

unit at your institution) (refused to continue existing ROTC programs at your institution) (prevented students from participation at a Senior ROTC program at another institution) by a policy or practice of the College. Current law¹ prohibits funds by grant or contract (including a grant of funds to be available for student aid) from appropriations of the Departments of Defense, Labor, Health and Human Services, Education, and Related Agencies to schools that have a policy or practice prohibiting or preventing the Secretary of Defense from maintaining, establishing, or efficiently operating a Senior ROTC unit. Those statutes also bar agency funds for schools that prohibit or prevent a student from enrolling in an ROTC unit at another institution of higher education. Implementing regulations are codified at 32 Code of Federal Regulations, part 216.

This letter provides you an opportunity to clarify your institution's policy regarding ROTC access on the campus of ABC College. In that regard, I request, within the next 30 days, a written statement of the institution with respect to (define the problem area(s)).

Based on this information, Department of Defense officials will make a determination as to your institution's eligibility to receive funds by grant or contract. The decision may affect eligibility for funding from appropriations of the Departments of Defense, Labor, Health and Human Services, Education, and Related Agencies. Should it be determined that ABC College is in violation of the aforementioned statutes, such funding would be stopped, and the school would be ineligible to receive such funds in the future.

I regret that this action may have to be taken. Successful officer procurement requires that the Department of Defense maintain a strong ROTC program. I hope it will be possible to (define the correction to the aforementioned problem area(s)). I am available to answer any questions.

PART 218—GUIDANCE FOR THE DETERMINATION AND REPORTING OF NUCLEAR RADIATION DOSE FOR DoD PARTICIPANTS IN THE ATMOSPHERIC NUCLEAR TEST PROGRAM (1945-1962)

Sec.

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218.4 Dose estimate reporting standards.

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¹ 10 U.S.C. 983 and 110 Stat. 3009.

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§ 218.1 Policies.

(a) Upon request by the Veterans Administration in connection with a claim for compensation, or by a veteran or his or her representative, available information shall be provided by the applicable Military Service which shall include all material aspects of the radiation environment to which the veteran was exposed and shall include inhaled, ingested and neutron doses. In determining the veteran's dose, initial neutron, initial gamma, residual gamma, and internal (inhaled and ingested) alpha, beta, and gamma shall be considered. However, doses will be reported as gamma dose, neutron dose, and internal dose. The minimum standards for reporting dose estimates are set forth in § 218.4.

(b) The basic means by which to measure dose from exposure to ionizing radiation is the film badge. Of the estimated 220,000 Department of Defense participants in atmospheric nuclear weapons tests, about 145,000 have film badge dose data available. The information contained in the records has been reproduced in a standard format and is being provided to each military service, which can use the film badge dose data to obtain a radiation dose for a particular individual from that service. This is done upon request from the individual, the individual's representative, the Veterans Administration, or others as authorized by the Privacy Act. Upon request, the participant or his or her authorized representative will be informed of the specific methodologies and assumptions employed in estimating his or her dose. The participant can use this information to obtain independent options regarding exposure.

(c) From 1945 through 1954, the DoD and Atomic Energy Commission (AEC) policy was to issue badges only to a portion of the personnel in a homogeneous unit such as a platoon of a battalion combat team, Naval ship or aircraft crew. Either one person was badged in a group performing the same function, or only personnel expected to be exposed to radiation were badged. After 1954, the policy was to badge all

personnel. But, some badges were unreadable and some records were lost or destroyed, as in the fire at the Federal Records Center in St. Louis. For these reasons the Nuclear Test Personnel Review (NTPR) Program has focused on determining the radiation dose for those personnel (about 75,000) who were not issued film badges or for whom film badge records are not available.

(d) In order to determine the radiation dose to individuals for whom film badge data are not available, alternative approaches are used as circumstances warrant. All approaches require investigation of individual or group activities and their relationship to the radiological environment. First, if it is apparent that personnel were not present in the radiological environment and had no other potential for exposure, then their dose is zero. Second, if some members of a group had film badge readings and others did not—and if all members had a common relationship with the radiological environment—then doses for unbadged personnel can be calculated. Third, where sufficient badge readings or a common relationship to the radiological environment does not exist, dose reconstruction is performed. This involves correlating a unit's or individual's detailed activities with the quantitatively determined radiological environment. The three approaches are described as follows:

(1) Activities of an individual or his unit are researched for the period of participation in an atmospheric nuclear test. Unit locations and movements are related to areas of radiation. If personnel were far distant from the nuclear detonation(s), did not experience fallout or enter a fallout area, and did not come in contact with radioactive samples or contaminated objects, they were judged to have received no dose.

(2) Film badge data from badged personnel may be used to estimate individual doses for unbadged personnel. First, a group of participants must be identified that have certain common characteristics and a similar potential for exposure to radiation. Such characteristics are: Individuals must be doing the same kind of work, referred to as

activity, and all members of the group must have a common relationship to the radiological environment in terms of time, location or other factors. Identification of these groups is based upon research of historical records, technical reports or correspondence. A military unit may consist of several groups or several units may comprise a single group. Using proven statistical methods, the badge data for each group is examined to determine if it adequately reflects the entire group, is valid for use in statistical calculations, or if the badge data indicate the group should be sub-divided into smaller groups. For a group that meets the tests described above, the mean dose, variance and confidence limits are determined. An estimated dose equal to 95% probability that the actual exposure did not exceed the estimate is assigned to unbadged personnel. This procedure is statistically sound and will insure that unbadged personnel are assigned doses much higher than the average/mean for the group.

(3) Dose reconstruction is performed if film badge data are unavailable for all or part of the period or radiation exposure, if film badge data are partially available but cannot be used statistically for calculations, special activities are indicated for specific individuals, or if other types of radiation exposures are indicated. In dose reconstruction, the conditions of exposure are reconstructed analytically to arrive at a radiation dose. Such reconstruction is not a new concept; it is standard scientific practice used by health physicists when the circumstances of a radiation exposure require investigation. The underlying method is in each case the same. The radiation environment is characterized in time and space, as are the activities and geometrical position of the individual. Thus, the rate at which radiation is accrued is determined throughout the time of exposure, from which the total dose is integrated. An uncertainty analysis of the reconstruction provides a calculated mean dose with confidence limits. The specific method used in a dose reconstruction depends on what type of data are available to provide the required characterizations as well as the nature of the radiation

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environment. The radiation environment is not limited to the gamma radiation that would have been measured by a film badge, but also includes neutron radiation for personnel sufficiently close to a nuclear detonation, as well as beta and alpha radiation (internally) for personnel whose activities indicate the possibility of inhalation or ingestion of radioactive particles.

§218.2 General procedures.

The following procedures govern the approach taken in dose determination:

(a) Use individual film badge data where available and complete, for determining the external gamma dose.

(b) Identify group activities and locations for period(s) of possible exposure.

(c) Qualitatively assess the radiation environment in order to delineate contaminated areas. If no activities occurred in these areas, and if no other potential for exposure exists, a no dose received estimate is made.

(d) If partial film badge data are available, define group(s) of personnel with common activities and relationships to radiation environment.

(e) Using standard statistical methods, verify from the distribution of film badge readings whether the badged sample adequately represents the intended group.

(f) Calculate the mean external gamma dose, with variance and confidence limits, for each unbadged population. Assign a dose equal to 95% probability that actual exposure did not exceed the assigned dose.

(g) If badge data is not available for a statistical calculation, conduct a dose reconstruction.

(h) For dose reconstruction, define radiation environment through use of all available scientific data, e.g., measurements of radiation intensity, decay, radioisotopic composition.

(i) Quantitatively relate activities shielding, position, and other factors to radiation environment as a function of time. Integrate dose throughout period of exposure.

(j) Where possible, calculate mean dose with confidence limits; otherwise calculate best estimate dose or, if data are too sparse, upper limit dose.

(k) Compare calculations with available film badge records to verify the

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calculated doses. Whether or not film badge data is available, calculate initial and internal doses where identified as a meaningful contribution to the total dose.

§218.3 Dose reconstruction methodology.

(a) *Concept.* The specific methodology consists of the characterization of the radiation environments to which participants through all relevant activities, were exposed. The environments, both initial and residual radiation are corrected with the activities of participants to determine accrued doses due to initial radiation, residual radiation and/or inhaled/ingested radioactive material, as warranted by the radiation environment and the specific personnel activities. Due to the range of activities, times, geometries, shielding, and weapon characteristics, as well as the normal spread in the available data pertaining to the radiation environment, an uncertainty analysis is performed. This analysis quantifies the uncertainties due to time/space variations, group size, and available data. Due to the large amounts of data, an automated (computer-assisted) procedure is often used to facilitate the data-handling and the dose integration, and to investigate the sensitivity to variations in the parameters used. The results of the gamma data calculations are then compared with film badge data as they apply to the specific period of the film badges and to the comparable activities of the exposed personnel, in order to validate the procedure and to identify personnel activities that could have led to atypical doses. Radiation dose from neutrons and dose commitments due to inhaled or ingested radioactive material are not detected by film badges. Where required, these values are calculated and recorded separately.

(b) *Characterization of the radiological environment.* (1) This step describes and defines the radiological conditions as a function of time for all locations of concern, that is, where personnel were positioned or where personnel activities took place. The radiation environment is divided into two standard categories—initial radiation and residual radiation.