



CONTROLLING (NORM) EXPOSURE

Toolbox Talk



AGENDA

- What is NORM?
- What is Radiation?
- Radiation Types
- Health Effects
- NORM Oil & Gas
- Where is NORM Located?
- How Could I Be Exposed?
- NORM Identification and Management



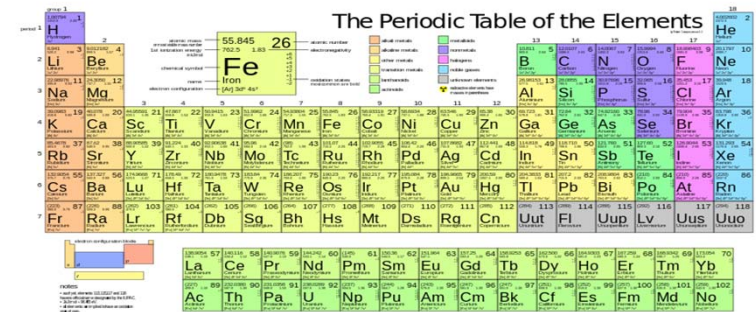
Source: https://upload.wikimedia.org/wikipedia/commons/f/fb/Radiation_warning_symbol.jpg

WHAT IS NORM?

» NORM is an acronym for Naturally Occurring Radioactive Material

» What is radioactivity?

- All matter consists of elements
- Some elements are more stable than others
- Unstable elements decay into other elements
- When they decay they release energy in the form of radiation



Source: https://commons.wikimedia.org/wiki/File:Periodic_table_large.svg

WHAT IS RADIATION?

- » Radiation can be in the form of both non-ionizing and ionizing radiation:
 - Non-ionizing includes visible light, radio waves, etc.
 - Ionizing (high energy radiation) includes x-rays, alpha, beta, etc.
 - This type of radiation changes the molecules it collides with
 - Elements like uranium decay and release radiation
 - Uranium is naturally occurring and part of rock and soil

RADIATION TYPES

» Radiation types:

- Gamma (x-rays)
 - Body penetrating radiation
 - Not usually a concern, because of lower activity, low quantities and low exposure time*
- Gas (radon)
 - Not usually an inhalation concern for workplaces provided you ventilate confined spaces
 - Decays into metallic films (lead-210)
- Particles (beta and alpha)
 - Can represent an inhalation concern

*See notes

HEALTH EFFECTS

- » Ionizing radiation can cause cancer
 - Lung cancer and leukemia
- » You may be familiar with NORM exposure in the form of radon gas
 - Second leading cause of lung cancer
 - Estimated to cause 16% of lung cancers in Canada⁽¹⁾
- » Keeping it real!
 - Does your own body generate radiation?
 - Answer: Yes, from potassium-40 decay⁽²⁾

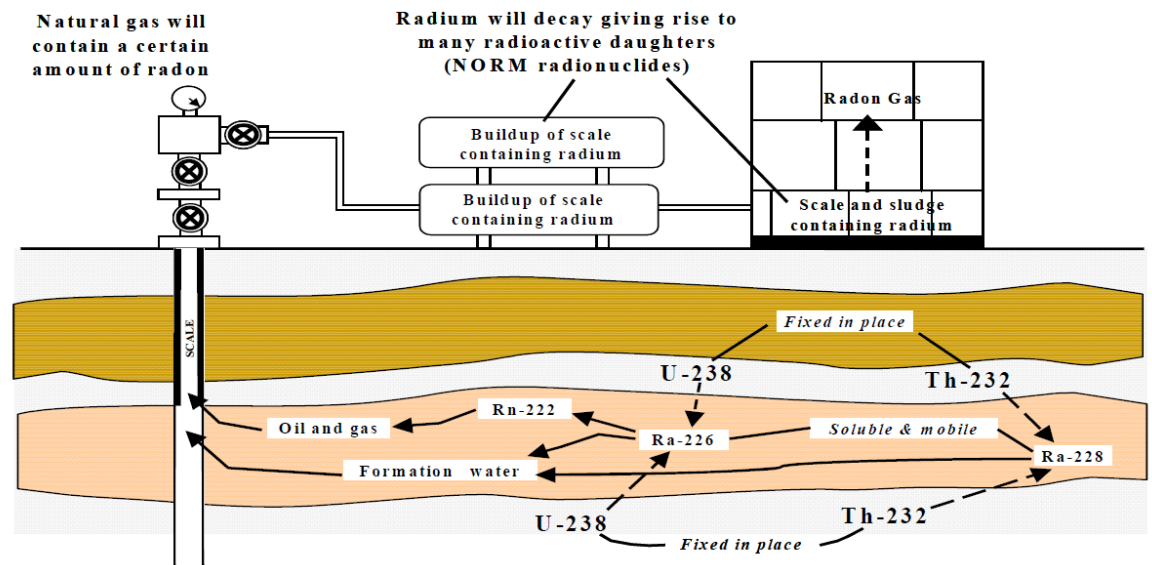
(1) Canadian Lung Association: <https://www.lung.ca/radon>

(2) https://www.cns-snc.ca/media/uploads/teachers/K40_4pg_10_06.pdf

NORM AND OIL AND GAS

» Because NORM occurs naturally in oil and gas formations it can be concentrated in process equipment

- » Three main types of NORM:
- Gas (radon-220)
 - Metallic Films (lead-210)
 - Scale and Sludge (radium-226)



Source: Technical Report on the Management of Naturally Occurring Radioactive Material (NORM) in Waste

WHERE IS NORM LOCATED?

- » NORM is known to exist in many locations including:
 - Northern British Columbia
 - Central and southeastern Alberta
 - Southern Saskatchewan
 - Offshore wells
- » It can vary based on formation type and can change over time
- » Chemical selection based on formation compatibility can minimize NORM scale and sludge

WHERE IS NORM LOCATED?

- » NORM may be more prevalent with:
 - Small grain size formations
 - High salinity formations
 - High reservoir temperatures
 - High water production formations

WHERE IS NORM LOCATED?

- » Where is radon located?
 - Radon and lead-210 is concentrated with liquid petroleum gases (LPG's)
 - Refrigeration equipment and bullets
 - Propane filters
- » Where is sludge located?
 - Sludge is located where liquids and solids are located?
 - Separators, tanks, etc.
 - Filter pots (produced water, glycol, amine etc.)
- » Where is scale located?
 - Typically where there is turbulence (valves, meters etc.)

HOW COULD I BE EXPOSED?

- » Working frequently near high gamma equipment
- » Disturbing scale and sludge
 - Cleaning vessels and tanks
 - Cleaning valve seats
- » Handling NORM-contaminated equipment
 - Changing orifice and conditioning plates
 - Entering confined spaces
 - Changing filters
 - Removing downhole equipment like tubing and pumps
 - Welding on NORM-contaminated equipment

NORM IDENTIFICATION

- » Conduct NORM surveys when equipment is active
 - Management of change
- » Identify equipment with elevated levels i.e. twice background*
- » Follow-up with risk assessment, controls and monitoring when equipment is opened



Source: Tervita Corporation *See notes

NORM MANAGEMENT

- » Is the material going to be disturbed?
- » What PPE do you need?
 - Do you need gloves?
 - Do you need disposable coveralls?
- » Is a half mask equipped with P100 respirators sufficient?
 - Are you using energized tools?
 - Is the material dry or wet?
 - Are you in a confined space?



HOW MIGHT THIS IMPACT US?

- » Have we conducted a NORM survey?
- » Do we know where NORM is located?
- » Do we have controls in place to mitigate exposure?

ADDITIONAL INFORMATION

- International Association of Oil and Gas Producers, [Managing Naturally Occurring Radioactive Material \(NORM\) in the Oil and Gas Industry](#), March 2016
- Canadian Nuclear Safety Commission, [Naturally Occurring Radioactive Material \(NORM\) Fact Sheet](#), November 2014
- Energy Safety Canada's [NORM Awareness Course](#)

For additional information please contact

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