Various Waste Streams

North Dakota Department of Health
Radiation Control & Waste Management

Definitions

- Purpose of this presentation is to define and discuss different types of waste streams;
- Will go from general waste types to the specific waste type called TENORM;
  - Industrial Waste
    - Radioactive Waste
  - Special Waste
    - NORM
    - TENORM

Types of Waste in ND

- Waste classification depends on
  - Source of material
  - Characteristics of material
- Source Based
  - Municipal, Industrial, Special
- Characteristic Based
  - Municipal, Inert, Hazardous

Special Waste

"Special waste" means solid waste that is not a hazardous waste regulated under chapter 23-20.3 and includes waste generated from energy conversion facilities; waste from crude oil and natural gas exploration and production; waste from mineral and ore mining, beneficiation, and extraction; and waste generated by surface coal mining operations. The term does not include municipal waste or industrial waste.

“Special Waste” Exemption

Oilfield “Special waste” is not regulated by EPA; NDDoH Law and Rule define & regulate.

States regulate this waste stream differently.

“Exemption” =

Exempt from the Hazardous Waste Rules

Waste Characteristics

Oilfield Special Waste (EPA Exemption)
- Exploration Waste (NORM)
- Production Waste (NORM)
  - Accumulated Materials
    - Potential TENORM

Industrial Waste
- Hazardous Waste
- Radioactive Waste
- Non-Hazardous Waste
- Inert Waste

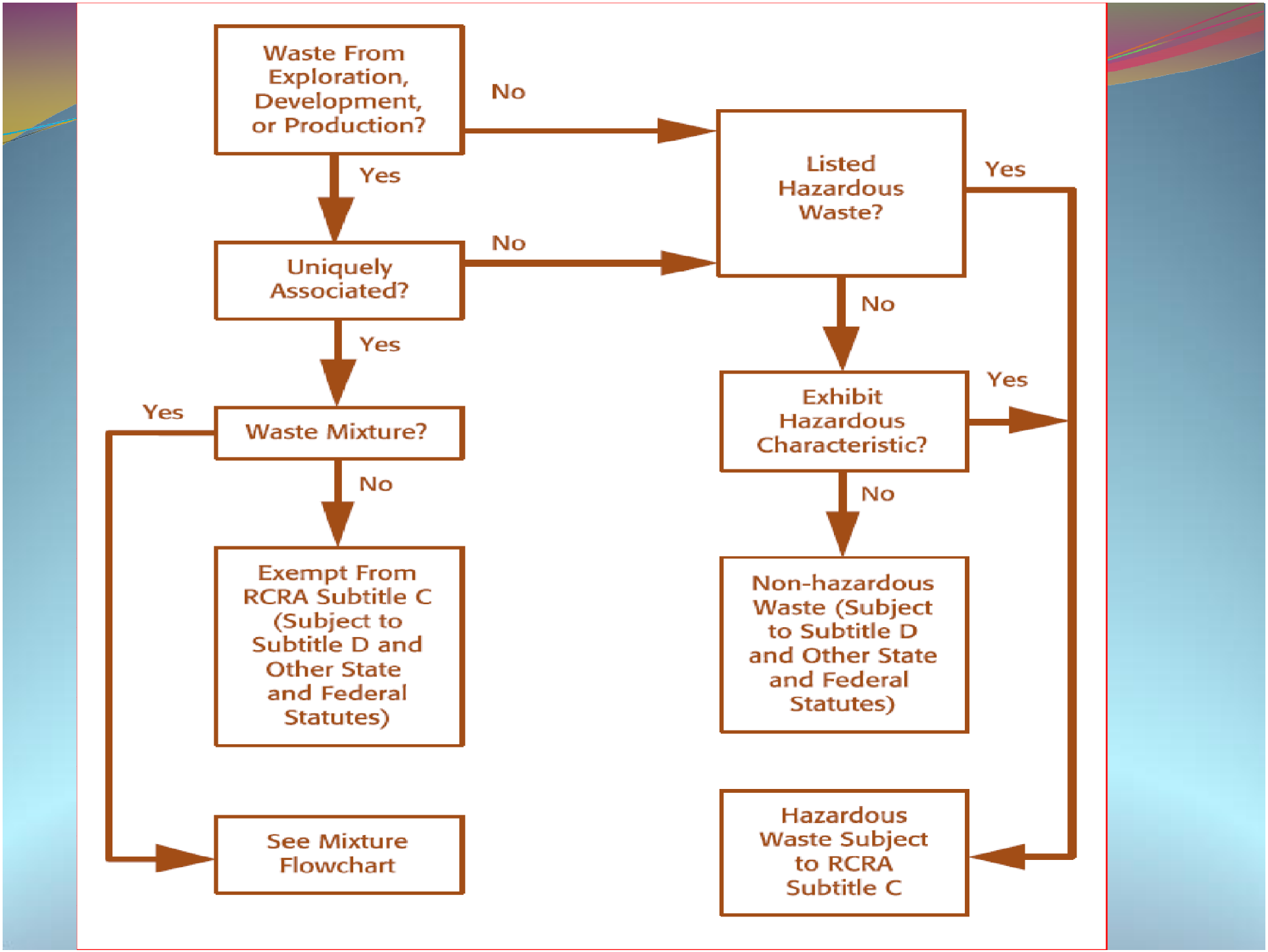
Special vs. Industrial Waste

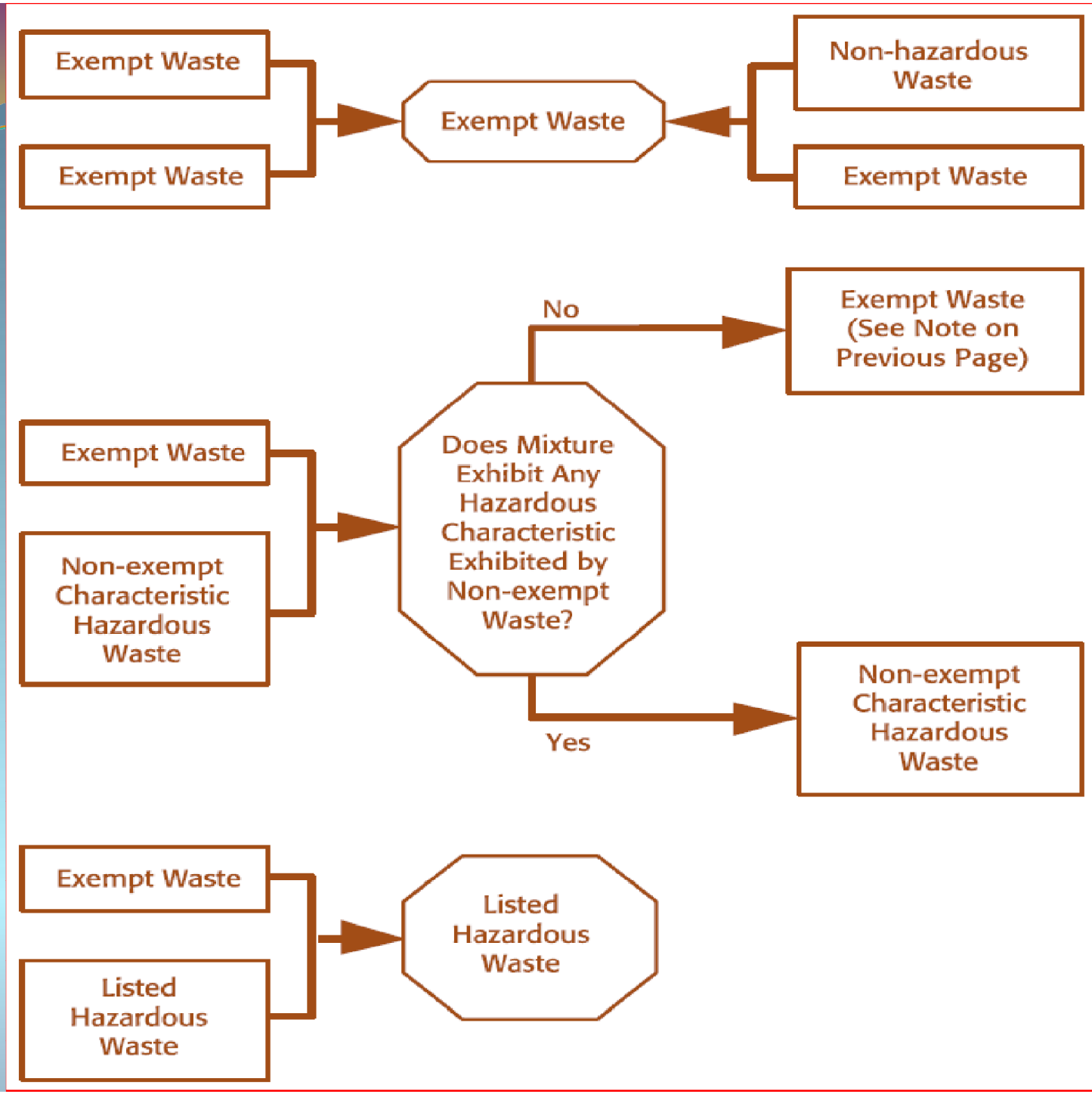
This is determined by EPA;
http://www.epa.gov/wastes/nonhaz/industrial/special/oil/index.htm

Your reference on this issue;
http://www.epa.gov/wastes/nonhaz/industrial/special/oil/oil-gas.pdf

EPA United States Environmental Protection Agency

Exemption of Oil and Gas Exploration and Production Wastes from Federal Hazardous Waste Regulations


Waste From Exploration, Development, or Production?
No
Yes
Listed Hazardous Waste?
Yes
Uniquely Associated?
No
Yes
No
Yes
Exhibit Hazardous Characteristic?
Yes
Waste Mixture?
Yes
No
No
Exempt From RCRA Subtitle C (Subject to Subtitle D and Other State and Federal Statutes)
Non-hazardous Waste (Subject to Subtitle D and Other State and Federal Statutes)
See Mixture Flowchart
Hazardous Waste Subject to RCRA Subtitle C


Exempt Waste
Exempt Waste
Exempt Waste
Non-hazardous Waste
Exempt Waste
No
Exempt Waste (See Note on Previous Page)
Exempt Waste
Non-exempt Characteristic Hazardous Waste
Does Mixture Exhibit Any Hazardous Characteristic Exhibited by Non-exempt Waste?
Yes
Non-exempt Characteristic Hazardous Waste
Exempt Waste
Listed Hazardous Waste
Listed Hazardous Waste

When does transportation begin?

"For crude oil, transportation begins at the point of custody transfer of the oil or, in the absence of custody transfer, after the endpoint of production separation and dehydration. Storage of crude oil in stock tanks at production facilities is considered part of the production separation process, not transportation, and is included in the exemption."

Petroleum Contaminated Soils

Benzene

- Under 0.5 PPM TCLP for Hazardous Waste
  - (TCLP is an extract procedure)
- Landfill limit under 50 PPM Total by permit
  - Minimize light hydrocarbons
  - Protect plastic liner

Ignitibility

- We don't want landfills catching fire

Definition of Hazardous Wastes

This would include wastes that are:

- hazardous (ignitable, corrosive, chemically reactive or toxic), or listed as a hazardous chemical on Title 40 of the federal CFR Part 261.
- ‘universal’ wastes: lead acid batteries, pesticides, mercury-containing equipment,
- ‘mixed’ wastes: waste that contains both radioactive & hazardous waste components

Waste Characteristics

Special vs. Industrial

- Special Waste = Oilfield
  - Exploration Waste
  - Production Waste
    - Accumulated Materials = Potential TENORM
- Special Waste = Power Plant
  - New Coal Combustion (CCR) Rules
- Industrial Waste
  - LUST (Leaking Underground Storage Tanks)
  - Crude oil spills during transportation
  - Hazardous Waste
  - Non-Hazardous Waste
    - Coal Combustion Residuals – not from power plant
  - Inert Waste

Industrial Waste

- Major Industries
  - Sugar Beet Plants (coal combustion)
  - Refinery
- Minor Industries
  - Spills and cleanups
  - Ag Industry; off specification and spoilage
  - Light industry, fabrication
  - Oil Industry support

Free Liquids in Waste

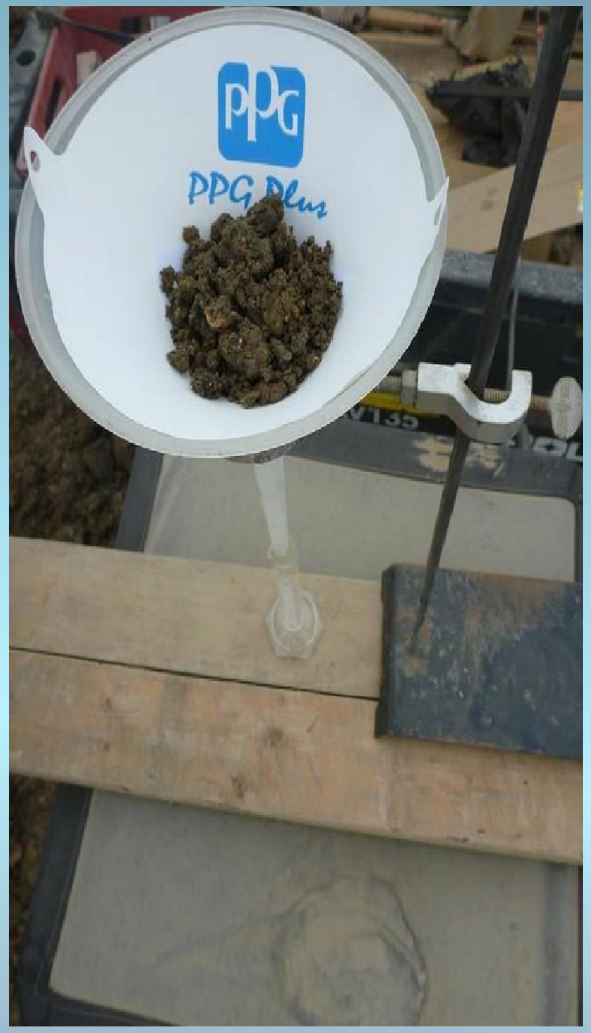
"Free liquid" means the liquid which separates from the solid portion of a solid waste under ambient pressure and normal, above freezing temperature. The environmental protection agency paint filter liquids test method or visual evidence must be used to determine if a waste contains free liquid.

Free Liquids in Waste

Note that contaminated snow or ice would fail a "free liquids" test.

Visual Evidence...

EPA Paint Filter Test



Radioactive Waste

- Radioactive waste is usually a by-product of nuclear power generation and other applications of nuclear fission or nuclear technology, such as research and medicine.

- NORM and TENORM are not this type of waste.

NORM VS TENORM

What is NORM

- Naturally occurring radioactive material that is found in the natural environment.

- Some of the radioisotopes found in the soils of North Dakota are:

Thorium- 232

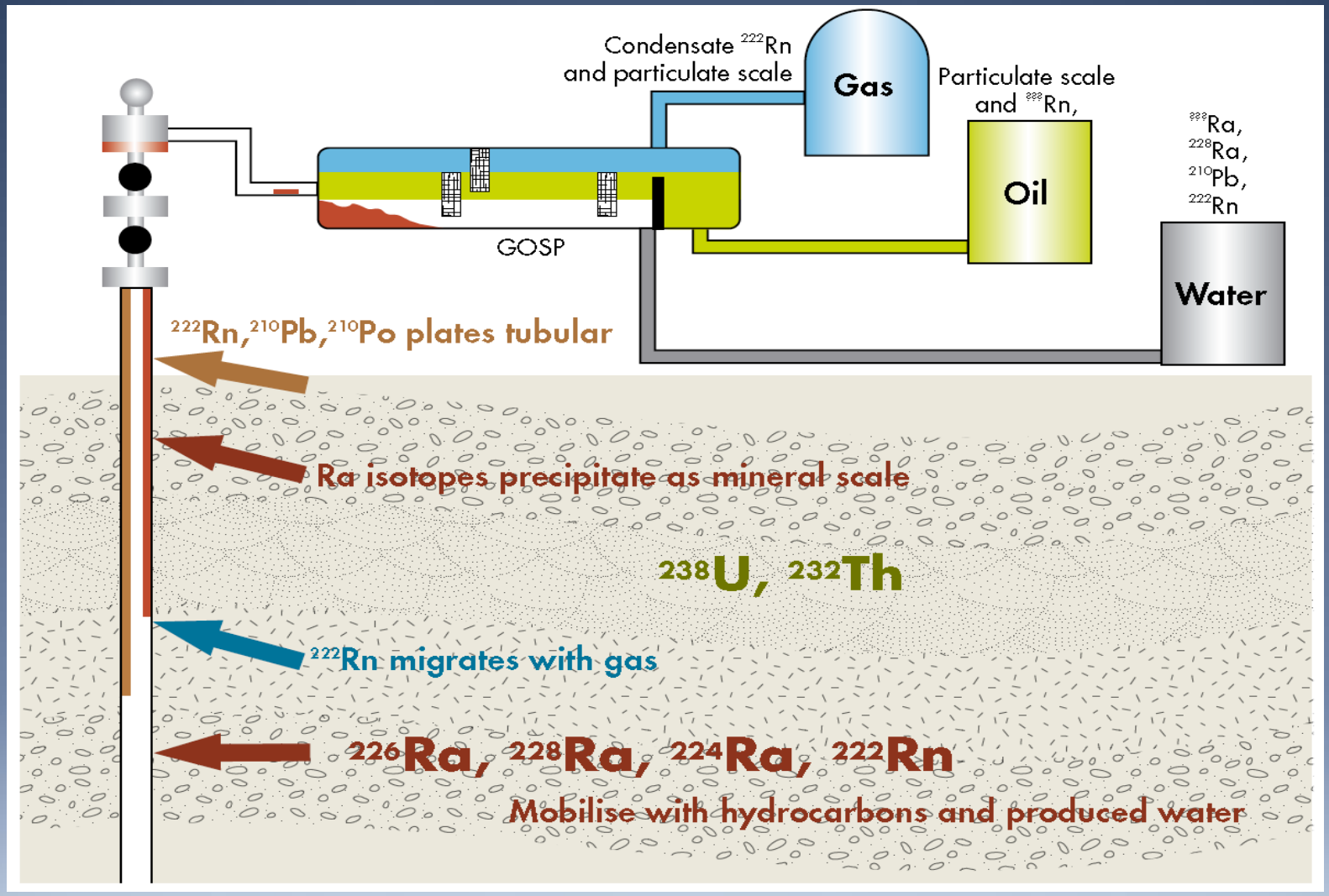
Uranium-238

Radium-226

Radium-228

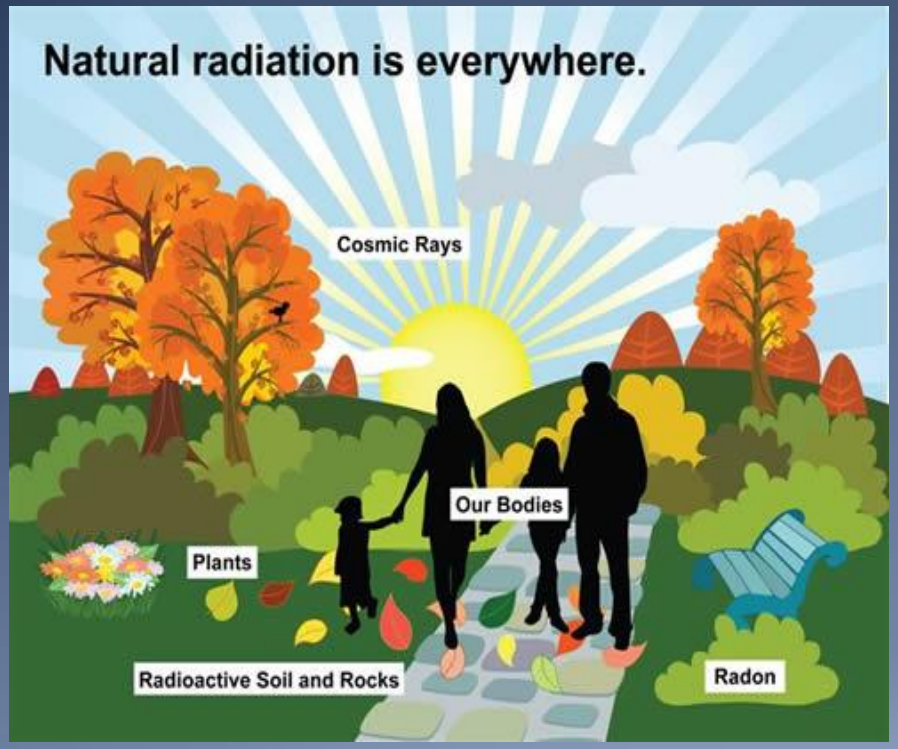
Lead-210

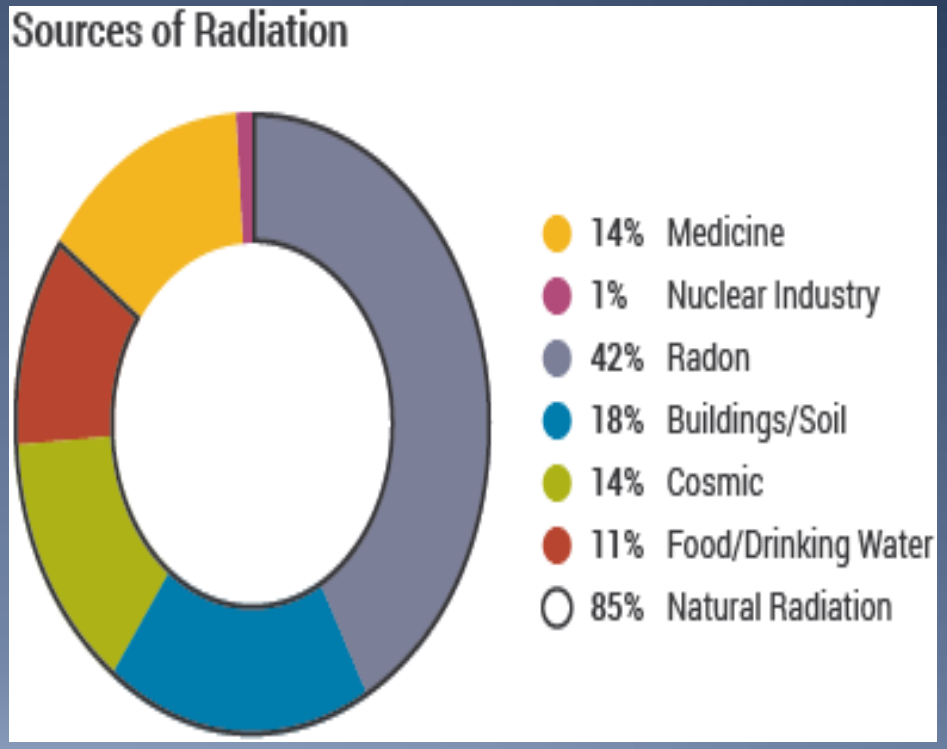
NORM


Condensate ^{222}Rn and particulate scale
Gas
Particulate scale and ^{222}Rn,
^{226}Ra, ^{228}Ra, ^{210}Pb, ^{222}Rn
Oil
Water
GOSP
^{222}Rn,^{210}Pb,^{210}Po plates tubular
Ra isotopes precipitate as mineral scale
^{238}U, ^{232}Th
^{222}Rn migrates with gas
^{226}Ra, ^{228}Ra, ^{224}Ra, ^{222}Rn
Mobilise with hydrocarbons and produced water

Radioactivity Occurs Naturally in Our Environment

- Radionuclides occur naturally in air, water, and soil.
- Background radiation comes from
  - Cosmic radiation
  - Terrestrial radiation
  - Internal radiation
- Background radiation levels vary by geographic location, depending upon local elevation and geology.
- Radionuclides also occur in food we eat, and in materials commonly present in our homes, and offices.


Natural radiation is everywhere.
Cosmic Rays
Our Bodies
Plants
Radioactive Soil and Rocks
Radon


Sources of Radiation
14% Medicine
1% Nuclear Industry
42% Radon
18% Buildings/Soil
14% Cosmic
11% Food/Drinking Water
85% Natural Radiation

What is TENORM

- Technological enhanced naturally occurring radioactive material. Materials that are removed from the earth and concentrated by human activity.

- When NORM is used for commercial purposes, processed, separated, or in some other manner has its radioactivity concentrated, it becomes TENORM.

Potential TENORM

Common Examples of Potential TENORM

1. Filter Socks
2. Filter Cake
3. Pipe Scale
4. Tank Bottoms
5. Ceramic Proppant after use/waste

Potential TENORM

- Flow back
  - Filtering
- Work over rig waste
  - Fittings
  - Rags
  - Gloves

Questions?