Comprehensive Radiation Protection Plan

Rev. 1.2 - October, 2025

Plan Prepared By:

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This CRPP was reviewed by Randy Hansen CHP. Mr. Hansen has over 35 years direct experience in the field of radiation protection and is certified by the American Board of Health Physics.

RSO – The radiological Safety Officer is Mr. Robert Bealko.

Curriculum Vitae and Credentials Packet: Upon request

I have reviewed and approved the CRPP for CNX facilities dated October 2025.

Randy Hansen, CHP, CSP, CPEA

Date: 10/14/25

1. Introduction

In December of 2000, the Pennsylvania Department of Environmental Protection (PADEP) promulgated regulations requiring monitoring for radiation and radioactive materials (Pennsylvania Code, Article IX). The State has also prepared a companion guidance document, "*Final Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities*" (PADEP Document Number: 250-3100-001). CNX operations involve the collection and handling of drill cuttings, production water, flow-back solids/sludge, and pipe scale resulting in waste products containing elevated levels of Naturally Occurring Radioactive Materials (NORM) and Technologically Enhanced Naturally Occurring Radioactive Materials (TENORM). This Comprehensive Radiation Protection Plan (CRPP), in conformance with 25 PA Code 293.111 requirements, has been developed to provide radiological monitoring, safety guidance, and regulatory requirements to personnel working at CNX locations.

While most experts agree there is “little potential for significant radiological exposure to workers and members of the general public related to E&P operations” (PADEP 2015), there can be environmental and regulatory issues of importance.

This CRPP identifies potential sources of radiation across the gambit of CNX oil/gas operations. It details the type of monitoring needed to identify potential sources of radiation, steps to keep worker exposure as low as reasonably achievable (ALARA), proper handling, as well as transportation and disposal of each potentially radioactive waste stream generated throughout CNX operations.

The intent of this CRPP is to provide a common-sense graded approach to radiation hazards identification and mitigation. The suggested surveys and controls made throughout are designed to be commensurate with the potential hazards that workers could encounter while working at CNX sites.

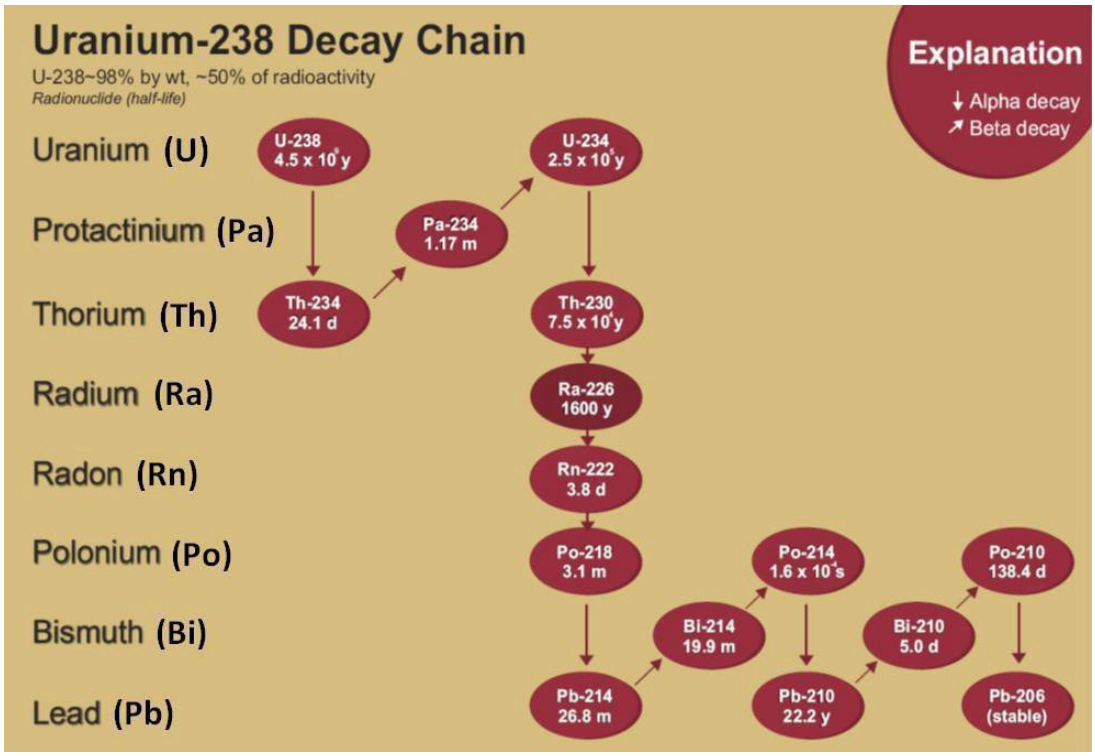
2. Background

Marcellus and Utica shale and other geologic formations rich in oil and gas (O&G) resources may contain NORM, specifically uranium (U), U-238 parent and thorium (Th), Th-232 parent, and their decay progeny, as well as Potassium-40 (K-40). These series occur naturally and are the most prevalent of the three natural decay series, the third being the actinium (Ac), U-235 parent. The decay series of U and Th are illustrated in **Figures 2-1** and **2-2**, respectively. Surface soil typically contains approximately 1 to 2 picocuries per gram (pCi/g) of both the U and Th series radionuclides with all of the series members at approximately equal activity, i.e., secular equilibrium. The radioactive materials, including TENORM, are brought to the land surface by O&G activities.

O&G activities concentrate the natural concentration of primordial radionuclides to create TENORM.

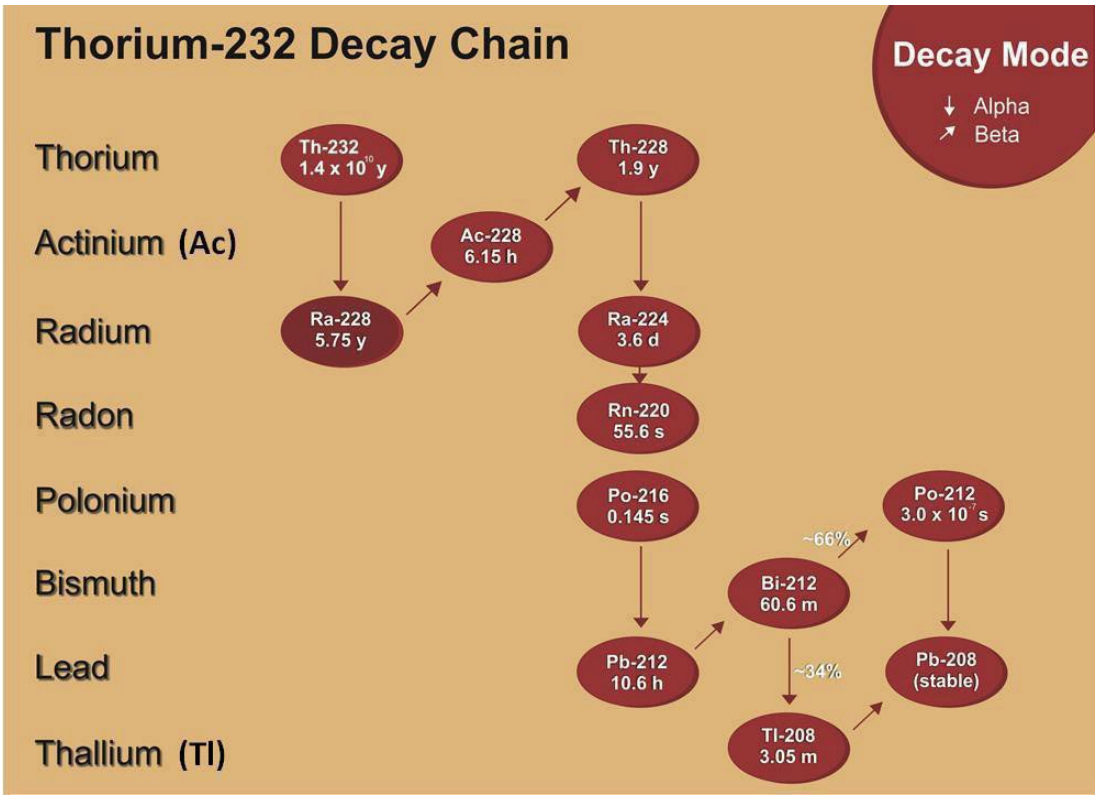
While no clear national standard currently exists regarding the generation and control of TENORM, CNX is taking proactive steps to ensure the protection of our workers, contractors, subcontractors and the environment.

Figure 2-1. Uranium-238 Decay Chain



Note: y = years, d= days, h = hours, m = minutes, and s = seconds

Figure 2-2. Thorium-232 Decay Chain



Note: y = years, d= days, h = hours, m = minutes, and s = seconds

3. CNX Company Policy

CNX is committed to conducting business in ways that mitigate impacts and risks to people, safety, health, and the environment. This is embedded in each of the Company's foundational core values: Responsibility, Ownership, and Excellence.

It is the policy of CNX to conduct business in compliance with all applicable state and federal health, safety and environmental laws and regulations, including permit conditions. In addition to compliance with these requirements, CNX is committed to being a steward of the environment in all communities in which we operate. All CNX employees, regardless of their role, are expected to perform their assigned duties within the scope of the law and in compliance with health, safety, and environmental laws and regulations. All CNX employees are required to immediately report any actual or potential violations of environmental laws, regulations, practices or policies to their supervisors and the Operational Excellence (OE) department.

4. Stop Work Empowerment

No job or activity is considered a success if CNX compromises the safety of its employees, contractors, visitors, or the surrounding communities, or if it adversely impacts the environment. CNX employs stop work empowerment, where every person working at a CNX location is empowered to stop work if they feel there is a risk to themselves, others, or the environment.

If adverse safety or environmental conditions are identified, CNX empowers its employees and contractors to take corrective actions or stop work, immediately, without fear of repercussions.

5. Purpose/Scope/Applicability

The body of this CRPP provides a general/programmatic approach to radiation protection and radioactive waste management. The appendices break down each facet of CNX O&G exploration and production and provide site specific information to workers at each type of facility.

The three primary purposes of this CRPP are:

1. Provide information regarding the nature and extent of radiological hazards related to exploration and production of oil/gas.

2. Detail actions necessary to ensure protection of our workers and the environment.

3. Ensure that CNX operations comply with all applicable federal, state and local laws.

6. Program Self-Assessment

This program will be reviewed, at a minimum, on an annual basis by the Radiation Safety Officer or a third-party Health Physicist (Radiological Consultant) and the results documented in writing. The procedures and protocols used to implement this program will be used as working documents, for training, and operational guides and will, therefore, be continually reviewed.

7. Radiation Protection Program Administration

A. Management Responsibilities:

The CNX Operational Excellence department is primarily responsible for the programmatic oversight of this CRPP. Field operations supervisors and other personnel should be familiar with the information and requirements of this plan and should contact the Radiation Safety Officer with questions regarding its implementation.

B. Contractor and Subcontractor Responsibilities

Contractors and subcontractors working with NORM/TENORM and other radioactive materials shall have a Radiation Protection Plan similar in scope and nature. Using ISNetworld, CNX can verify that the plans exist and may request copies of the plan to ensure contractor/subcontractor personnel are aware of the potential sources, control measures and effects of NORM/TENORM and other radioactive materials they may encounter at CNX facilities.

C. Radiation Safety Officer (RSO)

The RSO will be responsible for the implementation and compliance of the CRPP and will provide technical assistance and direction for conducting the program. The RSO will be notified immediately of any radiologically unsafe conditions that may occur. The RSO will also have unfettered access to communicate directly with CNX executive leadership on issues of radiological safety.

The RSO is responsible for:

- Coordinating any clean-up/remediation regarding radioactive materials.
- Verifying that Controls/Training are sufficient for the jobs being performed.
- Making the notifications to the State as specified in this CRPP.
- Modifying or updating this CRPP.
- Ensuring a periodic audit of the CRPP implementation to ensure personnel understand and implement the actions specified in this CRPP.
- Maintaining all survey forms, instrument calibration records, daily check forms, and audit / assessment records.

D. Training Coordinator

The training coordinator is responsible for maintaining the CNX Training Matrix and ensuring that relevant personnel have received the required Training specified in this CRPP. The training coordinator is also responsible for maintaining the records of training and will be able to provide them upon request.

E. Radiological Consultant(s)

Radiological Consultant(s) are responsible for providing assessments and advice on the nature, analysis, and disposition of material identified as exceeding the levels noted in this Plan. Radiological Consultant(s) will also be responsible for providing specialized training as mentioned in the section below.

8. Training

Radiation Training will be provided to employees based on job function and their potential exposure to radioactive materials. There are three levels of training available:

A. Radiation Awareness Training
This training will be provided to CNX employees performing work with or around NORM/TENORM or other radioactive materials. This training will be provided to new employees as part of their on-boarding training. This training is provided by the training coordinator.

B. NORM/TENORM Surveyor Training
This is a 4-hour training course that is required for employees that will be performing radiation and contamination surveys or that may be supervising or assisting with survey operations. This training is provided by a Radiological Consultant.

C. RSO Training
This is a 40-hour training course that is required for the RSO. The training is provided by a Radiological Consultant and needs to be renewed every 5 years. Renewal can be accomplished by completing an 8-hour refresher training course.

9. General Survey and Monitoring Requirements

To ensure personnel are not exposed to radiation above regulatory limits and to ensure regulatory compliance, radiological surveying and monitoring will be performed. Listed below are different types of surveys associated with the CRPP procedures:

General Area Gamma Survey – Performed with a gamma instrument with proper sensitivity to identify 5-5000 µR/hr (Ludlum Model 19 or equivalent). Dose readings should be taken at waist level with the objective being to observe fluctuations in general area dose rates. Readings taken 30 cm from a source are considered general area.

Contact Dose Rate Survey – Can be used to evaluate elevated general area dose rates and determine the source. Contact dose rates are also used to estimate waste concentrations.

DOT Shipping Surveys – Required if waste exceeds 270 pCi/g for combined Ra-226 and Ra-228 or if a container exceeds 90 µR/hr on contact. Shipping surveys include removable contamination wipe evaluation and driver's cab dose evaluation.

Removable Contamination Surveys – Smears or "swipes" are taken using a dry filter paper or NuCon type smear. Using moderate pressure, the surveyor wipes a ~20 cm "S" area (approximately 100 cm^2). Wipes are counted in an alpha/beta smear counter (Ludlum 2929 or equivalent) and reported in units of disintegration per minute per 100 cm^2 (DPM/100 cm^2).

Airborne Radioactivity Survey – Can be taken to determine radioactive airborne particulate and/or Radon concentration. Particulate samples are taken by drawing a known volume of air through a 47mm filter, counting the filter for alpha/beta using a Ludlum 2929 or equivalent, and calculating Derived Air Concentration (DAC)

Radon air samples can be taken using a passive charcoal filter (Accustar or equivalent) or by real time measurements (FemtoTech CRM-510 or equivalent).

Table 9-1 below details the types of surveys that should be performed at the frequency listed. It is meant to allow CNX to establish a baseline understanding of radiological hazards across the gambit of our operations and facilities. The RSO will ensure the survey of every site in every stage quarterly. If unexpected conditions are observed at the representative location/facility, additional surveys of like facilities should be conducted to determine if the condition is systematic.

This survey schedule will be reviewed on a yearly basis and adjusted according to the prior years results. Survey frequency at sites and during activities where minimal radiological hazards are identified, may be surveyed quarterly. Conversely, if an adverse/unexpected condition is recognized, the survey frequency and/or type can be expanded and potentially increased to monthly surveys.

It should be noted that the tables below list various types of radiological measurements that can be confusing. While this information is discussed in detail during worker awareness training, a brief summary of the various units of measurement commonly encountered are discussed below.

Curie – Is a unit of decay that was originally defined as "the quantity or mass of radium emanation in equilibrium with one gram of radium (element)" but is currently defined as 1 Ci = 3.7×10^{10} decays per second. Curies, or fractions thereof are typically used to measure concentrations (activity per unit pass).

- TENORM waste must not exceed 270 pCi/g (combined Ra-226 and Ra-228) without proper transportation controls.
- Allowable waste concentration in West Virginia 50 pCi/g (combined Ra-226 and Ra-228)

- Allowable waste concentration in Ohio 6.99 pCi/g (combined Ra-226 and Ra-228)

REM (Roentgen Equivalent Man) – A gamma dose measurement which combines the amount of energy (from any type of ionizing radiation that is deposited in human tissue), along with the medical effects of the given type of radiation.

- A worker in a nuclear plant is permitted to receive a maximum of 5 REM/yr.
- Each man, woman and child receive 360 mrem/yr from natural sources.
- Employers are required to monitor workers if they are expected to exceed 100 mrem/yr from all occupational sources (direct exposure, inhalation and ingestion).

Gamma Radiation Units			
Unit		Equals	
1	REM	1000	Millirem (mrem)
1	mrem	1000	Microrem (µrem)

Micro Roentgen per Hour vs. Roentgen Equivalent Man (REM)

- **Micro Roentgen per Hour (µR/hr)** measures **radiation exposure rate**—the amount of ionizing radiation present in the environment. It's a raw measure of how much radiation is being emitted in a specific location.
- **Roentgen Equivalent Man (REM)** measures **biological effect**—it accounts for how different types of radiation impact human tissue, factoring in their ability to cause harm.

Convert µR/hr to REM

1. **Understanding the Units**:

   - **1 Roentgen (R) ≈ 1 rad (absorbed dose in tissue)** for gamma radiation.
   - **1 rad ≈ 1 REM** for gamma and beta radiation.
   - **1 Roentgen = 1,000,000 micro Roentgen**.

2. **Conversion Steps**:

   - Take the measured µR/hr value and multiply it by the exposure time in hours to get a total µR dose value.
   - Convert to Roentgens by dividing by **1,000,000**.
   - Adjust for biological effects if necessary (for non-gamma radiation, apply radiation weighting factors).

What REM is Used For

- **Radiation Protection**: Helps assess health risks and set exposure limits.

- **Occupational Safety**: Used in regulations to protect workers in radiation environments.
- **Public Health Monitoring**: Used to track natural background radiation exposure and potential hazards.
- **Medical Dosimetry**: Helps determine safe exposure levels for medical imaging and treatments.

Field Implementation

Time, Distance, and Shielding Calculations

Time Dose Calculations

The most straightforward and widely used method for determining radiation dose involves analyzing the radiation rate in relation to the duration of exposure near the source. The equation for this calculation is as follows:

Dose=Dose Rate x Time

Time dose calculations help assess radiation exposure for members of the general public near fence lines and boundaries of restricted areas, as well as occupational workers who do not have assigned dose badges. A typical gamma exposure limit for NORM/TENORM is set at 50 micro Roentgen per hour (μR/hr), based on the annual public dose limit. This calculation assumes a working year of 2,000 hours and follows the field method conversion of 1 Roentgen (R) to 1 Roentgen Equivalent Man (REM).

50 microR/hr x 2,000hr/yr = 100,000 microR/year = 100 mrem/yr =0.1 Rem/yr

Table 9-1 Survey Frequency and Type

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Active Drilling Site (survey a different facility each time)	X	Quarterly	Perform gamma surveys of tanks, process equipment, and drill cuttings.
Active Completions Sites (survey a different facility each time)	X	Quarterly	Perform gamma surveys of tanks and process equipment.
Wells in Production (survey a different facility each time)	X	Quarterly	Focus gamma surveys on wastewater storage tanks and process equipment.
Midstream Compressor Stations (survey a different facility each time)	X	Quarterly	Perform gamma surveys of process equipment and upon system breach when performing maintenance and/or pigging. Survey pigging equipment, work area and waste containers.
Waste Water Storage and Transfer, ASTs and Impoundments (survey a different facility each time)	X	Quarterly	Perform gamma surveys around perimeter of impoundment, on waste containers and associated piping.
Equipment Storage Facilities (survey a different facility each time)	X	Quarterly and upon receipt of potentially contaminated equipment, prior to recycling	Survey potentially contaminated equipment when accepted for storage and prior to sending to a landfill or recycling facility.
Well Plugging (survey a different location each time)	X	Quarterly	Survey piping and equipment that will be recycled. Release to recycle melting facilities is 50 µR/hr.
Transportation Surveys	X	Every waste container is surveyed	Perform gamma surveys of inbound waste containers and gamma dose rate surveys of outgoing waste containers prior to transportation.

Table 9-2 provides permissible exposure thresholds for radiation workers and members of the general public. Typically, individuals working at CNX facilities will not receive >100 mrem/yr, similar to members of the general public.

Table 9-2 Exposure Information/Limits

Target Group	Average Gamma Exposure (mrem/yr)
Average Annual Exposure to Members of the General Public from All Naturally Occurring Sources	360
Annual Occupational Dose Limit for Untrained, Unmonitored Workers from All Work-Related Sources (direct gamma + inhalation)	100
Annual Occupational Dose Limit for Radiation Workers from All Work-Related Sources (direct gamma + inhalation)	5000

Table 9-3 provides additional definitions and limits related to the CRPP.

Table 9-3 Radiation /Contamination Limits

	Definition	Applicable Regulatory Citation
Radiation Area	An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 rem (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates.	10CFR20.1003
Equipment Unconditional Release	Equipment, room or area with removable contamination <20 dpm/100 cm2 alpha, 1000 dpm/100cm3 beta	Reg Guide 1.86
Airborne Radioactivity Area	A room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations—(1) In excess of the derived air concentrations (DACs) specified in §§ 20.1001- 20.2401, or (2) To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6percent of the annual limit on intake (ALI) or 12 DAC-hours	10CFR20.1003
Landfill Alarm Set Point	10 µR/hr above background at portal monitor face	Various State Rules
Recycle Facility Alarm Set Point	50 µR/hr	Various State Rules

10. Action Level Responses

Action Level 1 – If dose rates of 10 µR/hr above background or greater are measured on any vehicle, container surface the event becomes Action Level 1.

For this CRPP, radiation monitoring equipment at the facility or well site indicating the following dose rate readings shall be used as Action Level 1 thresholds:

A) General areas-

- If the area is found to exceed Action Level 1 (10 µR/hr above background in the general area (30 cm from the source)) **OR** 90 µR/hr on contact using a hand-held instrument, the following protocol is required: notify the RSO, terminate any further actions in the area and restrict access to that area. The RSO will conduct further survey activities.

B) Waste Transportation Vehicles –

- PADEP regulations require an alarm set-point, at any detector element, from a gamma exposure rate from a cesium-137 source, no higher than 10 micro roentgen per hour (µR/hr) above the average local background. However, fixed alarming detectors are typically only found at landfills. At oil/gas field facilities, hand-held detectors are used in lieu of fixed portal type alarming detector systems.

- If a vehicle is found to exceed Action Level 1 (10 µR/hr above background in the general area (30 cm from the source)) **OR** 90 µR/hr on contact using a hand-held instrument, the following protocol is required:

  - Remove the vehicle to the Designated Area for vehicles found to contain RAM and contact the individual responsible for waste at the facility or well site.

  - Promptly survey the vehicle surfaces at a distance of 2 inches (5 cm) with a portable radiation survey meter to determine if Action Level Two levels are exceeded.

  - If the waste load is to be rejected, contact the appropriate DEP Area Health Physicist for approval.

  - If the waste is to be rejected and the driver leaves with the vehicle without a DOT Special Permit and before the RAM can be evaluated, immediately contact the Pennsylvania State Police and DEP's Area Health Physicist and apprise them of the situation. Provide them with any information you may have on the vehicle such as make, model, color, company name, license plate number, time of departure, direction in which the vehicle was traveling, and, if possible, the intended destination. This is to ensure that the driver is safe but does not dispose of the contaminated waste improperly.

  - If the waste is to be accepted for storage in the CNX AST, no further

action is required

- If the waste is to be transported to the landfill, ensure DOT requirements are met, and the landfill is willing and able to accept the waste material given the measured external gamma exposure rate.

C) MASS AST and other areas of the site –
   - MASS ASTs are generally stationary, not used for transport of material on public roads, and are likely to exceed Action Level 1 due to buildup of TENORM in the sludge.
   - If a MASS AST or other general area site survey is found to exceed Action Level 1 (10 µR/hr above background in the general area (30 cm from the source)) **OR** 90 µR/hr on contact using a hand-held instrument, the following protocol is required: Promptly notify the RSO and compare the survey results to Action Level 2.

Action Level 2 – If dose rates of 2,000 µR/hr (2 mrem/hr) or greater are measured on any vehicle, container surface, or anywhere at the site, the event becomes Action Level 2.

For this CRPP, the following dose rate readings shall be used as Action Level 2 thresholds:

A) General Areas –
   - If a General Area is found to exceed Action Level 2 (2 mrem/hr above background) the following protocol is required: Notify the RSO, terminate any further actions, post the area as a radiological area, and contact the Radiological Consultant to characterize the identity of the material.
   - For additional information, refer to the Radiation Protection Action Plan (RPAP) for the site. Notification of the Regional PA DEP BRP Office/DEP Area Health Physicist may be required.

B) Waste Transportation Vehicles –
   - If the cab radiation level is over 2000 µR/hr (2 mrem/hr), the vehicle surface radiation level is over 50 mrem/hr, or radioactive contamination is detected, the facility should immediately notify the RSO and contact the Regional PA DEP BRP Office/DEP Area Health Physicist for guidance.
   - If there is no radioactive contamination, or the vehicle surface is less than 50 mrem/hr **and** the cab radiation level is less than 2 mrem/hr, implement the following procedure:
     - Notify the RSO.
     - Promptly relocate the vehicle or container to the Designated Area (or establish an isolation zone).
     - Relocate the driver and all other personnel at least 50’ from the truck and ensure the isolation zone where the perimeter dose rate is less than 2 mrem/hr.
     - Using appropriate instrumentation and measurement set-up, identify the radioisotope (i.e., via gamma spectroscopy).
     - In the designated area, survey the exterior of the vehicle with a portable

survey meter set at the most sensitive setting and hold meter no more than 2 inches (5 cm) from all vehicle surfaces. Mark areas where radiation levels appear to be the highest.

- Physically secure the load against removal or inadvertent disposal (i.e., leaks)
- Do not allow the vehicle to leave the facility without the permission of the Department, and the driver being issued a DOT Special Permit signed by the AHP or designee.
- If the driver leaves with the vehicle and without a DOT Special Permit and before the RAM can be evaluated, contact the Pennsylvania State Police and provide them with any information you may have on the vehicle such as make, model, color, company name, license plate number, time left and direction traveling.
- All incidents of detection of prohibited Level 2 radioactive material will be immediately reported to the Regional PA DEP BRP Office/DEP Area Health Physicist. Proceed as directed by the Area Health Physicist.

C) MASS AST and other areas of the site –

- If a MASS AST or other general area site survey is found to exceed Action Level 2 (2 mrem/hr general area above background) the following protocol is required: Notify the RSO, terminate any further actions, post the area as a radiological area, and contact the Radiological Consultant to characterize the identity of the material.
- For additional information, refer to the RPAP for the site. Notification of the Regional PA DEP BRP Office/DEP Area Health Physicist may be required.

11. Packaging and Transport of Radioactive Materials

Several types of waste are generated during the E&P process. Table 11-1 details the various types of waste, how/where they can be expected, transportation precautions, and disposal options.

If suspect class 7 is encountered (sample results >270 pCi/g for combined Ra-226 and Ra-228 or contact gamma exposure rate of 90 µR/hr), contact the RSO for further instructions.

While equipment is not likely to exceed the Class 7 concentration threshold due to the nature of contaminate distribution (surface contamination only), equipment found in excess of 90 µR/hr should be further evaluated prior to transportation. If you have any questions regarding packaging and/or transportation of contaminated equipment, contact CNX RSO for further instructions.

Applicable transportation rules are defined in 49 CFR Parts 100-185 and 10 CFR 20 Part 71.

Waste in excess of 270 pCi/g (combined Ra-226 and Ra-228) or in excess of 90 µR/hr and < 500 µR/hr is considered Class 7 (LSA-1 UN 2910) radioactive waste and requires special surveys and paperwork. Waste containers in excess of 500 µR/hr is (LSA-1 UN 2912) and requires special

surveys, paperwork, placarding and labeling.

CNX has waste transported to various local and out-of-area facilities for disposal. Additional information about these facilities can be found on the Disposal Site spreadsheet, which is located on Sharepoint in the Operational Excellence folder. This spreadsheet is maintained by the RSO.

SWOps (Solid Waste Operations) Application -
All solid waste that is generated on a CNX site will be tracked using the CNX SWOps application. SWOps will be used regardless of waste type or if a contractor is handling it. Liquid waste is tracked in a separate application (H2Ops).

Waste Profiles-
All waste profiles for CNX sites must be created under CNX Resources.

Table 11-1 Waste Summary

Waste Type	Typical Ra-226 and Ra-228 Concentration	Typical Gamma Dose Rate	Where its found	Disposal Option	Hazard Rating	Transportation considerations
Vertical Drill Cuttings	< 5 pCi/g	Similar to background	Generated during vertical phase of drilling	Drill cuttings are considered NORM (not TENORM) and can be disposed at most PA, WV mono cell and Ohio landfills	Worker Exposure - Extremely Low Environmental Impact - Very low however spills can potentially have a negative environmental impact. Transportation risk - Very Low	Transport in liquid tight container
Horizontal Drill Cuttings	<5 to 30 pCi/g (PADEP Avg was 9.82 pCi/g)	Similar to background	Generated during horizontal phase of drilling	Drill cuttings are considered NORM (not TENORM) and can be disposed at most PA, WV mono cell and Ohio landfills	Worker Exposure - Extremely Low Environmental Impact - Very low however spills can potentially have a negative environmental impact. Transportation risk - Very Low	Transport in liquid tight container
Hydraulic fracturing fluids (combination of fresh water, produced water and flowback fluid)	Ra-226 64.0-21,000 pCi/L, Ra-228 4.5-1,640 pCi/L	Similar to background	Commingled fluids used for hydrofracturing. Found in flowback tanks, gas busters, produced water tanks, ASTs and centralized impoundment ponds	Brine recycling facility or Class II Injection well	Worker Exposure - Extremely Low Environmental Impact - Very low however spills can potentially have a negative environmental impact. Transportation risk - Very Low	Transport in liquid tight container
Flowback Fluid	Ra-226 551 pCi/L-25,500 pCi/L, Ra-228 248-1,740 pCi/L	Similar to background	Commingled fluids used for hydrofracturing. Found in flowback tanks, gas busters, produced water tanks, ASTs and centralized impoundment ponds	Brine recycling facility or Class II Injection well	Worker Exposure - Very Low Environmental Impact - Low however spills could adversely affect the environment.	Transport in liquid tight container
Produced water	Ra-226 40.5 pCi/L-26,600 pCi/L, Ra-228 26.0-1,900 pCi/L	Similar to background	Commingled fluids used for hydrofracturing. Found in flowback tanks, gas busters, produced water tanks, ASTs and centralized impoundment ponds	Brine recycling facility or Class II Injection well	Worker Exposure - Very Low Environmental Impact - Low however spills could adversely affect the environment.	Transport in liquid tight container
Completions Solids/Sludge	Average <5 to 75 pCi/g* as high as 3000 pCi/g	Dose rates up to several hundred µR/hr	Drill plug residual, flowback and AST bottoms, centralized impoundments	Landfill or third-party waste processing facility based on concentration (see Table 9-2)	Worker Exposure - Low avoid inhalation/ingestion, practice good hygiene. Environmental Impact - Low however spills could adversely affect the environment. Transportation Hazard - Moderate	Waste in excess of 270 pCi/g (combined Ra-226 and Ra-228) or in excess of 90 µR/hr AND < 500 µR/hr is considered Class 7 (LSA-1 UN 2910) radioactive waste and requires special surveys and paperwork. Waste containers in excess of 500 µR/hr is LSA-1 UN 2912) and requires special surveys, paperwork, placarding and labeling.

Waste Type	Typical Ra-226 and Ra-228 Concentration	Typical Gamma Dose Rate	Where its found	Disposal Option	Hazard Rating	Transportation considerations
Scale	Average <480 to 400,000 pCi/g*	Dose rates up to several hundred µR/hr	Flowback, production and midstream piping and equipment. Water lines associated with separators, (separate gas from the oil and water). Heater treaters (divide the oil and water phases). Gas dehydrators, where scale deposits as thick as four inches may accumulate	Radioactive Waste Landfill or third-party waste processing facility based on concentration (see Table 9-2)	Worker Exposure - Moderate avoid inhalation/ingestion, practice good hygiene. Environmental Impact - Moderate however spills could adversely affect the environment. Transportation Hazard - High, likely Class 7 Radioactive Waste.	Waste in excess of 270 pCi/g (combined Ra-226 and Ra-228) or in excess of 90 µR/hr AND < 500 µR/hr is considered Class 7 (LSA-1 UN 2910) radioactive waste and requires special surveys and paperwork. Waste containers in excess of 500 µR/hr is LSA-1 UN 2912) and requires special surveys, paperwork, placarding and labeling.
Filter socks	<5 to several hundred pCi/g	Dose rates up to several hundred µR/hr	All phases of water filtration	Landfill, Radioactive Waste Landfill or third-party waste processing facility based on concentration (see Table 9-2)	Worker Exposure - Moderate avoid inhalation/ingestion, practice good hygiene. Environmental Impact - Moderate however spills could adversely affect the environment. Transportation Hazard - High, likely Class 7 Radioactive Waste.	Waste in excess of 270 pCi/g (combined Ra-226 and Ra-228) or in excess of 90 µR/hr AND < 500 µR/hr is considered Class 7 (LSA-1 UN 2910) radioactive waste and requires special surveys and paperwork. Waste containers in excess of 500 µR/hr is LSA-1 UN 2912) and requires special surveys, paperwork, placarding and labeling.
Gas Plant Equipment	<5 to several hundred pCi/g if scale is present	30-70 µR/hr average with 1000 µR/hr max.	Reflux pumps, propane pumps and tanks, other pumps, and product lines	Decontamination and release, Landfill, Radioactive Waste Landfill or third-party processor	Worker Exposure - Avoid disturbing scale during maintenance activities. Equipment with visible scale will likely exceed 10 µR/hr and may set off portal alarm at landfill. Environmental Impact - Moderate however spills could adversely affect the environment. Transportation Hazard - Moderate, likely Class 7 Radioactive Waste.	Waste in excess of 270 pCi/g (combined Ra-226 and Ra-228) or in excess of 90 µR/hr AND < 500 µR/hr is considered Class 7 (LSA-1 UN 2910) radioactive waste and requires special surveys and paperwork. Waste containers in excess of 500 µR/hr is LSA-1 UN 2912) and requires special surveys, paperwork, placarding and labeling.

Outgoing (from site) Transport Containers

Inspect the exterior of the container for sludge/debris build-up; where present, remove the material and place inside transport container or back in process container.

Perform an exterior exposure rate survey using a slow “S” motion from top to bottom of the sides. The meter should be held at 30 cm (12”) from the container sides during the survey.

If	**Then**
Exposure rate $\leq$ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate $\geq$ 10 and $\leq$ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

12. Radioactive Material Handling

Designated Storage and Holding Areas

Each facility will designate a location for temporary storage and handling of containers or equipment with elevated levels of radioactive materials.

A survey of the storage or sequester location will be performed daily (only if containers sequestered or material in storage) to ensure the postings and boundaries are still intact.

Surveys will be completed by employees that have completed the NORM/TENORM Surveyor Training.

If	Then
Equipment, Material or Vehicle indicate exposure rates between 10 and 2000 µR/hr above background	Area will be posted as a Radioactive Materials Storage Area
Equipment, Material or Vehicle indicate exposure rates ≥ 2000 µR/hr above background at 30 cm (12") away	Area will be posted as a Radioactive Materials Storage Area and Area will be roped off and signs placed on the ropes or barricades indicating RSO approval required for entry or Area will be continuously monitored to prevent unauthorized access

Disposition

Outgoing containers that exhibit high levels of radioactive material can only be shipped for disposal after a full characterization has been made and the RSO has signed a DOT exemption form/ DOT Special Permit and authorization to dispose of the material has also been granted. If an alarming vehicle is found to be leaving location without authorization, the state police/local authorities will be contacted.

Depending on the NORM levels, a risk assessment for the disposed material and acceptance by the disposal facility may be required. The Radiological Consultant will assist in this effort if these steps are needed.

Disposal of waste containers with material measuring in excess of 2,000 µR/hr from any surface shall be at an approved low level radioactive waste disposal facility. Additional characterization will be required.

13. Waste or Equipment Characterization

Initial Characterization

Determine whether the source is volumetric or a point source. The source is a point source if the elevated levels are localized to one or several spots on the truck or piece of equipment. The source is volumetric if a scan along the truck or equipment indicates the exposure rates remain consistent for most of the surface.

Note the time of the initial survey and wait 30 minutes and resurvey. If the exposure rate has reduced by more than 25% then the source is likely radon or radon progeny in the system or truck. If the exposure rate remains the same, then the source is likely to be radium or a radionuclide with a half-life longer than several hours.

Follow-up Characterization

After consulting with the RSO and the Radiological Consultant determine if there is a need for sampling and analysis of the suspect materials.

If sampling is required, then perform the following steps:

- For water samples collect the water samples in a 1-liter glass container, seal the lid to prevent leakage, and label the container.
- For solid samples collect at least 500 ml of solid material in a plastic container, seal the lid and label the container.
- Under the direction of the Radiological Consultant, complete the Chain of Custody (ies) for the sample(s) and ship the samples to the designated lab for analysis.

Alternate Characterization Methods

Alternate characterization methods include the use of a portable isotope identification system to determine the radionuclides principally responsible for the elevated exposure rates.

A calculation using software such as Microshield and the detected exposure rates can be used to determine the approximate activity concentration in the water or process materials.

Determination of Origin

Because the origin of the material is known to be from the drilling muds and flow back water, origin determination will not be needed. There is the potential for build-up of tracer radionuclides and if these are present then the Radiological Consultant will provide additional handling guidance.

14. Emergency Response

In the event of an emergency where radioactive material may be involved, immediately stop work and notify the site supervisor as well as the RSO.

Refer to the Emergency Response Plan (ERP) as well as the Radiation Protection Action Plan (RPAP) for additional information and site-specific procedures.

Plausible emergencies related to radioactive material include:

- Transport vehicle accidents
- Hose or transfer line rupture
- Line fitting leakage
- Tank overflow or puncture

When dealing with a spill, refer to the Prevention, Preparedness and Contingency (PPC) Plan and/or the Spill Prevention, Control, and Countermeasure (SPCC) Plan.

All spills involving potential TENORM must be reported to the RSO.

In the case of a vehicle spill on public roads, be prepared to provide first responders with as much information as possible including the type of waste, container dose rate and radium concentration (if known).

15. Instrumentation Use, Maintenance and Calibration

Gamma detection instruments to be used for survey of process facilities and wastes will be a Ludlum Model 19 or have equivalent detection capabilities.

Ludlum Model 19 -

The Ludlum Model 19 has detection capabilities of below 10 µR/hr and its use ensures the facility can meet the required guideline of detecting increases in radiation exposure rates at levels greater than 10 µR/hr above the facility background rates.

The initial calibration of the instruments will be performed by a calibration facility licensed by the Nuclear Regulatory Commission, or equivalent State agency, for the purpose of calibrating radiation detection equipment. National Institute of Standards and Technology (NIST) traceable sources will be used to calibrate the instruments in accordance with ANSI N323a-1997, *Radiation Protection Instrumentation Test and Calibration* requirements.

Upon receipt of the instrument from the calibration facility, an instrument inspection will be made to ensure operability, and a functional check of instruments' response will be made with an appropriate check source. This functional check will be used to establish the acceptance range for subsequent random quarterly functional checks.

Upon instrument acceptance and functional checks, a background exposure rate value will be established for the truck/container staging area where surveys are to be conducted.

Additional calibration and maintenance of the instrument will be performed under the following conditions:

- Annually
- Instrument malfunctions
- Failure to meet the established functional check range

A check of the instrument will be performed before each shift's use and include the following:

- Background check – compare instrument response to previously established background in instrument storage area
- Battery check – check to ensure sufficient DC voltage meets the manufacturer's operational specification
- Range check – movement of range switch to ensure no response is occurring on higher level exposure rate detector ranges
- Functional check – compare instrument exposure rate response to initially established acceptance range

A Ludlum 2929 or equivalent dual channel scaler will be used to count smears and air samples for alpha and beta. In lieu of purchasing and maintaining this instrument, swipes and air samples can be counted by an accredited lab or radiological service provider.

16. Records

All records will be stored at the Facility CNX Headquarters-Southpointe (either digitally or hard copy) and they will be maintained for at least five years.

The RSO will be responsible for maintaining the survey forms, instrument calibration records, daily check forms, and audit/assessment records. The Training Coordinator will be responsible for maintaining records of training.

Surveys

Surveys will be submitted using the Survey 123 application.

Data will note the date/time of survey, the surveyor, and a notation of whether the exposure rates exceeded the action levels specified in this Plan.

Truck/Container survey forms will be used for equipment or outgoing vehicle surveys that exceed the action levels specified in this Plan.

Instrumentation

The daily instrument checks and yearly calibration will be completed for the survey instrumentation (Ludlum Model 19 and/or Ludlum 2929 or equivalent instruments).

If supplemental instrumentation such as a portable isotope identifier instrument is used, then the daily check and annual calibration records for that instrument will also be maintained at the Facility.

Characterization and Analysis Data

Characterization and analysis data includes calculations, laboratory analytical data and print-outs for portable spectroscopy survey meters

Disposition and Shipping Records

Disposal/Shipping Records may include the following:

- Approved waste profile
- Radium analytical results (if required)
- Gamma survey information (if used to make shipping determination)
- Waste disposal tickets (from a landfill or properly permitted third party waste processing facility) that shows the amount of waste disposed.

17. Revisions

Revision (1) Date- August 29, 2025 Jarrod Shultz / Rob Bealko

Updated CNX Company Policy
Added Stop Work Empowerment
Updated Radiation Protection Program Administration
Added Training Section and Training Coordinator role
Added additional information about units of measurement
Added comprehensive explanation of Action Level Responses
Removed table 9-2
Updated Emergency Response Section and Records Section
Added Revisions Section

Revision (2) Date- October 14, 2025 Jarrod Shultz

Updated Appendices
Updated Table 9-1 Survey Frequency

APPENDICES

APPENDIX A. DRILLING OPERATIONS

A. Drilling Operations Description

The following provides a general description of drilling operations at CNX well pad facilities. Not all aspects at each facility will be exactly the same as those described in this Plan. The Plan action levels and responding actions are designed to be responsive for any of the differences between well pad facilities.

Applicable CNX contractors and subcontractors performing work at drilling facilities should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level – Extremely Low

Equipment to Monitor/Survey – Survey shakers/Centrifuge Primary Cuttings containers/halfrounds.

Incoming Container Survey – Periodic surveys of incoming waste containers, biased towards visibly unclean containers.

Outgoing Waste Surveys - Cursory scan of waste containers/Trucks to ensure dose rates are <10 μR/hr at 12" from the container surface. If in the unlikely event dose rates are found in excess of 10 μR/hr above bkgd at 12" from the containers surface, notify on site rep/RSO for further instructions.

Drilling Facility Survey – The CNX RSO will select a single representative pad with active drilling operations and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new drilling site for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Active Drilling Site (survey a different facility each time)	X	Quarterly	Perform gamma surveys of tanks and process equipment.

Waste Generated – Vertical and horizontal drill cuttings (NORM)

DOT Transportation concerns – No

TLD Monitoring Required – No

Air Sampling - No

APPENDIX A. DRILLING OPERATIONS

Waste Disposal Logic

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate ≥ 10 and ≤ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

DOT Transport Surveys

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	No further surveys are required, and container can be shipped as exempt.
Exposure rate ≥ 10 and ≤ 90 µR/hr and No analytical result for total radium has been obtained	The activity is likely below 270 pCi/g and the container can be shipped as DOT exempt/DOT Special Permit
If over 90 µR/hr and an analytical result for container contents has been obtained	Use the analytical results to determine if the shipment is considered Class & DOT hazardous
Shipment is classified as Class 7 DOT hazardous	Perform wipe tests at locations where dirt/soil appear to be present and on all four sides. and Survey drivers cab and ensure exposure rate less than 2000 µR/hr And If contact dose rate exceeds 500 µR/hr on contact Complete a uniform low level waste manifest, label shipping container “Radioactive LSA” and placard exclusive use truck

Process Facilities and Equipment

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal system process exposure rates	No action needed – note findings on survey log
Exposure rates ≥ 2 times the normal system process exposure rates	Contact On site rep and determine cause of increase. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed

APPENDIX A. DRILLING OPERATIONS

Exposure rate ≥ 5000 µR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the RSO/On site Rep and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings

Equipment Unrestricted Release

Note: This section is written as a temporary survey program designed to determine if contamination levels over the time of the work consistently remain below release criteria. In the event, it is shown that contamination levels never exceed the action levels in this plan, contamination surveys can be suspended.

DOT Transportation concerns – Unlikely. Waste containers in excess of 90 µR/hr on contact or total radium concentration of 270 pCi/g must undergo additional evaluation or be shipped in accordance with 49CFR173.436. Contact RSO/On site Rep for further directions.

B. Completions Process Description

The following provides a general description of completion operations at CNX Well Pad facilities. Not all aspects at each facility will be exactly the same as those described in this Plan. The Plan action levels and responding actions are designed to be responsive for any of the differences between Well Pad facilities.

Applicable CNX contractors and subcontractors performing work at completions facilities should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level – Low (except for potential exposure to nuclear gauges)

Exposure minimization

- Minimize time spent near nuclear density gauges or ensure adequate shielding is in place to minimize worker exposure to gamma radiation.
- No welding, burning, grinding or use of volatile chemicals to remove pipe scale without proper controls.
- When practical, cover ends of piping and equipment with obvious signs of pipe scale.
- Workers should minimize contact with sludge/solids to the extent possible.
- Workers should practice good hygiene (wash hands and face upon exit from controlled areas and prior to eating/drinking).

Survey Requirements

- Periodic check of incoming waste containers biased towards visibly unclean areas.
- Scan of waste outgoing waste containers to ensure dose rates are <10 µR/hr at 12" from the container surface. In the event readings are found to be greater than 10µR/hr at 12" from the waste container, contact RSO/On site Rep for further directions.
- Gamma Survey of area near nuclear density gauges on contact and at 30 cm from the source (pictured below)

APPENDIX B. COMPLETIONS OPERATIONS

Completions Facility Survey – The CNX RSO will select a single representative pad with active completions operations and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new completions site for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Active Completions Sites (survey a different facility each time)	X	Quarterly	Perform gamma surveys of nuclear density gauges, tanks and process equipment.

Required Area Posting - Radiation Area signage if gamma dose rate exceeds 5 mR/hr at 30 cm from density gauges (USNRC 10CFR20).

Suggested Area Posting – "Radioactive Material" stickers on nuclear density gauges with signage alerting workers not to loiter in the immediate area.

Supplementary Audit Criteria – Review contractor and subcontractor radioactive material license and ensure compliance.

Waste Generated – Flowback liquids and solids, plug remnants, contaminated equipment, filter socks and cartridges.

Waste Disposal Logic

If	Then
Exposure rate $\leq$ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate $\geq$ 10 and $\leq$ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

DOT Transport Surveys

If	Then
Exposure rate $\leq$ 10 µR/hr above background exposure rate	No further surveys are required, and container can be shipped as exempt.
Exposure rate $\geq$ 10 and $\leq$ 90 µR/hr and No analytical result for total radium has been obtained	The activity is likely below 270 pCi/g and the container can be shipped as DOT exempt/DOT Special Permit
If over 90 µR/hr and an analytical result for container contents has been obtained	Use the analytical results to determine if the shipment is considered Class & DOT hazardous

Shipment is classified as Class 7 DOT hazardous	Perform wipe tests at locations where dirt/soil appear to be present and on all four sides. and Survey drivers cab and ensure exposure rate less than 2000 µR/hr And If contact dose rate exceeds 500 µR/hr on contact Complete a uniform low level waste manifest, label shipping container "Radioactive LSA" and placard exclusive use truck

Process Facilities and Equipment

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal system process exposure rates	No action needed – note findings on survey log
Exposure rates $\geq$ 2 times the normal system process exposure rates	Contact On site rep and determine cause of increase. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed
Exposure rate $\geq$ 5000 µR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the RSO/On site Rep and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings

Equipment Unrestricted Release

Note: This section is written as a temporary survey program designed to determine if contamination levels over the time of the work consistently remain below release criteria. In the event, it is shown that contamination levels never exceed the action levels in this plan, contamination surveys can be suspended.

DOT Transportation concerns – Yes, waste containers in of 90 µR/hr or total radium concentration of 270 pCi/g must undergo additional evaluation or be shipped in accordance with 49CFR173.436. Contact RSO/On site Rep for further directions.

TLD Monitoring Required – No

Air Sampling – No

APPENDIX C. PRODUCTION

C. Production Facility Process Description

The following provides a general description of production operations at CNX Well Pad facilities. Not all aspects at each facility will be exactly the same as those described in this Plan. The Plan action levels and responding actions are designed to be responsive for any of the differences between Well Pad facilities.

Applicable CNX contractors and subcontractors performing work at production facilities should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level – Low

Exposure minimization

- No welding, burning, grinding or use of volatile chemicals to remove pipe scale without proper controls.
- When practical, cover ends of piping and equipment with obvious signs of pipe scale.

Survey Requirements

Production sites chosen for survey should differ in age, region, and geologic formation.

- Periodic check of production water holding tanks.
- Survey of miscellaneous scrap pipe, pumps and equipment prior to disposal, pay particular attention to areas with visible scale.
- **Production Facility Survey** – The CNX RSO will select a single representative pad with ongoing production operations and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new production site for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Wells in Production (survey a different facility each time)	X	Quarterly	Focus gamma surveys on wastewater storage tanks and process equipment.

APPENDIX C. PRODUCTION

Required Area Posting - None

Suggested Area Posting – None

TLD Monitoring Required – No

Air Sampling – No

Waste Generated – Produced water, tank bottom solids, contaminated equipment, filter socks and cartridges.

Liquid Waste Disposal – Liquid waste can be shipped directly to storage, wastewater processing facility or Class II injection well.

DOT Transportation concerns – Yes, waste containers with surface gamma dose rates of ≥90 µR/hr or with a total radium concentration of 270 pCi/g must be shipped in accordance with 49CFR173.436.

Solid Waste Disposal – The following describes logic that should be followed when considering waste disposal options. Waste will only be processed/disposed at facilities on the CNX Approved Vendors List.

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate ≥ 10 and ≤ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

APPENDIX C. PRODUCTION

Process Facilities and Equipment

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal system process exposure rates	No action needed – note findings on survey log
Exposure rates $\geq$ 2 times the normal system process exposure rates	Contact Facility Compliance Manager and determine cause of increase. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed
Exposure rate $\geq$ 5000 mR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the Compliance Manager and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings

D. Midstream Compressor Facility Process Description

The following provides a general description of midstream compressor station facilities. Not all aspects at each facility will be exactly the same as those described in this Plan. The Plan action levels and responding actions are designed to be responsive for any of the differences between midstream facilities. Applicable CNX contractors and subcontractors performing work at midstream facilities should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level – Low primarily due to potential Radon (Rn-222) gas exposure. Pipe scale and pigging waste (see above) can be highly contaminated (up to 400,000 pCi/g) and create a moderate hazard to workers.

Survey Requirements

- Periodic check of pumps, production lines and tanks. Pay particular attention pipe elbows, valves and or where piping decreases in size.
- Survey of scrap pipe, pumps and equipment prior to disposal. Pay particular attention to pipes and equipment with signs of scale build-up. These areas are likely to exhibit elevated gamma dose rates.
- Gamma survey of areas potentially effected by pigging operations (pig catch area).
- The CNX RSO will select a single representative midstream facility with ongoing operations and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new midstream facility for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Midstream Compressor Stations(survey a different facility each time)	X	Quarterly	Perform gamma surveys of process equipment quarterly and upon system breach when performing maintenance and/or pigging. Survey pigging equipment, work area and waste containers.

Required Area Posting – None

Suggested Area Posting – "Do not loiter" on exterior doors of unvented buildings with midstream equipment/piping.

Exposure minimization - Indoor areas should be ventilated prior to prolonged occupancy. No welding, burning, grinding or use of volatile chemicals to remove pipe scale without proper controls. Make sure a good containment exists in the pig catch area.

TLD Monitoring Required – No

APPENDIX D. MIDSTREAM OPERATIONS COMPRESSOR STATION

Air Sampling – No

Waste Generated – Scale, pigging waste, contaminated equipment, filter socks and cartridges, Tank solids.

Liquid Waste Disposal – Liquid waste can be shipped directly to storage, wastewater processing facility or Class II injection well.

DOT Transportation concerns – Yes, waste containers or contaminated equipment in of 90 µR/hr or total radium concentration of 270 pCi/g must be shipped in accordance with 49CFR173.436.

Solid Waste Disposal – Solid waste disposal logic is described below. Waste may only be processed/disposed at facilities on the CNX Approved Vendors List.

Waste Disposal Logic

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate ≥ 10 and ≤ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

APPENDIX D. MIDSTREAM OPERATIONS COMPRESSOR STATION

DOT Transport Surveys

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	No further surveys are required, and container can be shipped as exempt.
Exposure rate ≥ 10 and ≤ 90 µR/hr and No analytical result for total radium has been obtained	The activity is likely below 270 pCi/g and the container can be shipped as DOT exempt/DOT Special Permit
If over 90 µR/hr and an analytical result for container contents has been obtained	Use the analytical results to determine if the shipment is considered Class & DOT hazardous
Shipment is classified as Class 7 DOT hazardous	Perform wipe tests at locations where dirt/soil appear to be present and on all four sides. and Survey drivers cab and ensure exposure rate less than 2000 µR/hr and If contact dose rate exceeds 500 µR/hr on contact Complete a uniform low level waste manifest, label shipping container "Radioactive LSA" and placard exclusive use truck

Process Facilities and Equipment

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal system process exposure rates	No action needed – note findings on survey log
Exposure rates ≥ 2 times the normal system process exposure rates	Contact On site rep and determine cause of increase. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed
Exposure rate ≥ 5000 µR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the RSO/On site Rep and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings

APPENDIX E. WASTEWATER STORAGE AND TRANSFER FACILITIES

E. Wastewater Storage Facilities

The following provides a general description of above ground storage tanks (ASTs) and centralized impoundment ponds.

Applicable CNX contractors and subcontractors performing work at wastewater storage facilities should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level – Moderate exposure potential due to tank bottom solids when cleaning.

Exposure minimization

- No welding, burning, grinding or use of volatile chemicals to remove pipe scale without proper controls.
- Above Ground Storage Tanks should be ventilated prior to prolonged occupancy.
- Workers should minimize contact with sludge/solids to the extent possible.
- Workers should practice good hygiene (wash hands and face upon exit from controlled areas and prior to eating/drinking).
- Minimize dust generation when decontaminating tanks and centralized impoundment ponds.

Survey Requirements

- Periodic Survey of pumps, water lines and tanks. Pay particular attention pipe elbows, valves and or where piping decreases in size.
- Survey of scrap pipe, pumps and equipment prior to disposal.
- The CNX RSO will select a single representative location with wastewater storage and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new location for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Waste Water Storage (survey a different facility each time)	X	Quarterly	Perform gamma surveys around perimeter, on waste containers and associated piping.

Required Area Posting – None

Suggested Area Posting – "Contact CNX RSO For Entry" on fence

Exposure minimization – Impoundment ponds should not be allowed to drain completely. Keeping some water above the sludge mitigates potential airborne fugitive emissions.

Whenever possible, impoundment ponds and ASTs should be cleaned in a way that does not require immersion in the waste material.

APPENDIX E. WASTEWATER STORAGE AND TRANSFER FACILITIES

TLD Monitoring – No. Options are available to implement upon changing conditions.

Air Sampling – No

Waste Generated – Sand, fracking fluids, piping, HDPE liner.

Liquid Waste Disposal – Liquid waste can be shipped directly to storage, wastewater processing facility or Class II injection well.

DOT Transportation concerns – Yes, solid waste is likely to exceed 270 pCi/g and must be shipped in accordance with 49CFR173.436. Analyze representative samples of waste material prior to cleaning.

Waste Disposal Logic – Waste may only be processed/disposed at facilities on the CNX Approved Vendors List.

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate ≥ 10 and ≤ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

DOT Transport Surveys

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	No further surveys are required, and container can be shipped as exempt.
Exposure rate ≥ 10 and ≤ 90 µR/hr and No analytical result for total radium has been obtained	The activity is likely below 270 pCi/g and the container can be shipped as DOT exempt/DOT Special Permit
If over 90 µR/hr and an analytical result for container contents has been obtained	Use the analytical results to determine if the shipment may be considered Class 7
Shipment is classified as Class 7 DOT hazardous	Perform wipe tests at locations where dirt/soil appear to be present and on all four sides. and Survey drivers cab and ensure exposure rate less than 2000 µR/hr and If contact dose rate exceeds 500 µR/hr on contact Complete a uniform low level waste manifest, label shipping container “Radioactive LSA” and placard exclusive use truck

APPENDIX E. WASTEWATER STORAGE AND TRANSFER FACILITIES

Process Facilities and Equipment

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal system process exposure rates	No action needed – note findings on survey log
Exposure rates $\geq$ 2 times the normal system process exposure rates	Contact On site and/or RSO and determine cause of increase. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed
Exposure rate $\geq$ 5000 µR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the RSO/On site Rep and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings

F. Potentially Contaminated Equipment Storage

The following describes areas designated to store legacy/advanced usage equipment that may be contaminated with TENORM.

Applicable CNX contractors and subcontractors performing work at equipment storage locations should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level – Minimal unless improperly cleaning equipment.

Exposure minimization

- No welding, burning, grinding or use of volatile chemicals to remove pipe scale without proper controls.
- When practical, cover ends of piping and equipment with obvious signs of pipe scale.

Survey Requirements

- Upon receipt or prior to sale
- Survey of scrap pipe, pumps and equipment prior to disposal.

The CNX RSO will select a single representative equipment storage area and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new equipment storage site for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Equipment Storage Facilities (survey a different facility each time)	X	Quarterly and upon receipt of potentially contaminated equipment, prior to recycling	Survey potentially contaminated equipment when accepted for storage and prior to sending to a landfill or recycling facility.

Required Area Posting – None

Suggested Area Posting – Legacy equipment contaminated with pipe scale should be posted as "Radioactive Material" if it has shown elevated surveyed levels.

Exposure minimization – Survey legacy equipment prior to working on it. Avoid volatile cleaning solutions and grinding/flapping/burning on contaminated piping or equipment without proper controls.

TLD Monitoring Suggested – No

Air Sampling – No

APPENDIX F. POTENTIALLY CONTAMINATED EQUIPMENT STORAGE AREAS

Waste Generated – Contaminated piping equipment and scale

Recycle Gamma Radiation Limit – 50 µR/hr on contact

DOT Transportation concerns – Yes, solid waste is likely to exceed 270 pCi/g and must be shipped in accordance with 49CFR173.436. Analyze representative samples of waste material prior to cleaning.

Waste Disposal Logic – Waste may only be processed/disposed at facilities on the CNX Approved Vendors List.

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate ≥ 10 and ≤ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

DOT Transport Surveys

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	No further surveys are required, and container can be shipped as exempt.
Exposure rate ≥ 10 and ≤ 90 µR/hr and No analytical result for total radium has been obtained	The activity is likely below 270 pCi/g and the container can be shipped as DOT exempt/DOT Special Permit
If over 90 µR/hr and an analytical result for container contents has been obtained	Use the analytical results to determine if the shipment may be considered Class 7
Shipment is classified as Class 7 DOT hazardous	Perform wipe tests at locations where dirt/soil appear to be present and on all four sides. and Survey drivers cab and ensure exposure rate less than 2000 µR/hr and If contact dose rate exceeds 500 µR/hr on contact Complete a uniform low level waste manifest, label shipping container “Radioactive LSA” and placard exclusive use truck

APPENDIX F. POTENTIALLY CONTAMINATED EQUIPMENT STORAGE AREAS

Process Facilities and Equipment

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal background	No action needed – note findings on survey log
Exposure rates $\geq$ 2 times the normal background rates	Contact On site and/or RSO and determine cause of the elevated readings and to determine storage requirements. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed
Exposure rate $\geq$ 5000 µR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the RSO/On site Rep and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings

APPENDIX G. WELL PLUGGING

G. Well Plugging Operations

The following provides a general description of well plugging operations. Not all aspects at each abandonment site will be exactly the same as those described in this Plan. The Plan action levels and responding actions are designed to be responsive for any of the differences between abandoned well pad facilities. Applicable CNX contractors and subcontractors performing work at plugging sites and contractors that refurbish casing pipe should have a Radiation Protection Plan similar in scope to this document.

Worker Radiation Hazard Level –Scale inside piping and production tanks can be highly contaminated (up to 400,000 pCi/g) and create a moderate hazard to workers.

Survey Requirements

- Periodic check of pumps, production lines and tanks. Pay particular attention pipe elbows, valves and or where piping decreases in size.
- Survey of scrap pipe, pumps and equipment prior to disposal. Pay particular attention to pipes and equipment with signs of scale build-up. These areas are likely to exhibit elevated gamma dose rates.
- Gamma survey of areas potentially effected by pigging operations (pig catch area).
- The CNX RSO will select a single representative well plugging operation with ongoing operations and perform a survey in accordance with Table 9-1 of the CRPP. Survey sites should be alternated (pick a new midstream facility for each survey).

Facility Radiation/Contamination Monitoring	Gamma Survey	Survey Frequency	Comments
Well Plugging (survey a different location each time)	X	Quarterly	Survey piping and equipment that will be recycled. Release to recycle melting facilities is 50 µR/hr.

Required Area Posting – None

Suggested Area Posting – None

Exposure minimization – No welding, burning, grinding or machining of contaminated equipment. Look for pipe scale as an indication of radiological contamination.

TLD Monitoring Required – No

Air Sampling – No

Waste Generated – Scale, contaminated equipment, tank solids.

APPENDIX G. WELL PLUGGING

Liquid Waste Disposal – Liquid waste can be shipped directly to storage, wastewater processing facility or Class II injection well.

DOT Transportation concerns – Yes, waste containers or contaminated equipment in of 90 µR/hr or total radium concentration of 270 pCi/g must be shipped in accordance with 49CFR173.436.

Solid Waste Disposal – Solid waste disposal logic is described below. Waste may only be processed/disposed at facilities on the CNX Approved Vendors List.

Waste Disposal Logic

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	Container is acceptable for transport to a regional landfill.
Exposure rate ≥ 10 and ≤ 90 µR/hr	Consult with Landfill operator to determine if they require a laboratory analytical for the radium content or whether an estimated level will be acceptable.
Exposure rate > 90 µR/hr	Obtain laboratory analytical to verify radium content or Do not send material for regional landfill burial and ship container to alternate processing facility

DOT Transport Surveys

If	Then
Exposure rate ≤ 10 µR/hr above background exposure rate	No further surveys are required, and container can be shipped as exempt.
Exposure rate ≥ 10 and ≤ 90 µR/hr and No analytical result for total radium has been obtained	The activity is likely below 270 pCi/g and the container can be shipped as DOT exempt/DOT Special Permit
If over 90 µR/hr and an analytical result for container contents has been obtained	Use the analytical results to determine if the shipment is considered Class & DOT hazardous
Shipment is classified as Class 7 DOT hazardous	Perform wipe tests at locations where dirt/soil appear to be present and on all four sides. and Survey drivers cab and ensure exposure rate less than 2000 µR/hr and If contact dose rate exceeds 500 µR/hr on contact Complete a uniform low level waste manifest, label shipping container “Radioactive LSA” and placard exclusive use truck

APPENDIX G. WELL PLUGGING

Plugging Sites

Immediate Survey Actions

If	Then
Exposure rate less than 2 times the normal system process exposure rates	No action needed – note findings on survey log
Exposure rates $\geq$ 2 times the normal system process exposure rates	Contact On site rep and determine cause of increase. **Note**: Unless dose rates begin to approach 2000 µR/hr no immediate actions are needed
Exposure rate $\geq$ 5000 µR/hr	Complete current process and then cease operations and Post the area such that only personnel needing access to the equipment are authorized entry and Contact the RSO/On site Rep and Determine the nature of the material causing the elevated activity (see *Characterization Section*) NOTE: General area dose rates around nuclear density gauges may routinely exceed 5000 µR/hr. Area postings