Revision of IAEA Safety Report on Radiation Protection and the Management of Radioactive Waste in the Oil and Gas Industry

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IAEA Safety Standards & Guidance - NORM in industrial processes

Safety Report - ORP in the Water Supply and Treatment Industry

E-Learning; (ORP&NORM) IAEA’ Open Learning Management System

Safety Guide on Protection of Workers Against Exposure Due to Radon

Specific Safety Guide on Application of the Concept of Exemption

TECDOC- A Graded Approach to the regulation of NORM Residues
Rationale for revision

• SR-34 and its training package is the most demanding report and training by Member States
  – Guidance in fulfilling the requirements of BSS-115 (1996) and necessary guidance is provided with RS-G-1.1 (1996)
  – It is unique in terms of content (sealed, unsealed sources, radiation generators, NORM, waste management, disposal/storage, transport, decommissioning and training)

• **GSR Part 3** represent a significant change with respect to those of BSS-115

• Consolidated General Safety Guide on Occupational Radiation Protection (**GSG-7**) introduces new approaches


• New Safety Guides;
  – Radiation Safety in Industrial Radiography (**SSG-11**) (2011)
  – Decommissioning of Medical, Industrial and Research Facilities (**SSG-49**) (2019)
  – Radiation Safety in Well Logging (**SSG-57**) (2020)
  – Management of Residues Containing Naturally Occurring Radioactive Material from Uranium Production and Other Activities (**SSG-60**) (2021)
Motivation (outside the Agency)

- **NCRP Commentary # 29** – NORM and TENORM from the Oil and Gas Industry (2020) – *for a future report*
  - Contemporary methods of oil and gas exploration & production
  - Unconventional oil and gas exploration and production (i.e., hydraulic fracturing and horizontal drilling), increased production and the expansion of unconventional methods
  - Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees
  - Data from monitoring programs, Dose Assessment, Institutional Controls and Practices, Communications

- **ICRP Publication 142** (2020) on Radiological Protection from NORM in Industrial Processes
  - An integrated and graded approach for the protection of workers, the public, and the environment
  - Characterisation of the exposure situation, optimisation, protection strategy (management other hazards)
  - Reference levels (excluding exposure to radon and thoron) for the protection of workers should reflect the distribution of exposures and would, in the majority of cases, be less than a few mSv annual effective dose. Very rarely would it be expected that a value exceeding 10 mSv annual effective dose would be necessary.

- **IOGP Report # 412** (2016) Managing NORM in the Oil and Gas industry
Applicable ISO Standards (renewal)

  Radiological protection — Sealed radioactive sources — General requirements and classification

  Radiation protection — Sealed sources — Leakage test methods

- ISO 7205:1986
  Radionuclide gauges — Gauges designed for permanent installation (Now withdrawn)
DPPs for SR-34 Revision

**Objective:** To provide updated guidance on radiation protection and the management of radioactive waste in the oil and gas industry in line with the revision of the IAEA safety requirements, including the implications of the new technologies with a focus on unconventional oil and gas operations.

- Basis for creating a common understanding between various stakeholders

**Scope:** Technologies that involve the use of radioactive materials and radiation generators and situations where NORM is encountered within the various oil and gas industry sectors.

**Guidance on:**
- Application of new requirements (optimization, graded approach, RPP)
- Distribution and concentration of natural radionuclides within processes (additional info on unconventional)
- Characteristics of exposure pathways in terms of how they affect the arrangements needed for appropriate worker protection
- Good working practices, including methods of controlling, monitoring, assessing (and recording) the radiological risks

- Report preparation (2021-2022), target publication Q2 2023, joint secretariat RSM&WES
- Initial interactions with PA countries: 1-3 December 2020
- DPP approval: January 2021 (Coordination Committee)
- Virtual consultancy meeting (26-30 April 2021 & 4-8 October 2021-postponed)
- Participants: the US, Norway, Australia (PA country), Qatar, Malaysia, the Netherlands and Syria
- Discussion on regional workshops
Extended coverage is needed

- Especially for NORM, unconventional oil and gas exploration and production, such as hydraulic fracturing and horizontal drilling (volumes and concentrations)
- Guidance about Well Logging, Tracer, and Field Flood Study Licenses
- Neutron generators and well logging

- Additions
  - Discussion could be included within the framework of new technologies & approaches during report development (e.g., Artificial Intelligence)
  - Appendix - Examples of inspection programmes covering all sources (US, Norway)
    - Joint inspection programmes of different regulatory jurisdictions
    - Broader challenges on different regulatory approaches for international operations (multi-jurisdictional challenges)
    - Differences even in the same country
1. Introduction
2. Overview of the oil and gas industry
3. General Radiation Protection Considerations (NEW)
   - Graded approach, responsibilities (RB, Operator, TSO, worker), RPP, training
4. General methodology for control (NEW)
   - OHS, Control hierarchy, exposure pathways, measurement, monitoring
5. Radioactive material used in common practices (adjusted with updates)
   - IR (installed/mobile), Well logging, Tracers, Safety & Security, OE, waste, decom
6. NORM in the oil and gas industry (extended coverage)
   - Characteristics, concentrations, OE, control, monitoring, contamination, waste, decom
APPENDICES & ANNEXES
Further discussion topics

• Examples for licensing with some country approaches (discuss consent license or licenses issued by regulatory bodies)
• Approaches for sealed/unsealed sources versus NORM
• Transient / itinerant workers
• Detailed info on RPP (include public and environment) with examples
• General communication strategies with interested parties including public communication with regard to NORM
• Residue management (how it varies country to country)
S6: NORM in the Oil and Gas Industry

- Overview of the NORM life cycle
- Radiological characteristics of NORM
- Main forms of appearance of NORM
- Radionuclide concentration in NORM
- Occupational exposure and main exposure pathways (assessment of effective dose)
- Exposure control, monitoring and measures for optimization
- NORM residues management
  - NORM residue management plan
  - Identification and characterization of NORM residues
  - Inventory establishment and update
  - Measures to control the generation of residues
  - Processing (sorting, segregation, treatment, decontamination)
  - Clearance, if applicable
  - Reuse and recycling
  - Contamination and spill control
  - Discharge to the environment (produced water, and etc.)
- Long term management, including disposal where appropriate
S7: Decommissioning

- Covering both sources and NORM
- Decommissioning strategy and planning
- Conduct of decommissioning
  - RP
  - Residue management (Cross reference Section 6)
  - Consideration of non-radiological aspects
- Financial aspect of decommissioning (brief, generic)
- Regulatory aspect of decommissioning
Appendix and Annex

- App-1 Examples of an Inspection Programme
- App-2 Measurement techniques (modification of previous App-1, radiation monitoring)
- App-3 Methods of RW characterization
- Previous app on Training to be removed with necessary references to TCS-40 (to be updated in a later stage)
- App-4 Case studies
  - Decommissioning plan
  - PA NORM case study
  - Produced water to environment
  - OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic)
Survey

• A similar type survey with WS&T report
• Unique information directly from the operators
• Not only focusing on occupational exposure control
• NORM residues, decommissioning
• Cover page mentioning revision – initiated in July 2021, deadline 10 Sep, extended until 15 Oct
• Circulated to PMs (US, UAE, Saudi Arabia, Russia, China, Canada) and organizations (IOGP, CRCPD - American Petroleum Institute, ENA, AFAN)

Link: https://nucleus-new.iaea.org/sites/orpnet/home/SitePages/Home.aspx
Production Schedule

**STEP 1:** Preparing a DPP

**STEP 2:** Internal review of the DPP

(Approval by the Coordination Committee)

**STEP 5: Preparing the draft**

**STEP 13:** Establishment by the Publications Committee and/or Board of Governors

(for SF and SR only)

**STEP 14:** Target publication date

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**Safety Report**

Done

December 2020

2021-2022

Q4 2022

Q2 2023
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Thank you

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