

The Colorado Department of Public Health and Environment (CDPHE) will begin enforcing its rules in accordance with 6 CCR 1007-1, Part 20 regarding Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) on July 14, 2022. By this date, every facility that has suspected TENORM materials will have to have completed all initial testing and registrations.

Part 20 refers to extraction operations across numerous industries, most notably oil and gas, mining, drinking-water treatment, wastewater treatment, waste disposal, feed stock and biosolids. The CDPHE requires these industries, or any that may handle, dispose of or produce products known to potentially contain TENORM, to perform testing. The results of the tests will determine whether the facility qualifies for exempt, registered, or licensed status and will keep a facility in compliance with the CDPHE TENORM regulation.

The following guidance document outlines what material needs tested, testing procedures and what the results of those tests mean for a facility.

TENORM-Containing Isotopes

- Radium-226
- Radium-228
- Lead-210
- Polonium-210

Material to be Tested

- Produced Water
- Scrap metal pipes with signs of scaling used in the oil and gas industry that are over 50 feet in length
- All tank bottoms that have held products that potentially contain TENORM
- Equipment cleanouts
- Filter socks
- Natural gas processing equipment
- Pigging wastes
- Other oil and gas processing wastes

Testing Procedure

- Collect a set of three to six preliminary simple random samples from the material for laboratory analysis
- Samples may be three to six grab (liquid) samples or three to six composite (solid) samples
- Calculate the mean and variance of the net concentrations using the equations (2a) and (3a) in Table 9-1 of the SW-846 Chapter 9 document
- Then calculate the appropriate number of samples using the mean, variance, and the Regulatory threshold following the equation (8) in Table 9-1 of the SW-846 Chapter 9 document
- The Regulatory Threshold could be either the exempt concentration for exemption demonstration or the registration limitation for registration demonstration
- If the appropriate number of samples is less than the number of existing samples, no more samples are needed. Otherwise, additional samples are needed
- If additional samples are taken, repeat the above steps (2) and (3) until appropriate number of samples have been taken
- Calculate the upper limit of the confidence interval using the equations (4), (5), and (6) in Table 9-1, and the appropriate “t” value in Table 9-2 of the SW-846 Chapter 9 document
- Compare the upper limit of the confidence interval with the Regulatory Threshold; for example, if the upper limit of the confidence interval is less than the exempt concentration, the material is exempted

Facility Status

- Three levels of facility status: Exempt, Registered, and Licensed
 - *Exempt* facilities are those whose samples tested according to the above procedure show that the confidence interval is less than the exempt concentration of 100 millirems.
 - A *registered* facility has known materials containing TENORM that it generates, handles, processes, transfers, receives, transports, disposes of, or beneficially uses that are not under the exempt classification and pose a radiological risk to workers or members of the public and exceed 100 millirem annual public dose standard if no controls are in place.
 - A facility falls under the *licensed* category if it has known materials containing TENORM that it generates, handles, processes, transfers, receives, transports,

disposes of, or beneficially uses that are not under the exempt or registered classification and pose a radiological risk to workers or members of the public and substantially exceed 100 millirem annual public dose standard if no controls are in place and no substantial regulatory oversights are imposed.

- If a facility is exempt, no other action is needed, but CGRS recommends saving the testing records.
- If TENORM levels meet Registered or Licensed thresholds, the facility needs to file with the appropriate status to the Colorado Department of Public Health and Environment (CDPHE) by July 14, 2022.
- Facilities may need to perform periodic sampling on a case-by-case basis if the CDPHE deems it necessary. Facilities also need to retake TENORM determination sampling tests if a material has or will change its properties or a change to the material or process occurs.

Spills

- Exempt TENORM facilities do not need report spills to the CDPHE
- Registered and Licensed TENORM status facilities are required to report spills

Disposal

TENORM-containing material should be disposed of as follows:

- Disposal at commercial solid waste disposal facility registered with the CDPHE in accordance with this Part
- Disposal at a facility authorized to receive such material under terms of a specific radioactive materials license, a Part 20 TENORM registration, or equivalent licensing document issued by the Department, Nuclear Regulatory Commission (NRC) or any Agreement State, or to any person otherwise authorized to receive such material by the Federal Government or any agency thereof, the Department, or an Agreement State

Training

Training – which can be done electronically – is required for all individuals who may contact or work with TENORM material at registered and licensed facilities *only* must cover the following sections:

- The storage, transfer or use of sources of radiation
- General awareness in the health-protection problems associated with exposure to radiation and/or radioactive material to the individual and potential offspring, designed to

enable the employee to recognize and identify exposure to radiation and/or radioactive material

- Requirements of this Part that are specifically applicable to the functions or activities the employee performs
- The employee's responsibility to observe, to the extent within the worker's control, the applicable provisions of the Radiation Control Act, 6 CCR 1007-1, this Part and specific measures the employer has implemented for the protection of personnel from exposures to radiation or radioactive material
- The employee's responsibility to report promptly to the registrant any condition which may constitute, lead to, or cause a violation of this Part and registrations, or unnecessary exposure to radiation and/or radioactive material
- Methods and procedures for avoiding incidents
- Emergency response information, including the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation and/or radioactive material, and the procedures for mitigating any spill or release

Resources

For questions or concerns, contact:

- CGRS Energy Services – 800.288.2657
- Rad Pros – 720.772.0200
- Dr. Shiya Wang, CDPHE Environmental Protection Specialist – 303.692.2000