ISEMIR- N
Web-based Information Exchange Platform on ORP in Industrial Processes involving NORM

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New module on NORM Industrial operations

ISEMIR N is a tool that facilitates sharing operational experience and information to improve the optimization of occupational radiation protection in different industrial processes involving Naturally Occurring Radioactive Material (NORM) through regular collection and maintenance of data on occupational exposure.
UMEX

• The Information System for Uranium Mining Exposures (UMEX), designed to examine global occupational exposures in uranium mining and processing
  • https://nucleus.iaea.org/sites/orpnet/worldwide/umex/SitePages/Home.aspx

• U-Industry and General Radiation Protection Aspects
  • Exploration, Underground mines, Surface mines, In-situ leaching (ISL) mines & processing, Heap leaching, Processing, Non-conventional uranium extraction, Tailing facilities, Transport and Decommissioning
  • The survey provides a snapshot of the doses in the 2012 calendar year
  • Occupational data from 36 operating facilities were received
  • This covers a production of 58 344t of uranium or approximately 85% of global uranium production
  • Data was received from in excess of 30000 workers

Safety Report- ORP in the Water Supply and Treatment Industry
• **Very large numbers of workers** in the world may be exposed to NORM.
  • Based on some NDRs, the data are more limited than those for occupational exposures to man-made sources.

• The annual collective effective dose has been estimated to be approximately twice as large for some industries (e.g., U/Th mining and processing, minerals production, rare earth extraction, etc.)
  • The quantities of NORM, and hence the resulting exposures to workers, differ widely from field to field.

• **Lack of real data (as opposed to theoretical assessment) regarding actual exposure of workers in NORM activities – especially regarding internal exposure**
  • ORP data is the key for decision making (current approach; data from literature or with a survey)

• **Occupational exposure control is the backbone for any regulatory regime and most countries have not been particularly concerned with assessing occupational exposure to NORM** (and data is limited for some industries).
• To develop on overview tool (or a database) to better share RP operational management experience among various industries involving NORM

• Web-based
• Based on the same type of methodology, although the quantities of NORM, and hence the resulting exposures to workers differ widely from field to field
• Measurement of activity concentrations of NORM in any field, and generic modelling of the behaviour of workers, will allow average exposures to be assessed.
• Modification of the UMEX survey
Design Requirements

- Important requirements and information to collect:
  - **Capture as many of the NORM workers** as possible across a wide number of jurisdictions
  - Need to know the **type of operation and nature of the work** being performed
  - Need to understand the **key assumptions used to monitor and calculate exposure and dose**
  - **Collect dose information** based on individual pathways
  - Ideally wish to know the **underlying dose distribution**
  - **Record primary control mechanisms to optimise dose**
The final questionnaire developed was EXCEL based (to ease data merging and structure data entry) and covered the following key areas:

- Background information
- Operation information
- Monitoring approach
- Dose calculation
- Radiation controls
- Auxiliary controls
- Workgroup dose data
Corporate Information

Country*
State*
Organisation Name*
Address*
Contact Details*
Person completing*
Position
Email contact*
Phone contact*

Operation information

Operation Name*
Locaton*
Product Produced**
Type of Mining**
Processing Methodology 1**
Processing Methodology 2
Cause of Occupational Exposure 1**
Radionuclide of Concern**
Cause of Occupational Exposure 2
Radionuclide of Concern
Production*
Operational stage**
Environment
Staff Numbers
Occupationally exposed workers*
Occupationally exposed contractors not already included in above*
Non-designated workers
Total
Monitoring Approach

External Exposure - Gamma
- Monitoring Approach**
- Minimum Detectable Level\(^1\)
- Monitoring Methodology**
- Background subtracted**

Inhalation of Radon Decay Products (RDP)
- Monitoring Approach**
- Minimum Detectable Level\(^1\)
- Monitoring Methodology**
- Background subtracted**

Long Lived Radioactive Dust (LLRD)
- Monitoring Approach**
- Method for determining radioactivity**
- Minimum Detectable Level\(^1\)
- Radon retention in sample if appropriate\(^1\)
- Monitoring Methodology**
- Background subtracted**
- Biological monitoring/Internal Dosimetry**

Dose Calculation

Occupancy time**

External Exposure - Gamma
- Conversion factor if used\(^1\)

Inhalation of Radon Decay Products (RDP)
- Determination of RDP directly or equilibrium factor**
- Particle sizing of RDP if used\(^1\)

Long Lived Radioactive Dust (LLRD)
- Particle size**
- Solubility factor**
- Respiratory Protection Factor used for PPE**
## Radiation Controls

<table>
<thead>
<tr>
<th>Control Type</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Exposure - Gamma</strong></td>
<td></td>
</tr>
<tr>
<td>Mining controls</td>
<td>(select major controls) **</td>
</tr>
<tr>
<td>Processing controls</td>
<td>(select major controls) **</td>
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<tr>
<td><strong>Inhalation of Radon Decay Products (RDP)</strong></td>
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</tr>
<tr>
<td>Processing controls</td>
<td>(select major controls) **</td>
</tr>
<tr>
<td><strong>Special Controls in the Event of an Incident</strong></td>
<td></td>
</tr>
<tr>
<td>Mining controls/actions</td>
<td>(select major controls) **</td>
</tr>
<tr>
<td>Processing controls/actions</td>
<td>(select major controls) **</td>
</tr>
</tbody>
</table>

## Auxiliary Controls

- Radiation induction
- Radiation Training
- Designated vs non-designated
- Supervised and controlled areas
- Contamination controls
- QA systems
- Record keeping
- Radiation Staffing
- Emergency Response Plan
- Restricted release Zones
Based on the IAEA experience, a new web-based platform has been planned to collect necessary occupational exposure data to understand the trends and dynamics in each industry, and compliance with international safety standards for occupational exposure data from industrial activities involving NORM.

For information exchange for routine collection and maintenance of data on occupational exposure,

- To analyse the trends of collective occupational doses (or individuals) in different industrial processes
- Global and regional perspectives
- Harmonization of the RP programmes for different industrial operations (where possible)

Design has been completed by March 2019 & IT development has been initiated by June 2021 (all interested parties are invited to support the initiative).
**ISEMIR-N**

**ACTION**

2 - Existing - Enhance

**COMPONENT**

**PURPOSE**

This project will extend the IAEA Information System on Occupational Exposure in Medicine, Industry and Research (ISEMIR). It will deliver an ISEMIR module specific to industries involving naturally occurring radioactive material (NORM industries).

ISEMIR-NORM will support facilities in the NORM industry in optimizing their occupational radiation protection, similarly to ISEMIR.

**SCOPE**

Implement ISEMIR-N as a web-tool that allows authorized users from NORM industry facilities to regularly submit data on occupational doses and radiation protection measures (ISEMIR-N questionnaire with multi-lingual support).

Implement a repository to store responses to the questionnaire.

**RISKS**

Project is on a time constrain to be completed within 2021, for this reason it will follow an Agile approach so that a feasible product with core functionality is delivered as soon as possible.

**EXPECTED BENEFITS**

Data collected in ISEMIR-N will help NORM facilities benchmark their arrangements in radiation protection and safety. The data can further be used by the facilities to improve the occupational radiation protection of their workers.
Technical Meeting

- Technical Meeting on the Establishment of a Web-based Information Exchange Platform for ORP in Industries involving NORM(ISEMIR-N)
- 22-26 November 2021
- Virtual event
- Announced on 9 July 2021
- Official nomination deadline: 22 October 2021
Thank you!

- **NORM worker protection (Video):**

- **Radiation Underground- How to measure & control (Photo essay):**