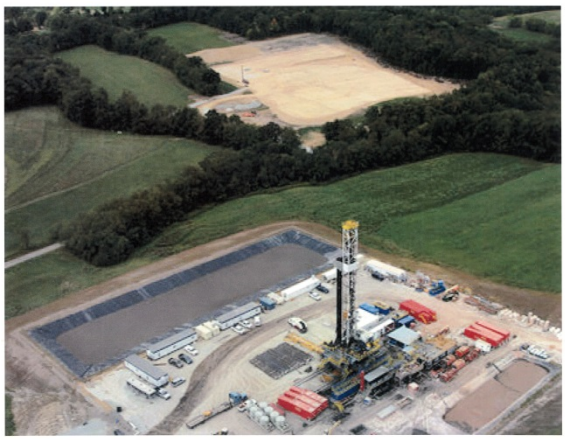
NCRP Commentary No. 29: Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced NORM (TENORM) from the Oil and Gas Industry

National Council on Radiation Protection and Measurements



Naturally occurring radioactive materials (NORM) contain primordial radionuclides, typically in the decay series of uranium and thorium. In the United States, individual state regulations recognize that if the natural concentrations or radionuclide distributions are enhanced by humans or technology, technologically enhanced NORM (TENORM) is produced. National Council on Radiation Protection and Measurement (NCRP) Commentary No. 29 provides a review of the generation and disposal of NORM/TENORM waste from oil and gas exploration and production. The Commentary addresses radiation protection, legal, and regulatory considerations.

NORM and TENORM can be associated with a wide variety of industries including mineral extraction, other forms of mining, geothermal energy production, phosphate fertilizer production, and water treatment. However, the scope of this NCRP Commentary is limited to the oil and gas industry because newer technologies associated with hydraulic fracturing, coupled with horizontal drilling, have been widely deployed. Application of these technologies, which are termed unconventional oil and gas exploration and production, causes potential radiation exposures, environmental protection concerns, and waste management issues associated with NORM/TENORM. The presence of NORM and TENORM in oil and gas fields has been well documented since the early 1900s, shortly after the discovery of radium. The concentration of the radionuclides is dependent on the local geology and geochemistry, and in the case of TENORM, the production technologies employed. The Commentary traces the background, history, and current

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status of NORM/TENORM from the oil and gas industry, which will allow a full evaluation and establishment of a framework for radiation protection in a future NCRP report.

Purpose:

While the scope limits consideration of NORM/TENORM from the oil and gas industry, the purpose of NCRP Commentary No. 29 is:

> *To review practices associated with contemporary methods of oil and gas exploration and production that have potential radiological concerns; evaluate the historical and current status of regulations pertinent to management of NORM/TENORM in the oil and gas industry; and recommend topic areas for development in a comprehensive future NCRP report.*

The intended audiences for NCRP Commentary No. 29 are oil and gas industry workers and industry management, states with oil and gas resources, educators, and members of the public. Previous NCRP reports have addressed various radiation protection aspects of NORM, including Report No. 118, *Radiation Protection in the Mineral Extraction Industry*. The common NORM/TENORM goal is to maintain radiation doses within established limits and as low as reasonably achievable.

Recommendation:

Based on the information provided in this Commentary, NCRP developed the following recommendation:

> *A full NCRP report should be developed to provide national environmental and radiation-safety guidelines for the management and disposal of NORM/TENORM associated with the contemporary oil and gas industry. The report should be scientifically based and comprehensive and focus on unconventional oil and gas operations. It should address dose assessments, institutional controls and practices, risk management, and communications with workers and other stakeholders.*

The issues identified in the recommendation are discussed in detail in the Commentary.