

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

October 17, 1985

IE INFORMATION NOTICE NO. 85-81: PROBLEMS RESULTING IN ERRONEOUSLY HIGH
READING WITH PANASONIC 800 SERIES
THERMOLUMINESCENT DOSIMETERS

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP) and certain materials and fuel cycle licensees who may use the subject thermoluminescent dosimeters (TLDs).

Purpose:

Information Notices IN 82-42 "Defects Observed in Panasonic Model 801 and 802 TLD's" and IN 85-42 "Loose Phosphor in Panasonic 800 Series Badge TLD Elements" discussed two separate problems with Panasonic TLD's that resulted in erroneous exposure measurements with the badges.

This information notice is provided to inform the licensees of two additional problems that have resulted in erroneously high readings with Panasonic 800-series TLDs. It is expected that licensees will review this information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

1. Self-Irradiation From Contaminated Lead Filters:

Several Panasonic TLD users have recently experienced anomalously high readings. On investigation, it was determined that the lead filters in the badges were contaminated with trace amounts of naturally occurring radioisotopes. The lead filters (on both sides of the TLD elements) are used to compensate for the energy dependence of calcium sulfate phosphor. The lead used for these filters appears to be contaminated with radium-226 daughters. Bismuth-210 is a major dose contributor. Low level radiation from these contaminants contributed up to 15 mrem in 30 days to the TLD elements. During the initial investigation of the anomalous readings, several TLD badges were counted using a gamma spectroscopy system. This technique was unable to identify contaminated lead filters because of the low activity of gamma emitting contaminants. However, when lead filters were recounted using a thin-window Geiger-Muller (GM) detector, they were found to be contaminated with beta emitting radioisotopes.

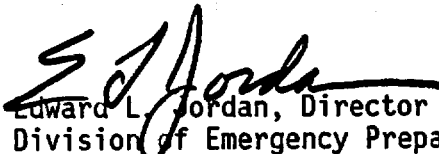
Panasonic TLD's can be screened for contaminated filters by placing several in a low background thin-window GM counter. Licensees wishing to use this screening technique should select a counting time sufficient to provide an acceptable lower limit of detection (5 pCi beta per gram of lead) for their system. Panasonic is currently negotiating the replacement of badges on a case-by-case basis.

2. Abnormal TLD Readings Caused by Hydrogen Sulfide (H₂S) Gas

On May 6, 1985, an unexpectedly high reading was indicated during a routine TLD processing of a terminating contract worker leaving the Brunswick Steam Electric Plant. The worker had been employed to clean marine life out of the plants intake structure, an area where no radiation is expected. He was issued a TLD because access to the job site was through the plant's protected area. The worker's TLD (Panasonic Model UD-802) indicated 13,500 and 457 millirem on elements 1 and 2, respectively (both lithium borate TLD material), with 1.2 and 1.4 millirem indicated on elements 3 and 4, respectively (calcium sulfate TLD material). On investigation, the licensee has concluded that the abnormal TLD response was caused by exposure to H₂S gas given off by the decaying marine life in the intake structure. Extensive testing by the licensee indicates that exposure to H₂S causes gross over-response from lithium borate TLD material. Multiple exposures to concentrations as low as 10 parts per million (ppm) over a 12-hour period caused responses that correspond to 250 millirem of radiation exposure. Indication as high as 4870 millirem were obtained from a 4-hour exposure to 114 ppm H₂S.

Several agents (such as chemical contaminants, ultraviolet light or extreme humidity) are known to cause abnormal TLD responses. Licensees may wish to provide appropriate means of protecting the TLD when exposure to these agents is likely. However, licensees should ensure that protective coverings or containers do not inhibit the TLDs ability to properly respond to actual radiation exposure.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.


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and Engineering Response
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Attachments: List of Recently Issued IE Information Notices

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-80	Timely Declaration Of An Emergency Class Implementation Of An Emergency Plan, And Emergency Notifications	10/15/85	All power reactor facilities holding an OL or CP
85-17 Sup. 1	Possible Sticking Of ASCO Solenoid Valves	10/1/85	All power reactor facilities holding an OL or CP
85-79	Inadequate Communications Between Maintenance, Operations, And Security Personnel	9/30/85	All power reactor facilities holding an OL or CP; research and nonpower reactor facilities; fuel fabrication and processing facilities
85-78	Event Notification	9/23/85	All power reactor facilities holding an OL or CP
85-77	Possible Loss Of Emergency Notification System Due To Loss Of AC Power	9/20/85	All power reactor facilities holding an OL or CP
85-76	Recent Water Hammer Events	9/19/85	All power reactor facilities holding an OL or CP
85-75	Improperly Installed Instrumentation, Inadequate Quality Control And Inadequate Post-modification Testing	8/30/85	All power reactor facilities holding an OL or CP
85-74	Station Battery Problems	8/29/85	All power reactor facilities holding an OL or CP
84-70 Sup. 1	Reliance On Water Level Instrumentation With A Common Reference Leg	8/26/85	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit