

**Title 64 Series 23A
Department of Health and Human Resources
Bureau for Public Health
Technologically Enhanced Naturally Occurring Radioactive Material
Summary of Public Comments**

COMMENTS AND RESPONSES

The descriptions of public comments below are a paraphrasing of the originally submitted comments. The full text of each public comment has been filed with the Secretary of State's Office.

General Comments

Comment

The Bureau's proposed rule is based on a misreading of the 2016 study instituted by the Pennsylvania Department of Environmental Protection.

Response.

The Bureau has been working with the gas extraction industry since January 2015, when it first became aware that technologically enhanced naturally occurring radioactive material (TENORM) is generated during the hydraulic fracturing completion process, to develop rules to address the public health consequences associated the all sources of ionizing radiation, including naturally occurring radioactive materials (NORM) and TENORM generated during hydraulic fracturing. Currently, the Bureau enforces Radiological Health Rules. (*W.Va. Code R. § 64-23-1 et seq.*), rules that have been in effect since 2001. Those legislative rules establish the safety requirements to reduce, to an acceptable level, the risk that any person is likely to be injured by the radiation. *See W.Va. Code R. § 64-23-1.1.*

As noted by the commenter, the Pennsylvania Department of Environmental Protection ("PADEP") recently published a study to collect data relating to TENORM associated with oil and gas operations in Pennsylvania. This study included the assessment of potential worker and public radiation exposure, TENORM disposal, and other possible environmental impacts. The study encompassed radiological surveys at well sites, wastewater treatment plants, landfills, gas distribution and end use, and brine-treated roads.

TENORM is commonly associated with specific industries and practices. Examples include uranium mining and overburden, phosphate waste, coal waste, petroleum production scale and sludge, drinking water treatment, mineral mining/overburden and processing/extraction, and geothermal wastes. TENORM is primarily associated with NORM decay chains of uranium-238 and thorium-232 and their progeny. Radium and radon are the main risk drivers in these decay chains.

TENORM can present serious health and safety hazards if it is not handled and disposed of properly. It has been predicted that the problems of TENORM waste will increase in the future because of the expansion of fracking technology, specifically with the exploration and production of shale and Marcellus gas. Most producers of TENORM are not required to have a radioactive materials license and may not have the radiological expertise necessary to deal with the myriad of TENORM waste streams.

The PADEP conducted radiological sampling and surveys at well sites, wastewater treatment plants, landfills, gas distribution facilities and facilities that use natural gas, and oil and gas brine-treated roads. Various samples of solids, liquids, natural gas, and ambient air were collected and analyzed for radiological constituents and in some cases additional parameters. The study contained a series of observations based upon the data compiled from the samples collected and surveys conducted.

While it is accurate to say that the study found there to be little potential for radiological exposure to workers and members of the public from handling and temporary storage of hydraulic fracturing fluid on natural gas well sites, the study also found that there is a potential for radiological environmental impacts from spills of hydraulic fracturing fluid on natural gas well sites and from spills that could occur from the transportation and delivery of this fluid. (*PADEP TENORM Study Report* – Section 9.0. p.9-2). The study indicated that Radium-226 was detected within the hydraulic fracturing fluid ranging from 64.0 – 21,000 pCi/L. Radium-228 was also detected ranging from 4.50 – 1,640 pCi/L. The hydraulic fracturing fluid was made up of a combination of fresh water, produced water, and reuse flowback fluid.

The study also found that while there is little potential for radiological exposure to workers and members of the public from handling and temporary storage of flowback fluid on natural gas well sites, there is a potential for radiological environmental impacts from spills of flowback fluid on natural gas well sites and from spills that could occur from the transportation and delivery of this fluid. (*PADEP TENORM Study Report* – Section 9.0. p.9-2). Radium-226 concentrations were detected within flowback fluid samples ranging from 551 – 25,500 pCi/L. Radium-228 was also detected ranging from 248 – 1,740 pCi/L. Further, while there is little potential for radiological exposure to workers and members of the public from handling and temporary storage of produced water on natural gas well sites, the study found that there is a potential for radiological environmental impacts from spills of produced water from unconventional natural gas well sites and from spills that could occur from the transportation and delivery of this fluid. Radium-226 concentrations were detected in produced water samples ranging from 40.5 – 26,600 pCi/L. Radium-228 concentrations were also detected ranging from 26.0 – 1,900 pCi/L. (*PADEP TENORM Study Report* – Section 9.0. pp.9-2 – 9-3). The Ra-226 activity in unconventional well site produced water is approximately 20 times greater than that observed in conventional well site produced water. The ratio of Ra-226 to Ra-228 in unconventional well site produced water is approximately eight times greater than that found in conventional well site produced water.

These findings are consistent with a study conducted in 2012, by the Conference of Radiation Control Program Directors' (CRCPD) E-42 Task Force charged with examining and reviewing TENORM radiological, environmental, regulatory, and health and safety issues. After an extensive review, the E-42 Task Force made several recommendations to the CRCPD, including:

- That training requirements for oil and gas TENORM workers be augmented. The E-42 Task Force prepared a set of proposed minimum training requirements for oil and gas industry TENORM workers, as well as for persons providing such training, that it believed would meet the need for the augmented training.
- That the oil and gas industry develop and incorporate best management practices and/or guidance. These should address the need for applications for oil and gas facilities and other supporting facilities, such as produced water treatment facilities, to include, as part of the overall licensing and permitting process, evaluations of the degree to which TENORM might be produced and/or handled at the facility. The applications should also address the potential doses that might be experienced by workers and members of the public, and the types, quantities and characteristics of TENORM waste that might be associated with such facilities. The level of detail of the evaluations should be commensurate with the potential magnitude of the anticipated impacts.

Consequently, there is ample evidence that oil and gas operations do indeed pose a significant risk of radiation exposure to workers and the public.

Comment

The preamble to the proposed rule suggests the rule has been developed to regulate TENORM generated through oil and natural gas exploration and development, but the proposed rule arguably does not apply to oil and gas activities.

Response

It is unclear to the Bureau what the commenter is referring to by preamble, however the scope of the rule is clear -- the requirements of the rule series are designed to control the receipt, possession, use, process, transfer, and disposal of sources of radiation by any registrant so the total dose to an individual, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation prescribed by *W.Va. Code R. § 64-23-6*.

While it is certainly the case that the generation of TENORM during oil and natural gas exploration and development is within the scope of the proposed rules, the rule is equally applicable to other activities that result in the receipt, possession, use, process, transfer, and disposal of TENORM.

Comment

The Bureau's proposed rule regulates the same activities as set forth in *W.Va. Code R. § 64-23-16 et seq.*

Response

The Bureau agrees with the commenter. However, the proposed rules are intended to supplement, not supplant the provisions of *W.Va. Code R. § 64-23-16 et seq.* The rapid expansion of unconventional drilling in unconventional formations have highlighted some aspects of the existing regulatory structure that the Bureau believes needed to be revisited to ensure they continue to be adequate in today's environment. The Bureau reviewed its current legislative rule and found it necessary that they be updated and streamlined. Rather than amending the current Radiological Health Rules, the Bureau decided to simply propose new rules that supplemented the provisions of the current rules.

To eliminate any confusion, the Bureau is amending the proposed rule to include a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.*. In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

In the forms filed with the West Virginia Secretary of State's office, the DHHR BPH cites as authority for the Proposed Rule - § 16-1-4(b)(2), (5) & (8), § 16-1-6(m) and § 16-1-11. However, the "Authority" cited in § 1.2 of the Proposed Rule is different and includes §§ 16-1-4(b)(3) & (8), § 16-1-6(n) and § 16-1-11. DHHR BPH should clarify the authority upon which it asserts the Proposed Rule is necessary and appropriate.

Response

The Bureau is charged with the enforcement of the Radiological Health Rules (*W.Va. Code R. § 64-23-1 et seq.*) (2001). The Radiological Health Rules currently provide registration and applicable safety requirements of all sources of NORM and TENORM, including those generated during the hydraulic fracturing completion process. The Radiological Health Rules establish safety requirements intended to reduce, to an acceptable level, the risk that any person is likely to be injured by the radiation. See *W.Va. Code R. § 64-23-1.1*.

The rules currently being proposed by the Bureau are intended to supplement, and not supplant the Radiological Health Rules by fleshing out the provisions of the current rule for the purposes of protecting the health and safety of persons employed by the gas extraction industry and the generally public which may come in contact with material containing TENORM.

In 2005, Congress passed the Energy Policy Act of 2005 (EPAct) that expanded the jurisdiction of the United States Nuclear Regulatory Commission (NRC) to include discrete sources of radium-226, accelerator-produced radioactive materials and discrete sources of naturally occurring radioactive materials, referred to as NARM. NARM encompasses discrete sources of naturally-occurring radioactive materials and accelerator-produced radioactive materials. NARM does not include diffuse sources of NORM or TENORM. The federal government does not have regulatory authority of NORM or TENORM. Regulation of these materials is left to the States.

NORM is present in the environment; in soils, air and water. Industrial processes can separate and concentrate this material into TENORM. TENORM is defined by the Radiological Health Rules as follows:

“naturally occurring radionuclides whose concentrations are increased by or as a result of past or present human practices. TENORM does not include background radiation or the natural radioactivity of rocks or soils. TENORM does not include uranium or thorium in "source material" as defined in the AEA [Atomic Energy Act of 1954] and US NRC regulations.” *W.Va. Code R. § 64-23-16.2.g.*

Thus, TENORM are those naturally occurring materials not regulated under the Atomic Energy Act of 1954, as amended, whose radionuclide concentrations have been increased by or as a result of human practices.

Accordingly, there is no question that the Bureau already has the authority to register and enforce applicable safety requirements related to sources of ionizing radiation. *West Virginia Code § 16-1-4* authorizes the Radiological Health Rules which, except as otherwise specifically provided, apply to all persons who receive, possess, use, process, transfer, own or acquire any source of ionizing radiation. *See W.Va. Code R. § 64-23-2.1.* These rules define “radiation” and “ionizing radiation” as gamma rays and x-rays; alpha and beta particles; high speed electrons; neutrons; and other nuclear particles capable of producing ion pairs, but does not include nonionizing radiation, such as microwaves, radio waves, visible, infrared, or ultraviolet light. *W.Va. Code R. § 64-23-3.70.*

Comment

The WVDEP, primarily through its Office of Oil and Gas, currently regulates every aspect of oil and natural gas exploration, production, and development in West Virginia. The statewide regulatory programs, administered by the Office of Oil and Gas, Division of Air Quality and Division of Water and Waste Management, provide consistency across the State in conformity with the purpose for which the Department of Environmental Protection was organized. Indeed, the West Virginia Legislature expressly recognized the need for uniformity and consistency with respect to enforcement of the environmental law in our State.

Response

The Bureau is charged with the enforcement of the Radiological Health Rules (*W. Va. Code R. § 64-23-1 et seq.*) (2001). The Rules provide registration and applicable safety requirements of all sources of NORM and TENORM, including those generated during the hydraulic fracturing completion process. The Rules establish safety requirements intended to reduce, to an acceptable level, the risk that any person is likely to be injured by the radiation. *See W. Va. Code R. § 64-23-1.1.*

In 2005, Congress passed the Energy Policy Act of 2005 (EPAAct) that expanded the jurisdiction of the United States Nuclear Regulatory Commission (NRC) to include discrete sources of radium-226, accelerator-produced radioactive materials and discrete sources of naturally occurring radioactive materials, referred to as NARM. NARM encompasses discrete sources of naturally-occurring radioactive materials and accelerator-produced radioactive materials. NARM does not include diffuse sources of NORM or TENORM. The federal government does not have regulatory authority of NORM or TENORM. Regulation of these materials is left to the States.

NORM is present in the environment; in soils, air and water. Industrial processes can separate and concentrate this material into TENORM. TENORM is defined by the Rule as follows:

“naturally occurring radionuclides whose concentrations are increased by or as a result of past or present human practices. TENORM does not include background radiation or the natural radioactivity of rocks or soils. TENORM does not include uranium or thorium in "source material" as defined in the AEA [Atomic Energy Act of 1954] and US NRC regulations.” *W. Va. Code R. § 64-23-16.2.g.*

Thus, TENORM are those naturally occurring materials not regulated under the Atomic Energy Act of 1954, as amended, whose radionuclide concentrations have been increased by or as a result of human practices.

Accordingly, there is no question as to the Bureau’s authority to register and enforce applicable safety requirements related to sources of ionizing radiation. *West Virginia Code § 16-1-4* authorizes the Radiological Health Rules which, except as otherwise specifically provided, apply to all persons who receive, possess, use, process, transfer, own or acquire any source of ionizing radiation. *See W. Va. Code R. § 64-23-2.1.* These rules define “radiation” and “ionizing radiation” as gamma rays and x-rays; alpha and beta particles; high speed electrons; neutrons; and other nuclear particles capable of producing ion pairs, but does not include nonionizing radiation, such as microwaves, radio waves, visible, infrared, or ultraviolet light. *W. Va. Code R. § 64-23-3.70.*

The West Virginia Department of Environmental Protection (WVDEP) implements the provisions of the Natural Gas Horizontal Well Control Act by issuing permits necessary for horizontal well development, as well as implementing programs controlling hazardous waste, solid waste and surface & groundwater pollution, from any source

To distinguish the Bureau's authority from WVDEP authority -- *W.Va. Code § 22-15-8(g)* authorizes commercial solid waste facilities to receive, for disposal, drill cuttings and drilling waste generated by horizontal well sites above month tonnage limited under certain conditions. Thus, the BPH has no authority to regulate solid waste disposal facilities including the content of materials that may be disposed of within WVDEP permitted facilities.

Unlike the WVDEP, the Bureau's charge is the reduction of the risk that any person is likely to be injured by radiation generated during the hydraulic fracturing completion process. This responsibility is mandated by the Radiological Health Rules which includes standards for radiation protection of workers during operations, including the adoption of a radiation safety plan and the designation of an individual to be responsible for radiation protection. Consequently, not only is there is no overlap or conflict with the scope of the authority granted to the Bureau and the WVDEP, the Bureau is also without any authority to regulate what materials may be disposed of in a WVDEP permitted facility.

Also, *W.Va. Code § 22-15-8(g)* authorizes commercial solid waste facilities to receive, for disposal, drill cuttings and drilling waste generated by horizontal well sites above month tonnage limited under certain conditions. The Bureau does not dispute that the authority to regulate the receipt, for disposal, of drill cuttings and drilling waste generated by horizontal well sites by commercial solid waste facilities in the State rests solely with the WVDEP). However, unlike the WVDEP, the Bureau's charge is the reduction of the risk that any person is likely to be injured by radiation generated by EQT during the hydraulic fracturing completion process. This includes the transfer of TENORM waste to a WVDEP regulated solid waste facility. This responsibility is mandated by the Radiological Health Rules which includes standards for radiation protection of workers during operations, including the adoption of a radiation safety plan and the designation of an individual to be responsible for radiation protection. Consequently, there is no overlap or conflict with the scope of the authority granted to the Bureau and the WVDEP by the West Virginia Legislature.

Comment

The Reports Referenced by DHHR BPH Do Not Support the Proposed Rule

Response

The Pennsylvania Department of Environmental Protection ("PADEP") recently published a study to collect data relating to TENORM associated with oil and gas operations in Pennsylvania. This study included the assessment of potential worker and public radiation exposure, TENORM disposal, and other possible environmental impacts. The study

encompassed radiological surveys at well sites, wastewater treatment plants, landfills, gas distribution and end use, and brine-treated roads.

TENORM is commonly associated with specific industries and practices. Examples include uranium mining and overburden, phosphate waste, coal waste, petroleum production scale and sludge, drinking water treatment, mineral mining/overburden and processing/extraction, and geothermal wastes. TENORM is primarily associated with NORM decay chains of uranium-238 and thorium-232 and their progeny. Radium and radon are the main risk drivers in these decay chains.

TENORM can present serious health and safety hazards if it is not handled and disposed of properly. It has been predicted that the problems of TENORM waste will increase in the future because of the expansion of fracking technology, specifically with the exploration and production of shale and Marcellus gas. Most producers of TENORM are not required to have a radioactive materials license and may not have the radiological expertise necessary to deal with the myriad of TENORM waste streams.

The PADEP conducted radiological sampling and surveys at well sites, wastewater treatment plants, landfills, gas distribution facilities and facilities that use natural gas, and oil and gas brine-treated roads. Various samples of solids, liquids, natural gas, and ambient air were collected and analyzed for radiological constituents and in some cases additional parameters. The study contained a series of observations based upon the data compiled from the samples collected and surveys conducted.

While it is accurate to say that the study found there to be little potential for radiological exposure to workers and members of the public from handling and temporary storage of hydraulic fracturing fluid on natural gas well sites, the study also found that there is a potential for radiological environmental impacts from spills of hydraulic fracturing fluid on natural gas well sites and from spills that could occur from the transportation and delivery of this fluid. (*PADEP TENORM Study Report* – Section 9.0. p.9-2). The study indicated that Radium-226 was detected within the hydraulic fracturing fluid ranging from 64.0 – 21,000 pCi/L. Radium-228 was also detected ranging from 4.50 – 1,640 pCi/L. The hydraulic fracturing fluid was made up of a combination of fresh water, produced water, and reuse flowback fluid.

The study also found that while there is little potential for radiological exposure to workers and members of the public from handling and temporary storage of flowback fluid on natural gas well sites, there is a potential for radiological environmental impacts from spills of flowback fluid on natural gas well sites and from spills that could occur from the transportation and delivery of this fluid. (*PADEP TENORM Study Report* – Section 9.0. p.9-2). Radium-226 concentrations were detected within flowback fluid samples ranging from 551 – 25,500 pCi/L. Radium-228 was also detected ranging from 248 – 1,740 pCi/L. Further, while there is little potential for radiological exposure to workers and members of the public from handling and temporary storage of produced water on natural gas well sites, the study found that there is a

potential for radiological environmental impacts from spills of produced water from unconventional natural gas well sites and from spills that could occur from the transportation and delivery of this fluid. Radium-226 concentrations were detected in produced water samples ranging from 40.5 – 26,600 pCi/L. Radium-228 concentrations were also detected ranging from 26.0 – 1,900 pCi/L. (*PADEP TENORM Study Report* – Section 9.0. pp.9-2 – 9-3). The Ra-226 activity in unconventional well site produced water is approximately 20 times greater than that observed in conventional well site produced water. The ratio of Ra-226 to Ra-228 in unconventional well site produced water is approximately eight times greater than that found in conventional well site produced water.

These findings are consistent with a study conducted in 2012, by the Conference of Radiation Control Program Directors' (CRCPD) E-42 Task Force charged with examining and reviewing TENORM radiological, environmental, regulatory, and health and safety issues. After an extensive review, the E-42 Task Force made several recommendations to the CRCPD, including:

- That training requirements for oil and gas TENORM workers be augmented. The E-42 Task Force prepared a set of proposed minimum training requirements for oil and gas industry TENORM workers, as well as for persons providing such training, that it believed would meet the need for the augmented training.
- That the oil and gas industry develop and incorporate best management practices and/or guidance. These should address the need for applications for oil and gas facilities and other supporting facilities, such as produced water treatment facilities, to include, as part of the overall licensing and permitting process, evaluations of the degree to which TENORM might be produced and/or handled at the facility. The applications should also address the potential doses that might be experienced by workers and members of the public, and the types, quantities and characteristics of TENORM waste that might be associated with such facilities. The level of detail of the evaluations should be commensurate with the potential magnitude of the anticipated impacts.

Consequently, there is ample evidence that oil and gas operations do indeed pose a significant risk of radiation exposure to workers and the public.

Comment

The Fiscal Note Preceding the Proposed Rule Does Not Comply with the West Virginia Administrative Procedures Act and Does Not Acknowledge the Proposed Rule Is an Impediment to Economic Development in West Virginia.

Response

The Department the completed the fiscal note in response to the questions contained therein. With regard to the potential impediment to economic development, the Department does not believe that the proposed rules which require (1) registration of entities that will receive,

possess, use, process, transfer, or disposal of TENORM; (2) a radiological safety plan; and (3) the appointment of a radiation safety officer, will in anyway impede economic development.

Comment

The Proposed Rule Should Exempt Wastes from Wells Drilled Pursuant to Well Work Permit Issued Under Articles 6 and 21, Chapter 22 of the W. Va. Code.

Response

Pursuant to the Natural Gas Horizontal Well Control Act, WVDEP regulates “drill cuttings and associated drilling waste”. WVDEP has defined “drill cuttings and associated drilling waste” to mean “the broken bits of solid material and drilling mud removed from a borehole drilled by rotary, percussion, or auger methods, but does not include, waste generated during the completion processor derived from the hydraulic fracturing process, including, but not limited to, flow back solids and liquids, brine, tank bottoms, pit cleanout material and sludges, filters and filter media, pipe scale, used frack sand and proppants, etc.” 33 CSR 1.5.6.a.1.

BPH regulates, (1) any waste emitting radiation at level greater than 10 microroetgens per hour (10 μ R/hr) above local background, as measured at the gate of a solid waste facility regulated by the WVDEP; and (2) any waste generated during the hydraulic fracturing completion process, including, but not limited to, flow back solids and liquids, brine, tank bottoms, pit cleanout material and sludges, filters and filter media, pipe scale, used frack sand and proppants, etc.

Consequently, there is no overlap or conflict with the scope of the authority granted to the Bureau and the WVDEP by the West Virginia Legislature.

Comment

The Proposed Rule Should Be Revised to Limit Incorporation of 64 C.S.R. 23.

Response

The proposed rules are intended to supplement, not supplant the provisions of *W.Va. Code R. § 64-23-16 et seq.* However, in an effort to clarify the Bureau’s intent a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.* In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The Proposed Rule Fails to Follow the "Commensurate with Risk" Principal.

Response

The Bureau believes that the proposed rule does indeed require training and qualification commensurate with occupational radiation exposure issues associated with TENORM. Specifically, with regard to the oil and gas industry, it is large and complex, and a comprehensive analysis is required to ensure that these workers are adequately trained and, if necessary, monitored for radiation exposure. A number of reports have been published that address radiation protection of workers in industries associated with TENORM and should be consulted as references for worker protection. The most recent such published reports address worker and public radiological issues primarily specific to the oil industry in North Dakota and the natural gas industry in Pennsylvania. These reports have been used to inform the proposed rule.

The proposed rule recognizes that occupational radiation protection measures are continually emerging due to increased concern for workers involved in unconventional drilling. The Bureau also recognizes that there exist several categories of workers, each having associated radiation protection issues.

- Workers Who Perform Maintenance on Equipment That Is Contaminated with TENORM
- Workers at the Shops Where Bits, Pumps, Lift Valves, etc., Are Cleaned and Maintained
- Workers Who Handle Equipment That Is Used Downhole in Gas Wells
- Inspectors of the Large Interstate and Intercontinental Gas Lines
- Workers at Centralized Waste Treatment (CWT) Facilities and Zero Discharge
- Workers at Injection Wells, Recycling and Disposal Facilities
- Workers Who Transport Produced Water, Production Water, and Other Residuals
- Workers at Natural Gas Plants (Dry) and Natural Gas Liquid Plants (Wet)
- Workers Involved in the Processing and Handling of Produced (Raw) Natural Gas

The Bureau has relied on the recommendations of the Conference of Radiation Control Program Directors' (CRCPD) E-42 Task Force charged with examining and reviewing TENORM radiological, environmental, regulatory, and health and safety issues. After an extensive review, the E-42 Task Force made recommendations for the general training of workers in the oil and gas industry with regard to TENORM to ensure worker protection and awareness training.

The following are recommendations regarding training.

- TENORM awareness training (1-2 hours) should be included as part of the health and safety training program (10-30 hours) required for TENORM workers in general.
- For facilities where exposures could exceed 1 mSv/yr (100 mrem/yr), additional training in radiation protection should be provided. Also, under these circumstances, access to health physics consultation and oversight is recommended.

- A more comprehensive training and radiation oversight program is recommended at sites where exposures could approach the radiation exposure limit for occupational dose, such as that required by SSRCR Part J, Notices, Instructions and Reports to Workers; Inspections (CRCPD 2003), which is equivalent to USNRC limits in 10 CFR Part 19. Such a program should be tailored to TENORM activities.

Fundamentals of Radiation Safety including:

- introduction to NORM and TENORM;
- characteristics of alpha, beta, and gamma radiation;
- units of radiation dose and quantity of radioactivity associated with TENORM;
- hazards of exposure to the different kinds of radiation;
- levels of radiation from TENORM sources of radiation; and
- methods of controlling radiation dose through time, distance, and shielding.

Proper Use of Personnel Protective Equipment (PPE) including:

- different types of PPE;
- donning of PPE;
- removal of PPE;
- decontamination techniques; and
- use of respiratory protection equipment, as needed.

Posting and Labeling TENORM areas.

- Containerization, storage and disposal of TENORM wastes.
- Requirements of pertinent state and federal regulations.

E-42 Task Force further recommends:

Topics and discussions of assigned activities during normal and abnormal situations involving exposure to TENORM which can reasonably be expected to occur during work activities. The extent of these instructions must be commensurate with potential radiological health protection problems present in the work place. The responsible party should provide a 1-4-hour TENORM refresher training for employees at intervals not to exceed 12 months and when there is a significant change to radiation protection policies, procedures, or regulations. The training program at each TENORM facility should be approved by the relevant state authority.

The Bureau believes the proposed rule provides reasonable requirements to ensure the safety of persons who may come in contact with TENORM.

Specific Comments

Comment

The scope of the Bureau's proposed rule directly conflicts with the rules' states purpose.

Response

The Bureau does not believe a conflict exists between the proposed rules and the provisions of *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) (See response to preceding comment).

However, in an effort to clarify the Bureau's intent a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.*. In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The Bureau's attempt to establish new radiation protection standards for TENORM is beyond the scope of the proposed rule.

Response

As noted above, the proposed rules are intended to supplement, not supplant the provisions of *W.Va. Code R. § 64-23-16 et seq.* The rapid expansion of unconventional drilling in unconventional formations have highlighted some aspects of the existing regulatory structure that the Bureau believes needed to be revisited to ensure they continue to be adequate in today's environment. The Bureau reviewed its current legislative rule and found it necessary that they be updated and streamlined. Rather than amending the current Radiological Health Rules, the Bureau decided to simply propose new rules that supplemented the provisions of the current rules.

The Bureau believes that any facilities that receive, possession, use, process, transfer, and disposal of TENORM should be required to register and provide support material that addresses TENORM issues. Specifically, the Bureau believes it is in the interests of public health and safety that applicants be required to describe the operation and the types, quantities, and radionuclide composition of water and solids that are anticipated to be received, stored, produced, handled, processed, shipped, and disposed of as part of the life cycle of the facility. Furthermore, the Bureau believes it is important to protect the public health and safety that applicants to include a description of the cleanup criteria for releasing a site for unrestricted use and the handling, disposal, and or reuse of the equipment upon termination of operations, as well as arrangements for financial assurance to ensure adequate cleanup. Included among

this descriptive material should be analyses that estimate the radiation doses, both external and internal, that might be experienced by workers at the site, taking into consideration uncertainties in facility design and operation and possible off-normal conditions.

Based on these analyses, the applicant should determine the degree to which a radiation protection program, including training, might be needed for workers and visitors to the site. For example, at a minimum, awareness training is needed if TENORM is expected to be present at the site. A more comprehensive radiation protection program and training will be needed if the anticipated doses are in excess of some trigger level (action or alert level), such as 0.25 mSv or 1 mSv/yr (25 or 100 mrem/yr). In addition, consideration needs to be given to the establishment of trigger levels expressed in terms of concentrations in residual radionuclides in soil, residue, and equipment prior to releasing a site or equipment for unrestricted use.

The extent of the survey, sampling, and training programs (i.e., the overall radiation protection program) should be:

- commensurate with the level of potential exposures anticipated to be experienced by the workers; and
- the levels of contamination.

Should the anticipated exposures exceed some trigger level, and/or the potential exists for internal exposure, personnel dosimetry and protective clothing, including respiratory protection, should be incorporated into the radiation protection program. In addition, the application should include consideration to establishing unrestricted release criteria for the site and its equipment. Such survey programs are needed:

- to confirm the predictions made in the applications;
- to ensure that exposures remain below established radiation protection standards; and
- to comply with prudent as low as reasonable achievable (ALARA) designs and practices.

This material should be provided in the permit application to a level of detail commensurate with the level of anticipated exposure and the types and quantities of TENORM that will be handled at the facility.

To eliminate any confusion, the Bureau is amending the proposed rule to include a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.*. In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The scope and purpose of the rule should be limited to the regulation of the possession and use of technologically enhanced naturally occurring radioactive material.

Response

The Bureau agrees with the commenter and has tried to do so throughout the proposed rule.

Comment

The Bureau should use consistent terms throughout the proposed rule.

Response

The Bureau agrees with the commenter and has tried to do so throughout the proposed rule.

Comment

The exemptions set forth in §64-23.A-1.8 create ambiguity as to who is subject to the rule.

Response

The Bureau does not believe the exemptions are ambiguous. The commenter's example suggests that the proposed rules are applicable only to oil and natural gas activities. That is not the case. The scope of the rule is clear -- the requirements of the rule series are designed to control the receipt, possession, use, process, transfer, and disposal of sources of radiation by any registrant so the total dose to an individual, including doses resulting from all sources of radiation other than background radiation, does not exceed the standards for protection against radiation prescribed by *W.Va. Code R. § 64-23-6*.

While it is certainly the case that the generation of TENORM during oil and natural gas exploration and development is within the scope of the proposed rules, the rule is equally applicable to other activities that result in the receipt, possession, use, process, transfer, and disposal of TENORM.

Comment

Clarification is needed as to how the Bureau will make the determination that the reasonably maximally exposed individual will not receive a public dose with a total effective dose equivalent (TEDE) of more than (100 MREM) in one year from all registered sources of radiation including TENORM.

Response

The Bureau will evaluate any request and supportive evidence received from a person who asserts that a facility that the reasonably maximally exposed individual will not receive a public

dose with a total effective dose equivalent (TEDE) of more than (100 MREM) in one year from all registered sources of radiation including TENORM.

Comment

The Bureau's proposed rule contains an exemption that directly conflicts with the radiation protection standards under W.Va. Code St. R. §64-23-16.

Response

The proposed rules define a "Reasonably maximally exposed individual" to mean a representative of a population who is exposed to TENORM at the maximum TENORM concentration measured in environmental media found at a site along with reasonable maximum case exposure assumptions. The exposure is determined by using maximum values for one or more of the most sensitive parameters affecting exposure, based on cautious but reasonable assumptions, while leaving the others at their mean value. This definition is identical to the definition contained in *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) (*See* § 16.3.f.). That rule also includes a definition of "Public Dose" which is the dose received by a member of the public from sources of radiation from registered operations. Public dose does not include occupational dose, or dose received from background radiation, or dose received as a patient from medical practices, or dose received from voluntary participation in medical research programs. (§ 3.65).

In an effort to clarify the exemption contained in § 1.8.e. of the proposed rules, the Bureau will include the definition of "public dose".

Comment

Provisions of the proposed rule regarding disposal and transfer of waste containing TENORM are in conflict with existing rule and/or are infringe upon existing rules promulgated by other state and federal agencies regulation the transport and disposal of waste containing TENORM.

Response

The Bureau disagrees with the commenter's assertion that provisions of the proposed rule conflict with existing rule and/or are infringe upon existing rules promulgated by other state and federal agencies regulation the transport and disposal of waste containing TENORM. The Bureau does not dispute that the West Virginia Department of Environmental Protection (WVDEP). has statutory authority to regulate the receipt, for disposal, of drill cuttings and drilling waste generated by horizontal well sites by commercial solid waste facilities in the State rests solely with the WVDEP. Nor does the Bureau dispute that the Occupational Safety and Health Administration (OSHA) has authority to protect workers or the Department of Transportation's (DOT) responsibility for regulation of highways. However, unlike the WVDEP, OSHA and DOT, the Bureau's charge is the reduction of the risk that any person is likely to be

injured by radiation generated during the hydraulic fracturing completion process. This includes the transfer of TENORM waste to a WVDEP regulated solid waste facility.

The Bureau is charged with the enforcement of the Radiological Health Rules (*W. Va. Code R. § 64-23-1 et seq.*) (2001), hereinafter referred to as “the Radiological Health Rules”. The Rules provide registration and applicable safety requirements of all sources of NORM and TENORM, including those generated during the hydraulic fracturing completion process. The Radiological Health Rules establish safety requirements intended to reduce, to an acceptable level, the risk that any person is likely to be injured by the radiation. *See W. Va. Code R. § 64-23-1.1.*

In 2005, Congress passed the Energy Policy Act of 2005 (EPAAct) that expanded the jurisdiction of the United States Nuclear Regulatory Commission (NRC) to include discrete sources of radium-226, accelerator-produced radioactive materials and discrete sources of naturally occurring radioactive materials, referred to as NARM. NARM encompasses discrete sources of naturally-occurring radioactive materials and accelerator-produced radioactive materials. NARM does not include diffuse sources of NORM or TENORM. The federal government does not have regulatory authority of NORM or TENORM. Regulation of these materials is left to the States.

NORM is present in the environment; in soils, air and water. Industrial processes can separate and concentrate this material into TENORM. TENORM is defined by the Rule as follows:

“naturally occurring radionuclides whose concentrations are increased by or as a result of past or present human practices. TENORM does not include background radiation or the natural radioactivity of rocks or soils. TENORM does not include uranium or thorium in "source material" as defined in the AEA [Atomic Energy Act of 1954] and US NRC regulations.” *W. Va. Code R. § 64-23-16.2.g.*

Thus, TENORM are those naturally occurring materials not regulated under the Atomic Energy Act of 1954, as amended, whose radionuclide concentrations have been increased by or as a result of human practices.

Accordingly, there is no question as to the Bureau’s authority to register and enforce applicable safety requirements related to sources of ionizing radiation. *West Virginia Code § 16-1-4* authorizes the Radiological Health Rules which, except as otherwise specifically provided, apply to all persons who receive, possess, use, process, transfer, own or acquire any source of ionizing radiation. *See W. Va. Code R. § 64-23-2.1.* These rules define “radiation” and “ionizing radiation” as gamma rays and x-rays; alpha and beta particles; high speed electrons; neutrons; and other nuclear particles capable of producing ion pairs, but does not include nonionizing radiation, such as microwaves, radio waves, visible, infrared, or ultraviolet light. *W. Va. Code R.*

§ 64-23-3.70.

Finally, the responsibilities mandated by the Radiological Health Rules includes standards for radiation protection of workers during operations, including the adoption of a radiation safety plan and the designation of an individual to be responsible for radiation protection. Consequently, there is no overlap or conflict with the scope of the authority granted to the Bureau and the WVDEP, OSHA or DOT.

Comment

The Bureau's registration requirements W.Va. Code St. R. §64-23.A-4 are in direct conflict with the provisions of W.Va. Code St. R. §64-23-16.

Response

The Bureau disagrees with the commenter. The Bureau believes the registration requirements contained in the proposed rules are complementary to the provisions of the Radiological Health Rules (*W.Va. Code R. § 64-23-1 et seq.*) (2001).

However, to eliminate any confusion, the Bureau is amending the proposed rule to include a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.* In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The Bureau's proposed rule requires individuals to maintain separate manifests for TENORM under W.Va. Code St. R. §§64-23-16 and 64-23.A-3.6.

Response

The Bureau disagrees with the commenter. The Bureau believes the manifest requirements contained in the proposed rules are complementary to the provisions of the Radiological Health Rules (*W.Va. Code R. § 64-23-1 et seq.*) (2001). The Secretary and Commissioner may include additional requirements in the proposed legislative rule that may not be contained in the current Radiological Health Rules so long as those requirement do not exceeded the scope of its statutory are in conformity with the legislative intent of the statute which the rule is intended to implement, extend, apply, interpret or make specific; and do not overlap, duplicate or conflict with any other provision of state law, any other rule adopted by the same or a different agency, with federal statutes and rules, or with local laws and rules. *See W.Va. Code § 29A-3-11.*

However, to eliminate any confusion, the Bureau is amending the proposed rule to include a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.* In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The Bureau's proposed rule is silent as to whether the certification statement required under *W.Va. Code St. R. §64-23.A-3.7* satisfies the certification statement required under *W.Va. Code St. R. §64-23-16*.

Response

As noted previously, the Bureau intends that the proposed legislative rule compliment and supplement, not supplant the provisions of *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules). Consequently, the certification statement required by *W.Va. Code R. § 64-23.A-3.7* satisfies the certification statement required under *W.Va. Code R. §64-23-16*.

However, to eliminate any confusion, the Bureau is amending the proposed rule to include a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.* In the event of any conflict between these rules (or any portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The Bureau's proposed rule directly conflicts with the generator's duties pertaining to the proper control and tracking of TENORM under *W.Va. Code St. R. §64-23-16*.

Response

The Bureau disagrees that the requirements related to a generator's duties pertaining to the proper control and tracking of TENORM under the current Radiological Health Rules (*W.Va. Code R. §64-23-16*) are directly conflict with those contained in the proposed rules. As noted by the commenter, the requirements *W.Va. Code R. §64-23-1 et seq.* includes TABLE 64-23 H (REQUIREMENTS FOR TRANSFER OF LOW-LEVEL RADIOACTIVE WASTE FOR DISPOSAL AT LAND DISPOSAL FACILITIES AND MANIFESTS) As noted by the commenter, the Table requires

a. Any radioactive waste generator who transfers radioactive waste to a land disposal facility or a registered waste collector shall comply with the requirements in (a)(1) through (8). Any radioactive waste generator who transfers waste to a registered waste processor who treats or repackages waste shall comply with the requirements of (a)(4) through (8). A registrant shall:

1. Prepare all wastes so that the waste is classified according to Section I of Table 64-23 I meets the waste characteristics requirements in Section II of Table 64-23 I;

2. Label each package of waste to identify whether it is class a waste, Class B waste, or Class C waste, in accordance with Section I of Table 64-23 I;

3. Conduct a quality control program to ensure compliance with Section I and II of Table 64-23 K; the program shall include management evaluation of audits;

4. *Prepare shipping manifests to meet the requirements of Section I and II;*

5. *Forward a copy of the manifest to the intended recipient, at the time of shipment, or deliver to a collector at the time the waste is collected, obtaining acknowledgment of receipt in the form of a signed copy of the manifest or equivalent documentation from the collector;*

6. *Include one copy of the manifest with the shipment;*

7. Retain a copy of the manifest and documentation of acknowledgment of receipt as the record of transfer of registered material as required by Section 11.26. of this rule; and

8. For any shipments or any portion of a shipment for which acknowledgment of receipt has not been received within the times set forth in this section, conduct an investigation in accordance with Section III.(e). (*Emphasis added*)

Paragraphs 4, 5, and 6 are essentially restated in subsection 3.8 of the proposed rule.

Subsection 3.8 requires the registrant to:

- Sign and date the manifest upon initial transporter acceptance of the waste material;
- Obtain the signature of the initial transporter and date of the acceptance of the manifest;
- Retain one copy for a period of not less than 3 years;
- Provide the initial transporter the remaining copies of the manifest; and
- Receive the fully signed copy of the manifest from the designated disposal facility within forty-five days from the delivery to the initial transporter. In the event the registrant does not receive the signed manifest within this period, the registrant shall:

- Notify the Bureau within seven days;
- Conduct an investigation into the reason the manifest was not received; and
- Report the results of the investigation to the Bureau within thirty (30) days.

Consequently, there is no conflict between the rules, rather the provisions of the newly proposed rules are complimentary and supplement, not supplant, the provisions of the current Radiological Health Rules.

Comment

The Bureau's proposed rule directly conflicts with the generator's duty to investigate whether the generator's TENORM has been properly disposed of under W.Va. Code St. R. §64-23-16.

Response

The Bureau agrees that the provisions of proposed rules differs somewhat with the regard to time-frame in which registrants must initiate an investigation (45 days vs. 20 days) if it does not receive a signed manifest and its duty to report the completion of the investigation to the Bureau (30 days vs. 14 days). In an effort to reduce any confusion regarding the duties of registrants, the Bureau will make the time-frames consistent between the proposed rules and the current rules.

Comment

The Bureau's proposed rule directly conflicts with the radiation testing requirements to terminate registrations under W.Va. Code St. R. §64-23-16.

Response

The Bureau disagrees with the commenter. The Bureau believes the testing requirements contained in the proposed rules are complementary to the provisions of the Radiological Health Rules (*W.Va. Code R. § 64-23-1 et seq.*) (2001). The Secretary and Commissioner may include additional requirements in the proposed legislative rule that may not be contained in the current Radiological Health Rules so long as those requirement do not exceeded the scope of its statutory are in conformity with the legislative intent of the statute which the rule is intended to implement, extend, apply, interpret or make specific; and do not overlap, duplicate or conflict with any other provision of state law, any other rule adopted by the same or a different agency, with federal statutes and rules, or with local laws and rules. See W.Va. Code § 29A-3-11.

However, to eliminate any confusion, the Bureau is amending the proposed rule to include a new subsection 1.9 to read as follows:

1.9. Relationship to *W.Va. Code R. 64-23-1 et seq.* (Radiological Health Rules) -- The provisions of these rules are intended to supplement, and not supplant the provisions of *W.Va. Code R. § 64-23-1 et seq.* In the event of any conflict between these rules (or any

portion thereof) and *W.Va. Code R. § 64-23-1 et seq.*, the terms of these rules shall govern and prevail.

Comment

The Bureau's proposed rule seeks to regulate areas of the law that are currently regulated by the West Virginia Department of Environmental Protection.

- The Bureau's proposed rule seeks to regulate entities for aboveground storage tanks.
- The Bureau's proposed rule seeks to regulate entities for site closure.

Response

The Bureau disagrees with the commenter that the Bureau is seeking to areas of the law that are currently regulated by the West Virginia Department of Environmental Protection, specifically "aboveground storage tanks" and "site closure".

First, with regard to aboveground storage tanks. Aboveground storage tanks are defined by "The Aboveground Storage Tank Act" (Act) as:

a device made to contain an accumulation of more than one thousand three hundred twenty gallons of fluids that are liquid at standard temperature and pressure, which is constructed primarily of non-earthen materials, including concrete, steel, plastic or fiberglass reinforced plastic, which provide structural support, more than ninety percent of the capacity of which is above the surface of the ground, and includes all ancillary pipes and dispensing systems up to the first point of isolation. The term includes stationary devices which are permanently affixed, and mobile devices which remain in one location on a continuous basis for three hundred sixty-five or more days. A device meeting this definition containing hazardous waste subject to regulation under 40 C. F. R. Parts 264 and 265, exclusive of tanks subject to regulation under 40 C. F. R. § 265.201 is included in this definition but is not a regulated tank. Notwithstanding any other provision of this code to the contrary, the following categories of devices are not subject to the provisions of this article:

(A) Shipping containers that are subject to state or federal laws or regulations governing the transportation of hazardous materials, including, but not limited to, railroad freight cars subject to federal regulation under the Federal Railroad Safety Act, 49 U. S. C. §§20101-2015, as amended, including, but not limited to, federal regulations promulgated thereunder at 49 C. F. R. Parts 172, 173 or 174;

* * * *

(H) Devices holding wastewater that is being actively treated or processed (e.g., clarifier, chlorine contact chamber, batch reactor, etc.); *W.Va. Code* § 22-30-3(1).

For the purposes of the proposed rule, a “tank” means a stationary device, other than a container as described in subsection 2 of section 3, designed to contain an accumulation of TENORM waste, which is constructed primarily of non-earthen materials (e.g., wood, concrete, steel or plastic), which provide structural support. (§ 2.13). Thus, it does not appear that the definition of an aboveground storage tank includes “tanks” subject to the proposed rule. Additionally, the “tanks” that are the subject of the proposed rules may be exempt from the provisions of the Act pursuant to (1)(A) or (1)(H) of *W.Va. Code* 22-30-3.

However, to avoid confusion the Bureau will replace the term “tank” with “waste container” throughout the proposed rules.

Comment

The Bureau’s proposed rule is silent as to the amount of time the Bureau may take in granting, amending, renewing, suspending, or terminating a registration.

Response

The Bureau intends to act expeditiously in reviewing applications and supporting materials to ensure there are no unnecessary delays in granting registrations, while also acting deliberately to ensure the public health is protected.

Comment

Unless and until the individual obtains a registration from the Bureau, the Bureau’s proposed rule prevents an individual from utilizing a horizontal well work permit issued by the West Virginia Department of Environmental Protection.

Response

The Bureau disagrees with the commenters premise that it prevents an individual from utilizing a horizontal well work permit issued by the West Virginia Department of Environmental Protection (WVDEP). The permitting requirements of the WVDEP are no aligned or dependent on the registration required by Bureau pursuant to the current Radiological Health Rule or the proposed legislative rule. The Bureau has no authority to restrict, suspend or revoke a permit issued by the WVDEP. The Bureau may only enforce the provisions of West Virginia public health law, including the Radiological Health Rule or the proposed legislative rule. If an individual fails to act in accordance with either the current Radiological Health Rule or the

proposed legislative rule, the Bureau may only utilize the enforcement mechanisms granted to the Secretary and the Commission/State Health Officer.

Comment

The Bureau’s proposed rule is silent as to whether an entity may register multiple sites under one registration.

Response

The Bureau believes the rule is clear, it requires registration by persons who receives, possesses, uses, processes, transfers, distributes, or disposes of technologically enhanced naturally occurring radioactive material (TENORM), not sites.

Comment

The Bureau’s proposed rule demanding background checks, financial disclosures, and financial surety arrangements for landfills and commercial solid waste facilities are arbitrary and capricious.

Response

Given the potential for both significant harmful impacts on both humans and the environment, the Bureau believes that it is not only necessary, but prudent to ensure that persons who intend to who receives, possesses, uses, processes, transfers, distributes, or disposes of technologically enhanced naturally occurring radioactive material (TENORM).

It is also important to point out that the proposed rules provide that if an applicant for registration currently holds a permit issued by the WVDEP pursuant to *W. Va. Code §§ 22-6A-1 et seq.*, it will not be required to undergo a criminal history check or post a separate bond. In effort to make the provisions of the rule consistent with regard to applicants who hold other permits issued by the WVDEP, the Bureau will add the following language:

“or any other permit issued by DEP in which the application process includes a criminal history check”; and

“or any other permit issued by DEP in which the application process includes a bond or surety requirement”.

Comment

The Bureau’s proposed rule should be revised to explicitly permit a company to register all of the company’s regulated sites under a single registration.

Response

The Bureau believes the rule is clear, it requires registration by persons who receives, possesses, uses, processes, transfers, distributes, or disposes of technologically enhanced naturally occurring radioactive material (TENORM), not sites.

Comment

The Bureau's proposed rule is silent as to whether entities are required to modify their registration with the Bureau whenever the entity adds or removes a site.

Response

The Bureau believes the rule is clear, it requires registration by persons who receives, possesses, uses, processes, transfers, distributes, or disposes of technologically enhanced naturally occurring radioactive material (TENORM), not sites

Comment

The Bureau's proposed rule pertaining to site reclamation is vague, arbitrary, and beyond the scope of the Bureau's proposed rule.

Response

Wastes exhibiting elevated levels of radioactivity generated from oil and gas production take the form of:

- drill cuttings;
- drilling fluids and mud;
- produced water;
- flowback water;
- filters;
- condensate; and
- accumulated sediments (i.e. tank bottoms or sludges).

Radioactivity can also concentrate in the mineral scales that form in pipes, storage tanks, or other extraction equipment. Spills and mismanagement of these materials also may present completed pathways to receptors. The radionuclide of concern in these wastes are primarily Ra-226, radium-228 (Ra-228), and their progeny, although unsupported Pb-210 and Po-210 have been found as well (IAEA 2003). Radon, a noble gas, is present both as a result of extraction from the formation and as a product of radium decay in the resulting waste streams. As radon further decays, Pb-210 and Po-210 can concentrate in gas valves, filters, pipelines, railcars, and trailers.

The environmental fate of each waste stream is based upon the commonly employed disposal options. Where sufficient data are available (average volumes generated and the typical radioactivity associated with each waste form), a measure of the environmental impact is

provided in terms of increased natural background radiation. Finally, the magnitude of the resulting environmental impact is provided in terms of a conservative estimate of total effective dose equivalent (TEDE) dose to the average member of the critical group.

The Bureau is charged with the enforcement of the Radiological Health Rules (*W. Va. Code R. § 64-23-1 et seq.*) (2001). These Rules provide registration and applicable safety requirements of all sources of NORM and TENORM, including those generated during the hydraulic fracturing completion process. These Rules establish safety requirements intended to reduce, to an acceptable level, the risk that any person is likely to be injured by the radiation. See *W. Va. Code R. § 64-23-1.1*.

Accordingly, there is no question as to the Bureau's authority to register and enforce applicable safety requirements related to sources of ionizing radiation. *West Virginia Code § 16-1-4* authorizes the Radiological Health Rules which, except as otherwise specifically provided, apply to all persons who receive, possess, use, process, transfer, own or acquire any source of ionizing radiation. See *W. Va. Code R. § 64-23-2.1*. These rules define "radiation" and "ionizing radiation" as gamma rays and x-rays; alpha and beta particles; high speed electrons; neutrons; and other nuclear particles capable of producing ion pairs, but does not include nonionizing radiation, such as microwaves, radio waves, visible, infrared, or ultraviolet light. *W. Va. Code R. § 64-23-3.70*.

Consequently, the Bureau does not believe the proposed rules, which are intended to protect the public health and safety, are vague, arbitrary or beyond the scope of the Bureau authority, duties and responsibilities to the public.

Comment

The Bureau's proposed rule permitting the transfer of a registration is in conflict.

Response

The Bureau does not believe the proposed rule is in conflict. Given the potential for both significant harmful impacts on both humans and the environment, the Bureau believes that it is not only necessary, but prudent to ensure that persons who intend to who receives, possesses, uses, processes, transfers, distributes, or disposes of technologically enhanced naturally occurring radioactive material (TENORM).

It is also important to point out that the proposed rules provide that if an applicant for registration currently holds a permit issued by the WVDEP pursuant to *W. Va. Code §§ 22-6A-1 et seq.*, it will not be required to undergo a criminal history check or post a separate bond. In effort to make the provisions of the rule consistent with regard to applicants who hold other permits issued by the WVDEP, the Bureau will add the following language:

"or any other permit issued by DEP in which the application process includes a criminal history check"; and

“or any other permit issued by DEP in which the application process includes a bond or surety requirement”.

Comment

The Bureau’s proposed rule is silent as to whether the transferor remains liable while in the process of transferring the registration.

Response

The Bureau agrees that the provisions of § 8.1.d. can be clarified. Consequently, the Bureau will amend the subdivision to include the following:

Upon receipt of a notice of a new controlling individual or entity, and subject to a public health and environmental compliance background review under section 5, the registration is transferred to the new registrant. At that point, the new registrant is responsible for all actions concerning that registration and is liable as the registrant under these rules.

Comment

The Bureau’s proposed rule is silent as to whether the transfer of a registration must be formally approved by the West Virginia Department of Health and Human Resources.

Response

The Bureau disagree with the commenter that the proposed rule is silent as to whether the transfer of a registration must be formally approved by the West Virginia Department of Health and Human Resources. Subdivision 8.1.d. provides that the new controlling individual or entity must undergo a public health and environmental compliance background review under section 5. Clearly, an individual or entity that does not undergo a public health and environmental compliance background review under section 5 may not hold a registration.

Comment

The Bureau’s proposed rule W.Va. Code St. R. §64-23.A-16, Radiation Protection Program, should require training and qualifications commensurate with the risk.

Response

The Bureau believes that the proposed rule does indeed require training and qualification commensurate with occupational radiation exposure issues associated with TENORM. Specifically, with regard to the oil and gas industry, it is large and complex, and a comprehensive analysis is required to ensure that these workers are adequately trained and, if necessary, monitored for radiation exposure. A number of reports have been published that address radiation protection of workers in industries associated with TENORM and should be consulted as references for worker protection. The most recent such published reports address

worker and public radiological issues primarily specific to the oil industry in North Dakota and the natural gas industry in Pennsylvania. These reports have been used to inform the proposed rule.

The proposed rule recognizes that occupational radiation protection measures are continually emerging due to increased concern for workers involved in unconventional drilling. The Bureau also recognizes that there exist several categories of workers, each having associated radiation protection issues.

- Workers Who Perform Maintenance on Equipment That Is Contaminated with TENORM
- Workers at the Shops Where Bits, Pumps, Lift Valves, etc., Are Cleaned and Maintained
- Workers Who Handle Equipment That Is Used Downhole in Gas Wells
- Inspectors of the Large Interstate and Intercontinental Gas Lines
- Workers at Centralized Waste Treatment (CWT) Facilities and Zero Discharge
- Workers at Injection Wells, Recycling and Disposal Facilities
- Workers Who Transport Produced Water, Production Water, and Other Residuals
- Workers at Natural Gas Plants (Dry) and Natural Gas Liquid Plants (Wet)
- Workers Involved in the Processing and Handling of Produced (Raw) Natural Gas

The Bureau has relied on the recommendations of the Conference of Radiation Control Program Directors' (CRCPD) E-42 Task Force charged with examining and reviewing TENORM radiological, environmental, regulatory, and health and safety issues. After an extensive review, the E-42 Task Force made recommendations for the general training of workers in the oil and gas industry with regard to TENORM to ensure worker protection and awareness training.

The following are recommendations regarding training.

- TENORM awareness training (1-2 hours) should be included as part of the health and safety training program (10-30 hours) required for TENORM workers in general.
- For facilities where exposures could exceed 1 mSv/yr (100 mrem/yr), additional training in radiation protection should be provided. Also, under these circumstances, access to health physics consultation and oversight is recommended.
- A more comprehensive training and radiation oversight program is recommended at sites where exposures could approach the radiation exposure limit for occupational dose, such as that required by SSRCR Part J, Notices, Instructions and Reports to Workers; Inspections (CRCPD 2003), which is equivalent to USNRC limits in 10 CFR Part 19. Such a program should be tailored to TENORM activities.

Fundamentals of Radiation Safety including:

- introduction to NORM and TENORM;

- characteristics of alpha, beta, and gamma radiation;
- units of radiation dose and quantity of radioactivity associated with TENORM;
- hazards of exposure to the different kinds of radiation;
- levels of radiation from TENORM sources of radiation; and
- methods of controlling radiation dose through time, distance, and shielding.

Proper Use of Personnel Protective Equipment (PPE) including:

- different types of PPE;
- donning of PPE;
- removal of PPE;
- decontamination techniques; and
- use of respiratory protection equipment, as needed.

Posting and Labeling TENORM areas.

- Containerization, storage and disposal of TENORM wastes.
- Requirements of pertinent state and federal regulations.

E-42 Task Force further recommends:

Topics and discussions of assigned activities during normal and abnormal situations involving exposure to TENORM which can reasonably be expected to occur during work activities. The extent of these instructions must be commensurate with potential radiological health protection problems present in the work place. The responsible party should provide a 1-4-hour TENORM refresher training for employees at intervals not to exceed 12 months and when there is a significant change to radiation protection policies, procedures, or regulations. The training program at each TENORM facility should be approved by the relevant state authority.

The Bureau believes the proposed rule provides reasonable requirements to ensure the safety of persons who may come in contact with TENORM.

Comment

The Bureau's proposed rule is silent as to whether the Radiation Safety Officer must be an employee of the registrant.

Response

The rule neither requires a radiation safety officer (RSO) to be an employee of the registrant or prohibit someone who is not an employee from being appointed the RSO. The rule defines an RSO as an individual with the responsibility for the overall radiation safety program on behalf of the registrant and who meets the requirements of section 12.

Comment

The proposed rule does not appear to apply to landfills. Specifically, § 1.8.d. states:

Persons who possess TENORM waste regulated by the Comprehensive Environmental Response, Compensation and Liability Act, as amended [42 U.S.C. 9601 et seq.] or by the Resource Conservation and Recovery Act, as amended [42 U.S.C. 6901 et seq.] or equivalent state authority are exempt from this chapter for the TENORM waste regulated by either of these federal acts.

Since Non-hazardous Waste is regulated under RCRA and landfills are permitted under RCRA subtitle D requirements which the WVDEP (equivalent State authority) has adopted it is clear that TENORM destined for landfills and received by landfills is exempt.

Response

Generally, and except as otherwise provided in § 1.8 of the proposed rules, the rule series applies to any person who receives, possesses, uses, processes, transfers, distributes, or disposes of technologically enhanced naturally occurring radioactive material (TENORM). This rule series does not apply to source material and byproduct material as both are defined in the Atomic Energy Act of 1954, as amended [42 U.S.C. 2011 et seq.] and relevant regulations implemented by the United States nuclear regulatory commission.

The Bureau does not have sufficient facts at this time to determine whether the commenter does in fact meet the requirements of § 1.8.d. However, assuming that the commenter did indeed meet the requirements of § 1.8.d., the commenter would be exempt from registration.

Comment

It our interpretation that section 1.8.e would allow for demonstrating TEDE for public by using methods such as RESRAD modeling to justify exemption from the program.

Response

The Bureau will evaluate any request and supportive evidence received from a person who assert that it operates a facility that the reasonably maximally exposed individual will not receive a public dose with a total effective dose equivalent (TEDE) of more than (100 MREM) in one year from all registered sources of radiation including TENORM.

Comment

1.6. "Processing" is not included in Section 1.1, so it appears inconsistent to include "processes" here. "Distribution" is not included in Section 1.1, so it appears inconsistent to include "distributes" here.

1.7 "Processing" is not included in Section 1.1, so it appears inconsistent to include "processing" here. "Distribution" is not included in Section 1.1, so it appears inconsistent to include "distribution" here.

Why is the phrase ". . . and of products containing TENORM" used in Section 1.7, but not elsewhere, such as in Sections 1.6 or 1.8.a? Are there TENORM products that the DHHR BPH intends to regulate, in addition to TENORM waste?

"Licensing of TENORM, including registration termination" makes "licensing" and "registration" sound synonymous, or that one is a subset of the other. If they are synonymous, can a single term be used?

Response

The Bureau agrees with the commenter's suggestions and has incorporated them into the agency approved rules.

Comment

§64-23.A-2. Definitions.

2.1 The term "registrant" is used throughout this rule, in addition to "applicant," but "registrant" is not defined in this Section 2. We request clarification as to whether "applicant" and "registrant" are intended to mean the same thing, as the definition of "Applicant" would seem to imply or, if not, what the difference is.

Response

The Bureau has added a definition registrant to the agency approved rules.

Comment

2.2 The defined term "beneficial to the product" is not used anywhere else in the Proposed Rule; should this definition be deleted? However, if retained for any reason, the word "necessary" in the proposed definition should be changed to "beneficial," since constituents of products can be legitimately beneficial even if not entirely necessary.

Response

The Bureau has deleted the definition as suggested.

Comment

2.8 Is there any reason that the definition of "radiation safety officer" in 64-23A is different than in 64-23, which reads "one who has the knowledge and responsibility to apply appropriate radiation protection rules"?

It also appears that the reference to "section 12" should be to "section 17."

Response

The Bureau has synchronized the definitions of radiation safety officer and corrected the errant reference.

§64-23.A-3. Disposal and transfer of waste for disposal.

Comment

3.1 This rule has “registration” requirements, not “licensing” requirements. We suggest that the same term be used throughout, unless licensing and registration are meant to convey different things.

3.2. It is not clear to us what standard is being applied when the Proposed Rule states that "containers of TENORM waste which are not of an average concentration must not exceed an average concentration of 50 pCi/g]. . ." Commenters request, at a minimum, that the words "which are not of an average concentration' be deleted.

Response

The Bureau has amended the rules to refer to registration instead of licensing. Additionally, the Bureau has amended the rule to remove reference to “waste”.

Comment

3.7. We suggest this certification statement be changed to “I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked, and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national government regulations” to be consistent with DOT requirements, and only be required under this rule when the TENORM waste meets DOT definition of radioactive material at 49 CFR § 173.403.

Response

The Bureau agrees with the commenter and has made the suggested changes.

§64-23.A-4. Registrations.

Comment

4.2. The phrase "decontamination of equipment, facilities and land" should be followed by "exceeding the thresholds listed in section 1.8.a and 3.3 of this rule."

Response

The Bureau agrees with the commenter and has made the suggested changes.

Comment

4.4.a.1 We suggest the following changes: The equipment and facilities that contained TENORM or materials containing TENORM are to be used by the recipient for a similar purpose or managed in a similar manner, until decontaminated, if appropriate, These suggested edits would allow for transfer of materials other than “equipment,” “facilities,” and “land,” which are the only things addressed in 4.4.a.1 or a.2 as currently drafted. For example, we may want to transfer flowback or produced water (which may be considered TENORM if concentrations of Radium have increased over background) from one operator to another for use in fracturing fluids.

Response

The Bureau agrees with the commenter and has made the suggested changes.

Comment

4.5 We suggest changing “distribution” to “transfer” consistent with the title of the preceding section 4.4 and the wording throughout the other 4.4 subsections. If “distribution,” as used here, was intended to mean something different than “transfer,” then that requires further explanation and definition.

Response

The Bureau agrees with the commenter and has made the suggested changes.

§64-23.A-5. Application and background review for registrations.

Comment

5.2. It appears that the word "may" was inadvertently omitted before the word "require."

Response

The Bureau agrees with the commenter and has made the suggested changes.

§64-23.A-6. Requirements for the issuance of registrations.

Comment

6.1.g. Not all TENORM material is “used;” some is simply generated and stored prior to transfer offsite. The wording "use location" should be changed to "location".

Response

The Bureau agrees with the commenter and has made the suggested changes.

Comment

6.1.g.2. The term “facility” is undefined in this rule and is more applicable in normal settings of radiological concerns (health care facilities, x ray departments, etc.) It is not sufficiently

descriptive in the oil and gas setting. Is the well a facility? Is the facility owner the producer? Is the facility owner the surface owner, mineral owner? Who has to be informed?

Response

The Bureau agrees with the commenter and has made the suggested changes.

§64-23.A-9. Expiration and termination of registrations.

Comment

9.1. It's not clear how long a registration term is intended to be. We believe it should be no less than 5 years, and would prefer a longer term.

Response

The Bureau has amended the subsection to provide that registration will expire after 3 years.

§64-23.A-11. Amendment of registrations at request of registrant

Comment

What action constitutes an official amendment? Will an amendment be required each time a facility is identified that is over the listed thresholds or each time TENORM is removed from a tank? In addition, an amendment should not require another \$500 fee.

Response

The Bureau agrees with the commenter and has amended the section to clarify that a registration fee is inapplicable to amendments.

§64-23.A-14. Record keeping requirements for site reclamation.

Comment

We suggest adding the acronym "TENORM" before the word "contaminant" or "contamination," and substituting that acronym for "radioactive materials".

Response

The Bureau agrees with the commenter and has made the suggested changes.