

Safety Bulletin

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**ENERGY
SAFETY
CANADA**

Understanding and Managing NORM

What is NORM?

NORM stands for **Naturally Occurring Radioactive Material**. Small amounts of radioactive elements—like uranium, thorium, and potassium—are found in many natural materials across Canada. These elements slowly break down and release radiation.

Most of the time, these levels are very low and are not harmful. But some activities can cause these materials to build up in higher amounts. When this happens, the material must be handled safely because it can give off more radiation than normal.

Why is NORM a Hazard?

Radiation from NORM can increase the risk of certain cancers if people are exposed for long periods of time. Most workplaces do not reach elevated levels, but employers must still work to keep exposure as low as reasonably achievable and follow safety rules.

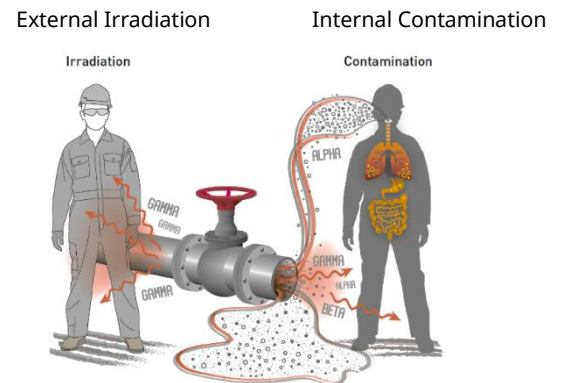
The more NORM that builds up, the greater the hazard. To stay safe, workplaces must:

- Monitor where NORM is found
- Develop safe work practices (e.g., isolation, signage)
- Use NORM-specific personal protective equipment (PPE) when needed

There are many types of radiation but there are three types of radiation associated with NORM: alpha, beta, and gamma. They affect the body in different ways:

- Alpha and beta radiation are mainly a risk if the material is breathed in or swallowed. This can happen during maintenance work where dust or sludge is handled.
- Gamma radiation is highly penetrating, and materials do not have to be inhaled or ingested to be a concern. The greater the intensity, the greater the hazard. This can be a risk even during normal operations, especially if large amounts of NORM have built up.

Safe work practices must protect against both internal and external exposure.



Source: IOGP 412NF – NORM The Facts

NORM in Canada

Health Canada and the Federal Provincial Territorial Radiation Protection Committee have created guidelines to help industries manage NORM safely. These guidelines explain how to find, measure, and handle NORM.

Health Canada has recognized six industries where NORM may be present in amounts sufficient to warrant radiation protection practices:

- Mining and ore processing
- Energy (oil, natural gas, etc.)
- Metal recycling
- Forest and power production
- Water treatment
- Tunnelling and underground work

Understanding and Managing NORM

NORM in the Energy Industry

Oil and gas operations can cause certain radioactive elements to build up in equipment:

- Radium can be carried in produced water. When the water comes to the surface, radium can settle out and form scale or sludge inside pipes, tanks, and equipment. These buildups can have more elevated radiation levels than the water itself.
- Radon gas can be found in natural gas. When radon breaks down, it forms Lead-210, which sticks to surfaces. This can build up especially in propane and ethane equipment.

Units of Measure

- Gamma radiation is measured in microsieverts (μSv). This shows how much radiation a person is exposed to. The worker limit is 1,000 μSv per year.
- Activity concentration is measured in becquerels (Bq) which is one decay per second.
- Surfaces: Bq/cm² (measured with NORM survey instruments as counts per minute)
- Solids: Bq/g (measured by a lab)
- Liquids: Bq/L (measured by a lab)

Regulations

Employers must follow several rules:

- Health and safety regulations require testing for hazardous materials, safe work procedures, and worker training.
- Industry regulations such as Alberta Oil and Gas Conservation Rules require monitoring, proper handling and disposal of NORM.
- Transportation of Dangerous Goods (TDG): NORM must be shipped as radioactive material if it is above 70 Bq/g, exceeds 10 times the IAEA limits or if contamination is above 10 Bq/cm².

Site Characterization

Workplaces that may have NORM must check for it.

This includes equipment or materials that may have become contaminated and have been moved to other locations.

When equipment or waste is prepared for transport, a lab test is recommended when gamma is above background levels or when surface contamination is above 1 Bq/cm². The results from past tests help set the site's "history," which can be used to guide future shipments.

Training

- Workers who may be exposed to NORM must receive training.
- Personnel conducting surveys or collecting samples need to be trained in detection equipment and sample collection.
- TDG training is also required for shipping radioactive materials.

Detection and Control

A NORM safe work practice can help:

- Keep track of where NORM is located and develop a site "history"
- Reduce workplace exposure
- Protect the public and the environment

Resources

Energy Safety Canada

- Toolbox Talk: [Controlling NORM Exposure](#)
- Webinar: [Naturally Occurring Radioactive Materials Awareness](#)
- Course: [NORM Awareness](#)
- IRP 28: [Drilling and Completions Waste Management](#)

External Resources

- CNSC: [Naturally Occurring Radioactive Material \(NORM\) Fact Sheet](#)
- Health Canada: [NORM Guidelines](#)
- International Atomic Energy Agency (IAEA): [Regulations for the Safe Transport of Radioactive Material](#)