UNIVERSITY OF RIO GRANDE & RIO GRANDE COMMUNITY COLLEGE

Environmental Radiological Monitoring: Portsmouth Gaseous Diffusion Plant

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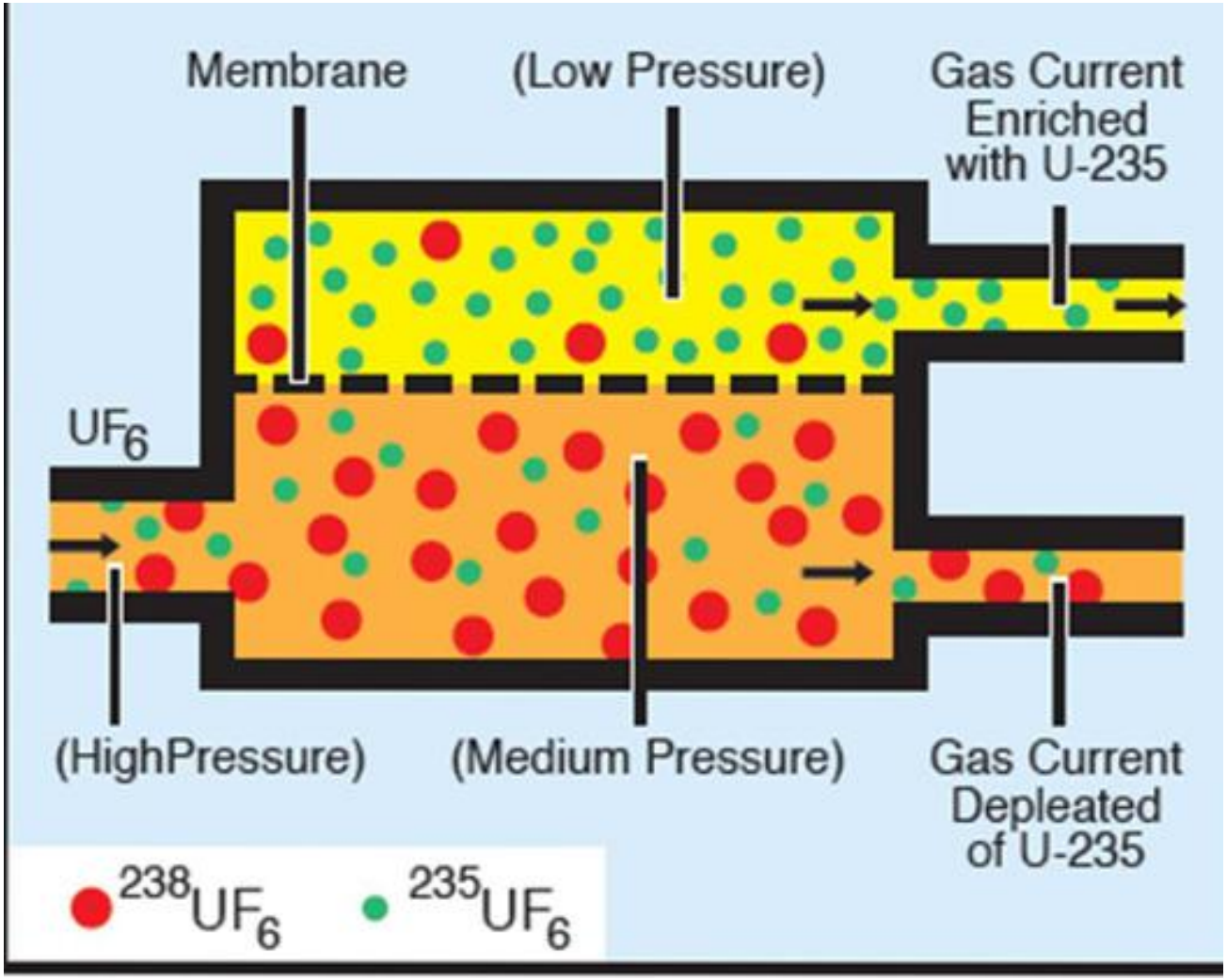
Portsmouth: GDP

Gaseous diffusion



Why monitor?

- Environmental monitoring (EM) programs required by state and federal regulations and DOE Orders
- Data collected to asses potential impacts to **human health** and the **environment** from radionuclides released
- Gauge impacts and set priorities for improvement

What are radionuclides?

- Uranium
- Isotopic uranium

Uranium enrichment process

- Transuranic radionuclides
  - Americium-241; neptunium-237; plutonium-238/239/240
- Technetium-99

Produced during fission process of nuclear reactors

Setting dose limits

- 10 mrem/year limit for release to air (USEPA – Clean Air Act and National Emission Standards for Hazardous Air Pollutants)
- 100 mrem/year limit for release from all other pathways (DOE)

- *Average US citizen exposed to 311 mrem/year from natural radiation sources*

Sources monitored

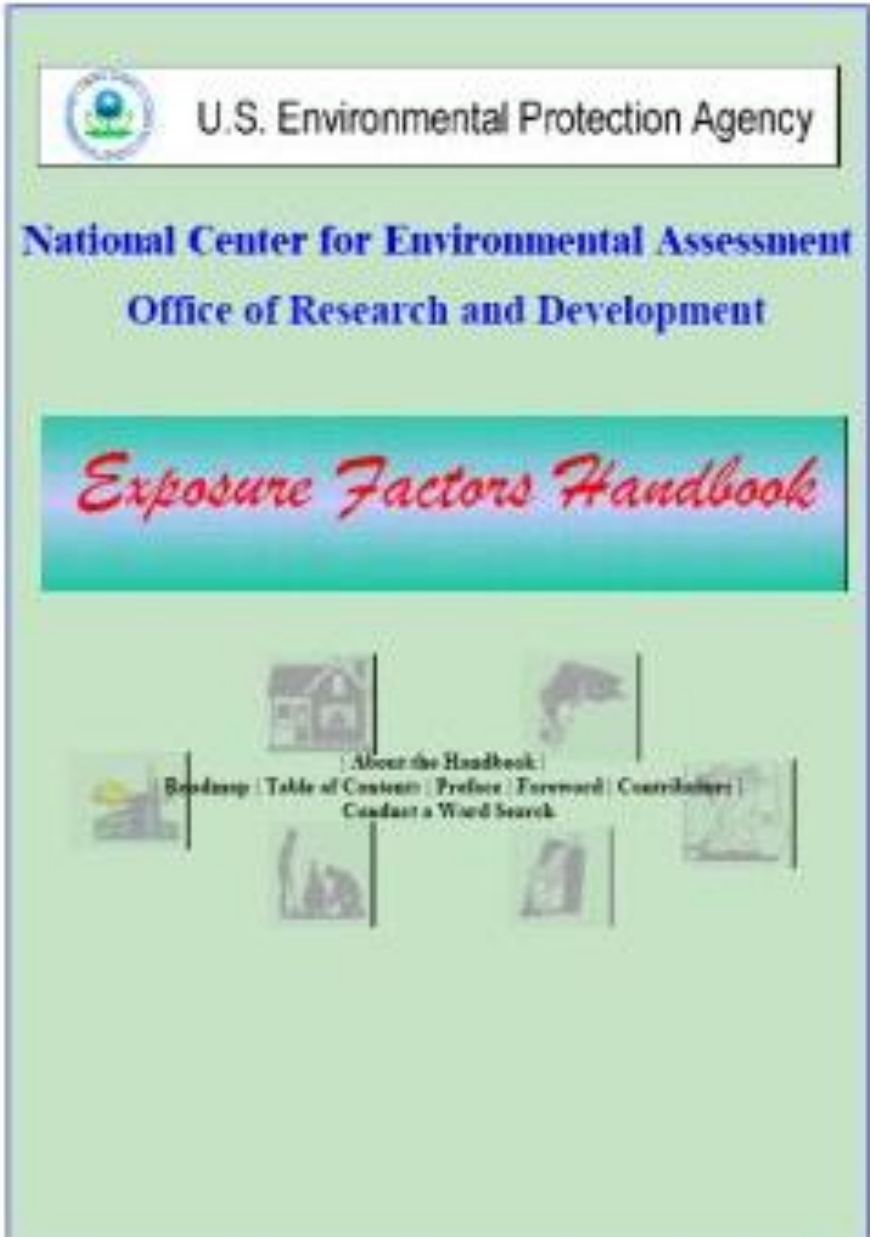
- Airborne discharges
- Ambient air
- Radiation
- Discharges to surface water
- Surface water
- Sediment
- Soil
- Vegetation
- Biota

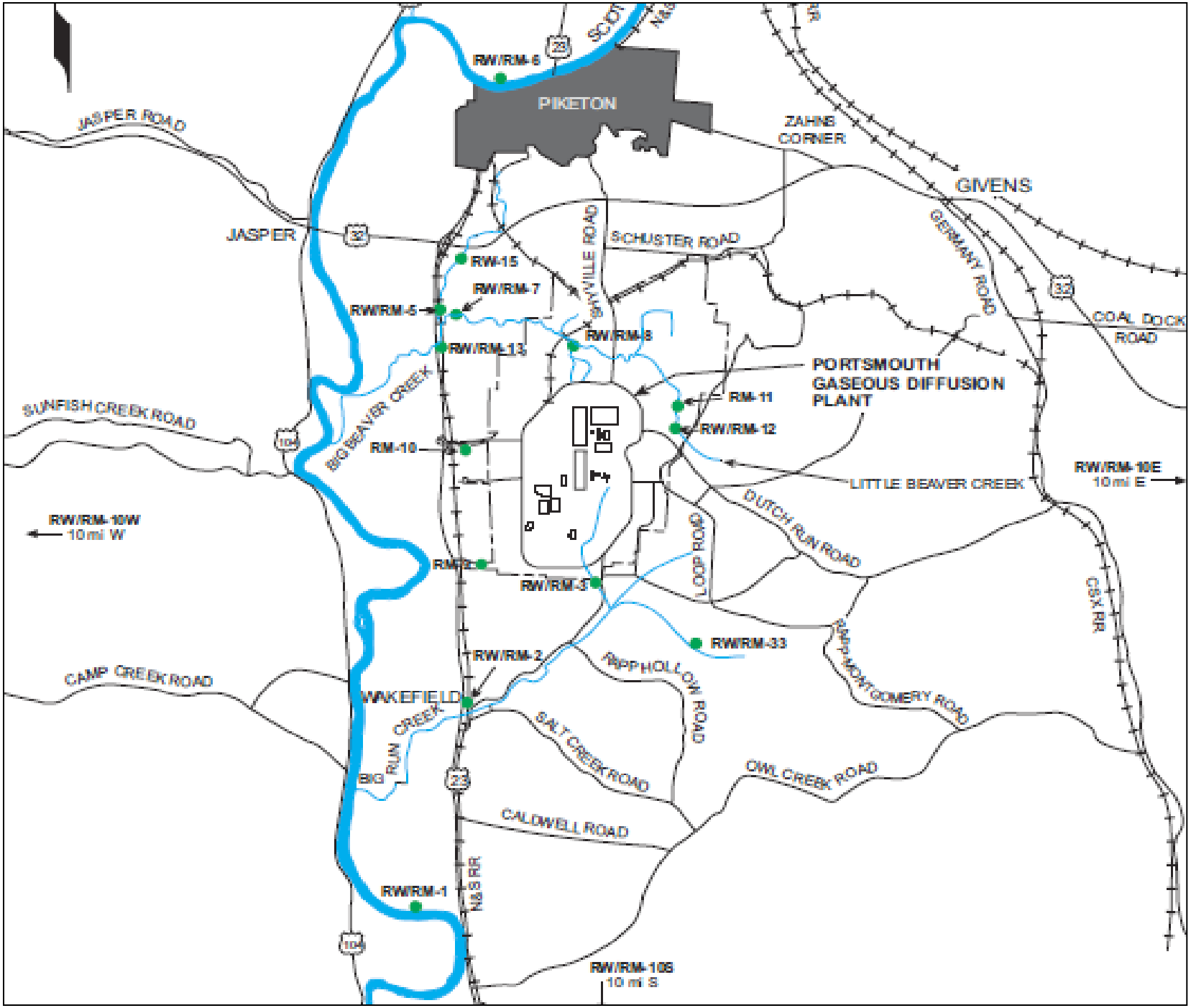
Focus on off-site sampling locations (public exposure)

Dose calculations

- Based on highest detected levels in environment and likely exposure routes
  - Contact
  - Bioaccumulation
  - Consumption

- Worst-case approach




RW/RM-6
PIKETON
JASPER ROAD
ZAHNS CORNER
GIVENS
JASPER
SCHUSTER ROAD
RW-15
RW/RM-7
RW/RM-5
SHAWNEE ROAD
GERMANY ROAD
COAL DOCK ROAD
RW/RM-8
RW/RM-13
PORTSMOUTH GASEOUS DIFFUSION PLANT
RM-11
RW/RM-12
SUNFISH CREEK ROAD
BIG BEAVER CREEK
RM-10
LITTLE BEAVER CREEK
RW/RM-10E
10 mi E
RW/RM-10W
10 mi W
DUTCH RUN ROAD
LOOP ROAD
RW/RM-3
RW/RM-33
CSX RR
RW/RM-2
RIPPHOLLOW ROAD
RIPPMONTGOMERY ROAD
CAMP CREEK ROAD
WAKEFIELD
BIG RUN CREEK
SALT CREEK ROAD
OWL CREEK ROAD
CALDWELL ROAD
N&S RR
RW/RM-1
RW/RM-10S
10 mi S

Sediment (aquatic systems)

- Uranium and transuranics (low levels) detected
  - Various locations
- Naturally occurring and possibly due to PORTS activity
  - *Background samples*

- Dose calculation = 0.052 mrem/year

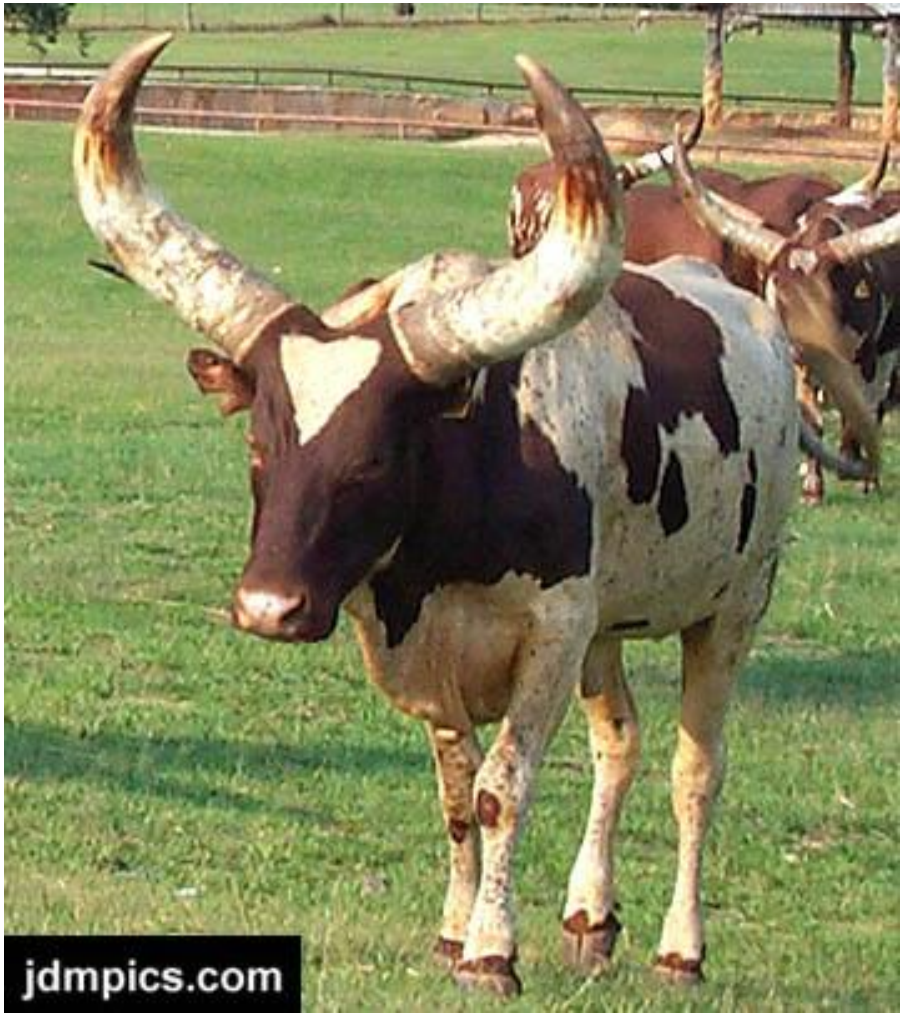
Soil (terrestrial)

- Uranium detected at all sites
- No transuranics detected
- Naturally-occurring levels (background levels)

- Dose calculation = 0.078 mrem/year

Vegetation (bioaccumulation)

- *Uptake of radionuclides*
- Sampled in same areas as soil
- No transuranics or technetium detected off-site
- Uranium detected off-site
- Dose calculation = 0.014 mrem/year



Biomonitoring: deer

- Sampled liver, kidney, and muscle

- No uranium, transuranics, or technetium detected

Biomonitoring: fish

- Sampled liver, kidney, and muscle

- No uranium, transuranics, or technetium detected

Biomonitoring: crops

- Sample corn, tomatoes, melons, squash, etc.
- Uranium detected only in melons
- Dose calculation = 0.0014 mrem/year

Biomonitoring: milk and eggs

- Sampled from dairy at Waverly and egg farm at Lucasville

- Uranium detected at low-levels in dairy samples and egg samples

- Dose calculation = 0.019 mrem/year

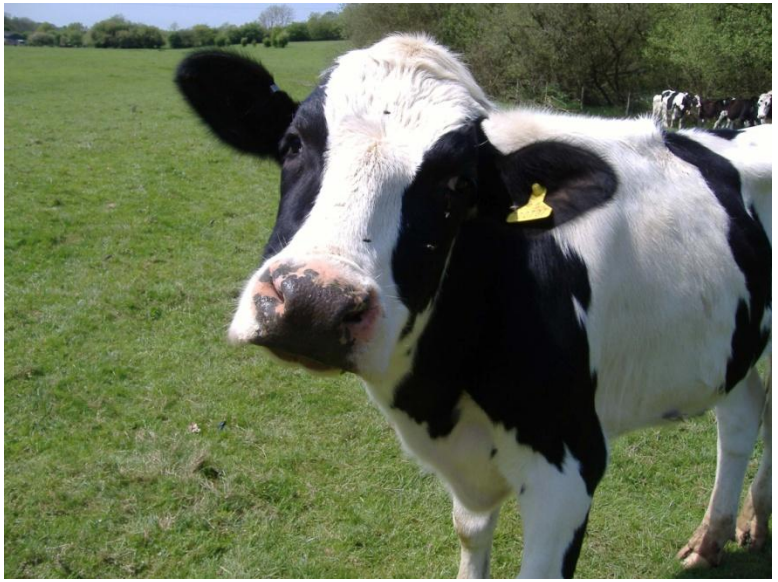


Table 4.2. Summary of potential doses to the public from radionuclides detected by PORTS environmental monitoring programs in 2009

Source of dose	Dose (mrem/year)[a]
Sediment	0.052
Soil	0.078
Vegetation	0.014
Crops	0.0014
Eggs	0.019
Total	0.16

[a]100 mrem/year is the DOE limit.

Summary

Table 4.1. Summary of potential doses to the public from PORTS in 2009

Source of dose	Dose (mrem/year)[a]
Airborne radionuclides	0.024
Radionuclides released to the Scioto River	0.037
Direct radiation from depleted uranium cylinder storage yards	0.72
Radionuclides detected by environmental monitoring programs (sediment, soil, vegetation, crops, and eggs)	0.16
Total	0.94

[a]100 mrem/year is the DOE limit.

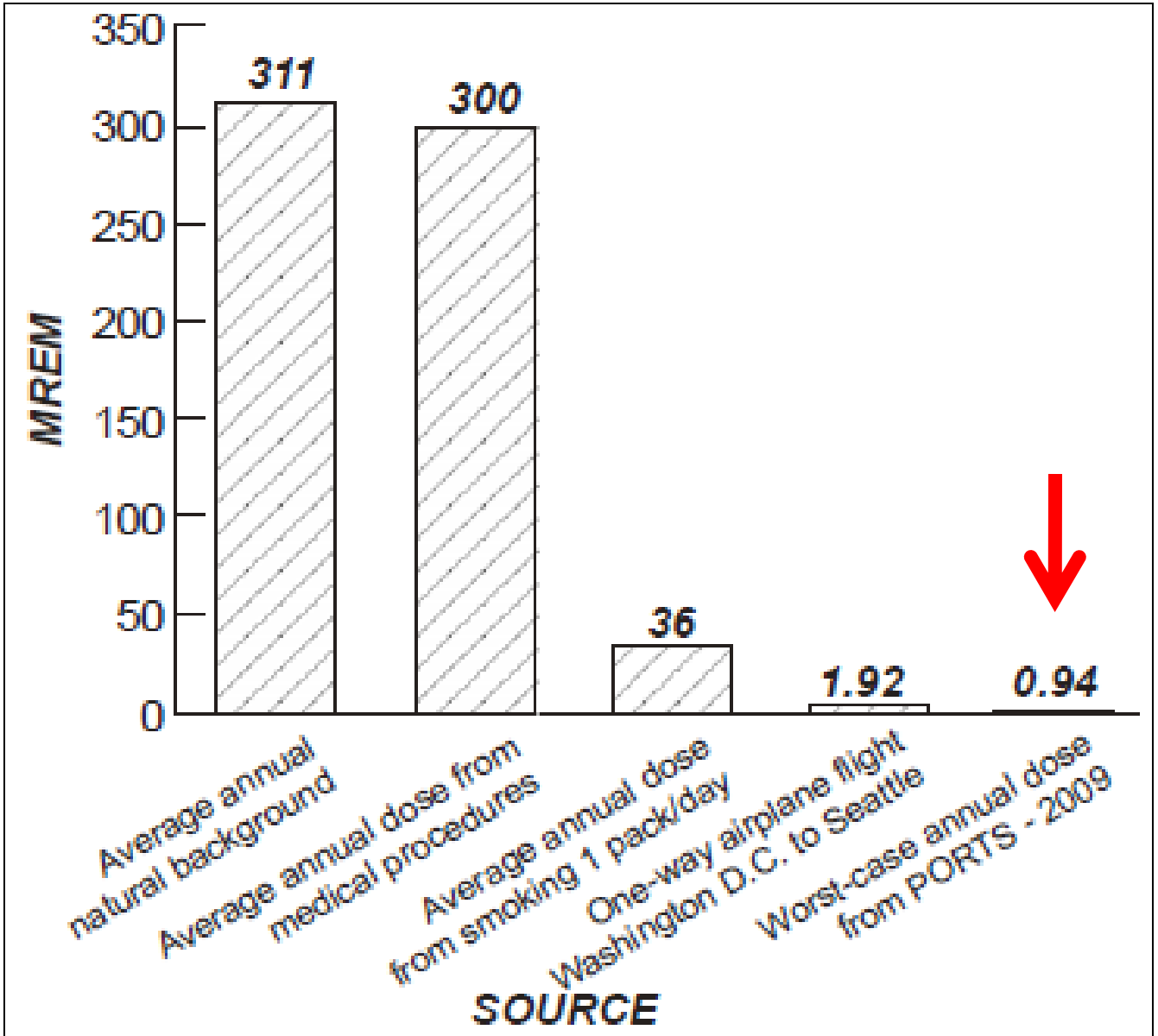


Figure 1. Comparison of dose from various common radiation sources (NCRP 2009).

Questions?