

Preface

Naturally occurring radioactive materials (NORM) contain primordial radionuclides, that is, radionuclides found on the Earth that have existed since before our solar system was formed. Primordial radionuclides are typically decay products of uranium (with a half-life of 4.5 billion years) and thorium (with a half-life of 14 billion years). For purposes of this Commentary, technologically enhanced NORM (TENORM) generally results from the concentration or alteration of NORM radionuclides by humans and technology. Both NORM and TENORM can be associated with a wide variety of industries including mineral extraction, other forms of mining, phosphate fertilizer and elemental phosphorous production, and water treatment. The presence of NORM/TENORM in oil and gas fields has been well documented since the early 1900s, soon after the discovery of radium in 1898. The concentration of the associated radionuclides is highly dependent on the local geology and, in the case of TENORM, on the exploration and production technologies employed. Newer technologies associated with hydraulic fracturing, coupled with horizontal drilling, are termed *unconventional oil and gas exploration and production*, and are now common across numerous states that are underlain with oil-and-gas-containing shale deposits. Because of the lack of national recommendations and regulations, the regulation of NORM/TENORM falls to the states and has resulted in inconsistencies across state regulations. The purpose of this Commentary 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 the topic areas for development in a comprehensive future National Council on Radiation Protection and Measurements (NCRP) report.

This Commentary was prepared by NCRP Scientific Committee 5-2. Serving on the Committee were:

William E. Kennedy, Jr., *Chairman*

W.E. Kennedy Consulting
Anacortes, Washington

Members

David J. Allard

Pennsylvania Department of
Environmental Protection
Harrisburg, Pennsylvania

Philip V. Egidi

U.S. Environmental Protection
Agency
Washington, D.C.

John R. Frazier

CHP Consultant
Knoxville, Tennessee

Martin D. Barrie

Oak Ridge Associated Universities
Oak Ridge, Tennessee

Gary Forsee

Illinois Emergency Management
Agency
Springfield, Illinois

Raymond H. Johnson

Radiation Safety Counseling
Institute
Rockville, Maryland

Andrew J. Lombardo
Perma-Fix Environmental
Services, Inc.
New Brighton, Pennsylvania

Ruth E. McBurney
Conference of Radiation Control
Program Directors, Inc.
Frankfort, Kentucky

NCRP Secretariat
Kathleen L. Shingleton, *Staff Consultant*
Cindy L. O'Brien, *Managing Editor*
Laura J. Atwell, *Director of Operations*

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John D. Boice, Jr.
President (2012 – 2018)

Kathryn D. Held
President (2019 –)