



*"Safety Comes First"*

# Case Western Reserve University Environmental Health and Safety

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## *Falls can be Prevented*

*Falls can be Prevented*

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### Preventing Falls from Roofs

**DO:**

- Wear a harness and always stay connected
- Make sure your harness fits
- Use guardrails or lifelines
- Inspect all fall protection equipment before use
- Guard or cover all holes, openings, and skylights

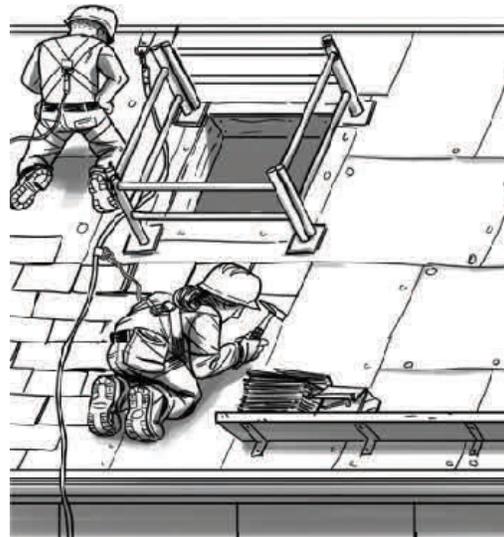
**DON'T:**



disconnect from the lifeline



work around unprotected openings or skylights



use defective equipment

- PLAN ahead to get the job done safely.
- PROVIDE the right roof equipment.
- TRAIN everyone to use the equipment safely.

*Protecting Yourself from Contaminated Sharps*

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## RADUCATION-NORM/TENORM



*“...NORM is exempted from regulation by the U.S. Department of Energy...”*

Naturally Occurring Radioactive Material (NORM) is radioactive material present in the environment; (i.e., soils, air and water) that is not man-made. NORM such as uranium (U), radium (Ra), and thorium (Th) emit low levels of naturally occurring radiation.

### What is NORM?

NORM, by definition, is naturally occurring and can be found everywhere. Since these materials are found in the natural environment, NORM is exempted from regulation by the U.S. Department of Energy, the U.S. Nuclear Regulatory Commission, and the State of Ohio. Common examples of NORM include the following:

- radon gas that homeowners may detect in basements and living spaces;
- potassium-40 in all plants and animals, including humans;
- krypton-80 that is in the atmosphere and air we breathe;
- carbon-14 that is taken in by all organic matter and can be measured thousands of years later to determine its age in the process known as “carbon dating”;
- uranium and thorium and their decay products commonly used in stone work, including granite countertops used in residential kitchens; marble used for cemetery markers, statues, and building veneers; and granite and limestone walls used in buildings;
- radium in deep drinking water aquifers that causes additional burdens to water treatment plants; and
- uranium *while it is still in the ground*, before it is mined and processed into fuel rods for use in nuclear reactors.

### What is TENORM?

When NORM is used for commercial purposes, processed, separated, or in some other manner has its radioactivity concentrated (intentionally or unintentionally), it becomes another category of radioactive material called Technologically Enhanced Naturally Occurring Radioactive Material (TENORM), which is regulated by the Ohio Department of Health. TENORM is the same group of NORM radionuclides, but it has been modified or “technologically enhanced” resulting in a man-made concentration higher than NORM.

Common examples of TENORM include the following:

- phosphate industry wastes including phosphogypsum and slag;

## ***RADUCATION-NORM/TENORM, cont.***

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- phosphate fertilizers that are commonly used;
- coal industry wastes including fly ash, bottom ash and slag;
- oil and gas industry wastes including scale and sludges;
- water treatment plant wastes including sludges and resin filtration systems;
- metal mining and processing industry wastes including rare earths, zirconium, hafnium, titanium, and tin;
- large volume industries including copper and iron; and
- geothermal energy production wastes.

### **Where can I find Ohio TENORM regulations?**

ODH TENORM rules were finalized in April 2012 and can be viewed at the following web link:

[http://www.odh.ohio.gov/en/rules/final/3701\\_1-43-TENORM.aspx](http://www.odh.ohio.gov/en/rules/final/3701_1-43-TENORM.aspx)

### **How are Oil & Gas drilling-related TENORM wastes regulated in Ohio?**

*The state of Ohio has some of the most restrictive regulations in the country regarding TENORM.*

- Ohio does not allow hydraulic fracturing water, flow back water, produced water, or other liquid wastes defined as brine to be used as drinking water. Since brine may contain elevated levels of NORM and other chemical constituents, Ohio requires this material to be sent to a permitted underground injection control-well where it can be safely disposed underground and not come into contact with drinking water supplies or wells.
- Oil & gas drilling-related waste, other than brine, that is TENORM must be tested before leaving the well pad to determine the concentration of radium-226 and radium-228.
- *Wastes containing TENORM cannot be disposed of at an oil and gas drill site.*
- Solid waste landfills can only accept TENORM wastes for disposal at concentrations less than 5 pico curies per gram above natural background.
- If a solid waste landfill or other facility wants to dilute TENORM wastes with concentrations greater than or equal to 5 picocuries per gram above natural background prior to disposal, this activity requires authorization from the Ohio Department of Health.

If solid wastes cannot be managed at a solid waste landfill because of elevated

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*“The state of Ohio has some of the most restrictive regulations in the country regarding TENORM.”*

## ***RADUCATION-NORM/TENORM, cont.***



***“Radiation exposures from TENORM will vary based on individual activities.”***

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levels of TENORM, the waste must be sent to a low-level radioactive waste disposal facility.

### **Where can you find NORM & TENORM in the Oil & Gas Drilling Process?**

The radioactive material categories found in Oil & Gas exploration and production (E&P) associated with drilling and hydraulic fracturing include the following:

(1) Exploration: preparing for production (includes drilling, hydraulic fracturing, produced fluids):

- “Earthen material” from the drilling process – NORM
- “Earthen material” with residual coating of refined-oil based muds - NORM
- Recycled drilling mud – TENORM
- Recycled hydraulic fracturing water / flow back water including some Brine (likely concentrated) – TENORM
- Spent tank bottoms - TENORM
- Filtrate, either liquid or solid, that results from, created during, processing and/or recycling of used hydraulic fracturing water, flow back water, or produced water – TENORM
- Used hydraulic fracturing sands – TENORM

(2) Production: pumping out gas, oil, and brine (a separation station is used to separate the gas, oil, and brine.)

- Gas
- Oil
- Brine – NORM
- Pipe scale (buildup) - TENORM

### **What are the relative risks from radiation exposures to the Public?**

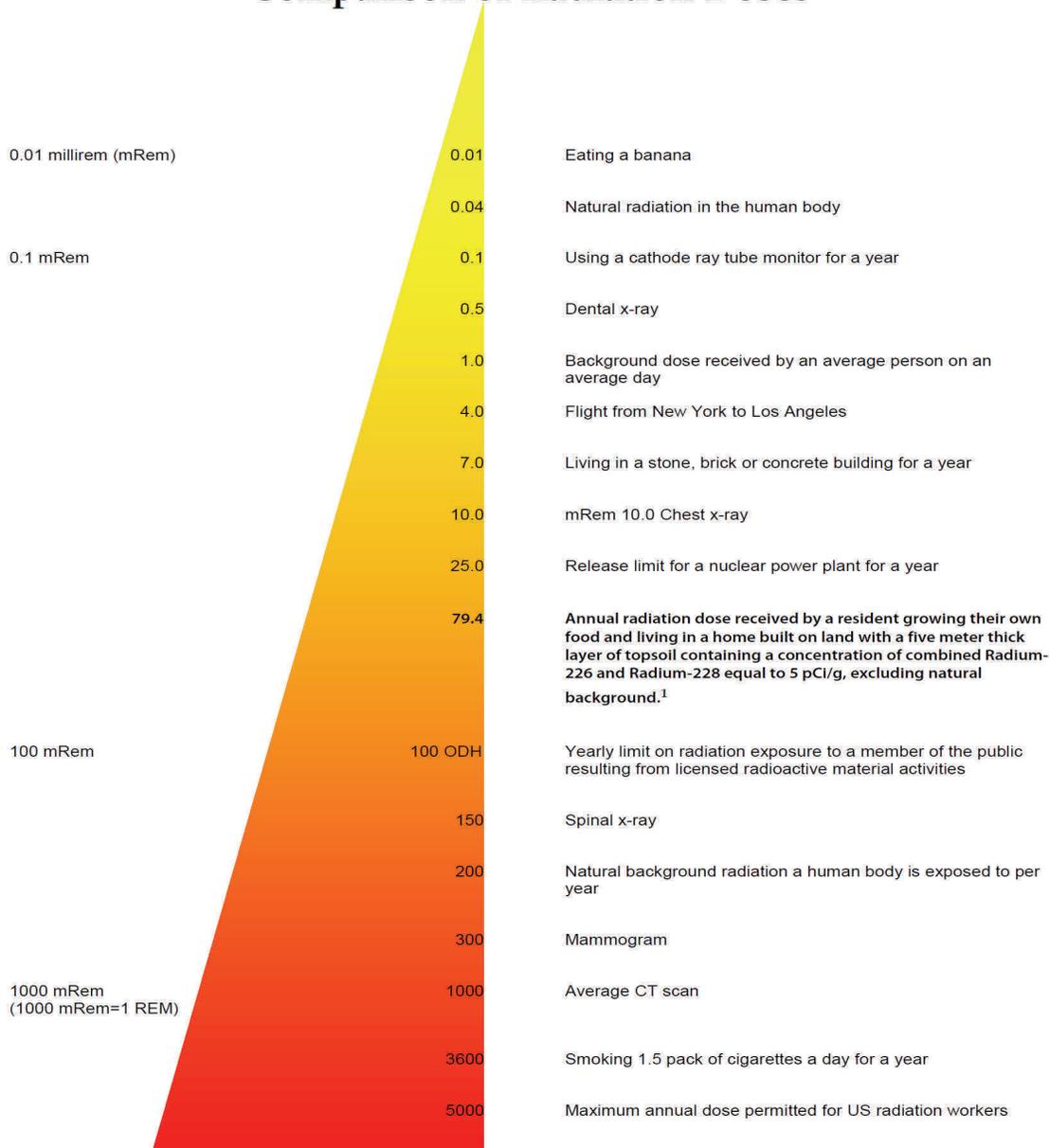
Radiation exposures from TENORM will vary based on individual activities.

The relative exposures from TENORM are low compared to the risks from other sources of radiation. See exposure comparisons on next page.

# RADUCATION-NORM/TENORM, *cont.*

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## Comparison of Radiation Doses



***“TENORM concentrations > 5 pico-Curies per gram (5pCi/g) are not allowed in Ohio landfills.”***

<sup>1</sup>The 79.4 mRem value was generated using the U.S. NRC’s RESRAD 6.5 software program developed by the U.S. Department of Energy’s Argonne National Laboratory.

The “Resident Farmer” scenario that was used is the most conservative model and will produce the highest radiological dose potential.

TENORM concentrations > 5 pico-Curies per gram (5pCi/g) are not allowed in Ohio landfills.

REM (Roentgen Equivalent Man) is the standard unit of measure for absorbed dose or dose equivalent to humans. A millirem is one thousandth of a rem (1000 mrem = 1 rem)

Source: President’s Blue Ribbon Commission on America’s Nuclear Future Report to the Secretary of Energy January 2012

## Protecting Yourself When Handling Contaminated Sharps



*“Primary Investigators and supervisors are required to consider and use safer medical devices, wherever possible.”*

A needlestick or a cut from a contaminated sharp can result in a worker being infected with human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and other bloodborne pathogens. The Bloodborne Pathogen Standard (29 CFR 1910.1030) specifies measures to reduce these types of injuries and the risk of infection. Careful handling of contaminated sharps can prevent injury and reduce the risk of infection. Employers must ensure that workers follow these work practices to decrease the workers' chances of contracting bloodborne diseases.

### Safer Medical Devices

Primary Investigators and supervisors are required to consider and use safer medical devices, wherever possible. These devices include those that are needleless or have built-in protection to guard workers against contact with the contaminated sharp. In addition, employers must ask non-managerial patient care workers who could be exposed to contaminated sharps injuries for their input in identifying, evaluating and selecting effective work practice and engineering controls, including safer medical devices. The employer must document consideration and implementation of these devices, and the solicitation of worker input, in the Exposure Control Plan.

### Prompt Disposal

Primary Investigators and supervisors must also ensure that contaminated sharps are disposed of in sharps disposal containers immediately or as soon as feasible after use. Sharps disposal containers must be readily accessible and located as close as feasible to the area where sharps will be used. In some cases, they may be placed on carts to prevent patients, such as psychiatric patients or children, from accessing the sharps. Containers also must be available wherever sharps may be found, such as in laundries. Contaminated sharps must never be sheared or broken. Recapping, bending, or removing needles is permissible only if there is no feasible alternative or if such actions are required for a specific medical or dental procedure. If recapping, bending, or removal is necessary, employers must ensure that workers use either a mechanical device or a one-handed technique. The cap must not be held in one hand while guiding the sharp into it or placing it over the sharp. A one-handed "scoop" technique uses the needle itself to pick up the cap, and then the cap is pushed against a hard surface to ensure a tight fit onto the device. Also, the

## *Protecting Yourself When Handling Contaminated Sharps, cont.*

*(Continued from page 6)*

cap may be held with tongs or forceps and placed over the needle. Contaminated broken glass must not be picked up by hand, but must be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps.

### **Sharps Containers**

Containers for contaminated sharps must be puncture-resistant. The sides and the bottom must be leakproof. They must be appropriately labeled or color-coded red to warn everyone that the contents are hazardous. Containers for disposable sharps must be closable (that is, have a lid, flap, door, or other means of closing the container), and they must be kept upright to keep the sharps and any liquids from spilling out of the container.

The containers must be replaced routinely and not be overfilled, which can increase the risk of needlesticks or cuts. Sharps disposal containers that are reusable must not be opened, emptied, or cleaned manually or in any other manner that would expose workers to the risk of sharps injury. Primary Investigators and supervisors also must ensure that reusable sharps that are contaminated are not stored or processed in a manner that requires workers to reach by hand into the containers where these sharps have been placed.

### **Handling Containers**

Before sharps disposal containers are removed or replaced, they must be closed to prevent spilling the contents. If there is a chance of leakage from the disposal container, workers must ensure that it is placed in a secondary container that is closable, appropriately labeled or color-coded red, and constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping.

### **Additional Information**

For more information, go to OSHA's Bloodborne Pathogens and Needlestick Prevention Safety and Health Topics web page at: <https://www.osha.gov/SLTC/bloodborne pathogens/index.html>. To file a complaint, report an emergency, or get OSHA advice, assistance, or products, contact your nearest OSHA office under the "U.S. Department of Labor" listing in your phone book, or call us toll-free at (800) 321-OSHA (6742).

***"Containers for contaminated sharps must be puncture-resistant."***



## Laboratory Safety Chemical Hygiene Plan (CHP)

*“Information to be provided to lab personnel working with hazardous substances include: The location and availability of the CHP.”*

### Required CHP Elements

1. Standard operating procedures relevant to safety and health considerations for each activity involving the use of hazardous chemicals.
2. Criteria that the employer will use to determine and implement control measures to reduce exposure to hazardous materials [i.e., engineering controls, the use of personal protective equipment (PPE), and hygiene practices] with particular attention given to selecting control measures for extremely hazardous materials.
3. A requirement to ensure that fume hoods and other protective equipment are functioning properly and identify the specific measures the employer will take to ensure proper and adequate performance of such equipment.
4. Information to be provided to lab personnel working with hazardous substances include:
  - The contents of the Laboratory standard and its appendices.
  - The location and availability of the CHP.
  - The permissible exposure limits (PELs) for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.
  - The signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
  - The location and availability of known reference materials on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, the Safety Data Sheets received from the chemical supplier.
5. The circumstances under which a particular laboratory operation, procedure or activity requires prior approval from the Primary Investigator, supervisor or EHS, where applicable.
6. Designation of personnel responsible for implementing the CHP, including the assignment of a Chemical Hygiene Officer and, if appropriate, establishment of a Chemical Hygiene Committee.
7. Provisions for additional worker protection for work with particularly hazardous substances. These include "select carcinogens," reproductive toxins and substances that have a high degree of acute toxicity. Specific consideration must be given to the following provisions and shall be included where appropriate:
  - Establishment of a designated area.
  - Use of containment devices such as fume hoods or glove boxes.
  - Procedures for safe removal of contaminated waste.
  - Decontamination procedures.
8. The employer must review and evaluate the effectiveness of the CHP at least



## Laboratory Safety Chemical Hygiene Plan (CHP), cont.

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annually and update it as necessary.

### Worker Training Must Include:

1. Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.).
2. The physical and health hazards of chemicals in the work area.
3. The measures workers can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect workers from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.
4. The applicable details of job-specific written CHP.

### Medical Exams and Consultation

The employer must provide all personnel who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

1. Whenever a worker develops signs or symptoms associated with a hazardous chemical to which the worker may have been exposed in the laboratory, the worker must be provided an opportunity to receive an appropriate medical examination.
2. Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance must be established for the affected worker(s) as prescribed by the particular standard.
3. Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected worker(s) must be provided an opportunity for a medical consultation to determine the need for a medical examination.
4. All medical examinations and consultations must be performed by or under the direct supervision of a licensed physician and be provided without cost to the worker, without loss of pay and at a reasonable time and place.

**For additional information on developing a CHP, consult the following sources:**

View the complete standard at the OSHA Web site, [www.osha.gov](http://www.osha.gov).

Appendix A of 29 CFR 1910.1450 provides non-mandatory recommendations to assist in developing a CHP.

*“The employer must provide all personnel who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations ...”*

## Falls can be Prevented, cont



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### Preventing Falls from Scaffolds

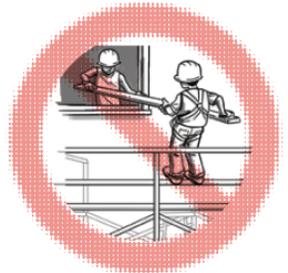
#### DO:

- Use fully planked scaffolds
- Ensure proper access to scaffold
- Plumb and level
- Complete ALL guardrails
- Ensure stable footing
- Inspect before use (by competent person)

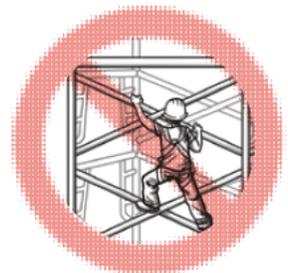
#### DON'T:



use ladder on top of scaffold



stand on rails



climb on cross-bars



- PLAN ahead to get the job done safely.
- PROVIDE the right roof equipment.
- TRAIN everyone to use the equipment safely.

*“Don’t climb on the cross-braces.”*



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