

# Review of the Regulatory Guidelines for Radiation Protection in NORM Industries by International Organization

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## Introduction

### □ Status of domestic NORM industry management

- Naturally occurring radioactive materials (NORM) can be used in various industries.
- In Korea, the act on protective action guidelines against radiation in the natural environment was enacted to manage NORM industries.
- After the radon mattress incident in 2018, the regulation and safety management regarding NORM industries were strengthened.

### □ Necessity of regulation based on a graded approach for the domestic NORM industry

- Due to the strengthened regulations, the social and economic burden have increased both of regulators and business operators.
- In order to reduce the social and economic burden caused by regulation, there is a need for regulation based on a graded approach for the domestic NORM industries.
- In this study, the regulatory guidelines were investigated for NORM industry by international organization to establish the graded regulation for NORM industries.

## Objective

### ❖ Analysis of regulatory guidelines for the NORM industry presented by international organizations

- To investigate the regulatory guidelines for radiation protection in NORM industry presented by the IAEA, ICRP, and EC

## Regulatory Guidelines for NORM Industries

### □ Regulatory Guidelines for NORM Industries in IAEA

- The IAEA published IAEA GSR Part 3, which corresponds to the basic safety standard for radiation protection.
- IAEA GSR Part 3 recommended that a regulation system should be established for the NORM industry by country.
- In addition, it recommended applying a graded approach based on radiation exposure risk when regulating NORM industries.
- IAEA GSR Part 3 recommended that NORM industry can be managed by a graded approach based on notification, registration, and licensing.
- The IAEA presented the need for radiation protection by NORM industry through a series of safety reports.
- Each safety report presents industrial characteristics, information on radiation exposure, and considerations in regulation of NORM industry.

Table 1. Industry and main contents presented in the IAEA safety report

Document	Industry	Contents
SRS 34	Oil and gas	1. Industrial characteristics 2. Worker exposure pathway and exposure dose 3. Consideration in regulation and radiation protection
SRS 49	Mineral and raw materials	
SRS 51	Zircon and zirconia	
SRS 68	Rare earths from thorium	
SRS 76	Titanium dioxide	
SRS 78	Phosphate	

### □ Regulatory Guidelines for NORM Industries in ICRP

- The ICRP published ICRP 142 report, which provided information on radiation protection in NORM industries.
- It presented the requirements for the application of the radiation protection system to the NORM industry and presented the major NORM activities.
- ICRP 142 report recommended that exposure in NORM industry should be managed and radiation protection should be achieved through justification and optimization.
- In addition, a graded approach was recommended for the radiation protection of workers, public, and the environment.
- Also, it was recommended considering not only the radiological risk but also the non-radiological risk.

Activities giving rise to NORM exposures (ICRP 142)	
1	Extraction of rare earth elements
2	Production and use of metallic thorium and its compounds
3	Mining and processing of ores (other than uranium)
4	Extraction of oil and gas
5	Manufacture of titanium dioxide
6	The phosphate processing industry
7	The zircon and zirconia industries
8	Production of tin, copper, iron, aluminium, lead
9	Extraction and combustion of coal
10	Water treatment
11	Building materials
12	Legacy sites

Fig. 1. Major NORM activities suggested by ICRP 142

### □ Regulatory Guidelines for NORM Industries in EC

- The EC published Radiation Protection (RP) 95 report, which provided reference levels for NORM industries.
- RP 95 report presented major NORM industries, materials, and situations that cause radiation exposure.
- It recommended using a control band to apply a graded approach when regulating the NORM industry. The classification criteria is the calculated effective dose under normal and unlikely assumptions.

Effective Dose		Regulatory level
Normal	Unlikely	
1 mSv/y	6 mSv/y	Band 1 No regulation necessary
6 mSv/y	20 mSv/y	Band 2 Lower level of regulation
20 mSv/y	50 mSv/y	Band 3 Higher level of regulation
		Band 4 Process not permitted

Fig. 2. Control band suggested by RP 95

## Conclusion

- ❖ We investigated the regulatory guidelines for the NORM industry presented by IAEA, ICRP, and EC.
- ❖ They presented the types of NORM industries that cause radiation exposure.
- ❖ They also recommended that a graded approach should be used when regulating the NORM industry.
- ❖ The results of this study can be used for deriving of regulation based on graded approach on the NORM industry.

## Acknowledgments

This work was supported by the KoFONS using the financial resource granted by NSSC. (No. 2105035)