

7.0 Personnel Exposure Monitoring

7.1 Occupational Exposure Limits

1. The annual limit for occupational workers is the more limiting of:
 - a. The total effective dose equivalent = 5,000 millirem (0.05 Sv); or
 - b. The sum of the deep dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) = 50,000 millirem (0.5 Sv).
2. The annual limits to the lens of the eye, to the skin, and to the extremities are:
 - a. Eye dose equivalent = 15,000 millirem (0.15 Sv)
 - b. A shallow dose equivalent = 50,000 millirem (0.5 Sv)

7.2 Non-Occupational Exposure Limits (Members of the Public)

Each user of radioactive material shall conduct operations so that:

1. The dose in any unrestricted area from external sources does not exceed 2 millirem (0.02 mSv) in an hour.
2. The total effective dose equivalent to individual members of the public from a licensed operation, exclusive of the dose contribution from a licensee's disposal of radioactive material into sanitary sewerage, does not exceed 100 millirem (1 mSv) in any year.

7.3 Declared Pregnant Workers Exposure Limits

The dose limit to an embryo/fetus during the entire pregnancy due to occupational exposure of a declared pregnant woman is 500 millirem (5 mSv). Care shall be taken so that no more than 50 millirem (0.5 mSv) be received during any one month during a declared pregnancy. Efforts shall be made to avoid substantial variation above the uniform monthly exposure rate to a declared pregnant woman (see Appendix B for additional information).

If the pregnant woman has not notified DRS of her estimated date of conception, the dose to the fetus shall not exceed 50 millirem (0.5 mSv) per month during the remainder of the pregnancy.

If, by the time the pregnant woman informs DRS of the estimated date of conception, the dose to the embryo/fetus has exceeded 450 millirem (4.5 mSv), the limit for the remainder of the pregnancy shall be 50 millirem (0.5 mSv).

7.4 Exposure Limits for Minors

The annual occupational dose limits for minors are 10 percent of the annual occupational limits specified for adult workers in Section 7.1 of this manual.

7.5 When Dosimetry Is Required

The IEMA requires dosimetry for the following:

1. Adults likely to receive in one year a dose in excess of 10 percent of the occupational exposure limits from sources external to the body (Section 7.1).
2. Minors and declared pregnant women likely to receive in one year a dose in excess of 10 percent of the applicable limits from sources external to the body (Sections 7.3-7.4).
3. Individuals entering a high or very high radiation area.

DRS assigns dosimetry when certain quantities and radionuclides are used. Specifically, the use of >10 mCi of P-32 requires the user to wear both an extremity (commonly referred to as a “ring”) and a whole-body dosimeter. At usage levels ≤ 10 mCi of P-32, dose assessments will be performed to evaluate the need for dosimetry. Dosimetry is not issued for individuals working with weak beta-emitting radionuclides such as H-3, C-14, P-33, and S-35.

DRS evaluates use of dosimetry for other radionuclides and quantities on a case-by-case basis.

7.6 Bioassays

Bioassays, analyses, or evaluations of materials excreted or removed from the body are required to determine types, concentrations, quantities, or locations of personal uptake of radioactive materials. A baseline (before first use) bioassay and another within 24 to 72 hours following each use of the quantities specified is required. Common bioassays performed are:

- Thyroid bioassays are performed using a hand-held scintillation probe and survey meter;
- Tritium bioassays performed by condensing water from exhaled air followed by liquid scintillation counting if the activity in the sample.

DRS personnel perform bioassays at the following location if other arrangements are not made:

Environmental Health and Safety Building, 101 South Gregory Street, Urbana

Users of *unbound* radioactive iodine (typically I-125 or I-131) in quantities of ≥ 1 mCi on a bench top or in quantities ≥ 10 mCi in a fume hood require thyroid bioassays. These bioassays are performed on a walk-in basis during business hours unless previous arrangements are made. Tritium bioassays are required when a person uses >100 mCi of H-3 without using a