

2024 Radiological Health Update

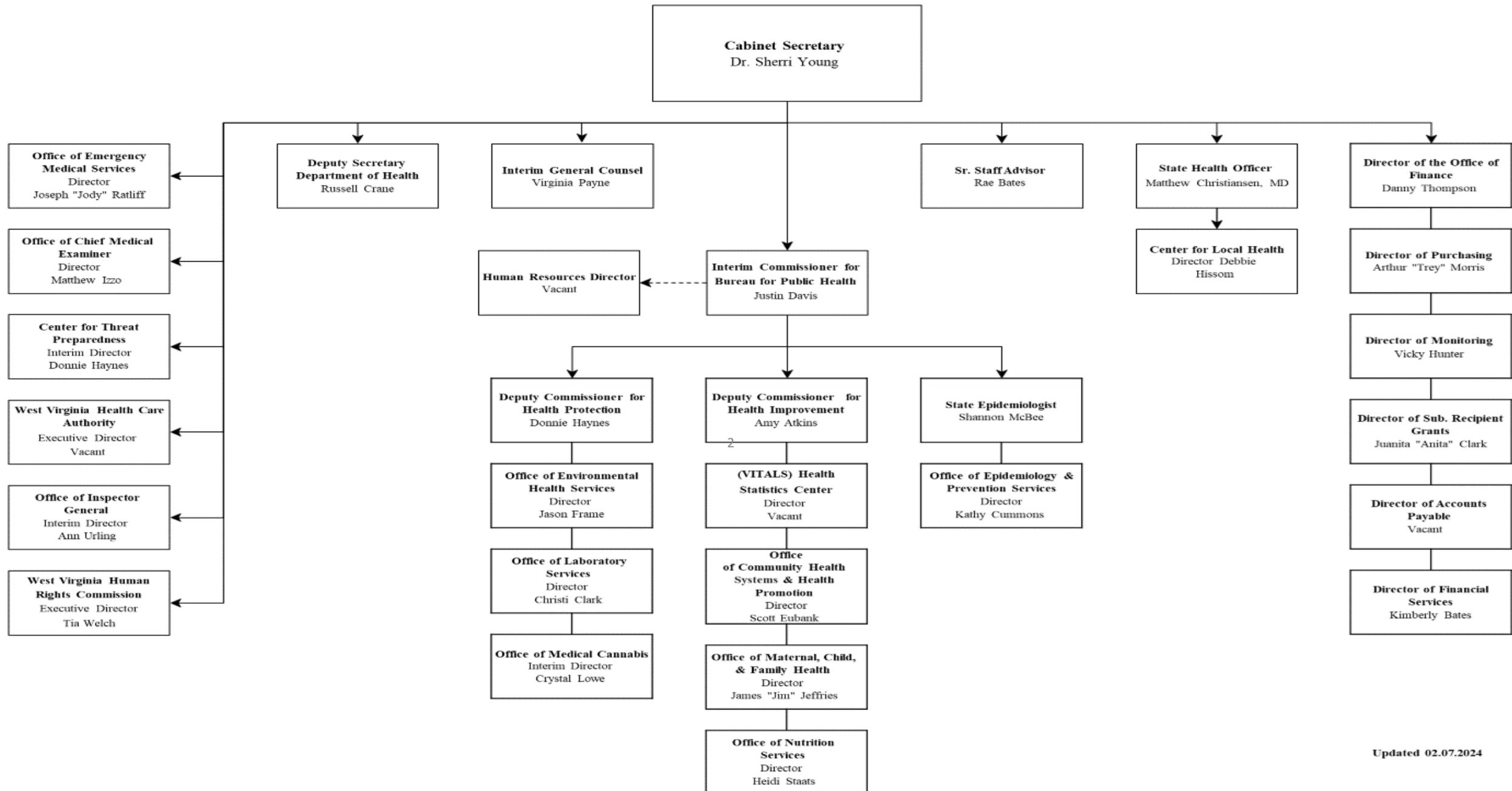
Jason Frame, Director – WV Office of Environmental Health Services

November 14, 2024
Fairmont Brine Public Meeting

Department Structure



West Virginia Department of Health



Updated 02.07.2024

Radiologic Health Program



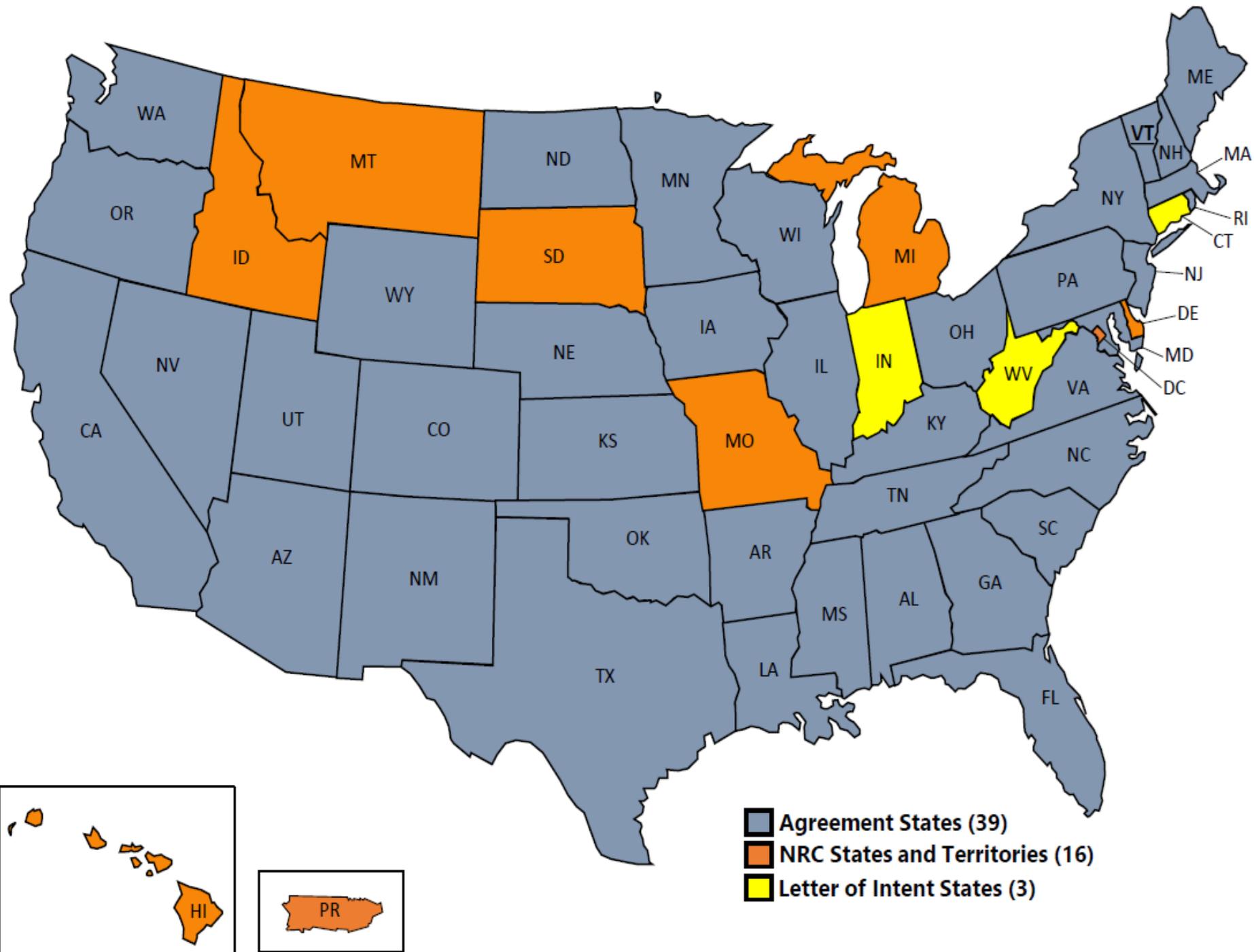
- Program sits in the Radiation, Toxics & Indoor Air Division of the West Virginia Office of Environmental Health
- Program Staff includes three Radiologic Health Specialists, two Environmental Resource Specialists, a Licensing Support Specialist, an Environmental Analyst (part-time) and a Radiologic Health Specialist Chief
- Radiologic Health Staff are responsible for multiple programs all related to education, outreach, prevention, and regulation of known radiologic carcinogens being exposed to workers, public and the environment
- These programs include:
 - Registration of all vendors and physicists who perform work related to radiation within the state
 - Inspection and registration of all facilities that house radiation producing machines
 - Inspections of mammography facilities within the state (through contract with FDA)
 - Emergency Response
 - Outreach and education related to Radon
 - Registering and inspecting facilities throughout the state who process TENORM fluids (since 2019)

WV Agreement State Progress



- Letter of Intent from Governor Justice submitted January 9th, 2023
- NRC response to Letter of Intent received March 9th, 2023
- Budgetary supplement developed in amount of \$675,000 annually for four positions during program development
- Enabling legislation passed 2024 legislative special session

Current Agreement States



Vendor Requirements to Register

- **Complete registration form**



Identify all services they wish to perform, such as:

- Machine sales, loan, or lease
- Machine assembly, removal, or repair
- Film processing/supplies
- Personnel dosimetry services
- Survey instrument calibration

Physicists' Requirements to Register



- **Application submission**
- **Resume**
- **Diplomas**
- **MQSA also requires a track of CE credits**
- **Board certifications**
- **Identify what types of services they will provide in West Virginia such as:**
 - General
 - Radiation machine evaluation
 - Therapy evaluation
 - Shielding design
 - Mammography



Radiation Machine Facilities

- Dental offices (950)
- Medical offices (595)
- Veterinary offices (210)
- Chiropractic offices (180)
- Hospitals (55)
- Podiatry offices (65)
- Radiation therapy facilities (20)
- Industrial facilities (225)



Mammography Facilities

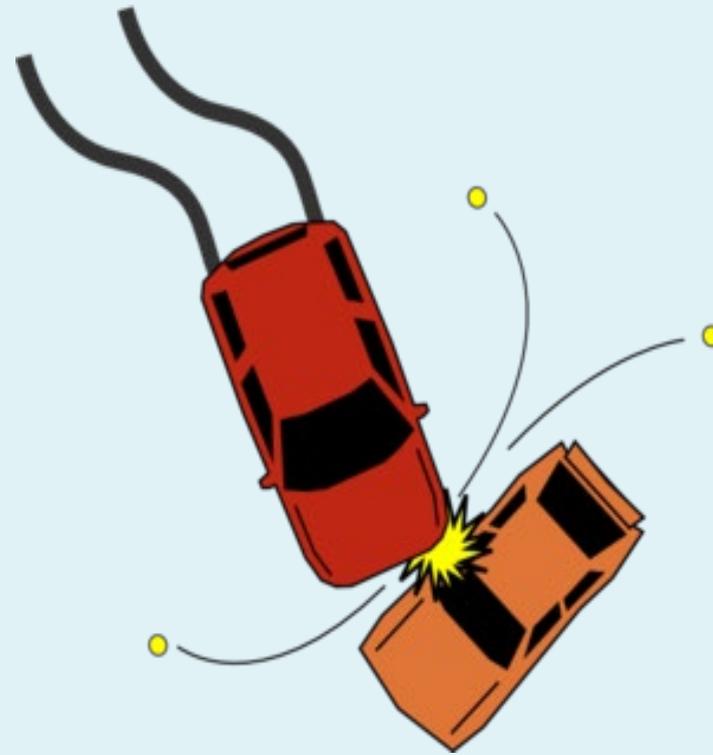
- Regulated by the FDA
- 62 facilities in the state
- Staff accredited by the FDA to perform inspections
- Inspections performed annually



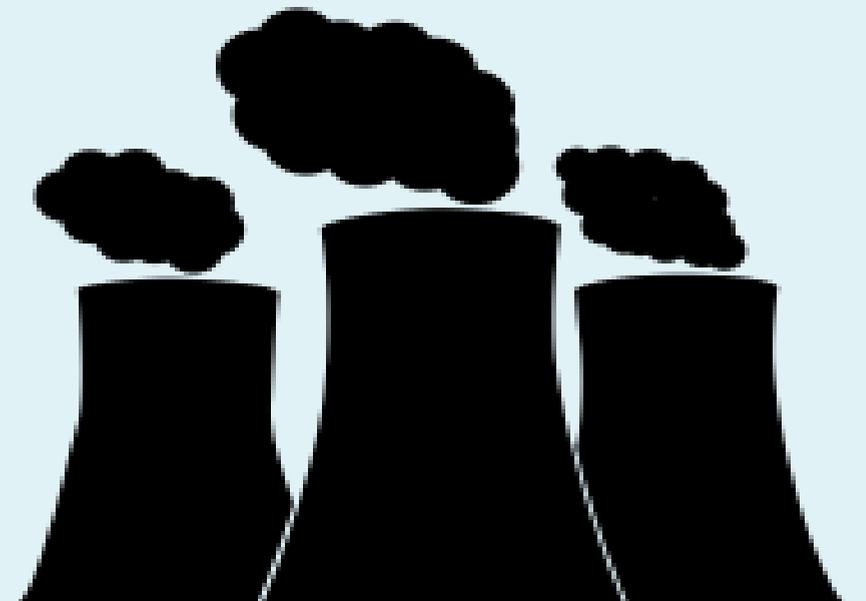
Emergency Response



Radiation Alarms



**Transportation
Accidents**



**Nuclear Power
Stations**

Beaver Valley Power Station

- **Located 5 miles east of Hancock County (Shippingport, PA)**
- **Radiological field monitoring teams, dose assessment, and liaisons to provide information**



WVDH Radon Program



- **Free Radon kits available to WV residents**
- **Program to test schools for Radon**

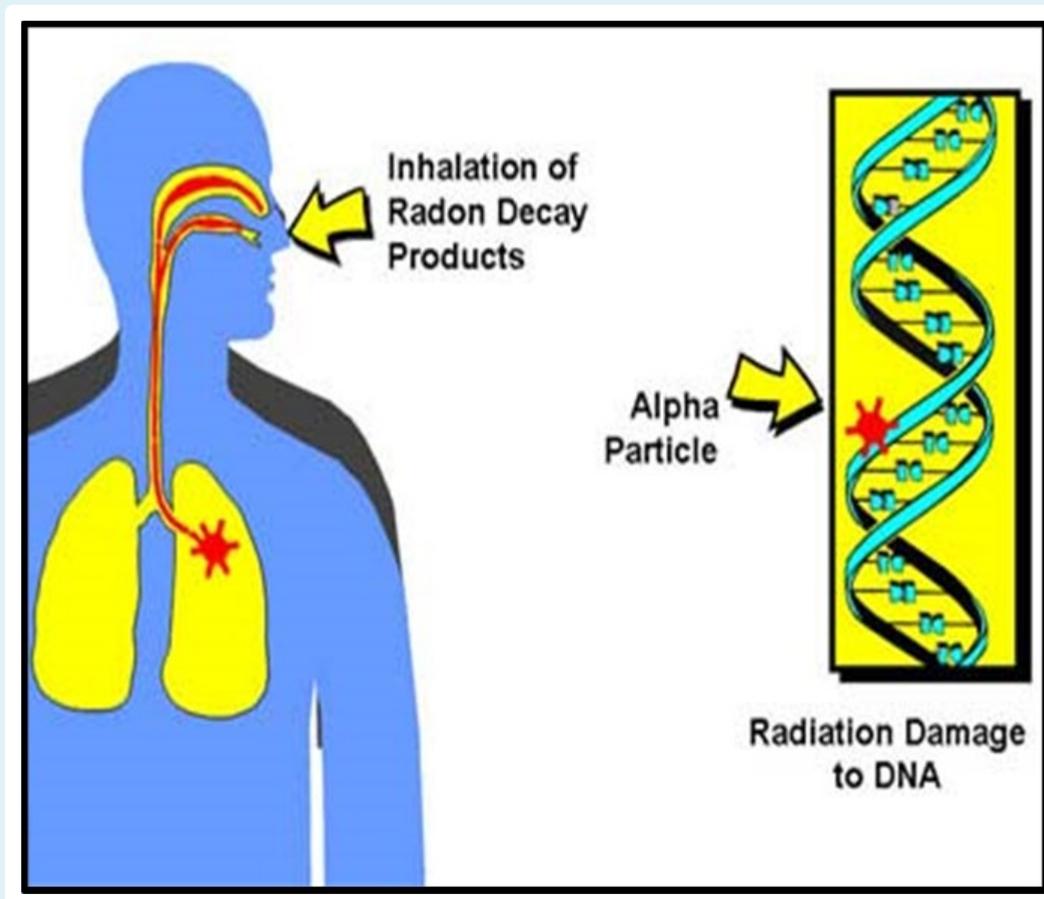


- **Testers and mitigators working in WV are required to be licensed to perform such work**



- **Work with local health departments and other agencies to increase awareness of the effects of Radon exposure**

Health Effects of Radon



- **Second leading cause of lung cancer in The United States**
- **Inhaled into lungs and undergoes radioactive decay**
- **During decay, tiny bursts of alpha particles are released that harm lung tissue by damaging the DNA**
- **The damaged DNA can lead to lung cancer**

Technologically Enhanced Naturally Occurring Radioactive Material



- ❖ Naturally occurring radioactive materials that have been concentrated or exposed to the accessible environment because of human activities such as manufacturing, mineral extraction, or water processing
- ❖ Industrial wastes or by-products enriched with radioactive elements is found in the environment such as: radium, uranium, thorium, potassium, and any of their decay products

Typical Radium Content

Using Radioactivity

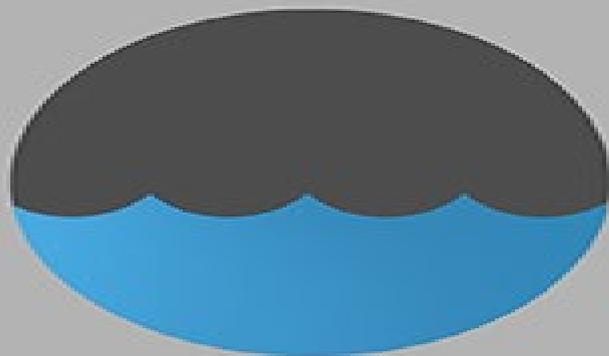
Common Use

Measuring soil, water and air samples

Units

Becquerel (Bq), Curie (Ci)

Examples



Surface water

Natural radium-226 levels:
0.0037 – 0.0185 Bq/L
or 0.1 – 0.5 pCi/L



Drinking water

Radium limit for daily consumption:
0.185 Bq/L or 5.0 pCi/L

Current TENORM Activities



- Currently the West Virginia Department of Health Radiologic Program Registers and Inspects Facilities that process TENORM Waste
- These facilities are routinely inspected, additional inspections are performed if complaints are received
- Inspections are typically a collaboration between West Virginia Department of Health (WVDH) and West Virginia Department of Environmental Protection staff
- To obtain these registrations the facility must submit a very detailed application that includes:
 - Radiation Protection Plans
 - Proof of DEP permitting
 - Financial Surety
 - Additional documentation

DEP Rule Radiological Summary



- Radiation detection equipment at landfills accepting drilling waste mandated by WV legislature
- Radiation Monitoring Plans must be approved for each landfill
- Portal monitors alarm at 2x background radiation
- Alarms and post alarm actions must be reported to WVDH & WV DEP in writing using form 1W
- Limits landfill disposal of drilling waste to 5 pCi/g or less of Radium 226/228 above background
- Providers of radiological analysis must register as a radiological vendor with WVDH

Health Effects

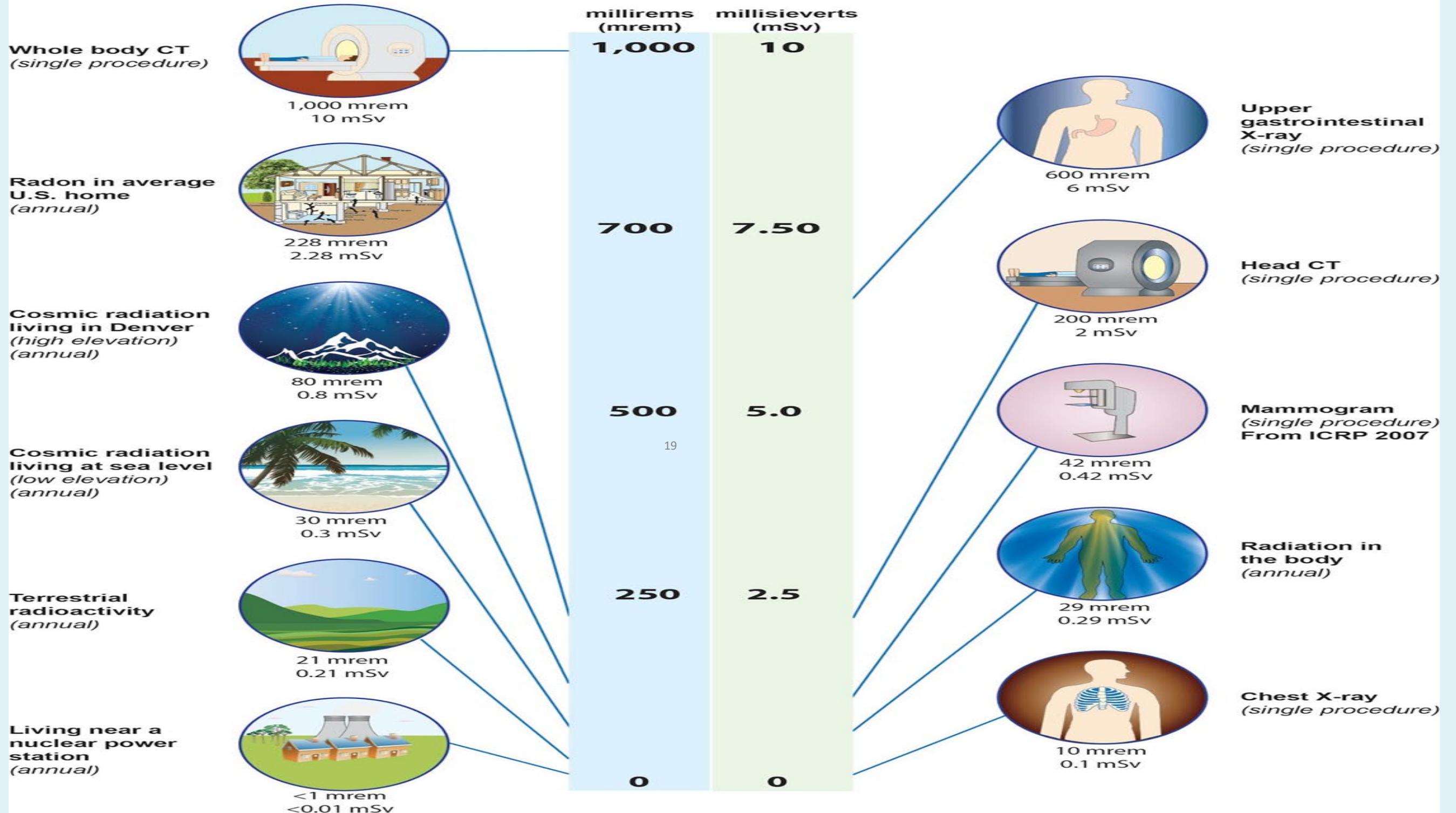
rem

- 5-10-Changes in blood chemistry
- 50-Nausea in a few hours
- 90-Diarrhea
- 100-Hemorrhage
- 400-Possible death in 2 months
- 1000-Destruction of intestinal lining, death in 1-2 weeks
- 2000-Damage to nervous system, loss of consciousness, death in a few hours

Dose Examples

RELATIVE DOSES FROM RADIATION SOURCES

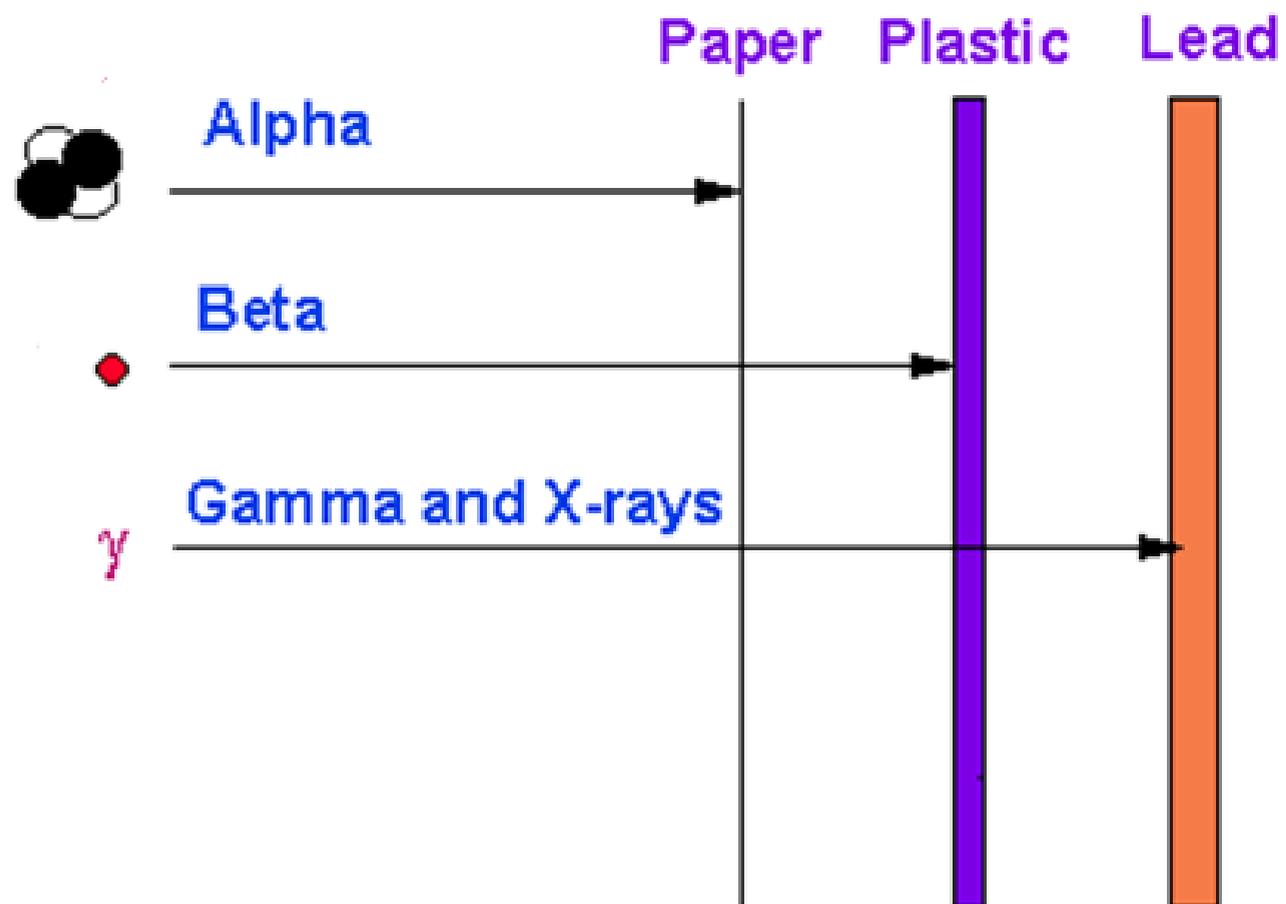
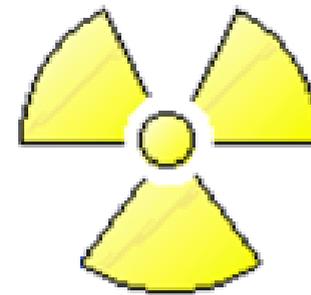
All doses from the National Council on Radiation Protection & Measurements, Report No. 160 (unless otherwise denoted)



Long-Term, Low-Level Exposure

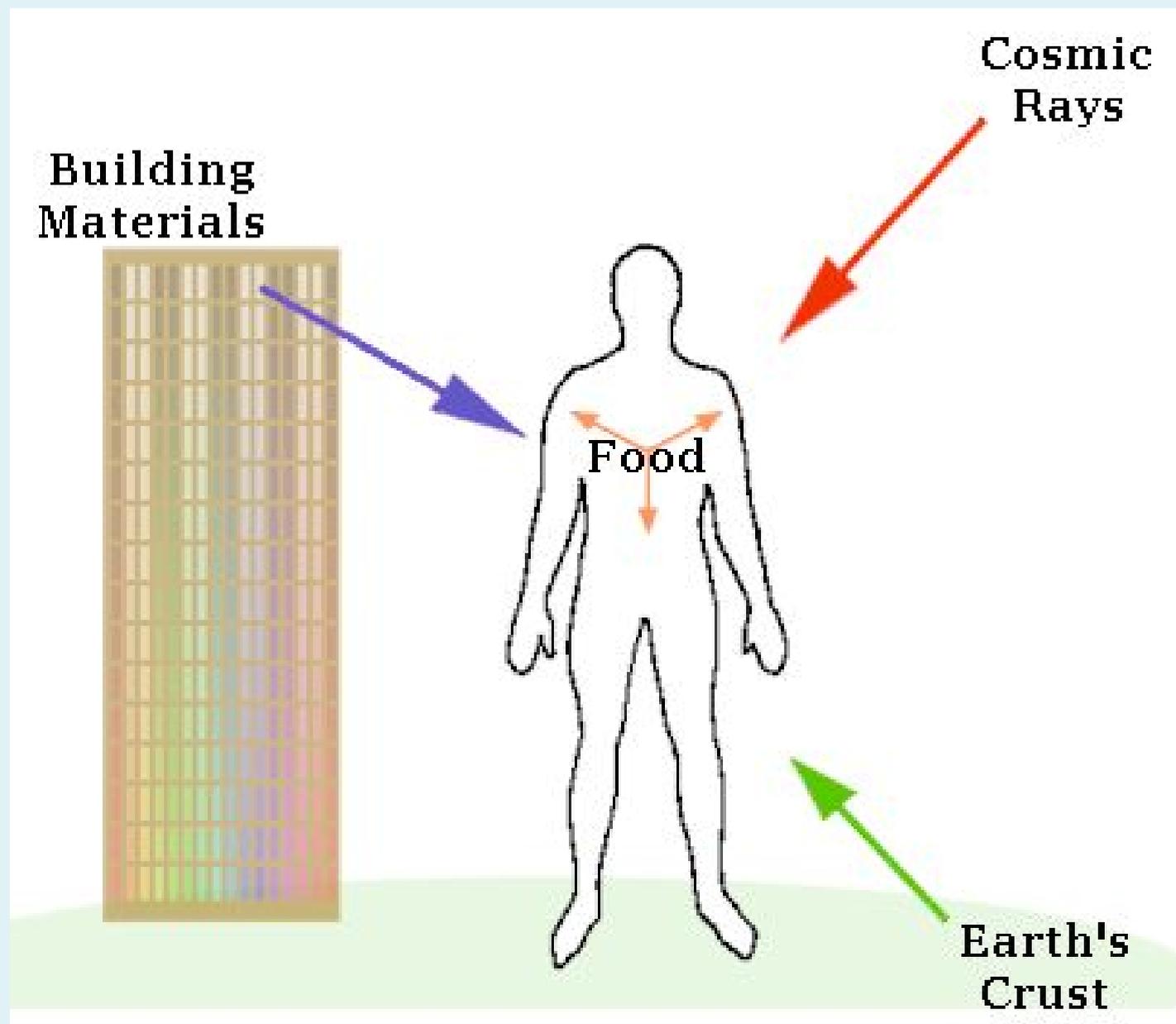
Long-term, low-level (chronic) exposure to radiation may not cause any ill effects in some people, while over extended time, may cause some adverse effects in others.

Penetrating Distances

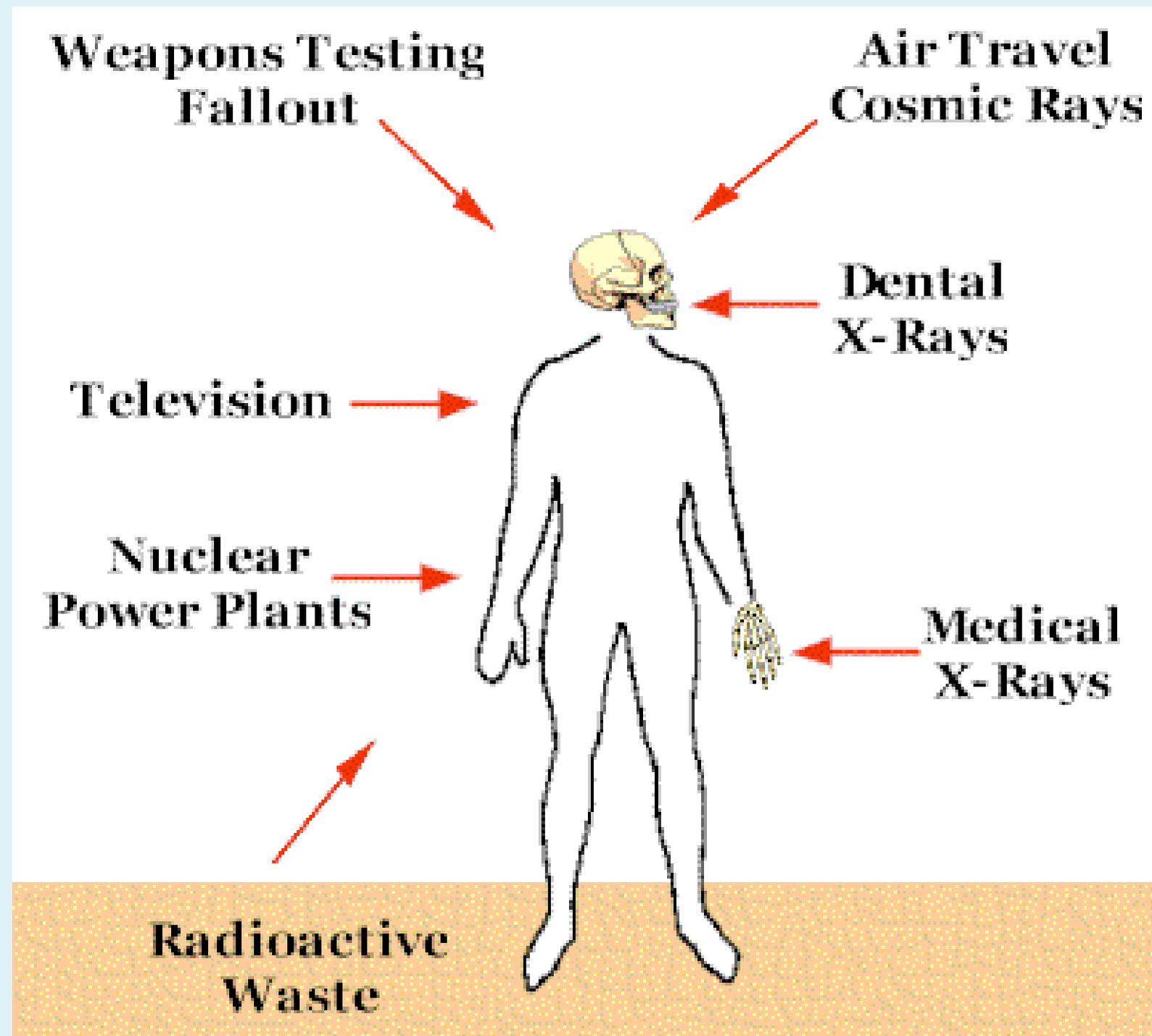


- TENORM emits Alpha and Beta Radiation
- Concern for Alpha and Beta Radiation primarily is ingestion of the particles
- Gamma and X-rays are primarily used in the medical field

Natural Sources of Radiation



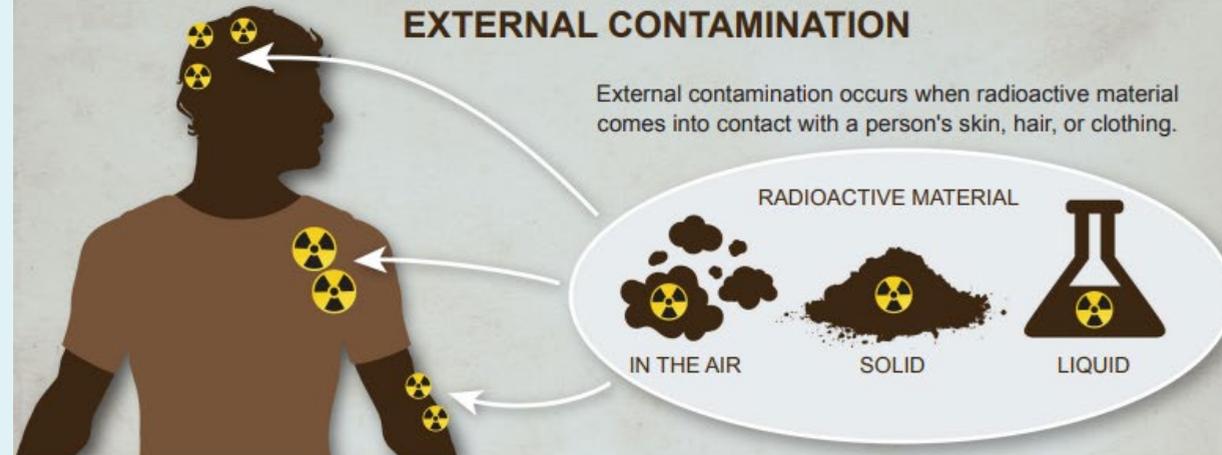
Man Made Sources of Radiation



Radiologic Exposure vs Contamination

RADIATION CONTAMINATION VERSUS EXPOSURE

EXTERNAL CONTAMINATION

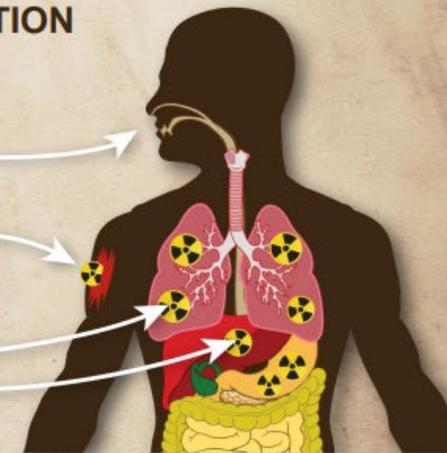


INTERNAL CONTAMINATION

Internal contamination can occur when radioactive material is swallowed or breathed in.

Internal contamination can also occur when radioactive material enters the body through an open wound.

Different radioactive materials can accumulate in different body organs.



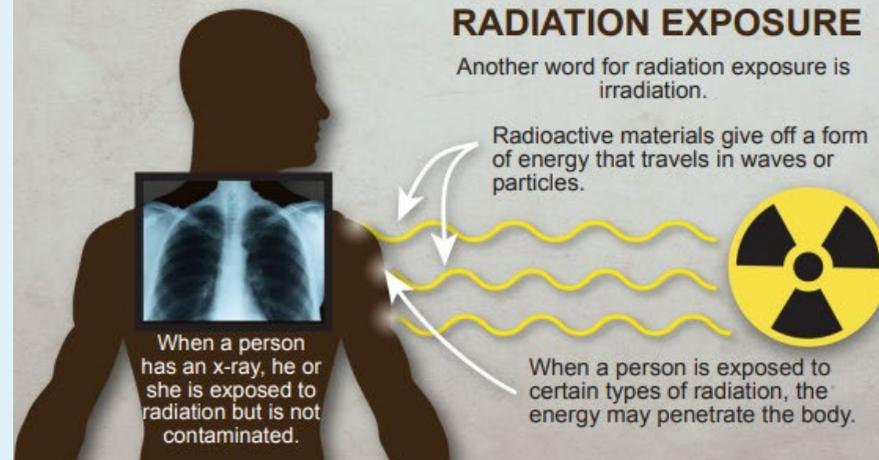
RADIATION EXPOSURE

Another word for radiation exposure is irradiation.

Radioactive materials give off a form of energy that travels in waves or particles.

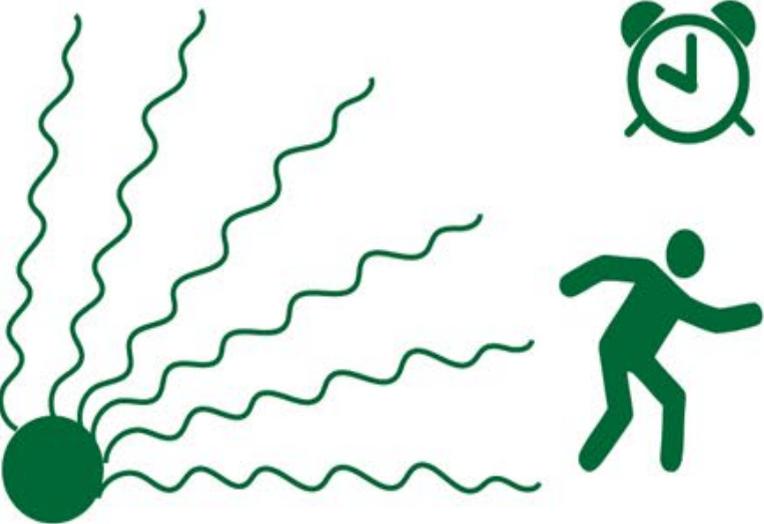
A person exposed to radiation is not necessarily contaminated with radioactive material.

For a person to be contaminated, radioactive material must be on or inside of his or her body.

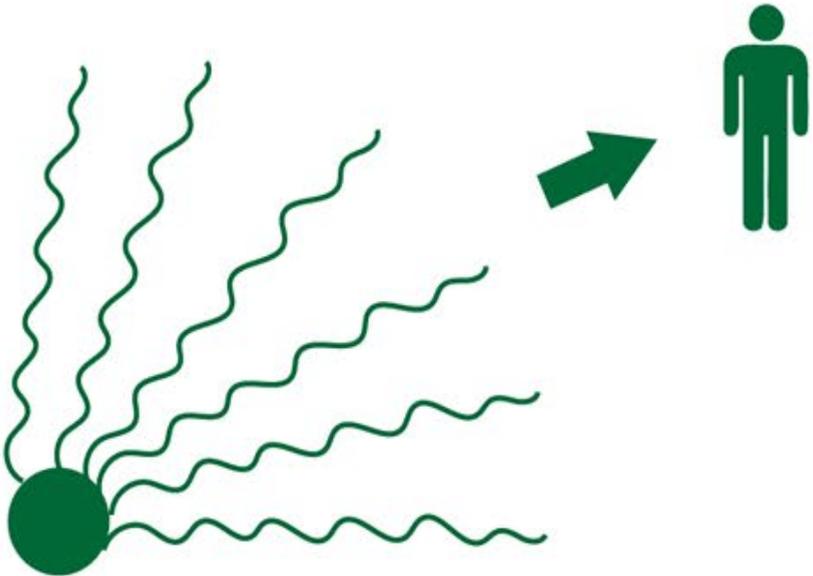


Reducing Dose

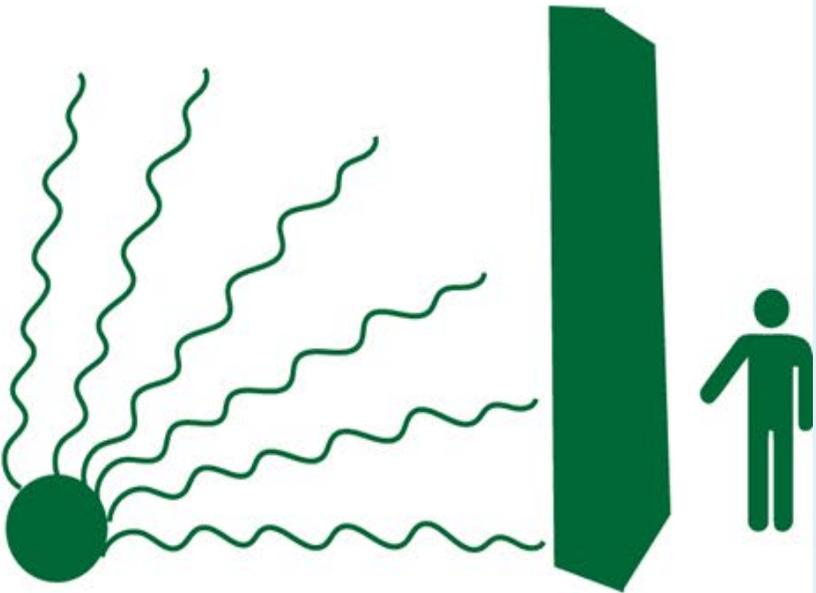
To reduce radiation exposure:



Limit Time



Increase Distance



Use Shielding

Contact



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