

INVESTIGATION OF RADIATION OVEREXPOSURE

1. Name of exposed individual: WATKINS, DEWEY G., Rank Sp-5,
ASN: RA 13292895.

2. Dose: 9.8 rem external, from Sr-90-Yt-90 sealed source.

3. Circumstances: On 27 April 1960 a TWX was received from Sacramento Signal Depot indicating that upon development of the film badge worn by the EM from 21 March to 16 April 1960 indicated a dose of 9.8 rem attributable to Sr-90 Yt-90 radiation. The USARAL Signal maintenance shop where the EM works uses a 40 mc beta M-6 source in a TS 784 calibrator.

4. Results of Investigation:

Upon receipt of the notification of overexposure investigation of the facility and circumstances resulting in the overexposure revealed the following:

a. During the period of the indicated overexposure Sp-5 Watkins had calibrated two IM-108 survey meters using the TS 784 calibrator. Prior to this film badge period he had calibrated about 8 other IM-108 survey meters without any significant exposure.

b. Questioning of the EM indicated that he had been well trained in calibrating procedures using the TS 784 and that he was quite familiar with the required safety precautions.

c. The dose rate from the TS 784 is variable by means of rotating disk which changes the shielding and diameter of the resulting beta beam. In the maximum dose rate position (40 K) the beta dose rate as measured with a Juno HRJ-6 survey meter is 25 rem per hour about one foot from the source. With the aluminum beta shield closed on the Juno survey meter the secondary electro magnetic radiation from this source is about 0.3 roentgens per hour at the same distance. Since the attenuation disk on the TS 784 calibrator is not equipped with a spring return the source could be inadvertently left in a high dose rate emitting position. The calibrator could cause the indicated beta dose to the operator if placed on the work bench in the "open" or unshielded configuration and facing the operator. However, it would appear that either the time of exposure would have to have been in excess of 20 minutes or the distance of exposure less than one foot. Neither of these conditions seem compatible with the probable time and distance factors resulting from inadvertently directing the beam toward the operator during calibration of two IM-108 survey meters.

d. Upon questioning the operator stated that he was fully aware of the consequences of mishandling the calibrator and that at no time did he place the source so that he was in the direct beam.

e. The exposed individual stated that he had not tampered with his film badge. The film badges are stored in an open rack accessible to all shop personnel thereby creating a situation where tampering could occur.

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f. When not in use the calibration sources are locked in a vault with a combination lock. Only four persons in the shop know the combination to the lock. Deliberate exposure of the operators film badge to the source by another individual is not considered probable. Deliberate exposure of the badge to the source by the operator is not considered likely in view of the training and performance of the operator.

5. After consideration of the data presented in paragraph 4 c and d above Sacramento Signal Depot was requested to re-examine the film for any indications of light exposure or film deterioration. Message received from Sacramento Signal Depot, SIGFT-DM-5A on 062210Z May, stated that upon re-evaluation the corrected dose for this film (003, PD, M) was determined to be 1800 mrem.

6. Conclusions: The operator probably received the radiation dose of 1800 mrem when he inadvertently exposed himself to the direct beam of the TS 784 calibrator, while calibrating one or two IM-108 survey meters. The duration of the exposure was probably between 10 and 30 minutes at a distance of less than three feet.

7. Duty Limitations: In accordance with Para 20.101, Title 10 Code of Federal Regulations the overexposed individual must not be exposed to more than ten per cent of the weekly permissible limit until such time that the average weekly dose equals the exposure limit.

a. In this specific case the radiation exposure was 1.8 rem of beta radiation in four weeks of which the weekly permissible limit is 300 mrem per week when the lens of the eyes may have been involved. To compensate for the overexposure the EM will be restricted to the following working conditions:

(1) Repair and maintenance of Radiac or other equipment not involving the use of calibration sources.

(2) Work outside of radiation areas.

b. Under the above working conditions the EM should compensate for the overexposure in two weeks provided his film badge during this time indicates no radiation dose. If any radiation dose during this time is indicated by the individual's film badge the duration of the duty limitation will be extended until the average weekly dose from 21 March 1960 is less than 300 mr/wk. It is anticipated that Sp-5 Watkins can return to calibration duty following the processing of the film badge worn for the period starting 17 April 1960.

8. Corrective Actions Recommended:

a. All personnel working with the TS 784 should again be cautioned to avoid the direct beam of the TS 784 calibrator.

b. A bench clamp should be fabricated to hold the TS 784 during calibration. Such a clamp should hold the calibrator in a position such that the radiation beam is directed to an area not accessible to shop personnel.

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c. Consideration by appropriate agencies should be given to the modification of the TS 784 to provide a spring return of the shield to the "safe" position.

William G. Powell

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WILLIAM G. POWELL
1st Lt, CmlC
Radiological Safety Officer
10 May 1960

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