

Annual Occupational Radiation Dosimetry Report

This information will help you understand the dose quantities being reported to you on your Annual Occupational Radiation Dosimetry Report. If you would like general information about radiation exposure, please refer to <http://www.radiationanswers.org/>.

Title 10 Code of Federal Regulation Part 835, *Occupational Radiation Protection* (10 CFR 835), requires assessment, recording and reporting of radiation doses to individuals who are exposed to sources of radiation or radioactive contamination. This includes assessing external exposure from a variety of radiation types, such as, beta, photon, and neutron radiation. External exposures may be uniform over the whole body or occur in a non-uniform (i.e., limited body location) fashion. Internal doses occur when radioactive material is taken into the body through ingestion, inhalation, absorption or wounds. The requirements include assessing doses to the whole body, skin, lens of the eyes, extremities and various organs and tissues.

In June 2007, 10 CFR 835 was amended to adopt more current dosimetric models (e.g., International Commission on Radiological Protection Publication 60 (ICRP 60)). Adoption of ICRP 60 dosimetric models included the updating of tissue weighting factors used primarily for assessing radiation doses resulting from intakes of radioactive material. A change in ICRP 60 includes the addition of skin as a specified organ assigned a tissue weighting factor. Prior to the 2007 amendment to 10 CFR 835, skin was not listed as an organ specifically assigned a tissue weighting factor. Other changes to 10 CFR 835 included modification to the magnitude and definition of radiation weighting factors (formerly Quality Factors) which primarily affects neutron dose calculations.

Furthermore, the June 2007 amendment to 10 CFR 835 included a change to the naming convention for dose quantities. Sections 702 and 801 of 10 CFR 835 specify the radiological dose quantities which must be reported annually to monitored individuals. Los Alamos National Laboratory, in accordance with its DOE-approved implementation plan for the amended 10 CFR 835, began reporting dose quantities consistent with the prescribed changes beginning with calendar year 2008 dose results.

The table below describes how the various components of measured and assessed dose quantities are compiled into the results shown on the Annual Occupational Radiation Dosimetry Report.

Radiation Reporting Quantities

Quantity to Record	Components of Quantity
Effective dose from external sources (ED)*	<p>Sum of:</p> <ul style="list-style-type: none"> • Photon (i.e., “Deep”) dose at 10 mm tissue depth. • Neutron dose. <p>Measured from whole body dosimetry.</p>
Equivalent dose to lens of eye from external sources	<p>Sum of:</p> <ul style="list-style-type: none"> • Photon and beta lens of eye dose at 3 mm tissue depth. • Neutron dose. <p>Lens of eye dose is normally derived from whole body dosimetry unless supplemental dosimetry is provided for direct monitoring of the lens of the eye.</p>
Equivalent dose to skin	<p>Sum of:</p> <ul style="list-style-type: none"> • Photon and beta (i.e., “Shallow”) dose at 0.07 mm tissue depth from whole body dosimetry. • Neutron dose from whole body dosimetry. • Any non-uniform skin dose (area of skin $\geq 10 \text{ cm}^2$) of 1 rem or greater (e.g., skin contamination). • Any committed equivalent dose to the skin from the intake of radionuclides.
<p>Equivalent dose to any extremity</p> <p><i>Note: Upper Left and Right extremities are hands and arms below the elbows.</i></p> <p><i>Lower Left and Right extremities are feet and legs below the knees.</i></p>	<p>Sum of:</p> <ul style="list-style-type: none"> • Photon and beta dose at 0.07 mm depth from direct monitoring of extremities (e.g., wrist dosimetry). • Neutron dose from extremity dosimetry. • Non-uniform skin dose of extremities (area of skin $\geq 10 \text{ cm}^2$) of 1 rem or greater. • Photon and beta (i.e., “Shallow”) dose at 0.07 mm depth and neutron dose from whole body dosimetry when no direct monitoring occurred. • Any committed equivalent dose to the skin from the intake of radionuclides into the body. <p>The reported extremity dose being not less than the skin dose is a constraint that is imposed for each calendar quarter.</p>
Committed effective dose (CED)	<p>Committed effective dose from the intakes of radionuclides.</p> <p>(Effective dose received over a 50 year period from intake.)</p>

Total effective dose (TED)	Sum of: <ul style="list-style-type: none"> • Effective dose from external sources (ED). • Committed effective dose from intakes of radionuclides (CED).
Committed equivalent dose to any organ or tissue <i>Note: Only organ and tissue doses greater than 1 rem are shown on this report.</i>	Committed equivalent dose to any organ/tissue from the intake of radionuclides. (Equivalent dose received over a 50 year period from intake.)
Total Organ/Tissue dose (except skin) <i>Note: Refer to the quantity Equivalent dose to the skin for the appropriate skin value.</i>	Sum of: <ul style="list-style-type: none"> • Equivalent dose to the whole body from external sources.* • Committed equivalent dose to organ/tissue from intakes of radionuclides.
Cumulative total effective dose (CTED)	Sum of: <ul style="list-style-type: none"> • Total effective dose (TED) for each year. • Total effective dose equivalent (TEDE), prior to 2008**
Equivalent dose to the embryo/fetus <i>Note: Only reported for declared pregnant workers.</i>	Sum of: <ul style="list-style-type: none"> • Photon plus neutron whole body doses from mother's whole body dosimetry (abdomen/torso area). • Committed equivalent dose to embryo/fetus from intakes of radionuclides.

* Effective Dose from external sources (ED) is set equal to the Equivalent Dose to the whole body from external sources as accepted within 10 CFR 835 (2007).

** Pre-10 CFR 835 (2007) quantity, total effective dose equivalent (TEDE), as recorded prior to 2008.

All dose quantities may additionally include results of special dose investigations.

If you have any questions on these quantities or your AORD report, please email dosimetry_questions@lanl.gov.