The EU survey on NORM: goals, challenges encountered and preliminary results

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10th International Symposium on Naturally Occurring Radioactive Material (NORM), Utrecht, the Netherlands
Towards effective radiation protection based on improved scientific evidence and social considerations - focus on radon and NORM

Research and Innovation action (RIA)
EURATOM Nuclear Fission and Radiation Protection Research
CALL: NFRP-2019-2020-12
Further integrating Radiation Protection research in the EU
Grant Agreement Number: 9 0 0 0 0 9

This project has received funding from the Euratom research and training programme 2019-2020 under grant agreement No 900009.
The main goal of RadoNORM is reduction uncertainties in the field of scientific, technical and societal knowledge with regard to Radon and NORM by:

- initiating and performing research and technical development
- stimulating and integrating education and training activities in all research and development activities
- disseminating project outcomes to the public, stakeholders and regulators

**Consortium**
56 Partners, 20 Member States plus Norway and Switzerland

**Starting date** 1st September 2020,
**End date** 31th August 2025 (60 months)

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www.radonorm.eu/norm-e-survey

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Objective of the survey (1)

- Gather specific information on various NORM topics from regulators, operators and potentially other stakeholders across Europe

1. Overview of NORM sites and exposure scenarios in Europe and their characteristics;
2. Updating approaches for modelling long-term prediction of NORM transfer in the environment;
3. Radiation risk mitigation measures applied in NORM involving industries and remediation of legacy sites;

- Strong interactions with wide group of stakeholders interested in these problems - develop scientific rationales for improving relevant methodologies as well as regulatory approaches of NORM treatment and management.

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Objective of the survey (2)

- Improved understanding and handling of NORM exposure situations: within EU exchange information, optimise approaches
- Update recommendations and develop methodologies for supporting practical implementation of national regulations based on EU BSSD 2013/59
- NORM survey may be valuable for practical use in future national, initial, periodical characterisation of NORM involving sites
Target Groups

- National/regional/local regulators
- Operators of NORM involving industries
- Operators in the field of waste management
- Experts on NORM (consultants, researchers,..)

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Developing methodology

- **Draft NORM survey**
  - Involvement at an early stage of social scientists and colleagues involved in communication and dissemination of RadoNorm project,
  - Ethical committee of RadoNorm Project,
- Discussion with Stakeholders,
- Test survey – conducted within RadoNorm consortium,
- Distribution to the contact list – NORM survey and Informed consent document

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Informed consent document

- Provides potential participants information they need in order to make a decision to participate in this survey; voluntary approach
- Explanation in detail what data/info we need, why we need it and how data is managed and protected
  - Participant information sheet – main objectives of the survey, who we are, how data will be used, risks and benefits
    
    ‘We would like to emphasize that we will properly inform you about results of this survey. A written document will summarise the findings and will be sent to you electronically.’

- Templates for informed consent in (a) NORM survey, and (b) research interview, with possible further data collection (Excel templates)
Glossary

Terms in the NORM survey that are clarified:

- Industry involving NORM, HBRA, NORM legacy site
- Prevention/Mitigation measures
- NORM waste/NORM residues
- Treatment/Recovery/Recycle/Reuse
- Waste code
- Dose assessment, Exposure assessment, Long-term assessment
- Leaching, Percolation
- Non-human-biota
- Class 7 ARD transport
NORM survey in a nutshell

- Different survey parts for identified target groups;
- Close and Open questions;
- EU Survey platform with possibility to access it more than once;
- Survey to be filled in during January – May 2022;
- Data - anonymized and considered in a broader picture or for specific situations within RadoNorm;
  - will be kept in accordance with international and RadoNorm rules for data, and destroyed after planned activities;
- Interviews and further data collecting (Excel templates);
- Feedback information on results.
Overview of NORM sites and exposure scenarios in Europe and their characteristics

- Gathering information for a systematic overview of NORM exposure sites in Europe – extent and characteristics;
  - Type and characteristics of NORM industrial sites;
  - Type and characteristics of NORM legacy sites;
  - Extent of liquid and gaseous discharges;
  - Exposure assessment at NORM sites
  - Main NORM exposure scenarios for workers and members of public;
  - Scientific and regulatory challenges identified at these situations/sites?
Updating approaches for modelling long-term prediction of NORM transfer in the environment

- Disposal of NORM in the context of conventional waste disposal;
- Models to deal with leachate and groundwater pathway; Improving water flow and solute transport models;
- NORM caused exposure to non-human biota;
- Sludge from sewer depuration systems of liquids effluents used as fertilizer in agriculture. Relevance of contamination pathway and guidance to dose-assessment.
Radiation risk mitigation measures applied in NORM involving industries and remediation of legacy sites

• Overview of ongoing treatments for each type of NORM involving industry that is used to mitigate radionuclide concentration;
• Extent to which liquid NORM is considered;
• Extent to which radioecological models/software is used for remediation activities.
Excel templates: other NORM information collection tools

- Workbook for each NORM activity
- Different worksheets
- General information and site description
- Relevant consideration about radioactivity and other hazards, mobilization and transport processes, monitoring, exposure scenarios
- Quantitative data:
  - U-238, Th-232 and progenies Ra-226, 228, Po-210, Pb-210, Th-228, Rn-220, Rn-222,K-40
- Closed, semi-closed and open questions
- Dropdown menu and possibilities for new entries
- Manuals (instructions) for filling in available as templates in Word format
Developed Excel templates for the following categories:

1. HBRA
2. Oil and gas production
3. Geothermal energy production
4. Phosphate fertilisers production
5. Zircon industry,
6. Cement production
7. Phosphoric acid production
8. Coal fired PP
9. Ground water filtration facilities
10. Mining industry (of ores other than U ore)
11. Other NORM involving activities
12. Legacy sites
Challenges

- **Motivate participants**
- Online technical implementation: **EU survey platform**
- Building and managing a contact list;
  - Contact list with entries obtained by gathering RadoNorm stakeholder contacts, ENA and HERCA contacts, internet search of NORM industries and operators of waste facilities.
Conclusions

● Survey period 10 January 2022 - May 2022
● Online implementation: RadoNorm webpage (Information doc) + link to survey - EU survey webpage
● Results will be made available to respondents
● Mutual benefit for participation in the survey
  • Added value for participants in summarizing national NORM information/inventory through our questions, but also as added value in considerations of potentially new aspects that need to be accounted for
  • RadoNorm improvements based on your data will be shared
Basic statistics

- We sent the invitation to more than 400 people. 83 people went so far that they looked at the surveys. Also NON-EU countries showed interest.
- Especially survey for NORM operators was looked at but more regulators replied. Waste managers not so interested.
- So far Eastern European countries were very interested, especially from some we were not even sure about right E-Mail contacts (Lithuania, Estonia, Latvia, ..).

<table>
<thead>
<tr>
<th>Informed consent was filled up</th>
<th>Survey was filled out</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
<td><strong>Industry operator</strong></td>
</tr>
<tr>
<td>33</td>
<td>29</td>
</tr>
</tbody>
</table>
Concluding remarks from NORM survey
(based on answers provided till April, 15th)
General concluding remarks based on responses

- Results will provide a new insight and information for the improvement of NORM related issues in regulation and management – marked as the main reason for taking part in the survey. Interest in scientific goals of the RadoNorm and survey also shown.
- **Mutual benefit** – survey can be used for national information collection, agreement on that based on responses
- Still, number of responses included detailed information for Tables on NORM industry overview (waste disposal, activity concentration ranges of NOR in raw materials, products, residues, effluents) is limited

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Remarks based on responses: user’s survey evaluation

Technical and practical aspects

● Some preliminary concluding remarks:
  o survey is not difficult to understand, questions useful and properly formulated, but surveys for regulators and industry operators are considered as comprehensive ones
  o main issue: access to data – not always easy to compile all necessary data
  o time consuming
  o issue how to compile data from regional levels on the national level
  o good overview and knowledge of national regulations and management practices – much better response rate on part 2. Legislative basis and regulatory approaches
Countries at different level regarding the NORM inventory – some countries have done it before EU Directive 2012/59/Euratom and there is a need for review, some countries still preparing for the inventory or even no current plans due to lack of human resources and proper knowledge.

Challenges identified by responders regarding NORM industry regulatory control and management:
- Human resources for inventory conducting NORM
- Inventory done at regional levels, but not always compiled data at national level
- NORM control is still a new issue, and introduced legal solutions require interpretation and establishing procedures and developing good practices
- A challenge regarding approach to large volumes of rock waste containing NORM
- Capacity of disposal sites that may receive for NORM, transport across boarders
- Communication of RP requirements to NORM involving industries
- Monitoring programmes – requirements not harmonized, international input needed Dose assessments/modelling for humans and biota that can be used in the regulatory practice
Answers on some more specific NORM questions

- OHS standards and provisions are taken into the consideration together with RP in the developed regulatory approaches.
- However, only few countries have provided an overview on other hazards that may be identified/controlled at NORM involving industries.
- In cases of NORM emissions – they are controlled in terms of RP and possible contamination around emitters is monitored or dedicate models are applied to evaluate possible environment contamination including occupational and public exposure.
- However, in general - exposure doses considerations are still an issue in many countries – with no clear guidance and models for daily use in regulatory practice; considerations of non-human biota – there is an international consensus on need to these, but in practice no much data available – still anthropocentric approach.
Answers on some more specific NORM questions

- Liquid NORM – there is possibly a difference how countries consider liquid NORM – an issue: if below exemption level (dose criterion) should that be controlled/monitored/notified and reported? That also affects the answer how liquid NORM is treated/or not – only discharged
- Dose criterion and activity concentrations are the main methods used in consideration of need to do prevention/mitigation/remediation
- There is an available overview when preventive and mitigation methods are needed from regulatory perspective, but missing information on which of these actually are used
- NORM residues and NORM waste: in most countries respondents – a dedicated threshold for NORM residues is provided, above that NORM are classified as radioactive waste
Thank you for your attention