

Lab & Rad Safety Newsletter



Alan Watts
Radiation Safety Officer

In This Issue:

 Instruction Concerning Risks From Occupational Radiation Exposure.....pg.1-3

 Calculate Your Radiation Dose.....pg.4

 = Required

 = Optional



INSTRUCTION CONCERNING RISKS FROM OCCUPATIONAL RADIATION EXPOSURE

1. What are the NRC occupational dose limits?

For adults, an annual limit that does not exceed:

5 rems (0.05 Sv) for the total effective dose equivalent (TEDE), which is the sum of the deep dose equivalent (DDE) from external exposure to the whole body and the committed effective dose equivalent (CEDE) from intakes of radioactive material.

50 rems (0.5 Sv) for the total organ dose equivalent (TODE), which is the sum of the DDE from external exposure to the whole body and the committed dose equivalent (CDE) from intakes of radioactive material to any individual organ or tissue, other than the lens of the eye.

15 rems (0.15 Sv) for the lens dose equivalent (LDE), which is the external dose to the lens of the eye.

50 rems (0.5 Sv) for the shallow dose equivalent (SDE), which is the external dose to the skin or to any extremity.

For minor workers, the annual occupational dose limits are 10 percent of the dose limits for adult workers.

For protection of the embryo/fetus of a declared pregnant woman, the dose limit is 0.5 rem (5 mSv) during the entire pregnancy.

The occupational dose limit for adult workers of 5 rems (0.05 Sv) TEDE is based on consideration of the potential for delayed biological effects. The 5-rem (0.05 Sv) limit, together with application of the concept of keeping occupational doses ALARA, provides a level of risk of delayed effects considered acceptable by the NRC. The limits for individual organs are below the dose levels at which early biological effects are observed in the individual organs. The dose limit for the embryo/fetus of a declared pregnant woman is based on a consideration of the possibility of greater sensitivity to radiation of the embryo/fetus and the involuntary nature of the exposure.

2. What are background radiation exposures?

The average person is constantly exposed to ionizing radiation from several sources. Our environment and even the human body contain naturally occurring radioactive materials (e.g., potassium-40) that contribute to the radiation dose that we receive. The largest source of natural background radiation exposure is terrestrial radon, a colorless, odorless, chemically inert gas, which causes about 55 percent of our average, nonoccupational exposure. Cosmic radiation originating in space contributes additional exposure. The use of x-rays and radioactive materials in medicine and dentistry adds to our population exposure. As shown below in the table, the average person receives an annual radiation dose of about 0.36 rem (3.6 mSv). By age 20, the average person will accumulate over 7 rems (70mSv) of dose. By age 50, the total dose is up to 18 rems (180 mSv). After 70 years of exposure this dose is up to 25 rems (250 mSv).

<i>Source</i>	<i>Effective Dose Equivalent (mrems)</i>	
Natural		
Radon	200	
Other than Radon	100	
Total		300
Nuclear Fuel Cycle		0.05
Consumer Products ^b		9
Medical		
Diagnostic X-rays	39	
Nuclear Medicine	14	
Total		<u>53</u>
Total		about 360 mrems/year

3. What are the typical radiation doses received by workers?

For 1993, the NRC received reports on about a quarter of a million people who were monitored for occupational exposure to radiation. Almost half of those monitored had no measurable doses. The other half had an average dose of about 310 mrem (3.1mSv) for the year. Of these, 93 percent received an annual dose of less than 1 rem (10 mSv); 98.7 percent received less than 2 rems (20 mSv); and the highest reported dose was for two individuals who each received between 5 and 6 rems (50 and 60 mSv). The table lists average occupational doses for workers (persons who had measurable doses) in various occupations based on 1993 data. It is important to note that beginning in 1994, licensees have been required to sum external and internal doses and certain licensees are required to submit annual reports. Certain types of licensees such as nuclear fuel fabricators may report a significant increase in worker doses because of the exposure to long-lived airborne radionuclides and the requirement to add the resultant internal dose to the calculation of occupational doses.

<i>Occupational Subgroup</i>	<i>Average Measurable Dose per Worker (millirems)</i>
Industrial Radiography	540
Commercial Nuclear Power Reactors	310
Manufacturing and Distribution of Radioactive Materials	300
Low-Level Radioactive Waste Disposal	270
Independent Spent Nuclear Fuel Storage	260
Nuclear Fuel Fabrication	130

➤ Calculate Your Radiation Dose

Use the following link to get an estimated calculation on your annual dose of radiation. Estimates are given in millirem, The millirem is the U.S. unit used to measure effective dose. Effective dose is a measure of the amount of radiation absorbed by a person that accounts for the type of radiation received and the effects on particular organs.

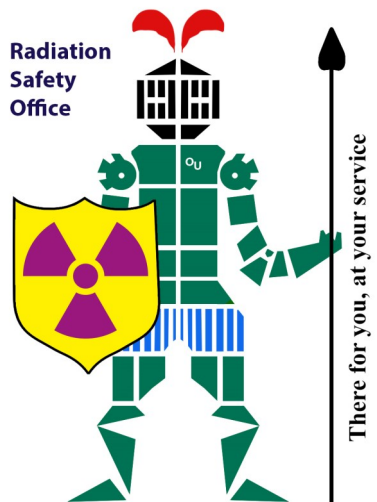


<https://www.epa.gov/radiation/calculate-your-radiation-dose>



These questions and answers for risks from occupational radiation exposure will continue with subsequent newsletters

Stay tuned for a continuation of the risk information in the next newsletter!



Labaratory and Radiation Safety

Who you gonna call?

Radiation Safety Contacts

Name	Office	Cell
OUPD	593-1911	
Alan Watts	593-4176	740-517-5075
Ricardo Gaytan	597-2950	956-740-5900
David Schleter	593-1662	740-591-0557
David Ingram	593-1705	740-707-5362

www.ohio.edu/riskandsafety/radiationsafety