

## ALARA TRAINING

**Workplace:** 509 MXS Non Destructive Inspection (NDI)

**WIC:** 00203-FAND-119A

**Ionizing Radiation Source/Emitter:** Sperry model #650300

1. **Risk from radiation exposure.** (See Atch 1) Personnel operating the Sperry unit have a potential risk of exposure to ionizing radiation. Some of the health effects that exposure to radiation may cause are cancer (including leukemia), birth defects in the future children of exposed parents, and cataracts. There are three types of effects that could be encountered.

a. **Prompt effects.** Are observable shortly after receiving a very large dose in a short period of time.

b. **Delayed effects.** Cancer may occur years after exposure to a high dose of radiation or as a result of years of exposure to lesser doses.

c. **Genetic effects.** Can occur when there is radiation damage to the genetic material.

The main concern that Air Force personnel who are occupationally exposed to radiation should have is for the delayed incidence of cancer. The chance of delayed cancer is believed to depend on how much radiation exposure a person gets; therefore, every reasonable effort should be made to keep exposures low. Personnel in NDI have a potential risk for the delayed incidence of cancer.

2. **Health risks to children of women who are occupationally exposed to radiation during pregnancy.** Scientists have recommended that the total radiation dose to the unborn child as a result of occupational exposures of the expectant mother should not exceed 0.5 rem because of possible increased risk of childhood leukemia and cancer. Since this 0.5 rem is lower than the dose generally permitted to adult workers, the Air Force has established a policy to ensure so far as is possible that pregnant workers will not be exposed to levels of radiation that will result in a dose greater than 0.5 rem to the unborn child. All fertile females working in the NDI are required to read and sign the briefing in atch 2.

3. **Maximum permissible dose limits.** Your shop is required to be on the Thermoluminescent Dosimeter (TLD) Badge program. As the Radiation Safety Officer (RSO) for the base, I have set a maximum permissible dose limit for personnel working in NDI at .21 Rems per month. This number is a guideline applicable only at Whiteman AFB. At your next base it may be higher or lower. The **abnormal** exposure action level set by the Air Force is .417 Rems for a monthly badge. The local maximum permissible dose is lower due to low workload of x-ray operations conducted per month at Whiteman. The local maximum permissible dose and abnormal exposure action level mean that if a TLD badge result shows levels above this number, then an investigation needs to be conducted to determine the cause.

4. **Protective measures required.**

a. Personnel should stand behind the exposure cart during operation of the x-ray machine. The exposure cart should be at the farthest distance possible away from the tubehead.

b. During x-ray procedures, all entrances to the hangar should be securely shut and locked.

c. Personnel performing the x-ray need to always wear their TLD badge. The body badge should be located at chest height, dependent upon how tall the individual is in relation to the exposure cart. If a person normally wears their badge at chest level and because of their height, their badge is shielded by the exposure cart, they should wear their TLD badge at collar level.

d. The control badge should never be removed from its storage location, except for exchange of badges, which is done by Bioenvironmental Engineering (BEE) personnel. The control must **never** be worn for any reason.

e. Prior to performing routine x-ray procedures, personnel must process through BEE and receive specific training for the TLD program. BEE must be contacted for entry into the TLD program.

f. Proper x-ray procedures should be followed, as described in T.O. 33B-1-1, Chapter 5 and the NDI shop operating instruction for keeping exposures ALARA.

5. **ALARA philosophy and practice.** As Low As Reasonable Achievable (ALARA) philosophy applies to all Air Force Military and civilian personnel. The ALARA concept is defined as that set of management and administrative actions taken to reduce personnel radiation dose to as low a level as possible consistent with existing technology, costs, and operational requirements. The ALARA concept was developed in response to scientific evidence that suggests that no level of radiation exposure is totally risk free (linear, no threshold dose-effect relationship). While the established maximum permissible doses are conservative and offer a low risk of adverse health effects compared to other hazards of life and occupation, it is prudent that every effort be made to reduce exposures to the lowest level that is reasonably achievable and thereby lower the health risk associated with that exposure.

KIRK A. PHILLIPS, Capt, USAF, BSC, CIH,  
Bioenvironmental Engineering Flight Commander  
Base Radiation Safety Officer

#### Attachments

1. Initial TLD Briefing
2. Fertile Female Briefing

PRINTED NAME/RANK \_\_\_\_\_

SIGNED NAME \_\_\_\_\_ DATE \_\_\_\_\_