 to 3.5 M€, and has defined an upper limit of 5 M€ for any project. The available budget for integral Research Excellence Grants is 30 months of effort.

Potential Impact

Proposals must demonstrate adequate and appropriate participation/links to the “end user” community. This may be through the inclusion of unfunded JRP-Partners or collaborators, or by including links to industrial/policy advisory committees, standards committees or other bodies. Evidence of support from the “end user” community (e.g. letters of support) is encouraged.

You should detail how your JRP results are going to:

- feed into the development of urgent documentary standards through appropriate standards bodies
- transfer knowledge to the environmental sector.
- cooperate with dose rate monitoring stations

You should detail other impacts of your proposed JRP as detailed in the document “Guide 4: Writing a Joint Research Project”

You should also detail how your approach to realising the objectives will further the aim of the EMRP to develop a coherent approach at the European level in the field of metrology and includes 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 Member States and countries associated with the Seventh Framework Programme whose metrology programmes are at an early stage of development to be increased
- outside researchers & research organisations other than NMIs and DIs to be involved in the work

Time-scale

The project should be of up to 3 years duration.