

## MEDICAL EXAMINATIONS FOR RADIATION WORKERS

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The NASA radiological health program will be developed in consonance with a basic radiological protection policy. According to this policy, an employee may be assigned to work in a radiologically controlled area only if all of the following conditions are met:

- (1) The area must be radiologically safe for the intended operations.
- (2) The employee must be medically fit.
- (3) The employee must be properly trained.
- (4) Appropriate radiation protection procedures must be prepared.
- (5) Appropriate dosimetric, survey, surveillance and reporting procedures must be implemented.
- (6) Adequate controls and records must be established.

Guides are being prepared which will help to assure that this policy is implemented. The guides are intended to provide some consistency in the protection of NASA employees but are generalized to allow for individual differences in existing programs at the Centers.

Medical fitness is by far the most difficult requirement to express in terms of generalized guidance. The difficulty is due primarily to the lack of agreement among agencies and organizations and among their physicians. Since there is no consensus to follow, it will be necessary to make a number of decisions in this regard. Additional difficulties arise because of the dual objectives of a medical examination program-- protection of the worker's health, and protection of the employer against unwarranted claims.

Our study of this question began with an effort to find out what other Federal agencies, and what AEC contractors, are doing. The following letter was sent to several agencies and to physicians at forty AEC contractor installations:

"The subject of medical examinations for radiation workers is currently being studied at NASA with a view toward the development of the Agency's standard in this regard. From our determinations to far, there appears to be little general agreement as to the necessity and effectiveness of such examinations.

It has occurred to us that from your considerable experience you may have arrived at certain conclusions regarding the usefulness of such examinations from both the personal protection and the medico-legal viewpoints. To be more specific, it should be mentioned that we are looking at four types of examination--pre-exposure, post-overexposure, routine periodic, and termination.

A particular problem that we have with pre-exposure examinations is whether they should be conducted to establish medical fitness for employment as radiation workers or for baseline purposes only. The content of the examination apparently should be determined by this consideration. The basic question with medical fitness is whether there are any physical conditions which should prevent employees from receiving radiation exposures at the permissible occupational levels. We are very interested in your position on this question.

Subsequent examinations following very high exposures are obviously necessary for the benefit of the employee. However, for exposures greater than regulatory standards but less than levels of immediate medical concern (e.g., an acute exposure of 10 R to the whole body), it may be that the most useful purpose of the examination would be medico-legal. If this value is substantial, examinations following exposures at these levels should always be required. Knowledge of your policy in this regard would be helpful to us, and in particular we would like to have the benefit of your experience regarding the value of such examinations in the adjudication of claims.

The medical value of routine eye lens examinations for workers exposed to neutrons and other high energy particles seems to be generally accepted. Routine examinations of the hands, face, and eye lens of analytical X-ray equipment operators also appear to be necessary for medical reasons. However, the medical necessity of routine physical examinations, conducted annually or bi-annually for all radiation workers, and conducted for the purpose of verifying medical fitness to continue work in restricted areas, seems to be questionable. It may be that the forensic necessity is more readily evaluated. We would like to know your position on this problem.

The value of termination examinations appears to be almost entirely medico-legal. It appears that the recorded results of such an examination would be useful in the event of a subsequent claim. Our principal difficulty is whether such examinations should always be performed, or whether the examination should be contingent upon certain conditions (such as a former over-exposure), and if so what these conditions should be. Your comments on this problem would be appreciated.

We are aware of the time and effort involved in the preparation of a reply to a letter of this type and want to express in advance our appreciation."

Replies were received from most of the Federal agencies and from twenty-five of the AEC contractors. The replies were surprisingly comprehensive and informative, in most cases representing a considerable effort. In general, the physicians were candid in giving their personal viewpoints. Unfortunately, these varied viewpoints do not lend themselves to summarization.

The replies are unanimously favorable toward pre-placement examinations. However, the physicians differ as to whether the routine examination is sufficient for radiation workers, and as to whether the examination has actual medico-legal value. Physicians who place little emphasis on disqualifying factors seem less inclined to perform special procedures for radiation workers. Those who emphasize disqualifying factors usually do so for medico-legal reasons, and they tend to be specific with regard to special procedures. There is considerable variation in the disqualifying factors reported.

Eye examination requirements cover the complete spectrum from no specified examination at all to slit-lamp examination of the cornea, iris, and lens, with ophthalmoscope examination of the media and fundus, and fundus photographs if lesions are found. Medico-legal justification is normally given or implied for comprehensive eye examinations. Despite this reasoning, the identification of opacities or lesions is not always considered disqualifying. In these instances the purpose is to establish the presence and location prior to exposure. Some physicians feel that the legal protection provided by these comprehensive examinations is a delusion. Apparently most of the medico-legal cases have arisen from people who develop radiation-type cataracts but who have never been significantly exposed and therefore are not included in the comprehensive eye examination program. From this viewpoint, it is better to perform a careful ophthalmoscope examination for virtually everyone who enters a radiation area, with special examinations only for noted, significant lens opacities, for known over-exposure, and in cases where adequate dosimetry cannot be performed, e.g., X-ray diffraction unit operators.

Two opposing positions are held regarding medical examinations following over-exposures. Some feel that examinations should be performed following exposures that exceed permissible levels but are clinically undetectable. Others would conduct an examination only if there is reason to believe that a biological effect may be observed. In addition to medico-legal reasons, those who hold the former view believe that an examination can alleviate apprehension. Those of the latter persuasion believe that the medically useless examination needlessly creates apprehension.

Routine periodic examinations are performed at most installations, but not all. In some cases the content of the examination is more extensive for radiation workers, and in some cases the examinations are more frequent for these employees. Again, the degree of emphasis placed on disqualifying factors is influential. It is interesting to note that while one physician will perform pre-placement and periodic examinations, another will perform pre-placement and termination examinations; and a third will do all three.

A wide range of termination examination policies is evident. This examination may be required for all employees, or only for radiation workers, or only for those significantly exposed, or for employees concerned about their exposure, etc. The justification may be medico-legal, or primarily employee benefit, or for good will purposes, or to gain insight into plant problems, etc.

By far the most intriguing aspect of these replies is that each one contains at least one new and different thought. We believe that the survey has provided information that will be invaluable in the development of the NASA standards.

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