

Federal Aviation Agency

OB



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AIRCRAFT

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**SUBJECT : HAZARDS OF RADIUM-ACTIVATED LUMINOUS COMPOUNDS USED
ON AIRCRAFT INSTRUMENTS**

1. **PURPOSE.** This advisory circular provides information concerning health hazards associated with the repair and maintenance of instruments containing luminous markings activated with radium 226 or radium 228 (mesothorium).
2. **GENERAL.** Many older instruments released to the public by the armed forces through surplus channels and some instruments from non-government sources have radium-activated luminous markings. The repair of these instruments presents a potential health hazard. The self-luminous material, generally found on dial faces and pointers and adjacent to or on switches, tends to flake with age. When an instrument is damaged or dismantled, particles of radium paint can be ingested, inhaled, or absorbed through a break in the skin. Ingestion can occur following accumulation of radioactive material on the hands, cigarettes, and food. A portion of the radium taken into the body becomes fixed in the bones and, if sufficient amounts accumulate, can cause serious injury and death.
3. **RADIATION INJURY.** According to the International Committee on Radiation Protection, the maximum permissible body burden of radium 226 is 0.1 microgram. Recognizable bone lesions have been found in persons with a body burden of only 0.4 micrograms. One to 10 micrograms of radium fixed in the bones can cause cancer and widespread damage to bone structure; greater amounts can cause severe and often fatal anemia. As much as 40 years may elapse between the time radium is initially deposited in the body and the appearance of symptoms.
4. **FACILITIES AND PERSONNEL.** The safe handling of radium-activated luminous compounds requires specially designed workrooms and equipment, disposal procedures, careful selection and instruction of personnel, constant and competent supervision, routine medical examinations, and periodic inspection of facilities for contamination.

Without a comprehensive inspection and decontamination program, it is possible for radioactive particles to remain in the work area (work-benches, etc.) long after the instruments have been repaired. This could result in continued contamination of personnel.

5. PAINING AND REFACING INSTRUMENT DIALS. Procedures in the reconditioning of radium-dial instruments most likely to present a health hazard are: (1) painting of dials, and (2) stripping or scrapping of dials before refacing. It is recommended that both these procedures be discontinued, and the instrument faces and pointers be replaced with dials that do not contain radioactive materials. The replaced dials should be disposed of as radioactive waste in accordance with the applicable State radiation control regulations. The fact that the instrument markings do not glow in the dark is not a reliable indication of the absence of radium since, under continuous irradiation, the luminous compound eventually loses its property to emit light.
6. IDENTIFICATION OF INSTRUMENTS. Benefits derived from the use of radium-activated luminous dials rarely warrant the health hazards involved in painting the dials and the expense of maintaining an adequate facility. However, if the repair and/or reconditioning of these instruments are necessary, it is recommended that a warning label be placed permanently on the back of the instrument to alert personnel of the need for special handling procedures during future maintenance.
7. ADDITIONAL INFORMATION. State regulations cover the USE, TRANSFER, and DISPOSAL of radioactive materials. If radium dial stripping and repainting are conducted or if a large number of radium-dial instruments are kept in stock, it may be necessary to register with the State to obtain a license. Further information can be obtained from the State Health Department or State Atomic Energy Agency.

Procedures for handling radioactive luminous compounds are described in "Manual of Industrial Radiation Protection, Part V, Guide on Protection Against Ionising Radiations in the Application of Luminous Compounds, 1964." This guide may be obtained from the International Labour Office, Geneva, Switzerland (Price: \$1.00).


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