

Great Western Painting

Ionizing Radiation

IONIZING RADIATION

29 CFR 1910.1096 - Ionizing Radiation

All employees must understand the below definitions which are extracted from the above referenced OSHA standard:

Radiation includes alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other atomic particles; but such term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

Radioactive material means any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.

Restricted area means any area access to which is controlled by the employer for purposes of protection of individuals from exposure to radiation or radioactive materials.

Unrestricted area means any area access to which is not controlled by the employer for purposes of protection of individuals from exposure to radiation or radioactive materials.

Dose means the quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body. When the provisions in this section specify a dose during a period of time, the dose is the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. Several different units of dose are in current use. Definitions of units used in this section are set forth in paragraphs (a)(6) and (7) of this section.

Rad means a measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit of mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue (1 millirad (mrad)=0.001 rad).

Rem means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of 1 roentgen (r) of X-rays (1 millirem (mrem)=0.001 rem). The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions for irradiation. Each of the following is considered to be equivalent to a dose of 1 rem:

- a. A dose of 1 roentgen due to X- or gamma radiation;
- b. A dose of 1 rad due to X-, gamma, or beta radiation;
- c. A dose of 0.1 rad due to neutrons or high energy protons;

- d. A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye;
- e. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, 1 rem of neutron radiation may be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if there is sufficient information to estimate with reasonable accuracy the approximate distribution in energy of the neutrons, the incident number of neutrons per square centimeter equivalent to 1 rem may be estimated from Table G-17:

TABLE G-17 NEUTRON FLUX DOSE EQUIVALENTS

Neutron energy (million electron volts (Mev))	Number of neutrons per square centimeter equivalent to a dose of 1 rem (neutrons/cm ²)	Average flux to deliver 100 millirem in 40 hours (neutrons/cm ² per sec)
Thermal	970 X 10 ⁶	670
0.0001	720 X 10 ⁶	500
0.005	820 X 10 ⁶	570
0.02	400 X 10 ⁶	280
0.1	120 X 10 ⁶	80
0.5	43 X 10 ⁶	30
1.0	26 X 10 ⁶	18
2.5	29 X 10 ⁶	20
5.0	26 X 10 ⁶	18
7.5	24 X 10 ⁶	17
10	24 X 10 ⁶	17
10 to 30	14 X 10 ⁶	10

Exposure of individuals to radiation in restricted areas: As an employer, we will not possess, use, or transfer sources of ionizing radiation in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from sources in our possession or control a dose in excess of the limits specified in Table G-18:.

TABLE G-18

	Rems per calendar quarter
Whole body: Head and trunk; active blood-forming organs; lens of eyes; or gonads	1 ¼
Hands and forearms; feet and ankles	18 ¾
Skin of whole body	7 ½

Note: A calendar quarter means any 3-month period determined as follows:

1. The first period of any year may begin on any date in January: Provided, That the second, third, and fourth periods accordingly begin on the same date in April,

July, and October, respectively, and that the fourth period extends into January of the succeeding year, if necessary to complete a 3-month quarter. During the first year of use of this method of determination, the first period for that year shall also include any additional days in January preceding the starting date for the first period; or

2. The first period in a calendar year of 13 complete, consecutive calendar weeks; the second period in a calendar year of 13 complete, consecutive weeks; the third period in a calendar year of 13 complete, consecutive calendar weeks; the fourth period in a calendar year of 13 complete, consecutive calendar weeks. If at the end of a calendar year there are any days not falling within a complete calendar week of that year, such days shall be included within the last complete calendar week of that year. If at the beginning of any calendar year there are days not falling within a complete calendar week of that year, such days shall be included within the last complete calendar week of the previous year; or
3. The four periods in a calendar year may consist of the first 14 complete, consecutive calendar weeks; the next 12 complete, consecutive calendar weeks, the next 14 complete, consecutive calendar weeks, and the last 12 complete, consecutive calendar weeks. If at the end of a calendar year there are any days not falling within a complete calendar week of that year, such days shall be included (for purposes of this section) within the last complete calendar week of the year. If at the beginning of any calendar year there are days not falling within a complete calendar week of that year, such days shall be included (for purposes of this section) within the last complete week of the previous year.

Duties of our Ionizing Radiation Program Administrator:

Our Ionizing Radiation Program Administrator is: Robert Evans

Duties and responsibilities include:

1. Ensuring surveys are made as necessary to comply with the provisions of the above referenced standard [29 CFR 1910.1096]. A survey means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present.
2. Ensuring every employee is supplied with appropriate personnel monitoring equipment, such as film badges, pocket chambers, pocket dosimeters, or film rings.
 - a. Every employee will have received training in these monitoring devices and are required to use them.
3. Ensuring that appropriate signage is posted for each radiation area. For the radiation area, itself, the signage must state "CAUTION RADIATION AREA".

- a. Warning signs indicate the presence of radioactive materials. These signs have a magenta, red or black symbol, called a trefoil, on a yellow background.



4. Ensuring all individuals working in or frequenting any portion of a radiation area are informed of the occurrence of radioactive materials or of radiation in such portions of the radiation area and they are instructed in the safety hazards associated with exposure to such materials or radiation and in precautions or devices to minimize exposure. They will also be instructed in the applicable provisions of the referenced standard for the protection of employees from exposure to radiation or radioactive materials. Lastly, they will be advised of reports of radiation exposure which employees may request pursuant to this standard.
5. Ensuring a copy of the reference standard, 29 CFR 1910. 1096 is conspicuously posted along with a copy of the operating procedures applicable to the work being performed.
6. Ensuring the immediate evacuation warning signal is designed, installed, tested and functioning in accordance with paragraphs 1910.1096(f)(1) through (f)(3)(vii).
 - a. All employees whose work may necessitate their presence in an area covered by the signal shall be made familiar with the actual sound of the signal-preferably as it sounds at their work location. Before placing the system into operation, all employees normally working in the area shall be made acquainted with the signal by actual demonstration at their work locations.
7. Ensuring radiation exposure records are maintained for all employees for whom personal monitoring is required and advise each employee of his individual exposures at least annually.