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Heal. Teach. Discover. Serve.

March 11, 2002

Mr. James Kopenhaver  
Department of Environmental Protection  
Radiation Protection Department  
909 Elmerton Avenue  
Harrisburg, PA 17110-8200

License #: PA-0006  
Registration: 10-04553  
Re: Reportable Event

Jim:

Per our recent telephone conversation, a summary report of an incident that appears to be reportable to your office is attached. The nature of the incident was employee radiation exposure that exceeded the annual, occupational MPDE to the whole body.

Since the revised regulations of the State DEP incorporate NRC 10 CFR 20 by reference, 20.1201, 20.2104, and 20.2203 were used in this report.

After investigating this matter thoroughly, two issues to call to your attention are the use of EDE, and the need to integrate current year radiation exposure history from past employers into the legal dose of record for new employees. This latter process was found to be in need of improvement here, and we have implemented extensive corrective measures to prevent similar events from recurring. Relative to the use of EDE, I have included my observations and comments on the supplement page that follows. I hope they are helpful to you.

If you have any questions, please do not hesitate to call.

A handwritten signature in black ink that reads "Catherine M. Anderko".

Catherine Anderko  
Director, System, Medical Health Physics  
Radiation Safety Officer

A handwritten signature in black ink that reads "Robert W. Davies".

Robert W. Davies  
Vice President  
Geisinger System Services

CA/laj

cc: Nuclear Regulatory Commission, per 25 PA Code 219.6

Attachments

IE 71

**Supplement: Comments on the use of EDE:**

- The use of EDE in environments where both NRC and State-regulated radiation sources are used appears to need the attention and clarification of both agencies. Today's medical milieu often includes both; in the Cardiology environment, radiation sources include fluoroscopy, intravascular brachytherapy, and radiopharmaceuticals for stress testing. In Radiology, personnel involved with interventional angiography may also rotate through Nuclear Medicine or attend to procedures in the Operating room involving lymphoscintigraphy. Although fluoroscopy is typically a major contributor, it would be difficult to know for certain that it contributed all of the exposure when multiple source types are used. Multiple badges based on where the individual is working may not be operationally feasible.
- The NRC does not currently approve of external dose weighting. The NRC regulations (and now the State by incorporating 10 CFR 20 by reference) mandate that the body dosimeter be placed in the area of the whole body likely to receive the highest exposure (the head and upper arms, which are not shielded in fluoroscopy).
- A position statement issued by the State DEP allows either formula, but mandates the use of two badges if non-fluoroscopic exposure is received, and requires that the shielded badge become the whole body unshielded monitor during non-fluoroscopic work. Although I understand the State's rationale as it relates to the two-badge formula, it appears inherently wrong to mix the two devices this way; certainly, it does not comply with the regulation cited in bullet #2.
- The use of existing EDE formula's greatly alter the dose of record. The two more commonly used formula's are based on the number of badges worn, either one or two, and depending on which calculation is used, the resulting dose of record can vary by more than a factor of three. The rationale to take a dose reduction "credit" for wearing lead protective garments in fluoroscopy is intuitive, however, being able to adjust the legal dose of record so dramatically depending on which formula is selected seems inherently wrong.
- The EDE methodology allows the whole body badge to receive 16.7 rem (one badge formula) and >100 rem when the two-badge formula is employed. As the 15 rem lens limit becomes the limiting dose, the use of lead eyeglasses appears an important condition of use. There are other basic conditions of use that should be in place before the EDE is used as a dose modification method. Using EDE as a "last resort" is in line with ALARA.
- Employees who work only with fluoroscopy, and wear appropriate lead devices to attenuate scattered x-ray photons incident on important parts of their whole body, should be able to utilize an EDE technology to provide a more reasonable estimate of true whole body dose. This seems reasonable to do once all other dose reduction methods and engineering controls have been implemented. Consistent regulatory guidance on how and when EDE may be applied appears to need improvement. A consistent formula is recommended.