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
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)

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 Safety@EnergySafetyCanada.com