Proposed

State of Kansas
Department of Health and Environment

Notice of Hearing on Proposed Administrative Regulations

The Kansas Department of Health and Environment (KDHE), Division of Environment, Bureau of Waste Management, and the KDHE Division of Public Health, Bureau of Community Health Systems, will conduct a public hearing at 10:00 a.m. Thursday, September 27, 2018, in the Flint Hills Conference Room, third floor, Curtis State Office Building, 1000 SW Jackson, Topeka, Kansas, to consider the adoption of proposed new regulations K.A.R. 28-35-800, 28-35-802, 28-35-803, 28-35-804, and 28-35-805 regarding naturally-occurring radioactive material (NORM) and technologically enhanced NORM (TENORM).

A summary of the proposed regulations and estimated economic impact follows:

Summary of Regulations:

K.A.R. 28-35-800. Definitions. Defines terms that are used in the proposed regulations, including coal combustion residuals (CCR), natural background radiation, NORM, NORM waste, purposeful dilution, reasonably maximally exposed individual, TENORM, and TENORM waste.

K.A.R. 28-35-802. Exemption of NORM or TENORM. Specifies the conditions that must be met for NORM/TENORM to be exempt from the licensing, registration, and recordkeeping requirements of the KDHE Radiation Control Program.

K.A.R. 28-35-803. Classification and exemption of NORM and TENORM waste. Specifies the conditions that must be met for NORM/TENORM waste to be excluded from classification as low-level radioactive waste and to be exempt from the licensing, registration, and recordkeeping requirements of the KDHE Radiation Control Program.

K.A.R. 28-35-804. Determination of exemption and classification. Specifies the methods that must be used to determine whether or not NORM/TENORM, including

NORM/TENORM waste, meets the classification and/or exemption conditions of K.A.R. 28-35-802 or 28-35-803.

K.A.R. 28-35-805. Purposeful dilution. Establishes a prohibition against deliberately diluting NORM/TENORM for the purpose of rendering the material exempt from regulation unless the dilution is approved by the secretary of KDHE.

Economic Impact:

Cost to the agency: KDHE Radiation Control staff may need to evaluate requests and demonstrations submitted by the regulated community regarding classification, exemptions from Radiation Control Program requirements, alternate methods of determining exemption or classification requirements, and purposeful dilution. KDHE may provide some technical assistance, maintain certain records, and perform other information management regarding NORM/TENORM management and disposal. These duties will be absorbed by existing staff. There is no added costs to the agency.

Cost to regulated community: These regulations create no new capital or annual operating costs for generators or handlers of NORM/TENORM, including NORM/TENORM waste. The regulations formalize (legalize) NORM/TENORM historical disposal practices for wastes that contain low levels of NORM/TENORM. Any waste that would be prohibited for disposal by land burial in Kansas because it exceeds the exemption limit is already subject to a landfill disposal ban.

Costs to other governmental agencies or units: These regulations will not result in added costs to other government agencies.

The time period between the publication of this notice and September 28, 2018, constitutes a public comment period of at least 60 days for the purpose of receiving written public comments on the proposed regulations. All interested parties may submit written comments prior to 5:00 p.m. on September 28, 2018, to Stephanie Fackrell, Kansas Department

of Health and Environment, Bureau of Waste Management, 1000 SW Jackson, Suite 320, Topeka, KS 66612-1366, by email to Stephanie.Fackrell@ks.gov, or by fax to 785-559-4252.

During the hearing on September 27, 2018, all interested parties will be given a reasonable opportunity to present their views orally on the proposed regulations as well as an opportunity to submit their written comments. In order to give each individual an opportunity to present their views, it may be necessary for the hearing officer to request that each presenter limit an oral presentation to an appropriate time frame.

Complete copies of the proposed regulations and the corresponding regulatory impact statement may be obtained from the KDHE Bureau of Waste Management website, at http://www.kdheks.gov/waste/p_regsandstatutes.html or from the Radiation Control Program website at http://www.kdhe.ks.gov/radiation/radpubnotice.html or by contacting Stephanie Fackrell at Stephanie.Fackrell@ks.gov, 785-296-1606 or fax 785-559-4252. Questions pertaining to the proposed regulations should be directed to Stephanie Fackrell at the contact information above.

Any individual with a disability may request accommodation in order to participate in the public hearing and may request the proposed regulations and the regulatory impact statement in an accessible format. Requests for accommodation to participate in the hearing should be made at least five working days in advance of the hearing by contacting Stephanie Fackrell.

Jeff Andersen
Secretary
Kansas Department of Health and Environment

Proposed

28-35-800. Definitions. For the purposes of this part in these regulations, each of the following terms shall have the meaning specified in this regulation:

(a) "Coal combustion residuals" and "CCR" have the meaning specified for "coal combustion residuals (CCR)" in 40 C.F.R. 257.53, dated July 1, 2016, which is hereby adopted by reference.

(b) "Natural background radiation" means "background radiation," as defined in K.A.R. 28-35-135b, but shall not include either of the following:

(1) TENORM; and

(2) NORM that has been moved by human intervention from its natural location.

(c) "NORM" means "naturally occurring radioactive material," as defined in K.S.A. 2017 Supp. 48-1603 and amendments thereto.

(d) "NORM waste" has the meaning specified in K.S.A. 2017 Supp. 48-1603, and amendments thereto.

(e) "Purposeful dilution" means the deliberate act of mixing NORM or TENORM, or both, with one or more other substances with the intent of rendering the NORM or TENORM, or both, exempt from regulation.

(f) "Reasonably maximally exposed individual" means a representative of a population who is exposed to NORM or TENORM, or both, at the maximum concentration of NORM or TENORM, or both, measured in environmental media found at a site along with reasonable maximum case exposure assumptions. The exposure shall be 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 other parameters at their mean value.

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(g) "TENORM" means "technologically enhanced NORM," as defined in K.S.A. 2017 Supp. 48-1603 and amendments thereto.

(h) "TENORM waste" has the meaning specified in K.S.A. 2017 Supp. 48-1603, and amendments thereto. (Authorized by K.S.A. 48-1607; implementing K.S.A. 2017 Supp. 48-1603 and K.S.A. 48-1607; effective P-_____.)

Proposed

28-35-802. Exemption of NORM or TENORM. The following shall be exempt from the licensing, registration, and recordkeeping requirements of this article of the department's regulations:

(a) NORM that has not been moved by human intervention from its natural location;

(b) NORM or TENORM, or both, that meet both of the following conditions:

(1) The concentration of each of the following is no greater than 185 becquerels per kilogram (five picocuries per gram) above natural background radiation:

(A) The combination of radium-226 and radium-228; and

(B) any single progeny of radium-226 or radium-228; and

(2) the concentration of all other radioactive constituents combined is no more than that of the natural background radiation;

(c) coal combustion residuals that are beneficially used in a manner approved in writing by the secretary before use; and

(d) NORM or TENORM, or both, for which the secretary has issued an exemption in writing. An exemption may be issued by the secretary if the person requesting the exemption demonstrates to the secretary that the reasonably maximally exposed individual will not receive a public dose with a total effective dose equivalent of more than one millisievert (100 millirems) in one year from all licensed or registered sources of radiation and the NORM or TENORM, or both. Doses from the inhalation of indoor radon and its short (less than one hour) half-life progeny shall not be included in calculations of the TEDE, unless the dose is due to effluent releases from licensed operations involving the handling or processing of NORM or TENORM, or both. (Authorized by and implementing K.S.A. 48-1607; effective P-_____.)

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Proposed

28-35-803. Classification and exemption of NORM waste and TENORM waste. The following shall not be classified as low-level radioactive waste and shall be exempt from the licensing, registration, and recordkeeping requirements of these regulations:

(a) NORM waste or TENORM waste, or both, that meet both of the following conditions:

(1) The concentration of each of the following is no greater than 185 becquerels per kilogram (five picocuries per gram) above natural background radiation at the disposal location:

(A) The combination of radium-226 and radium-228; and

(B) any single progeny of radium-226 or radium-228; and

(2) the concentration of all other radioactive constituents combined is no more than that of the natural background radiation at the disposal location;

(b) coal combustion residuals that are placed in one of the following:

(1) A solid waste disposal area, as defined in K.S.A. 65-3402 and amendments thereto, that has been issued a solid waste permit pursuant to K.S.A. 65-3407, and amendments thereto; or

(2) a surface impoundment, as defined in K.A.R. 28-29-3, that has been issued a solid waste permit under K.S.A. 65-3407, and amendments thereto;

(c) drilling waste consisting of drilling mud and cuttings and meeting both of the following conditions:

(1) The drilling waste is generated from one or more wells drilled in Kansas and managed in accordance with the solid and hazardous waste regulations in articles 29 and 31 of the department's regulations; and

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(2) if the drilling waste is generated by the drilling of one or more oil or gas wells or related injection wells that are permitted by the Kansas corporation commission, the drilling waste is disposed of by one the following methods:

(A) Placement in a solid waste disposal area that has been issued a solid waste permit pursuant to K.S.A. 65-3407, and amendments thereto;

(B) placement in a pit that has been permitted or authorized by the Kansas corporation commission; or

(C) land-spreading, in accordance with K.A.R. 28-29-1600 through 28-29-1608; and

(d) NORM waste or TENORM waste, or both, for which the secretary has issued an exemption in writing. An exemption may be issued by the secretary if the person requesting the exemption demonstrates to the secretary that the reasonably maximally exposed individual will not receive a public dose with a total effective dose equivalent of more than one millisievert (100 millirems) in one year from all licensed or registered sources of radiation and the NORM waste or TENORM waste, or both. Doses from the inhalation of indoor radon and its short (less than one hour) half-life progeny shall not be included in calculations of the TEDE, unless the dose is due to effluent releases from licensed operations involving the handling or processing of NORM or TENORM, or both. (Authorized by K.S.A. 48-1607; implementing K.S.A. 2017 Supp. 48-1603 and K.S.A. 48-1607; effective P-_____.)

28-35-804. Determination of exemption and classification. Each person that generates or manages NORM or TENORM, or both, including NORM waste or TENORM waste, or both, shall determine whether or not the NORM or TENORM, or both, meet the exemption and classification requirements of K.A.R. 28-35-802 or K.A.R. 28-35-803 according to the following:

(a) Knowledge of the NORM or TENORM. The person may use verifiable knowledge of the expected characteristics of the NORM or TENORM, or both. The basis for the determination shall be provided to the department upon request.

(b) Laboratory analysis. If analysis is required to determine the concentration of radium-226 and radium-228, the samples shall be analyzed by a laboratory that meets at least one of the following conditions:

(1) The laboratory is a certified laboratory. For the purposes of this regulation, "certified laboratory" shall mean a laboratory that is certified by the secretary for the analysis of radium-226 and radium-228.

(2) The method or methods that the laboratory uses are approved by the secretary. A method may be approved by the secretary if the owner or operator of the laboratory demonstrates to the secretary that the method meets one of the following conditions:

(A) The method for the analysis of radium-226 and radium-288 is the same as a method used at a certified laboratory.

(B) The accuracy, precision, and detection limit of the method are similar to, or better than, a method used at a certified laboratory and are protective of human health, safety, and the environment.

(c) Alternate methods. An alternate method to determine whether the NORM or TENORM, or both, meet the exemption or classification requirements of K.A.R. 28-35-802 or K.A.R. 28-35-803 may be used if the alternate method is approved in writing by the secretary. An alternate method may be approved by the secretary if the person who will use the method demonstrates to the secretary that the method will accurately determine the level of risk posed to human health, safety, and the environment by the NORM or TENORM, or both. (Authorized by K.S.A. 48-1607; implementing K.S.A. 2017 Supp. 48-1603 and K.S.A. 48-1607; effective P-_____.)

Proposed

28-35-805. Purposeful dilution. Purposeful dilution may be performed only with prior written approval from the secretary. Purposeful dilution may be approved by the secretary if the person who is requesting approval for the purposeful dilution demonstrates to the secretary that the reasonably maximally exposed individual will not receive a public dose with a total effective dose equivalent (TEDE) of more than one millisievert (100 millirems) in one year from all licensed or registered sources of radiation including the NORM or TENORM, or both. Doses from the inhalation of indoor radon and its short (less than one hour) half-life progeny shall not be included in calculations of the TEDE, unless the dose is due to effluent releases from licensed operations involving the handling or processing of NORM or TENORM, or both. (Authorized by K.S.A. 48-1607; implementing K.S.A. 2017 Supp. 48-1603 and K.S.A. 48-1607; effective P- _____.)

Proposed

Kansas Department of Health and Environment

Regulatory Impact Statement

pursuant to K.S.A. 2017 Supp. 77-416

Proposed New Regulations

K.A.R. 28-35-800
K.A.R. 28-35-802
K.A.R. 28-35-803
K.A.R. 28-35-804
K.A.R. 28-35-805

October 11, 2017

Proposed

Executive Summary of Proposed New Regulations

Many wastes contain naturally-occurring radioactive material (NORM) or technologically enhanced NORM (TENORM) with very low concentrations of radioactive isotopes. These wastes pose little or no risk to human health or safety or the environment. K.S.A. 48-1620, which went into effect in the 1980s, prohibits the burial of low-level radioactive waste and, until 2015, the definition of low-level radioactive waste in K.S.A. 48-1603 did not allow any exceptions for NORM and/or TENORM (NORM/TENORM) containing very low concentrations of radioactive isotopes. This meant that common practices, such as the disposal of drilling waste in on-lease pits permitted by the Kansas Corporation Commission (KCC) or in municipal solid waste landfills permitted by the Kansas Department of Health and Environment (KDHE), were technically prohibited by state law.

In 2015, K.S.A. 48-1603 was amended to allow the exclusion of certain wastes containing NORM/TENORM from classification as low-level radioactive waste, based on concentrations and/or sources established by the secretary of KDHE. The secretary also has authority under K.S.A. 48-1607 to exempt certain sources of radiation from licensing, registration, and recordkeeping requirements of the radiation control program.

The KDHE Radiation Control Program and Bureau of Waste Management worked together to develop the proposed regulations, which will:

- Allow disposal by burial of NORM/TENORM wastes with very low levels of radioactive isotopes.
- Exempt NORM/TENORM, including NORM/TENORM waste, with very low levels of radioactive isotopes from radiation control program licensing, registration, and recordkeeping requirements.

A brief summary of each of the proposed new regulations follows:

28-35-800. Definitions.

This regulation defines terms that are used in the proposed regulations:

- Coal combustion residuals (CCR)
- Natural background radiation
- NORM
- NORM waste
- Reasonably maximally exposed individual
- TENORM
- TENORM waste

28-35-802. Exemption of NORM or TENORM.

This regulation specifies the conditions that must be met for NORM/TENORM to be exempt from the licensing, registration, and recordkeeping requirements of the KDHE Radiation Control Program. Exempt materials include:

- NORM that is in its natural location;
- NORM/TENORM with very low concentrations of radioactive isotopes; and
- CCR that is beneficially used with KDHE approval.

In addition, the secretary of KDHE may approve exemptions on a case-by case basis if the public radiation dose, including exposure to the NORM/TENORM, will be below a specified level.

28-35-803. Classification and exemption of NORM waste and TENORM waste.
This regulation specifies the conditions that must be met for NORM/TENORM waste to be excluded from classification as low-level radioactive waste and to be exempt from the licensing, registration, and recordkeeping requirements of the KDHE Radiation Control Program. Excluded and exempt wastes include:

- NORM/TENORM waste with very low concentrations of radioactive isotopes;
- CCR that is placed in a landfill or surface impoundment that has been issued a solid waste permit;
- Drilling waste that is generated in Kansas. If the drilling waste is from an oil or gas well, it must be:
    - Placed in a permitted solid waste landfill;
    - Placed in a pit permitted or authorized by KCC; or
    - Land-spread as authorized by KCC.

In addition, the secretary of KDHE may approve exclusions and exemptions on a case-by case basis if the public radiation dose, including exposure to the NORM/TENORM waste, will be below a specified level.

CCR that is beneficially used with KDHE approval is not listed in this regulation because material that is beneficially used is not considered a waste.

28-35-804. Determination of exemption and classification.
This regulation specifies the methods that must be used to determine whether or not NORM/TENORM, including NORM/TENORM waste, meets the classification and/or exemption conditions of K.A.R. 28-35-802 or 28-35-803. These methods include knowledge of the material, laboratory analysis, or an alternative method approved by the secretary of KDHE.

28-35-805. Purposeful dilution.
This regulation establishes a prohibition against deliberately diluting NORM/TENORM for the purpose of rendering the material exempt from regulation unless the dilution is approved by the secretary of KDHE.

Environmental Benefit Statement

1) Need for proposed amendments and environmental benefit likely to accrue.

a. Need.
These regulations are necessary to specify the types of low-risk NORM and TENORM waste that are not considered low-level radioactive waste (LLRW) and, therefore, are not subject to the Kansas statutory prohibition on burial of LLRW. Without these regulations, all NORM and TENORM waste, regardless of radioactivity level, are technically prohibited from land burial. K.S.A. 48-1603 authorizes and directs KDHE to establish the conditions (concentration and sources) under which NORM and TENORM would not be considered LLRW. This regulation implements that directive.

b. Environmental benefit.
These regulations specify threshold levels of radioactive isotopes in NORM and TENORM, including NORM/TENORM waste. NORM/TENORM with concentrations of radioactive isotopes below these levels may be managed without regulatory oversight by the KDHE Radiation Control Program. The regulations also specify certain materials and wastes which are

known to contain relatively low levels of radioactive isotopes and may be managed or disposed of in specified ways without negatively impacting public health or the environment.

These regulations will help ensure that NORM/TENORM is appropriately managed by:

- Clarifying which disposal practices are allowable and protective of public health and the environment;
- Clarifying which NORM/TENORM wastes retain the LLRW designation and may not be disposed of by burial in Kansas; and
- Prohibiting the dilution of NORM/TENORM, if it is done to avoid regulation.

2) When applicable, a summary of the research or data indicating the level of risk to the public health or the environment being removed or controlled by the proposed regulations or amendments.

These proposed regulations provide allowances and controls on the management and disposal of NORM/TENORM in Kansas. As explained under preceding Section 1a, NORM/TENORM wastes containing low levels of radioactive isotopes are not considered LLRW; therefore, land burial in accordance with solid waste regulations is allowed. Overall, these regulations control or limit public and worker exposures by limiting the concentration of waste that can be buried in Kansas.

The proposed regulations set the following as the level below which NORM/TENORM may be managed without oversight by the KDHE Radiation Control Program:

(1) The concentration of each of the following is no greater than 185 becquerels per kilogram (five picocuries per gram) above natural background radiation:

(A) The combination of radium-226 and radium-228; and

(B) any single progeny of radium-226 or radium-228; and

(2) the concentration of all other radioactive constituents combined is no more than natural background radiation.

For the purposes of further discussion in this regulatory impact statement, this level will be referred to as "5 picocuries per gram" or "5 pCi/g."

The regulations allow NORM/TENORM containing up to 5 pCi/g to be land-disposed or otherwise managed without oversight by the KDHE Radiation Control Program. This level is set to be consistent with other regulatory agencies, as discussed in Section 3.

The regulations also allow land disposal of drilling waste from wells drilled in Kansas and coal combustion residuals (CCR) without testing of the material, based on the following information.

Drilling waste. Typical radioactive isotope levels for drilling waste produced in Kansas are much less than 5 pCi/g. KDHE conducted a sampling program in 2016 to assess typical radioactive isotope concentrations in Kansas drilling waste. In coordination with the Kansas Corporation Commission, drilling waste samples were obtained from recently used on-site disposal pits in the following six counties: Lyon, Barber, Sedgwick, Ellis, Stanton, and Logan. The analytical results showed the concentrations across the state to be generally less than 2 pCi/g. While higher concentrations may be possible in certain isolated thin shale layers, the total concentration for all generated drilling waste at any site should be well below the 5 pCi/g limit. In comparison, the

KDHE Radiation Control Program publication "Naturally Occurring Radioactive Material" (August, 2017) states that "Soil samples in Kansas typically contain 1 to 4 pCi/g of ^{226}Ra [Radium-226]." Additionally, drilling waste from oil and gas wells may only be disposed of in accordance with permits or authorizations issued by either the Kansas Corporation Commission or KDHE.

Coal Combustion Residuals. TENORM concentrations in CCR produced by Kansas facilities is not available; however, studies indicate that radium concentrations in CCR generated from diverse sources of coal range from 1 to 16 pCi/g[1], with averages for coal from the Illinois, Appalachian, and Powder River Basins of 8.0, 7.6, and 5.8 pCi/g, respectively[2].

Although these averages are somewhat higher than the exemption level of 5 pCi/g, all CCR will be managed under the oversight of KDHE. Beneficial use of CCR must be approved by the KDHE Bureau of Waste Management. All CCR disposal units are permitted by KDHE and are subject to the U.S. Environmental Protection Agency's (EPA's) coal combustion residuals rule, which has requirements for landfill design, groundwater monitoring (including assessment monitoring for radium), and corrective action [40 CFR Part 257 Subpart D].

In summary, the proposed regulatory controls regarding allowable NORM/TENORM management and disposal provide necessary safeguards to protect public health and the environment.

[1] Radian Corporation. *Assessment of NORM Concentration in Coal Ash and Exposure to Workers and Members of the Public.* Prepared for the Utility Solid Waste Activities Group, June 1988, table 3.

[2]Lauer, N; Hower, J; Hsu-Kim, H; Taggart, R; Vengosh, A. *Naturally Occurring Radioactive Materials in Coals and Coal Combustion Residuals in the United States.* Environmental Science and Technology, 2015, 49, 11227-11233, abstract.

3) If specific contaminants are to be controlled by the proposed regulation or amendment, a description indicating the level at which the contaminants are considered harmful according to current available research.

Risk from exposure to NORM/TENORM is based on time and proximity and concentration. These regulations will control public exposures to radioactive material by limiting the radioactive isotope concentration in waste that may be managed or landfilled in Kansas without oversight by the Radiation Control Program.

The U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, Public Health Statement of Radium (CAS#: 7440-14-4) states that "exposure to higher [than normal] levels of radium over a long period of time may result in harmful effects including anemia, cataracts, fractured teeth, cancer (especially bone cancer), and death" but "the amount of radium that you are exposed to and the amount of time necessary to produce these effects is not known."

The United States Nuclear Regulatory Commission (NRC) has set the following as the level in 10 CFR Part 40 Appendix A, Criterion 6(6), regarding covers for uranium and thorium mill

tailings: *"The design requirements in this criterion for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters, which, as a result of byproduct material, does not exceed the background level by more than: (i) 5 picocuries per gram (pCi/g) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface, and (ii) 15 pCi/g of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15 cm below the surface."*

EPA has also set a soil concentration limit for radium-226 in uranium and thorium mill tailings of 5 pCi/g in the first 15 centimeters of soil and 15 pCi/g in deeper soil [40 CFR 192.12(a)].

EPA references both 10 CFR Part 40 Appendix A, Criterion 6(6) and 40 CFR 192.12(a) in its guidance for remediation at Superfund/CERCLA sites (sites remediated under the Comprehensive Environmental Response, Compensation, and Liability Act).

A report prepared and presented at the Conference of Radiation Control Program Directors entitled Implementation Guidance for Regulation and Licensing of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) Part N of the Suggested State Regulations for Control of Radiation states: *"The exemption level for TENORM under Part N is 0.18 becquerels (Bq) [5 picocuries (pCi)] of radium per gram (any combination of radium-226 and radium-228). This is the same exemption level established for the clean-up of property contaminated with uranium mill tailings."*

The National Academy of Sciences and National Academy of Engineering issued a report to Congress evaluating EPA's guidelines for NORM/TENORM and comparing these guidelines to those of other organizations. The report found that "all organizations that have developed guidances for TENORM other than indoor radon have assumed essentially the same risk related to uniform irradiation of the whole body on the basis of data obtained primarily from studies of the Japanese atomic bomb survivors."[3] The report also states that "all regulatory and advisory groups have assumed about the same risk coefficients. This reflects a general acceptance by the scientific community of the linear no-threshold risk-extrapolation approach as a plausible and useful means of developing public health regulations."[4]

There appears to be general consistency among regulators for selecting 5 pCi/g as a low-risk radium level, therefore this was the level set in these regulations. No maximum concentration was set for drilling waste generated in Kansas and CCR, but rather each waste stream has been exempted from the LLRW definition based on the known characteristics and management methods for these waste streams.

[3]Committee on Evaluation of EPA Guidelines for Exposure to Naturally Occurring Radioactive Materials, National Research Council of the National Academy of Sciences and National Academy of Engineering, *Evaluation of Guidelines for Exposures to Technologically Enhanced Naturally Occurring Radioactive Materials,* 1999, page 219.

[4]Ibid., page 244.

Economic Impact Statement

1) Are the proposed regulations or amendments mandated by federal law as a requirement for participating in or implementing a federally subsidized or assisted program?
No.

2) Do the proposed regulations or amendments exceed the requirements of applicable federal law?
No.

3) Description of costs to agencies, to the general public and to persons who are affected by, or are subject to, the regulations:

a. Capital and annual costs of compliance with the proposed regulations or amendments and the persons who will bear those costs.
These regulations create no new capital or annual operating costs for generators or handlers of NORM/TENORM, including NORM/TENORM waste. The regulations formalize (legalize) historical disposal practices for wastes that contain low levels of NORM/TENORM. Any waste that would be prohibited for disposal by land burial in Kansas because it exceeds the 5 pCi/g limit was already subject to a landfill disposal ban.

This rule does not stipulate any new required testing of NORM/TENORM, including NORM/TENORM waste, to determine the concentration of radioactive isotopes. It has always been the generator's responsibility to ensure that disposed waste was not radioactive waste. It is also noteworthy that the source exemptions for coal combustion residuals (CCR) and drilling waste avoid the necessity to test the waste to determine the concentration of radioactive isotopes.

b. Initial and annual costs of implementing and enforcing the proposed regulations or amendments, including the estimated amount of paperwork, and the state agencies, other governmental agencies or other persons or entities who will bear the costs.
KDHE Radiation Control Program staff may need to evaluate requests and demonstrations submitted by the regulated community regarding: classification as low-level radioactive waste (LLRW); exemption from the licensing, registration, and recordkeeping requirements of the Radiation Control Program; alternate methods of determining if NORM/TENORM meets the exemption or classification requirements of the regulations; and purposeful dilution. KDHE may also provide some technical assistance, maintain certain records, and perform other information management duties regarding NORM/TENORM management and disposal. These duties will be absorbed by existing staff positions.

c. Costs which would likely accrue if the proposed regulations or amendments are not adopted, the persons who will bear the costs and those who will be affected by the failure to adopt the regulations.
Since this regulation simply clarifies and legalizes what is already taking place with respect to most NORM/TENORM disposal, the cost savings associated with the adoption of this regulation cannot be calculated. However, if these regulations are not adopted, various parties could incur unnecessary costs.

For example, without these regulations, a generator of low-level NORM/TENORM waste could mistakenly assume that such waste requires highly expensive out-of-state disposal at an LLRW disposal site, or a third party could claim that such a waste constitutes LLRW waste in Kansas in accordance with state law and seek legal action to require disposal in an LLRW site. Unnecessary disposal in an LLRW site could result in costs of approximately $200 per cubic foot compared to $1 to 2 per cubic foot for disposal in an in-state municipal solid waste (MSW) landfill.

Formalizing the general exemption for drilling waste and CCR saves money related to both laboratory analysis (about $120 per sample) and waste disposal.

Drilling an oil or gas well can produce roughly 10,000 to 100,000 cubic feet (ft^3) of drilling waste. Coal-burning power plants can produce roughly 50,000 to 10,000,000 ft^3 of coal combustion residuals. Costs that could be incurred if these regulations are not adopted are shown in the table below.

ft^3	$/$ft^3$	$
10,000	200	$ 2,000,000
50,000	200	$ 10,000,000
100,000	200	$ 20,000,000
10,000,000	200	$ 2,000,000,000

d. A detailed statement of the data and methodology used in estimating the costs used in the statement.
As explained in preceding Section 3c, estimated cost savings associated with this regulation cannot be exactly calculated because most, if not all, covered low-concentration NORM/TENORM waste is already being managed in a manner that these regulations will legalize.

Analytical laboratory costs represent those costs (about $120 per sample) paid by KDHE to the Iowa State Hygienic Laboratory when implementing the 2016 drilling pit sampling effort.

The LLRW disposal cost information represents approximate values ($200 per cubic foot) for disposal of LLRW waste in the two out-of-state facilities that will accept LLRW generated in Kansas: Energy Solutions in Utah and Waste Control Specialists in Texas. The MSW landfill disposal cost ($25 to $50 per ton, or $1 to $2 per cubic foot) represents an approximate average cost of special waste disposal in MSW landfills in Kansas.

General knowledge of oil and gas industry was used to determine the volume of drilling waste produced. Coal burning power plants in Kansas generated between 1,900 and 392,028 tons of industrial waste in 2016, most of which was CCR. Conversion to cubic feet was made using a density for CCR of 1 ton per cubic meter.

e. Description of any less costly or less intrusive methods that were considered by the agency and why such methods were rejected in favor of the proposed regulations.
There are no less intrusive or less costly methods available for consideration by KDHE to

achieve the purposes of the proposed regulations.

f. Consultation with League of Kansas Municipalities, Kansas Association of Counties, and Kansas Association of School Boards.

Municipalities, counties, and school boards will not incur any costs as a result of the regulatory changes. However, the three organizations will be contacted electronically with attached copies of the proposed regulations, regulatory impact statement, and notice of hearing at the time the notice of hearing is published in the *Kansas Register*.