ALARA TRAINING

Workplace: 509 Bomb Squadron **Permit:** 24-30352-1AFP

Ionizing Radiation Source/Emitter: Carbon-14 (sealed source)NSN 6605-01-258-3145NR: 30 sources not to exceed 300 microcuries per source, Carbon-14 (sealed source)NSN 6605-01-380-4939NR: 30 sources not to exceed 300 microcuries per source.

1. **Risk from radiation exposure.** Personnel installing the Astro-Inertial Navigation Unit (AIN) have a potential risk of exposure to ionizing radiation. The AIN contains Carbon 14 which a beta emitter. The AINs are controlled under a radioactive material permit. Reference permit #24-30352-1AFP Docket #030-90280. Beta rays or particles are particulate radiation consisting of electrons or positrons traveling at extremely high speeds (up to 95% the speed of light). Beta particles have strong ionizing power, and moderate penetrating power. Beta particles do not ionize gases as readily as alpha particles, but beta particles can penetrate shields 100 times as thick as that required to stop alpha particles. Metallic shields are very effective against beta particles, a sheet of aluminum 0.04 inches thick will stop a beta particle. 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 which 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 the Bomb Squadrons have a low 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 with the AINS in the bomb squadrons are required to read and sign the briefing in atch 2.

3. **Maximum permissible dose limits.** Although your shop is not required to be on the Thermoluminescent Dosimeter (TLD) Badge program, you still may be exposed to ionizing radiation from beta particles emitted from the AINs. The maximum permissible dose for personnel is 2 mR/hr, or 100 mR in seven consecutive days. These exposure would only occur if the AIN was damaged.

4. **Protective measures required.**

a. Personnel should follow procedures for control of radioactive material as outlined in AFI 40-201, *Managing Radioactive Materials in the USAF*.

b. Personnel are required to know and be familiar with the conditions of the Radioactive Material Permit #24-30352-1AFP Docket #030-90280

c. This permitted material shall be used only by personnel trained in proper operations of the AINS and familiar with radioactive source safety and accountability.

d. Personnel shall follow operational requirements as outlined in T.O. 1B-2A-34JG-00-1, 1B-24-34JG-40-1, AND 1B-2A-34GS-00-1.

e. Personnel should **always** wash their hands after performing operational checks, or using the AIN units.

f. Personnel should **never** smoke while using or working with the AIN units.

1. **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 be made to reduce exposures to the lowest level that is reasonably achievable and thereby lower the health risk associated with that exposure. There are three ways to reduce your exposure to radiation. These are time, distance, and shielding.

a. Time: Limit your time of exposure. This would not placing the unit away from normally occupied spaces. Also when the unit is being installed the same person should not always perfrom the work but should share the task with other trained individuals.

b. Distance: When possible stay away from the AIN. Approach it only when necessary to perform an action.

c. Shielding: The AIN is supplied with sufficient shielding to reduce exposures to negligible amounts. Do not try to open the unit. This will breach the shielding and increase the exposure. If a unit is damaged in a crash or accident do not approach the unit until a determination of exposure can be determined.

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Attachment:

Fertile Female Briefing