Regional Workshop on the International Basic Safety Standards

Session 9: Regulatory Approaches to NORM

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The BSS introduces NORM as one category of the radioactive source in the explanatory note to the definition of ‘natural source’:

“A naturally occurring source of radiation, such as the sun and stars (sources of cosmic radiation) and rocks and soil (terrestrial sources of radiation), or any other material whose radioactivity is for all intents and purposes due only to radionuclides of natural origin, such as products or residues from the processing of minerals; but excluding radioactive material for use in a nuclear installation and radioactive waste generated in such an installation.“ [from Definitions]

- Examples of natural sources include naturally occurring radioactive material (NORM) associated with the processing of raw materials (i.e. feedstocks, intermediate products, final products, co-products and waste).
Planned exposure situation or existing exposure situation

In the BSS, exposure to the natural sources is covered under existing exposure situations (situation that already exists when regulation needs to be taken, i.e. a priori it is not planned), unless it is covered by the requirements for planned exposure situation (see Requirement 52).

This approach is consistent with ICRP 103 where Exposure to NORM is recommended to be treated under the category of existing exposure situations.

“Radon in dwellings or the workplace, and naturally occurring radioactive material (NORM) are well-known examples.” of existing exposure situations. [ICRP Publ.103 (284)]
**Planned exposure situation or existing exposure situation**

**key point:**

“…some exposures due to natural sources may have some characteristics of both planned exposure situations and existing exposure situations.” (para 1.21)

and thus a decision has to be made on which type of exposure situation applies:

**The requirements for planned exposure situations apply to:**

…… Exposure to material in any practice with activity concentration of any radionuclide in the uranium or thorium decay chains is greater than 1 Bq/g or the activity concentration of $^{40}$K is greater than 10 Bq/g (para 3.4(a))

**e.g. The mining and processing of raw material that involve exposure to radioactive material…** (para 3.1(f))

……and mineral extraction and processing facilities… (para 3.2(a))”
The requirements for existing exposure situations apply to:

… radionuclides of natural origin, regardless of the activity concentration, in commodities, … (para 5.1(c)(ii))

… other materials in which the activity concentration of no radionuclide in either uranium or thorium decay chains exceeds 1 Bq/g .... (para 5.1(c)(iii))

e.g. existing residues in the environment, soil, commodities, building materials,
Graded approach to regulatory control of NORM in planned exposure situation

Which practices (or industries) require consideration for regulatory control

Apply graded approach to the regulatory control of NORM

• Exemption (dose less than 1 mSv)
• Notification
• Registration
• Licensing
Responsibility for setting regulatory approach to NORM

The BSS does not assign responsibility specifically for the exposure to NORM, i.e. responsibilities are identical with those relevant to other sources:

In planned exposure situation

The **government or regulatory body**
- Define those industries that require consideration for regulatory control

The **registrants and licensees**
- Ensure compliance with the requirements of the BSS

In existing exposure situation

The **government or regulatory body**
- Ensure that existing exposure situations that have been identified are evaluated
- Assign responsibilities for protection and safety & establish reference levels
- Ensure protective actions and remedial actions are justified and protection and safety is optimized
Industry sectors

Industry sectors most likely to require some form of regulatory consideration

1. Uranium mining and processing
2. Rare earths extraction
3. Thorium extraction & use
4. Niobium extraction
5. Non-U mining – incl. radon
6. Oil and gas
7. Production and use of TiO₂
8. Phosphate Industry
9. Zircon & zirconia
10. Metals production (Sn, Cu, Al, Fe, Zn, Pb)
11. Burning of coal etc.
12. Water treatment – incl. radon
IAEA Safety Reports on NORM

Industry-specific reports

Safety Reports Series No.34
Radiation Protection and the Management of Radioactive Waste in the Oil and Gas Industry

Safety Reports Series No.51
Radiation Protection and NORM Residue Management in the Zircon and Zirconia Industries

Safety Reports Series No.68
Radiation Protection and NORM Residue Management in the Production of Rare Earths from Thorium Containing Minerals

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BSS Workshop Ukraine 2012
Revision of the BSS – implications for natural sources

Existing exposure situation instead of chronic exposure situation

• These are essentially the same – direct substitution
• The term “intervention” has been avoided in the BSS by referring to “remedial or protective actions”

For existing exposure situations, “reference level” instead of “action level”

• These are not the same
• A reference level is an upper bound with optimisation below it, whereas
• An action level can be seen as a lower bound – a “non-action” level, below which further remedial or protective action is deemed to be not necessary
• ICRP still mentions the possibility of a “non-action” level for radon in homes, but the emphasis has shifted
Thank you for your attention