Joint Session of the 45th Meeting of the Radiation Safety Standards Committee (RASSC)  
46th Meeting of the Waste Safety Standards Committee (WASSC)  

21 November 2018  
(Agenda Item RW3.1)

Draft Safety Guide DS459: Management of Residues Containing Naturally Occurring Radioactive Material from Uranium Production and Other Activities (Revision of WS-G-1.2)

Action requested from the Committee’s approval for submission to CSS)

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Division of Radiation, Transport and Waste Safety
Outline

• Background
• Scope
• MSs comments
• Comments by the Committee – second review
• Summary of comments
• Action requested
Background (1/3)

- Residues from uranium production has long been regulated. WS-G-1.2: Management of Radioactive Waste from the Mining and Milling of Ores (2002), focusing on mining and milling uranium and thorium ores

- Knowledge and concerns of residues arising from NORM related activities have been growing over time:
  - NORM Symposia series
    - Amsterdam, Netherlands 1997
    - Krefeld, Germany 1998 (NORM II)
    - Brussels, Belgium 2001 (NORM III)
    - Szczyrk, Poland 2004 (NORM IV)
    - Seville, Spain 2007 (NORM V)
    - Marrakesh, Morocco 2010 (NORM VI)
Background (2/3)

• Activities were required by MSs related to NORM residues
  – International Peer Reviews.
  – IAEA TC Projects.
  – International Forum on Regulatory Supervision of Legacy Sites (RSLS).
  – Newcomers and model regulations for uranium production.

• GSR Part 3 establishes requirements on management of naturally occurring radioactive materials
• WASSC 31 (June 2011) concluded that: WS-G-1.2 is to be revised at the light of the new requirements and developments.

• WASSC and RASSC (Nov 2011) and CSS 31 (March 2012) endorsed the DPP

• First Standards Committee review of the draft publication by WASSC and RASSC in June 2016

• 120 day Member States consultation completed in December 2016

• The draft was reviewed and endorsed by the Coordination Committee on 1 March 2018 for second Committee review
Scope (1/3)

- Recommendations and guidance to
  - Regulatory bodies,
  - Operating organizations,
  - Technical support organizations,
  - and other interested parties

- Radioactive residues that arise from mining, and milling of ores for the extraction of uranium or thorium,

- and to other industries including mining and processing of other ores

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. TiO₂
8. Phosphates
9. Zircon & zirconia
10. Metals production (Sn, Cu, Al, Fe, Zn, Pb)
11. Burning of coal etc.
12. Water treatment – incl. radon
Scope (3/3)

- Uranium mining and processing
- Rare earth extraction
- Thorium extraction and use
- Niobium extraction
- Non-U mining – including radon
- Oil and gas
- TiO₂
- Phosphates
- Zircon and Zirconia
- Metal production (Sn, Cu, Al, Fe, Zn, Pb)
- Burning of coal etc.
- Water treatment – including radon

Safety case and safety assessment
Funding management system

Decommissioning and closure
  - Operation
  - Storage
  - Construction
  - Reuse/Recycle
  - Design
  - Treatment
  - Characterization
  - Siting
  - Generation
  - Planning

Liquid waste
Manufactured items containing NORM
Contaminated items
Higher activity waste
Uranium mill tailings
Bulk minerals processing residues other than uranium mill tailings
Waste rock, mineralized waste rock and similar residues
Development of DS459

- 7 CS meetings on DS459
  - 1st CM: 3-7 September 2012
  - 2nd CM, 15-19 April 2013
  - 3rd CM, 4-8 November 2013
  - Home-based assignment to improve the draft
  - 4th CM 1-4 September 2014 for review of draft text
  - 5th CM 20-24 April 2015
  - 6th CM 20-24 July 2015
  - 7th CM 30 May-3 June 2016

- TM on Application of the Graded Approach to Safety for Management of NORM Residues, 19-23 June 2017
Input considered

- EAN-NORM Series
  - Dec. 2013, Spain, "Alternatives in NORM wastes management"
  - Dec. 2014, the Netherlands, "Disposal of NORM in Member States"
  - Dec. 2016, Sweden


- NORM Symposia: NORM VII, China, 2013; NORM VIII, Brazil, 2016


Proposed Structure of DS459

1. Introduction
2. Overview of NORM activities and NORM residues
3. Governmental, legal and regulatory framework for safety
4. Protection of people and the environment
5. System for regulatory control
6. Strategies for NORM residue management
7. The safety case and safety assessment for NORM residues management
8. Safety consideration for long term Management of NORM Residues

Appendix A. Special considerations of residues from uranium production
Appendix B. Residue management plan for uranium production
Appendix C. Closure plan for tailings management facility

References
Annex I. Examples of residues to be assessed for possible regulatory control
Annex II. Sampling and determining radionuclide activity concentrations
Annex III. Example of application of the graded approach in the management of NORM residues
Annex IV. Reuse and Recycling of NORM Residues
Annex V. Bibliography
## MSs Comments

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Resolutions of MSs Comments

• 275 comments from 11 MSs
• 248 (90%) accepted and accepted with modifications
• 27 (10%) rejected:
  ✓ Beyond the scope of the document
  ✓ Fraction of 1 mSv/a
  ✓ Citation and reference
## Comments by the Committee – second review

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Resolutions of comments by the Committee – second review

• 102 comments in total
• 99 (97%) accepted (57%) and accepted with modifications (40%)
• 3 (3%) rejected:
  ✓ “Source constraint”
  ✓ “Delete use of gross alpha on solids” (Annex II)
  ✓ “Uranium can be estimated by gamma spec using the Protactinium peak”
Comments on Fraction of 1 mSv (1/2)

Comments:

- Constraint of a fraction of 1 mSv as the 1 mSv/y is defined as limit for public dose

GSR Part 3

- I-4. For radionuclides of natural origin, exemption of bulk amounts of material is necessary considered on a case by case basis by using a dose criterion of the order of 1 mSv in a year, commensurate with typical doses due to natural background levels of radiation.
Comments on Fraction of 1 mSv (2/2)

- 3.12 In addition, as stated in para. 3.22 of GSR Part 3: “The government or the regulatory body … shall establish or approve constraints on dose and on risk, as appropriate, or shall establish or approve a process for establishing such constraints, to be used in the optimization of protection and safety.”

- 4.13. If several radiation facilities and activities are located at the same site, the dose constraints for public exposure should take into account all sources of exposure that could be associated with activities at the site, leaving an appropriate margin for foreseeable future activities at the site that may also give rise to exposure.
Change of the title

- Old title: Management of Radioactive Residues from Uranium Production and Other NORM Activities (Endorsed at WASSC 38)

- Current title as technical editorial review: Management of Residues Containing Naturally Occurring Radioactive Material from Uranium Production and Other Activities (Endorsed at WASSC 44)
Develop national list of NORM activities

- Reference list as provided in IAEA Safety Report No. 49 (2006), GSG-7 as Occupational Radiation Protection, and Section 2 DS459
- It is a starting point to develop a list under national circumstance
- Direct copy of the recommended list should be avoided
- The list is not exclusive

1. Rare earths extraction
2. Thorium extraction & use
3. Niobium extraction
4. Non-U mining – incl. radon
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Radon in association with NORM residues

- USA Comment No.7 on: Para 5.18 stated: “Possible outcomes of the screening assessment include exemption, authorization by registration including a periodic review) or authorization by licensing. If the estimated effective dose, **excluding the contribution from the emanation of radon.**”

- There appears to be ambiguity in DS459 regarding potential dose impacts from radon emanation and how to address mitigation and reduction of radon dose exposure as distinguished from background. In this context, DS459 may refer to limits on radon emanation and discuss if the total dose from radon above background to be considered and how.

- Clarified information and link to applicable Safety Standards, GSR Part 3 and GSG-7, and link to Section 7 and 8 on measures to mitigate and control for both worker and member of the public.
Exemption of small amounts of residues

- A basis to apply the exemption criterion of 1 mSv/a to “small amount” of NORM residues with exceeding 1 Bq/g of U, Th or 10 Bq/g of K-40.

- GSR Part 3 I-12(c) For radionuclides of natural origin in residues that might be recycled into construction materials or the disposal of which is liable to cause the contamination of drinking water supplies, the activity concentration in the residues does not exceed specific values derived so as to meet a dose criterion of the order of 1 mSv in a year, commensurate with typical doses due to natural background levels of radiation.

- Draft DS459, para. 5.40. Therefore, specific clearance levels may be developed for scenarios and pathways specific to NORM residues. In terms of the processing of NORM and the management of NORM residues, it may be appropriate to establish a single set of levels both for exemption and clearance.
Assure access to the NORM facilities

- “j) Grant the regulatory body access to the facility for inspection and to, at its own discretion, carry out confirmatory measurements at an entity that falls within the scope of the legislation”
- “The regulatory body should ensure that the operating organization provides the regulatory body with access to the facility”
- The operating organization is required to provide the regulatory body with access to the facility and to safety related information
NORM residues are very diversified and the situation varies from country to country, from sector to sector. This makes development and implementation of DS459 complex and challenging.

The DS459 was improved with 275 Member State comments and 102 comments from the second WASSC and RASSC review.

The draft was revised with technical editorial review to be consistent with existing safety requirements, in particular the GSR Part 3.

There is no unresolved comments.
You are kindly requested to approve the submission to the CSS
Thank you!