

Exposure Limits for users of X-Ray Equipment

AZRRA has imposed limits on the dose of ionizing radiation which may be received by individuals working with sources of ionizing radiation. These limits are shown in Table 4-1.

Annual Limit, whichever is the more limiting between:

- a. Total Effective Dose Equivalent
- b. Sum of the deep dose equivalent and committed dose equivalent to any organ or tissue other than the lens of the eye

Annual Limit, which is the more limiting of:	
a. Total Effective Dose Equivalent	5 rem (0.05 Sv)
b. Sum of the deep dose equivalent and committed dose equivalent to any organ or tissue other than the lens of the eye	50 rem (0.5 Sv)
Eye Dose Equivalent	15 rem (0.15 Sv)
Shallow Dose Equivalent to the skin or to each of the extremities	50 rem (0.5 Sv)

Table 4-1 Regulatory Dose Limits

Limits to the Embryo-Fetus of Declared Pregnant Workers

Due to concerns about prenatal radiation exposure (See Appendix A of the X-Ray Program Manual) AZRRA regulations provide separate limits for the embryo/fetus of Declared Pregnant Workers. The limit is 0.5 rem dose equivalent to the fetus during pregnancy. This limit applies only for workers who have formally declared pregnancy. In addition to other recipients, declaration of pregnancy should be sent to the Radiation Safety Officer and include the estimated date of conception.

Individuals concerned about radiation and pregnancy should feel free to speak to the Radiation Safety Officer.

Limits for Members of the Public

The regulatory limit for members of the public is 0.1 rem total effective dose equivalent per year. This limit applies to all individuals who are not trained to work with sources of ionizing radiation. At NAU this includes most faculty, staff and students.

Investigation Levels

Investigational levels have been established at NAU. These dose levels are shown in Table 4-2.

Personnel exposures equal to or greater than investigational Level I (based on dosimetry results) are reviewed by the RSO, who reports the results to the RSC at their next regularly scheduled meeting. The RSC may require corrective actions on the part of the RSO or registrant.

Personnel exposures equal to or exceeding Investigational Level II are investigated in a timely manner by the RSO who takes immediate action if warranted. A report of the investigation, actions taken, and a copy of the individual's radiation dosimetry history is included in that individual's records, and a report with personal data redacted may be presented to the RSC at their next scheduled meeting following completion of the investigation. The RSC may impose restrictions on future use as warranted.

Investigational limits exceeding those listed in Table 4-2 may be established by the RSC for a worker or group of workers when the higher investigational levels are consistent with good ALARA practice for the work being conducted by the individual or group.

Limit	Level (rem/quarter)	
	Level I	Level II
Total Effective Dose Equivalent	0.065	0.200
Eye Dose Equivalent	0.180	0.600
Shallow Dose Equivalent to the Skin or to each of the Extremities	0.625	2.000

Table 4-2 Investigational Dose Levels

Other Radiation Limits

- a. Each x-ray tube housing must be so constructed that with all shutters closed the leakage radiation measured at a distance of 5 cm from its surface is not capable of producing a dose in excess of 2.5 mrem in one hour at any specified tube rating.
- b. Each x-ray generating device must be supplied with a protective cabinet which limits leakage radiation measured at a distance of 5 cm from its surface such that it is not capable of producing a dose in excess of 0.25 mrem in one hour.
- c. Any apparatus utilized in beam alignment procedures must be designed in such a way that excessive radiation will not strike the operator. Particular attention should be given to viewing devices, in order to ascertain that lenses and other transparent components attenuate the beam to an acceptable level.

Additional Details on X-Ray Equipment Safety may be found in the NAU **X-Ray Program Manual**.

Contact and additional program information for NAU EH&S safety personnel and programs is available on the EH&S Website <http://nau.edu/Research/Compliance/Environmental-Health-and-Safety/> or by using the EH&S switchboard email regulatorycompliance@nau.edu or switchboard phone number (928)-523-7288.