



## Relative Doses from Radiation Sources

Rem (Roentgen Equivalent Man) is a standard of measurement and this unit of measurement is used to assess the biological effects of ionizing radiation for humans. The millirem (mrem) is the one thousand part of a rem and is the measurement often used to approximate doses commonly encountered, such as those depicted here. The U.S. Population on average receive 620 mrem from exposure to radiation per year that can come from natural background and man-made radiation (NCRP 160).

**Note:** Conversion to SI Units: 1 mrem = 0.01 mSv



**DOE/NRC Standard for the General Public**  
100 mrem per year



**Normal Cosmic Radiation in Ohio**  
28 mrem per year

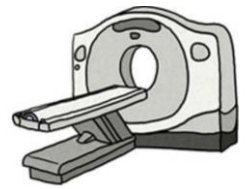
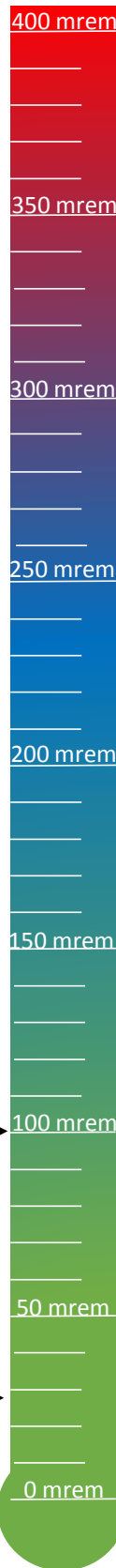
**NRC and DOE Standard for Decommissioning sites**  
25 mrem per year



**EPA/ dose limit for Air Releases-** 10 mrem per year



**Maximum individual dose from 2017 air emissions at all DOE sites less than**  
1 mrem in a year



**Full Body CT (X-ray) per session**  
Average dose 5 to 10 rem



**Average Natural Background dose to the US Population**  
310 mrem per year



**Radon Average US Population**  
200 mrem per year



**Nuclear Medicine Procedure**  
50 mrem per year



**Mammogram**  
30 mrem (single Procedure)



**Round trip flight from Washington DC to Seattle**  
3.8 mrem per trip



**Smoke Detectors**  
Less than 0.001 mrem per year.

Sources: <https://www.epa.gov/radiation/radiation-sources-and-doses>  
<https://www.nrc.gov/about-nrc/radiation/around-us/calculator.html>

Mettler Jr, Fred A., et al. "Effective doses in radiology and diagnostic nuclear medicine: a catalog." Radiology 248.1 (2008): 254-263.



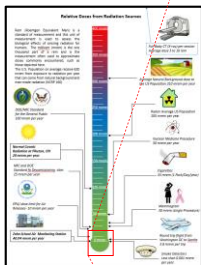
## Relative Doses from Radiation Sources A Closer Look!



Added dose from living in brick, stone, or concrete structure 7 mrem per year



eating one 10 g package of brazil nuts  
0.02 to 0.1 mrem



DOE Sites air pathway dose are < 1 mrem/yr, where  
80% of these sites, the max dose is < 0.1 mrem/yr



Round trip flight from Washington  
DC to Seattle 3.8 mrem per trip



Eating an 8 oz serving  
of carrots or potatoes  
0.024 mrem



Eating an 8 oz steak  
0.02 mrem



Eating one banana  
0.01 mrem



drinking a 16 oz beer  
0.005 mrem

