

BEFORE THE DEPARTMENT OF ENVIRONMENTAL QUALITY  
OF THE STATE OF MONTANA

In the matter of the adoption of a new )	NOTICE OF PUBLIC HEARING
subchapter codifying New Rules I )	ON PROPOSED ADOPTION
through XII for technologically )	
enhanced naturally occurring )	(SOLID WASTE MANAGEMENT)
radioactive material (TENORM) waste )	

TO: All Concerned Persons

1. On September 7, 2017, at 10:30 a.m., in Room 111 of the Metcalf Building, 1520 East Sixth Avenue, Helena, Montana, the department will hold a public hearing to consider the proposed adoption of the above-stated rules. Before the hearing, on the same day, at 9:00 a.m., the department will conduct an informal public meeting to discuss the proposed rules and answer questions pertaining to these rules. On September 20, 2017, at 7:00 p.m., at the MonDak Heritage Center, 120 3rd Ave. SE, Sidney, Montana, the department will hold a public hearing to consider the proposed adoption of the above-stated rules. Before the hearing, on the same day, at 5:30 p.m., the department will conduct an informal public meeting to discuss the proposed rules and answer questions pertaining to these rules.

2. The department will make reasonable accommodations for persons with disabilities who wish to participate in this public hearing or need an alternative accessible format of this notice. If you require an accommodation, contact Sandy Scherer, Legal Secretary, no later than 5:00 p.m., August 31, 2017, to advise of the nature of the accommodation that you need. Please contact Sandy Scherer at the Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901; phone (406) 444-2630; fax (406) 444-4386; or e-mail [sscherer@mt.gov](mailto:sscherer@mt.gov).

3. The rules proposed to be adopted provide as follows (for further explanation, see the General Reason Statement):

GENERAL REASON STATEMENT: Section 75-10-204, MCA, authorizes the department to adopt rules implementing the Montana Solid Waste Management Act (MSWMA). Section 75-10-227, MCA, authorizes the department to pursue administrative enforcement if any rules adopted to implement the MSWMA are violated.

According to ARM 17.50.502(41), waste is defined as useless, unwanted, or discarded materials in any physical form, i.e., solid, semi-solid, liquid, or gaseous. The term is not intended to apply to by-products or materials which have economic value and may be used by the person producing the material or sold to another person for resource recovery or use in a beneficial manner. According to ARM 17.50.502(37) and 75-10-203, MCA, a "solid waste management system" means a system which controls the storage, treatment, recycling, recovery, or disposal of solid waste. In addition, for the purposes of this definition, the department does not consider a container site to be a component of a solid waste management system.

Technologically enhanced naturally occurring radioactive material (TENORM) is naturally occurring radioactive material whose radionuclide concentrations are increased by or as a result of past or present human practices.

Naturally occurring radioactive material (NORM) occurs at low levels in soils and rocks and contains one or more radioactive isotopes, also called radionuclides. These radionuclides are present in geologic formations from which oil and gas are produced and from other sources, such as ground water aquifers that are used for drinking water and in bio-solids derived from wastewater treatment. The material generally consists of the radionuclides uranium and thorium and their daughter products, including radium. This TENORM is solid waste and must be disposed of in accordance with the Solid Waste Management Act.

In Montana, wastes are classified according to their physical and chemical characteristics and the resulting potential of the wastes for causing environmental degradation or public health hazards. This classification determines the degree of care required in handling and disposal. To this point, TENORM wastes have been regulated as Group II wastes and require management at a Class II facility. Class II facilities are designed to include the most protective controls to ensure the continued protection of human health and the environment.

The department is proposing NEW RULES I through XII to provide additional requirements to ensure protection of human health and the environment from the impacts associated with the management of TENORM waste. In development of the proposed rules, the department analyzed scientific studies and other states' regulations, and gained stakeholder input through the Solid Waste Advisory Committee (SWAC) meetings and other publicly received comments from industry and environmental groups. The department also received technical expertise from a consulting firm, Tetra Tech Inc. (Tetra Tech), and a draft of these rules were reviewed by a nonprofit, multi-stakeholder, educational organization, State Review of Oil and Natural Gas Environmental Regulations (STRONGER). STRONGER's board of directors is comprised of equal representation from the oil and gas industry, state oil and gas environmental regulatory agencies, and the environmental public advocacy community.

TENORM poses a radiation health risk not only from direct radiation exposure, but also from inhalation or ingestion of dust particles associated with the material. Daily cover of TENORM waste and mitigation of fugitive dust in a landfill reduces potential inhalation or ingestion. Dose rate monitoring will detect if there are any exceedances above the radiation limits to human health and the environment. Therefore, the proper landfilling of TENORM waste, such as requiring daily cover, dust monitoring, and dust control minimizes the potential radiation dose associated with radionuclides.

In accordance with the Atomic Energy Act (AEA), 42 USC 2011 et seq., the Nuclear Regulatory Commission (NRC) would have jurisdiction over NORM and TENORM only if it qualifies as source material (natural uranium or thorium at concentrations greater than 0.05 percent by weight). Licensed material is classified as source material, special nuclear material, or byproduct material and must be received, possessed, used, transferred or disposed of under a general or specific license issued by NRC.

Use and possession of radioactive materials that fall under the authority of the AEA are regulated by the NRC or an Agreement State. An Agreement State is a state that has signed an agreement with the NRC authorizing the state to regulate byproduct, source or special nuclear materials. Montana is not an Agreement State; therefore, the use and possession of radioactive source material is regulated by the NRC. TENORM is not considered to be licensed material subject to regulation by the NRC. Therefore, Montana has the authority for promulgating rules for TENORM solid waste management systems that are protective of human health and the environment.

The maximum allowable radiation dose for a radiation worker at a nuclear power plant, uranium mill or another facility licensed by the NRC is 5,000 millirem per year (mrem/y); and the maximum allowable radiation dose to a member of the public from one of these NRC licensed facilities or an Agreement State is 100 mrem/y, excluding background and medical radiation doses.

The United States Department of Transportation (DOT) exempt concentration for radium-226 and radium-228 is 270 picocuries/gram (pCi/g) for each in the absence of any other radionuclides except their short-lived decay products. Materials with concentrations below those limits are exempt from DOT regulation, but state or federal radionuclides regulations may apply to these materials.

The department believes that the safeguards provided in the proposed NEW RULES I through XII, such as: acceptance criteria, prohibitions, design and siting criteria, operation and maintenance plans, ground water monitoring, liquid restrictions, closure and post-closure care requirements, financial assurance, and spill reporting requirements, are protective of human health and the environment. In addition, the technical input provided by STRONGER, Tetra Tech, and stakeholders through SWAC meetings and other comments received by industry and environmental groups, helped further refine the proposed rules to specifically meet the concerns and needs of Montanans.

NEW RULE I PURPOSE AND APPLICABILITY (1) The purpose of this subchapter is to establish requirements for the management of technologically enhanced naturally occurring radioactive material (TENORM) at licensed solid waste management systems.

(2) The rules in this subchapter are adopted to discharge the department's responsibilities under Title 75, chapter 10, part 2, MCA, The Montana Solid Waste Management Act (MSWMA), by adopting rules governing solid waste management systems.

(3) Except as provided in (4), this subchapter applies to any person disposing of technologically enhanced naturally occurring radioactive material (TENORM) waste or operating or maintaining a solid waste management system involved in the storage, treatment, recycling, recovery of TENORM waste or TENORM contaminated filter socks or objects as defined in [NEW RULE II]. [NEW RULE XII] applies to any person transporting TENORM waste.

(4) This subchapter does not apply to management of TENORM at a facility regulated by the Board of Oil and Gas Conservation pursuant to Title 82, chapter 11, MCA.

(5) Existing waste management systems that are licensed to accept

TENORM waste must comply with the provisions of these rules by [date that is six months after the effective date of these rules].

AUTH: 75-10-204, MCA

IMP: 75-10-204, 75-10-214, MCA

REASON: Section 75-10-204, MCA, authorizes the department to adopt rules implementing the Montana Solid Waste Management Act (MSWMA).

Sections (1), (2), and (3) are adopted to inform the regulated community and the public of the scope and the statutory basis for the rules. Section (4) is necessary because, under 75-10-214(1)(b), the MSWMA does not have authority over facilities regulated by the Board of Oil and Gas Conservation, and therefore these rules cannot apply to these facilities. Section (5) is proposed because existing facilities that manage TENORM cannot come into compliance with these rules immediately. Six months should be adequate to come into compliance.

NEW RULE II DEFINITIONS In this subchapter, the following definitions apply:

- (1) "Filter sock" means a sock-like bag used to filter solids from fluids.
- (2) "Hazardous waste" has the meaning given in 75-10-403(8), MCA.
- (3) "Spill" means discharging, injecting, depositing, dumping, releasing, spilling, leaking, or placing of TENORM waste into or onto the land so that the waste or any constituent of it may enter the environment or be emitted into the air or discharged into any waters, including ground water.
- (4) "Technologically enhanced naturally occurring radioactive material (TENORM)" means naturally occurring radioactive material whose radionuclide concentrations are increased by or as a result of past or present human practices. TENORM includes, but is not limited to, drill cuttings, drilling mud, and hydraulic fracturing (frac) sands associated with oilfield exploration and production activities. TENORM does not include background radiation or the natural radioactivity of rocks or soils. TENORM does not include "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 (NRC).
- (5) "TENORM contaminated" refers to a solid object(s) such as but not limited to: filter socks, equipment and/or survey instruments that are not themselves classed as TENORM material, but have TENORM material distributed on any of their surfaces as a result of industrial or technological activity.
- (6) "TENORM waste" is solid waste that contains TENORM.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: The department is proposing NEW RULE II(1) through (6) to provide the regulated community with certainty regarding the requirements of the proposed rules regarding TENORM waste management systems.

The department is proposing NEW RULE II(1) because the term is not

commonly used by the general public. NEW RULE IV(2) contains different waste characterization sampling requirements for TENORM contaminated filter socks than other waste material due to the number of filter socks contained in transport trailers coming from production sites and the potential for filter socks to have higher concentrations of TENORM than other waste.

The department is proposing NEW RULE II(2) to clarify in NEW RULE V what substances are specifically prohibited.

The department is proposing NEW RULE II(3) to provide a definition for the term "spill" used in NEW RULE XII that broadly defines spills associated with TENORM to ensure that all releases of TENORM are evaluated and addressed if necessary.

The definition in NEW RULE II(4) is proposed to notify persons of what material is regulated by these rules. The definition specifically includes drill cuttings, drill mud, and hydrologic fracturing sands because it is unclear whether these materials would otherwise meet the definition. They are considered to be TENORM in some states and not in others. The department has determined that, due to their content, they should be specially regulated and therefore subject to these rules.

The definitions in NEW RULE II(5) and (6) reflect the common meaning of the terms but are added to avoid any misunderstanding of what is meant by the terms as they are used in these rules.

NEW RULE III TENORM WASTE MANAGEMENT SYSTEM LICENSE REQUIREMENT, APPLICATION REQUIREMENTS (1) Except as provided in [New Rule I](4) or (5), a person may not construct, expand, or operate a TENORM waste management system after [the effective date], without a solid waste management system license from the department.

(2) An applicant for a TENORM waste management system license shall submit an application to the department on a department-approved form. The application must comply with ARM 17.50.508 and include:

- (a) signed documentation granting access to the property to the department, private contractors, and the waste management system owner/operator to perform activities associated with operation of the TENORM waste management system;
- (b) technical design specifications;
- (c) construction plans;
- (d) a detailed site plan that includes:
  - (i) information concerning any material that will be used to construct a liner or berm, including but not limited to:
    - (A) type, quantity, and source;
    - (B) compaction density;
    - (C) moisture content;
    - (D) design permeability; and
    - (E) liner construction quality assurance and quality control (QA/QC) plans;
  - (ii) design and location of any proposed storage or treatment areas;
  - (iii) design and location of any liquid containment or storage structures; and
  - (iv) design, location, and grades of any surface water diversion and drainage structures;
- (e) an operation and maintenance plan that complies with the requirements

of [NEW RULE VII];

(f) a ground water monitoring plan that complies with the requirements of [NEW RULE VIII]; and

(g) a closure and post-closure plan that complies with the requirements of [NEW RULE X].

(3) The department may require modifications of the application to ensure that the requirements of these rules will be met and that human health and the environment will be protected.

(4) An owner or operator who has received a license pursuant to this subchapter shall construct, operate, and close the licensed facility, and shall conduct post-closure operations, in compliance with the terms of the approved application and license, including the approved operation and maintenance, ground water monitoring, and closure and post-closure plans.

AUTH: 75-10-204, MCA

IMP: 75-10-204, 75-10-221, MCA

REASON: Proposed NEW RULE III establishes the requirements for TENORM licensing to ensure waste management systems are licensed properly, follow the pertinent requirements according to their facility type, and to let the regulated community know when they need to be in compliance with the proposed rules. The information and plans required by this rule are necessary to ensure compliance with the substantive requirements for the operation and closure of TENORM waste management facilities.

NEW RULE IV ACCEPTANCE CRITERIA FOR TENORM WASTE MANAGEMENT SYSTEMS (1) The owner or operator of a TENORM waste disposal management system shall manage the waste so that:

(a) the annual average TENORM concentration in a disposal unit does not exceed 50.0 picocuries per gram (pCi/gm) of radium-226 plus radium-228; and

(b) the TENORM concentration of waste in an active disposal unit does not result in the exceedance of the dose limit of 100 millirem per year (mrem/y) at the boundary of the active disposal unit based upon the results of the department approved site-specific modeling.

(2) Prior to removal from the point of generation, a TENORM waste generator shall collect samples for characterization as follows:

(a) With the exception of TENORM contaminated filter socks, the TENORM waste generator shall collect at least 1 composite sample that consists of 5 sub-samples per 200 cubic yards of TENORM waste material generated from the same contaminant source and analyzed in accordance with the agency protocol for waste acceptance criteria at licensed TENORM waste management systems in Montana DEQ's guidance "Requirements for the Characterization of TENORM Wastes" Montana DEQ – Solid Waste Program (Revised August, 2017) available at <http://deq.mt.gov/Land/solidwaste> or by contacting DEQ's Solid Waste Program at (406) 444-5300.

(b) A waste generator of TENORM contaminated filter socks generated from the same contaminant source shall collect at least 1 composite sample that consists

of 5 sub-samples per 20 cubic yards or less and analyzed in accordance with the agency protocol for waste acceptance criteria at licensed TENORM waste management systems in Montana DEQ's guidance "Requirements for the Characterization of TENORM Wastes" Montana DEQ – Solid Waste Program (Revised August, 2017) available at <http://deq.mt.gov/Land/solidwaste> or by contacting DEQ's Solid Waste Program at (406) 444-5300.

(3) The owner or operator of a waste management system licensed to manage TENORM waste shall screen every incoming load and document the characterization of the TENORM waste prior to acceptance and management on site. The characterization criteria must include:

(a) generator information;  
(b) identification of the waste source location, volume, physical state, and type;

(c) identification of the process producing the waste;  
(d) method of receipt; and  
(e) contaminant concentrations or dose rate.

(4) TENORM contaminated objects, equipment and/or survey instruments that exceed a maximum exposure limit of 100 microrentgen per hour ( $\mu\text{R/hr}$ ), including background radiation at any accessible location, must not be disposed in a landfill.

(5) If annual average contaminant concentrations exceed [NEW RULE IV](1)(a) or dose limits exceed [NEW RULE IV](1)(b), the owner or operator of a waste disposal management system shall follow the requirements in [NEW RULE VII](4).

(6) The department adopts by reference Montana DEQ's guidance "Requirements for the Characterization of TENORM Wastes" Montana DEQ – Solid Waste Program (Revised August, 2017) available at: <http://deq.mt.gov/Land/solidwaste> or by contacting DEQ's Solid Waste Program at (406) 444-5300.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: Proposed NEW RULE IV establishes the acceptance criteria requirements for TENORM waste management systems to ensure protection of human health and the environment. These rules provide the necessary regulatory framework to protect human health and the environment. For acceptance criteria for TENORM waste management systems, there is no comparable federal regulation or guideline addressing the same circumstances, so the requirements of 75-10-107, MCA, do not apply.

The department is proposing a dual-protective approach in setting acceptance criteria for TENORM that the annual average TENORM concentration does not exceed 50.0 pCi/gm of radium-226 plus radium-228 and that TENORM waste in a landfill does not result in the exceedance of the dose limit of 100 mrem/y at the boundary of the active disposal unit based upon the results of the department approved site-specific modeling. This approach is based upon analyzing scientific studies holistically and providing safety for human health and the environment. The

department believes this dual protective approach in addition to all of the safeguards provided in this subchapter such as: daily cover requirements, prohibitions, design and siting criteria, operation and maintenance plans, ground water monitoring, liquid restrictions, closure and post-closure care requirements, financial assurance, and spill reporting requirements, are protective of human health and the environment.

The department requested technical expertise from Tetra Tech Inc. (Tetra Tech) to assist and provide guidance in developing rules regarding TENORM waste management for the State of Montana. Tetra Tech developed a report entitled "Development of TENORM Rules for the State of Montana" (December, 2016), available at <http://deq.mt.gov/Land/solidwaste> or by contacting DEQ's Solid Waste Program at (406) 444-5300 (hereafter Tetra Tech's report). The three main authors of this report are as follows: a radiological scientist with an area of expertise in radiation health physics with over 40 years of experience, and a PhD in Environmental Health, MS in Health Physics and BS in Chemistry; a senior scientist with over 40 years of experience, and a PhD in Radiation Biology, MS in Health Physics, and a BA in Physics; and a Project Environmental Engineer with over 10 years of experience, a MS in Civil and Environmental Engineering and a BS in Environmental Resources Engineering.

According to Tetra Tech's report: "The amount of radioactivity in a material is expressed in terms of the becquerel (Bq), or more commonly in the United States, the curie (Ci). The Ci is a very large amount of radioactivity, so when natural radioactivity is of concern, the activity is usually expressed in terms of millionths of a Ci ( $\mu$ Ci) or trillionths of a Ci (pCi). The activity concentration in TENORM is expressed as becquerels per kilogram (Bq/kg) or picocuries per gram (pCi/g). The average background activity concentrations in soil are approximately 0.9 pCi/g uranium-238 and 1.2 pCi/g thorium-232 (National Council on Radiation Protection and Measurements, 1992)."

The report also states: "Radiation doses to humans are generally expressed in terms of millisieverts (mSv), or more commonly in the U.S., in millirem (mrem). The dose unit represents the amount of energy absorbed in human tissue, the distribution of the energy, and the sensitivity of the whole body or individual organs to radiation. The dose in mrem indicates the potential long-term human health risk. Radiation doses to individuals in the U.S. from natural background radiation range from approximately 200 mrem per year (mrem/y) to more than 1,000 mrem/y in high background locations primarily in the Rocky Mountain region. The average background radiation dose in the United States is approximately 311 mrem/y (NCRP, 2009)."

Tetra Tech's report concluded: "Assuming the landfill worker spends no more than 50 percent of his or her time managing TENORM and that the mix of radionuclides includes thorium-232 at a ratio not greater than 25 percent of the total activity (as was assumed for the example described in Appendix A), an average radium-226 plus radium-228 activity concentration less than 50 pCi/g is likely to be protective and should meet the 100 mrem/y dose limit for the landfill worker. DEQ could establish a default acceptance criterion, a 'threshold,' that would be protective of workers and the public under landfill conditions that comply with the general landfill requirements for groundwater and air monitoring. Such landfills would be expected to operate under a routine set of conditions, receiving a relatively



unchanging and specific mix of TENORM radionuclides." This concentration limit is contained in proposed NEW RULE IV(1)(a).

For example, a threshold value of 67 pCi/g was calculated for a TENORM mixture of 25 percent radium-228, 25 percent thorium-232, and 50 percent radium-226, assuming a landfill worker spent only 1,000 hours per year handling TENORM. (See Appendix A of Tetra Tech's report). Further, research conducted by Tetra Tech indicates that thorium-232 concentrations relative to radium-226 plus radium-228 in wastes from the producing formations associated with oil and gas development in North Dakota and Pennsylvania account for an average activity of 27 percent and 17 percent, respectively. However, information from North Dakota did not include thorium activity in drill cuttings or drilling muds because these waste streams are not regulated as TENORM waste in North Dakota, but constitute a large portion of TENORM wastes as defined in Montana. The data from Pennsylvania suggests that thorium activity in drill cutting accounts for less than 1 pCi/g, or less than 20 percent, of the total radium plus thorium activity. Tetra Tech concludes that "this calculation and the review/evaluation leading to it suggest that a somewhat more conservative threshold soil TENORM concentration of 50 pCi/g, if selected by DEQ, would be protective of human health and the environment."

It should be noted that other states, such as North Dakota, exclude drill cuttings, hydraulic frac sands and drilling mud from their definition of TENORM, yet they constitute a large fraction of exploration and production (E&P) wastes. In contrast, Montana is proposing to include all of these materials in its own definition of TENORM.

Scientific studies, such as the Argonne National Laboratory (ANL) report, "Radiological Dose and Risk Assessment of Landfill Disposal of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) in North Dakota" (ANL, 2014) available at <http://www.ndhealth.gov/ehs/tenorm/> or by contacting DEQ's Solid Waste Program at (406) 444-5300 indicate that a maximum average concentration limit of 50 pCi/g total radium, and an annual volume limit of 10 percent of all material accepted at the landfill excluding drill cuttings, hydraulic frac sands and mud, would be environmentally sound and protective of human health. This report also concluded that at these levels, health risks would be negligible for humans. Workers actively involved in landfill operations, individuals living adjacent to the landfill during disposal action, the general population living within a 50 mile radius, and future industrial and recreational users of the landfill property would be protected. In addition, the ANL report stated that while thorium-232 may be present in the wastes in addition to radium, the average thorium activity for wastes associated with the producing formations did not exceed 24 pCi/g.

Landfill workers in Montana spend less than 50 percent of their time on the landfill working face. Landfill equipment operators direct waste haulers to the area of the landfill where wastes are to be deposited. However, wastes are not typically spread out until the end of the working day and the necessary daily cover is applied. Therefore, exposure to the typical TENORM waste landfill worker is minimized.

The department is proposing NEW RULE IV(1)(b) in accordance with the recommendation in Tetra Tech's report conclusion, that acceptance criteria for TENORM could be based on the acceptable annual dose of 100 mrem/y to the landfill worker and member(s) of the public. In addition, this dose limit is also

supported by other scientific studies, recommendations, and guidelines.

According to the "Evaluation of EPA's Guidelines for Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM) Report to Congress" (June, 2000) available at <https://www.epa.gov/sites/production/files/2015-04/documents/402-r-00-001.pdf> or by contacting DEQ's Solid Waste Program at (406) 444-5300, the National Academy of Science (NAS) Committee found that the risk assessment methods for TENORM are not based on the source because effective dose (or risk) is based on radiation type (e.g., alpha, beta, gamma), its energy and, for internal radiation, sensitivity of specific organs. The NAS Committee also found that it is widely accepted to use a linear, no-threshold dose-response relationship at low levels of exposure. Important factors to consider include: the physical characteristics of a site, the extent of the TENORM source, and the projected land use.

The NAS Committee recommended to the EPA that it should use dose and risk assessments that are "reasonably realistic" for developing exposure standards to the various types of TENORM. The Committee defined "reasonably realistic" as "not intended to greatly overestimate or underestimate actual effects for the exposure situation of concern." The EPA agreed with this recommendation and encouraged including a range of potential exposure scenarios for the exposed individual. The NAS Committee also recommended developing stylized methods of dose and risk assessments for assumed reference conditions that are "reasonably representative" of the exposure situations of concern.

According to the E-42 Task Force Report "Review of TENORM in the Oil & Gas Industry" (June, 2015) available at <http://www.crcpd.org/news/306896/E-42-Task-Force-Report-Review-of-TENORM-in-the-Oil-and-Gas-Industry.htm> or by contacting DEQ's Solid Waste Program at (406) 444-5300, volumes and concentrations should not be used as the basis for estimating the potential for public dose. The report points out that the exposure pathway is critical in determining exposure potential. The report also discusses how the practice of adding fill and cover material significantly reduces the average concentration of any TENORM waste disposed at a facility. In addition, the report concludes that with the proper monitoring and maintenance of TENORM facilities, the potential for worker and public exposure in the present and into the future is minimized. Furthermore, using a dose-based standard with appropriate monitoring, training of workers, operation and maintenance requirements, and proper closure and post closure requirements should pose little risk to human health and the environment.

According to the E-42 Task Force Report "Review of TENORM in the Oil & Gas Industry" (June, 2015), landfill workers receiving TENORM waste in excess of license requirements should be treated in relation to the potential of their exposure and a radiation protection plan should be implemented accordingly. General awareness training is appropriate for licensed TENORM facilities that have landfill personnel exposures below 100 mrem/y.

For each facility, the department approved site-specific modeling will demonstrate whether TENORM waste will exceed the proposed dose limit set in NEW RULE IV(1)(b) of 100 mrem/y at the boundary of the active disposal unit.

The department is proposing NEW RULE IV(2) and IV(3) to ensure that sampling and characterization are done, necessary details are collected, and a

licensed waste management system does not exceed the concentration in NEW RULE IV(1)(a) or the dose limit established in NEW RULE IV(1)(b).

NEW RULE IV(2)(a)'s requirement of 1 composite sample that consists of 5 sub-samples per 200 cubic yards is based upon soil characterization requirements for landfarm remediation and/or landfill disposal.

NEW RULE IV(2)(b) is proposed because TENORM contaminated filter socks should be sampled more intensively due to the number of filter socks contained in transport trailers coming from production sites and the potential for TENORM contaminated filter socks to have higher concentrations of TENORM than other waste. The requirement to take 1 composite sample that consists of 5 sub-samples per 20 cubic yards or less is based upon the standard and most common size of delivery vehicle loads for filter socks, which is 20 cubic yards.

NEW RULE IV(3) requires specific documentation requirements to enable the department to track specifics, such as where the waste came and how it was produced. This information will allow the department to ensure compliance with the concentration limit.

NEW RULE IV(4) is proposed to ensure contaminated objects, equipment and/or survey instruments that exceed 100 microrentgen per hour ( $\mu\text{R/hr}$ ), are not disposed in a landfill that complies with this subchapter to protect human health and the environment. 100  $\mu\text{R/hr}$  is protective of worker health, according to the following calculations provided by Tetra Tech: Assuming the net surface exposure rate of the object is 85  $\mu\text{R/hr}$  = 0.085 mR/hr and the background is 15  $\mu\text{R/hr}$  (average background in Montana is 2 to 7  $\mu\text{R/hr}$ ), then the total measured exposure rate of the object plus the background would be 100  $\mu\text{R/hr}$ . Except for his/her hands and arms, the worker would be expected to be at a distance of at least 0.5 m from the source. The reduction in exposure rate with distance from the source depends on the geometry of the source. A factor of two would be a conservative distance factor. Therefore, the estimated exposure rate at the worker's body attributable to the source would be one-half the net surface exposure rate or 0.043 mR/hr. A worker is not likely to spend a significant amount of time handling the object. Assuming 200 hours per year at an exposure rate of 0.043 mR/hr, the annual exposure would be 8.6 mR. Also, assuming 1 mR exposure gives a dose of 1 mrem, the estimated annual dose would be 8.6 mrem, which is well below the dose limit of 100 mrem/y.

The department is proposing NEW RULE IV(5) to ensure waste disposal management systems follow the proper requirements if contaminant concentrations or dose limits are exceeded.

The guidance in NEW RULE IV(6) requires characterization methodologies that the department has determined will provide accurate characterization and consistent results between facilities.

NEW RULE V PROHIBITIONS (1) If hazardous waste or TENORM waste that exceeds the acceptance criteria in [NEW RULE IV] is delivered to a landfill for disposal, the waste must be rejected.

(2) Disposal of waste subject to regulation by the NRC, which does not meet the definition of TENORM, is prohibited in all licensed TENORM waste management systems.

(3) If prohibited wastes are received, the owner or operator of the licensed

TENORM waste management system shall note the source, amount, generator, and other identifying information about the rejected waste and shall notify the department in writing within 24 hours of waste rejection.

AUTH: 75-10-204, MCA  
IMP: 75-10-204, MCA

REASON: NEW RULE V is proposed to ensure that TENORM waste that violates acceptance criteria is not placed in a landfill. The department is also proposing to include notification requirements in NEW RULE V(3) to ensure the department is aware of the source, amount, generator, and other identifying information about the rejected waste in a timely manner. The proposed rule enables the department to provide compliance assistance and enforcement actions if necessary.

NEW RULE VI DESIGN AND SITING CRITERIA (1) The department may approve a license for a TENORM solid waste management system, or lateral expansion of a licensed TENORM solid waste management system, only if the department determines that the design is protective of the uppermost aquifer. The design must utilize a composite liner, a leachate collection and leachate removal system that are designed and constructed to maintain less than a 30-cm depth of leachate over the liner.

AUTH: 75-10-204, MCA  
IMP: 75-10-204, MCA

REASON: Proposed NEW RULE VI(1) sets requirements for design criteria for TENORM waste management systems to ensure protection of human health and the environment.

The design requirement to utilize a composite liner and a leachate collection and removal system that are designed and constructed to maintain less than a 30-cm depth of leachate over time is in accordance with ARM 17.50.1204. This requirement is to ensure the uppermost aquifer is protected.

NEW RULE VII OPERATION AND MAINTENANCE (1) A waste management system approved to manage TENORM waste as defined in [NEW RULE II](6) must have an Operation and Maintenance (O&M) Plan that includes:

- (a) waste acceptance criteria that depicts the types of wastes that will be accepted;
- (b) a description of how the waste management system will determine whether a shipment of wastes meets the acceptance criteria;
- (c) the types of onsite sampling and testing that will be utilized;
- (d) the procedures for rejecting waste;
- (e) procedures for the management of TENORM wastes that comply with the requirements of ARM 17.50.509;
- (f) provisions for hydrogen sulfide monitoring, dust monitoring, and dust control;

(g) the radiation survey equipment to be used and calibration procedures that meet the following criteria:

(i) the equipment and calibration procedures must be capable of accurately measuring radiation; and

(ii) calibration records must be available for inspection by the department;

(h) an employee radiation protection training and awareness program plan to provide workers with knowledge necessary to comply with the requirements of this subchapter and protect their health and public health;

(i) provisions to minimize noise impacts on residential areas to the degree practicable through berms, vegetation screens, and reasonable limits on hours of operation; and

(j) provisions to monitor ionizing radiation at the active facility boundary on at least a monthly basis to ensure that doses to member(s) of the public at the facility boundary do not exceed 100 mrem/y.

(2) The owner or operator of a waste disposal management system licensed to manage TENORM waste shall file the annual report required by ARM 17.50.410(1)(b) that includes a demonstration indicating that the waste management system has not exceeded the annual average concentration limit contained in [NEW RULE IV](1)(a).

(3) The owner or operator of a waste management system licensed to manage TENORM waste shall file with the department a monthly summary report indicating the date of receipt, type and waste characterization results, dose readings at the boundary of the active landfill unit contained in [NEW RULE IV](1)(b) and [NEW RULE VII](1)(j). The report must be filed within 15 days after the end of each month; and if TENORM wastes have not been accepted for disposal during the reporting period, the report must indicate this.

(4) If the owner or operator of a licensed TENORM waste management system, or the department, determines, pursuant to [NEW RULE IV](1)(a) that the annual average concentration has been exceeded or dose limit in [NEW RULE IV](1)(b) or in [NEW RULE VII](1)(j) has been exceeded, the owner or operator shall:

(a) within 5 days after this determination, or notification by the department of the department's determination, place a notice in the operating record indicating the exceedance, and notify the department that this notice was placed in the operating record; and

(b) within 15 days after the determination was made or notice from the department was received, submit for department approval, a corrective action plan. The plan must provide that:

(i) the materials responsible for the exceedance will be removed and properly disposed of; or

(ii) additional clean soil material will be applied over the waste disposal unit.

(5) TENORM waste must be covered by at least six inches of clean soil or department approved daily cover material by the end of each operating day. For landfills that operate continuously (24 hours per day), all TENORM waste must be covered at least once during every 24 hour period.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: Proposed NEW RULE VII establishes the criteria for TENORM facility waste management system operation and maintenance plan. The department has determined that it is reasonably necessary to require an operator to submit an operation and maintenance plan for a facility so that the department can be assured that the owner or operator of the facility will comply with the requirements of these rules and will operate the facility in a manner that will ensure protection of human health and the environment.

The proposed rule requires that the owner or operator include waste information and radiation monitoring procedures that will allow the department to determine whether the operating plan is adequate to ensure that the limits in NEW RULE IV(1) will be met. Submission of the plan and department review is intended to ensure that each solid waste management system is evaluated on a case-by-case basis taking into consideration the physical characteristics of the site, and the types and amounts of wastes.

Dust monitoring and dust control are necessary to protect human health and the environment by limiting worker and public exposure to TENORM and radiation. In addition, hydrogen sulfide monitoring is necessary due to potential residual vapors contained in waste to protect worker and public exposure.

In addition, the proposed rule requires facilities have provisions for radiation protection training and awareness for workers to achieve the same goals. The rule requires the owner or operator to tailor training to the risk associated with a particular facility.

Because noise impacts on surrounding neighborhoods from facility operations and waste hauling can adversely affect public health, the department is proposing to require the owner or operator to include provisions to mitigate noise impacts.

The department is proposing to monitor dose limits on a monthly basis for the public at the active facility boundary and require necessary corrective measures if the limit is exceeded as required by NEW RULE VII(4).

The department is proposing NEW RULE VII(4) to address exceedances of the annual average concentration or dose limit. If an exceedance is detected, the owner or operator is required to identify department approved methods to detect areas with higher concentrations or dose limits and develop the appropriate corrective action plans. If corrective actions cannot lower the concentration or dose level to an acceptable level as described in NEW RULE IV(1)(a) and IV(1)(b), the load would need to be removed and properly disposed of.

The department is proposing NEW RULE VII(5) in accordance with the recommendation in Tetra Tech's report "Development of TENORM Rules for the State of Montana" (December, 2016), that TENORM should be covered by at least 6 inches of clean material on a daily basis. NEW RULE VII(5) is also in accordance with ARM 17.50.1104(1), which also requires an owner or operator of a Class II landfill to cover disposed solid waste with six inches of earthen material at the end of each operating day.

TENORM poses a radiation health risk not only from direct radiation exposure, but also from inhalation or ingestion. Daily cover of TENORM waste in a landfill reduces potential inhalation or ingestion. In addition, mitigation of fugitive dust minimizes the potential for inhalation of radionuclides. Dose rate monitoring will

detect if there are any exceedances above the radiation limits to human health and the environment. Therefore, the proper landfilling of TENORM waste, such as requiring daily cover, dust monitoring, and dust control minimizes the potential radiation dose associated with radionuclides and possible "hot spots." The addition of cover soil at the end of each working day provides an additional barrier from exposure to TENORM waste.

NEW RULE VIII GROUND WATER MONITORING (1) The owner or operator of a licensed waste management system that accepts TENORM wastes and does not have an approved no-migration demonstration according to ARM 17.50.1204 shall submit to the department for approval a site specific ground water sampling and analysis plan based upon the requirements of ARM Title 17, chapter 50, subchapter 13 Ground Water Monitoring and Corrective Action. Ground water monitoring requirements must be tailored to the types of waste being managed and site specific conditions.

(2) The TENORM waste management system owner or operator shall monitor for all constituents and parameters required in the department-approved site specific ground water sampling and analysis plan at least semiannually during the active life of the waste management system and the closure and post-closure periods. During the first semiannual sampling event, a minimum of four independent samples from each background and downgradient well must be collected and analyzed for all constituents and parameters for which monitoring is required in this rule. At least one sample from each background and downgradient well must be collected and analyzed during subsequent semiannual sampling events. The department may specify an appropriate alternative frequency for repeated sampling and analysis for constituents and parameters for which monitoring is required in this rule during the active life of the unit and closure and the post-closure care periods. An alternative frequency during the active life of the unit and closure, may be no less frequent than annual. An alternative frequency must be based on consideration of the following factors:

- (a) lithology of the aquifer and unsaturated zone;
- (b) hydraulic conductivity of the aquifer and unsaturated zone;
- (c) ground water flow rates;
- (d) minimum distance between upgradient edge of the waste management system and downgradient monitoring well screen (minimum distance of travel); and
- (e) resource value of the aquifer.

(3) In addition to the site specific department approved ground water sampling and analysis plan, the owner or operator of the TENORM waste management system shall monitor for any constituents deemed necessary by the department and for the constituents in Table 1:

Table 1  
Constituents for Detection Monitoring

<u>Common Radionuclides</u>	<u>Exceedance Concentrations</u>
Radium-226 in pCi/L and radium-228 in pCi/L	Combined radium-226 and radium-228: 5 pCi/L; alpha particle activity (including

	radium-226, excluding radon and uranium): 15 pCi/L;
Uranium in micrograms per liter	30 micrograms per liter (µg/L)

(4) If detection monitoring results indicate an exceedance in the concentration listed in Table 1 for any of the constituents, the owner or operator of the waste management system shall implement an assessment monitoring program and corrective actions based upon ARM Title 17, chapter 50, subchapter 13, and any other measures deemed necessary by the department.

AUTH: 75-10-204, MCA

IMP: 75-10-204, 75-10-207, MCA

REASON: Proposed NEW RULE VIII(1) through (3) establishes ground water monitoring requirements for TENORM waste management systems to ensure protection of human health and the environment.

Ground water monitoring at waste management facilities is required by existing rules. However, existing rules do not require monitoring for radiation in ground water. Proposed NEW RULE VIII(2) requires ground water monitoring of specific constituents associated with TENORM in addition to ground water monitoring required under ARM Title 17, chapter 50, subchapter 13 Ground Water Monitoring and Corrective Action. The exceedance concentrations in Table 1 are EPA's Safe Drinking Water Act maximum contaminant levels for radionuclides found in 40 CFR 141.66 available at <https://www.gpo.gov/fdsys/pkg/CFR-2009-title40-vol22/pdf/CFR-2009-title40-vol22-sec141-66.pdf> or by contacting DEQ's Solid Waste Program at (406) 444-5300.

Proposed NEW RULE VIII(4) outlines corrective action measures if detection monitoring indicates an exceedance specifically for TENORM constituents. These requirements are necessary to ensure protection of public health and the environment.

NEW RULE IX LIQUIDS RESTRICTIONS (1) Bulk or non-containerized liquid waste may not be placed in a TENORM waste disposal unit unless:

(a) the waste has first been sufficiently solidified according to a department-approved method and will pass the paint filter liquids test; or

(b) the waste is leachate derived from the Class II landfill unit, whether it is a new or existing Class II landfill unit or lateral expansion of an existing Class II landfill unit, and the landfill unit is designed and constructed with a composite liner, leachate collection and leachate removal system that complies with ARM 17.50.1204(1)(b).

(2) The owner or operator shall submit a demonstration to the department that the waste or waste disposal facility meets the requirements of (1), place the demonstration in the waste management system operating record, and notify the department that it has been placed in the operating record.

(3) The owner or operator of a TENORM waste management system that intends to recirculate leachate shall:

(a) only recirculate leachate over areas of the facility with a composite liner and leachate collection system;



- (b) submit to the department a plan for approval that includes the following:
  - (i) a location map where leachate will be recirculated; and
  - (ii) a leachate system design plan that contains:
    - (A) supporting assumptions, drawings, and calculations to demonstrate the leachate collection system will be able to handle the additional volume of liquid and maintain no more than one-foot of head above the liner;
    - (B) a specific design of the drainage layer;
    - (C) a description of the method that will be used to ensure that drainage layer will not become plugged;
    - (D) a description of the method that will be used to ensure there will not be a chemical reaction of the leachate with the drainage layer material;
    - (E) a description of the method that will be used to ensure long-term permeability of the drainage layer;
    - (F) a description of the method to verify excessive head is not collecting above the liner;
    - (G) a description of the method to ensure that leachate application is performed at a low flow rate with uniform distribution over the proposed recirculation area;
    - (H) a description of the method to ensure leachate application does not exceed holding capacity of the soils so as to cause ponding, runoff, or any discharge of leachate from the facility; and
  - (iii) any other information deemed necessary by the department;
- (c) not recirculate leachate during periods of high winds, freezing temperatures, or during or immediately after rainfall events;
- (d) provide adequate leachate storage when leachate is not being applied;
- (e) submit to the department for approval a quarterly sampling plan to monitor changes in leachate composition that includes the following:
  - (i) a description of the statistical analysis of the results to determine increases;
  - (ii) if the statistical analysis shows an increasing trend that includes consultation with the department to either modify or halt recirculation activities, an action plan;
  - (iii) any other information deemed necessary by the department; and
- (f) submit quarterly records to the department that include the amount of leachate recirculated, locations of recirculation, and leachate testing results.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: Proposed NEW RULE IX(1) through (2) sets liquid restrictions and leachate recirculation requirements specifically for TENORM waste management systems to ensure protection of human health and the environment.

Proposed NEW RULE IX(1) through (2) are necessary to adopt TENORM liquid restriction and leachate recirculation requirements. They set restrictions for bulk or non-containerized liquid to avoid potential impacts to ground water resources and spills during transport. Proposed NEW RULE IX(2) sets recirculation requirements to ensure recirculation is done with a proper liner, leachate collection

and removal systems, design plan, proper drainage layer and interface between leachate and drainage layer material, proper permeability of the drainage layer, avoidance of excessive head collecting above the liner and proper methods are utilized. NEW RULE IX(2) also ensures that recirculation is done at appropriate times to ensure efficiency by avoiding freezing temperatures and maximizing evaporation. Reporting requirements makes the department aware of daily operations and ensures that leachate is being managed in accordance with the department approved plan. In addition, NEW RULE IX(3) ensures that, if there is a detection of an increasing trend of a parameter(s) corrective actions are implemented if necessary to protect human health and the environment.

NEW RULE X CLOSURE AND POST-CLOSURE CARE REQUIREMENTS

(1) The owner or operator of a licensed TENORM landfill facility shall comply with the Class II closure and post-closure care requirements in ARM Title 17, chapter 50, subchapter 14.

(2) The owner or operator of a licensed TENORM processing, storage, recovery, and recycling facility shall submit a closure and post-closure plan for department approval that includes:

- (a) timeline and methods for site decommissioning;
- (b) procedures for removal of any remaining TENORM wastes and final disposal location;
- (c) procedures for equipment removal, including any necessary equipment decontamination and remediation procedures and final disposal that is protective of human health and the environment;
- (d) decommissioning of site buildings and appurtenances;
- (e) a process for soil sampling and analysis to identify potential areas of soil contaminated as a result of site operations;
- (f) excavation and removal or remediation of stained and/or contaminated soil, with confirmation sampling procedures and analysis, that is protective of human health and the environment;
- (g) procedures for removal and disposal of contaminated soil; and
- (h) proposed final closure date.

(3) Prior to the commencement of closure activities, the owner or operator of a licensed TENORM waste management system shall submit a Notification of Intent to Close to the department.

(4) Closure activities must be completed within 180 days of submittal of the Notification of Intent to Close.

(5) The owner or operator of a licensed TENORM waste management system shall comply with any other post-closure care requirements determined by the department to be necessary to protect human health or the environment.

(6) Design of the final cover for a licensed TENORM waste management system must ensure the dose from all TENORM radionuclides does not exceed 25 mrem/y at the facility boundary.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: Proposed NEW RULE X establishes closure and post-closure plan requirements for TENORM waste management systems to ensure protection of human health and the environment.

Proposed NEW RULE X(1) sets closure requirements in accordance with Class II facilities. Class II facilities are designed to include the most protective controls to ensure the continued protection of human health and the environment.

Proposed NEW RULE X(2) sets specific requirements for closure and post-closure plans specific to TENORM non-disposal waste management systems to ensure that closed TENORM waste management sites do not impair public health and the environment.

Proposed NEW RULE X(3) and (4) requires notification of the department of when the waste management system plans to close so the appropriate fees are assessed and a schedule can be set for the system to comply with the requirements in ARM Title 17, chapter 50, subchapter 14. ARM Title 17, chapter 50, subchapter 14 sets the time limit of 180 days based on typical timeframes for construction that is reasonable and achievable while protecting human health and the environment.

Proposed NEW RULE X(5) ensures post-closure requirements are met. The department is proposing NEW RULE X(6) in accordance with the recommendation in Tetra Tech's report "Development of TENORM Rules for the State of Montana" (December, 2016), that dose limits at reclaimed landfills shall not exceed 25 mrem/y in accordance with NRC's dose limit for facilities released for unrestricted use for landfill that accept TENORM.

NEW RULE XI FINANCIAL ASSURANCE (1) The owner or operator of a licensed TENORM waste management system shall comply with the requirements of ARM 17.50.540 for financial assurance.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: Proposed NEW RULE XI(1) sets necessary financial assurance requirements for TENORM waste disposal management systems to ensure protection of human health and the environment. The department is proposing to require compliance with ARM 17.50.540, which is modeled after the financial assurance mechanisms for municipal solid waste landfills found in 40 CFR 258. Proposed NEW RULE XI(1) provides sound mechanisms for ensuring TENORM waste disposal management systems have the financial means for proper operation and closure to protect human health and the environment.

NEW RULE XII TENORM SPILL REPORTING REQUIREMENTS (1) The transportation of TENORM waste is subject to the requirements of ARM 17.50.523. Persons who transport TENORM waste for the purpose of processing or disposal shall comply with the requirements of this rule.

(2) A person, or an authorized representative of that person, who spills TENORM waste, shall no later than 24 hours from the date of the incident or its discovery, report to the Montana Disaster and Emergency Services (DES) at (406) 324-4777 any spill of TENORM waste that meets the following criteria:

(a) the spilled materials have entered or may enter state water or a drainage that leads directly to surface water; or

(b) the spill is 25 gallons or more of liquid TENORM waste or one cubic yard or more of solid TENORM waste.

AUTH: 75-10-204, MCA

IMP: 75-10-204, MCA

REASON: Proposed NEW RULE XII(1) through (2) establishes the necessary spill reporting requirements for transporters of TENORM waste to ensure protection of human health and the environment.

Proposed NEW RULE XII(1) requires transporters of TENORM waste to cover and secure their loads and keep loads covered and secure while in transit in a manner that prevents discharge, dumping, spilling or leaking from the transport vehicle.

Proposed NEW RULE XII(2) provides sound mechanisms for ensuring transporters of TENORM waste report spills in a timely manner. Montana DES is the lead coordinator for comprehensive emergency management in Montana and provides quantifiable risk analysis and emergency response and recovery for communities.

4. Concerned persons may submit their data, views, or arguments, either orally or in writing, at the hearing. Written data, views, or arguments may also be submitted to Sandy Scherer, Legal Secretary, Department of Environmental Quality, 1520 E. Sixth Avenue, P.O. Box 200901, Helena, Montana 59620-0901; faxed to (406) 444-4386; or e-mailed to [sscherer@mt.gov](mailto:sscherer@mt.gov), no later than 5:00 p.m., October 18, 2017. To be guaranteed consideration, mailed comments must be postmarked on or before that date.

5. The department maintains a list of interested persons who wish to receive notices of rulemaking actions proposed by this agency. Persons who wish to have their name added to the list shall make a written request that includes the name, e-mail, and mailing address of the person to receive notices and specifies that the person wishes to receive notices regarding: air quality; hazardous waste/waste oil; asbestos control; water/wastewater treatment plant operator certification; solid waste; junk vehicles; infectious waste; public water supplies; public sewage systems regulation; hard rock (metal) mine reclamation; major facility siting; opencut mine reclamation; strip mine reclamation; subdivisions; renewable energy grants/loans; wastewater treatment or safe drinking water revolving grants and loans; water quality; CECRA; underground/above ground storage tanks; MEPA; or general procedural rules other than MEPA. Notices will be sent by e-mail unless a mailing preference is noted in the request. Such written request may be mailed or delivered to Sandy Scherer, Legal Secretary, Department of Environmental Quality, 1520 E. Sixth Ave., P.O. Box 200901, Helena, Montana 59620-0901, faxed to the office at (406) 444-4386, e-mailed to Sandy Scherer at [sscherer@mt.gov](mailto:sscherer@mt.gov); or may be made by completing a request form at any rules hearing held by the department.

6. Jeni Garcin, Public Information Specialist for the Department of Environmental Quality, has been designated to preside over and conduct the hearing.

7. The bill sponsor contact requirements of 2-4-302, MCA, do not apply.

8. With regard to the requirements of 2-4-111, MCA, the department has determined that the adoption of the above-referenced rules will not significantly and directly impact small businesses.

Reviewed by:

DEPARTMENT OF ENVIRONMENTAL  
QUALITY

/s/ John F. North  
JOHN F. NORTH  
Rule Reviewer

BY: /s/ Tom Livers  
TOM LIVERS, Director

Certified to the Secretary of State, August 7, 2017.