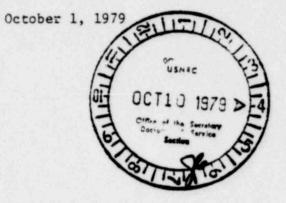
OH 804-4 5. MEGUIRE

PROPUSED BULE PR- Rig Suite

Secretary of the Commission U.S. Nuclear Regulatory Commission Washington, DC 20555

ATTENTION: Docketing and Service Branch

Dear Sir:



I read, with interest, the recent draft regulatory guide entitled "Audible Alarm Dosimeters." Though I can see that there may be difficulties associated with these devices in the industrial environment, I would not like to see the Nuclear Regulatory Commission discourage the use of these devices in the medical field. We have had excellent experience with these in diagnostic radiology and I am sure that they would be just as valuable in nuclear medicine departments. I am enclosing a copy of a paper which will be published in the near future in the American Journal of Roentgenology concerning our experience.

Again, I would urge NRC not to discourage the use of such devices when used as secondary monitoring devices in diagnostic radiology and nuclear medicine.

Sincerely

Jhel B. Gray, Ph.D.

Department of Diagnostic

Radiology Mayo Clinic

Rochester, MN 55901

JEG:rea Enclosure

1743 289

		TECHNICH NOTES	Ü.
11	AJR:133, December 1979	TECHNICAL NOTES	
	000	TECHNICAL NOTES	AJR:133, December 19
. 11	AJR:133. December 1979	TECHNICAL NOTES	OC
		TECHNICAL NOTES	AJR:133, December 19
	000		
1/1	AJR:133, December 1979	TECHNICAL NOTES	00
	000	TECHNICAL NOTES	AJR:133, December 19
		TECHNICAL NOTES	00
11	AJR:133, December 1979		1.0.102 0
5	000	TECHNICAL NOTES	AJR:133, December 19
111	AJR:133, December 1979	TECHNICAL NOTES	0(
13	AJR:133, December 1979		
13			

Received January 30, 1979; accepted after revision August 17, 1979.

**Department of Diagnostic Radiology, Mayo Clinic and Mayo Foundation, Rochester, MN 55901.

Radiation Awareness and Exposure Reduction with Audible Monitors

Joel E. Gray

++

The monitoring of radiation exposure to individuals working in diagnostic radiology is usually carried out with film badges or thermoluminescent dosimeters. Though these cumulative exposure readings provide useful information, it is retrospective and of little value in educating staff in avoiding or reducing hazards.

Small (about the size of a pack of cigarettes), inexpensive (about \$125) radiation monitors that emit an audible "chirp" on exposure to a predetermined amount of radiation are available from several firms. Most of these devices use a Geiger-Mueller tube as the radiation detector and, consequently, are not suitable for quantitative measurements in the diagnostic range. However, due to their extreme sensitivity they are ideal for use in a radiation awareness program in diagnostic radiology. At the same time this extremely high sensitivity may cause the users to become apprehensive about an apparent lack of protection unless adequate education is also provided, with the sensitivity of the monitor being demonstrated and out into perspective.

Characteristics

Audible monitors whose sensitivity, according to the manufacturer, results in one chirp for each 0.25 μ R (as measured at 662 keV) are ideal for use by technologists, nurses, and residents (who are not doing fluoroscopic examinations). For radiologists and residents doing fluoroscopic procedures, a lower sensitivity (one chirp for each 10 μ R) is desirable.

When first attempting to use the audible monitors here, it was found that the high volume of the chirping was distracting. In one model "chirpie" evaluated, the manufacturer supplied information that allowed insertion of a variable resistor in series with the speaker to reduce the volume. Since similar information was not available from the other manufacturer, it was discovered that removing the speaker, which is glued directly to the plastic case, and remounting it with silicon rubber sealant reduced the volume to an acceptable level. This manufacturer has since provided a prototype unit with a volume control which should be for sale in the near future. The lowest volume setting is almost inaudible to everyone in the room except the wearer.

7/26/72

Insut several but in CM

OK of revised

Oxor revised

All fair

All fair

Applications

Each new resident in the department was given one of the audible monitors for the first 3 months of their training after an initial introduction to radiation safety, and a demonstration and discussion of the use of the monitors. Their film badge readings were compared to those of residents in the previous year who had not used audible monitors. There was a 65% reduction in radiation exposure during the first month of training when most were observing fluoroscopy daily. A 30% reduction was noted during the second month

of residency for the group using the audible monitors. Since the number of participants was small (7 residents without monitors and 10 with monitors) and since the assignments for the two groups may not have been identical during their first 2 months, this can only be considered a pilot study.

Taking the overall average for the 2 month period there is a 47% reduction in exposure for the group with the audible monitors. It is believed that these reductions are significant and that the audible monitors have provided the residents with an immediate awareness of radiation safety in the clinical environment.

Radiologists and cardiologists here periodically use the audible monitors with general interest and acceptance. Several radiologists, including some of the more senior staff, have stated that they have changed the way they do fluoroscopy (primarily where they stand) since they are now able to immediately determine the higher radiation areas around the table. Likewise, the cardiologists have stated that they have changed their techniques somewhat in order to reduce their exposure as a result of using the audible monitors.

If one of the female staff advises her supervisor that she is pregnant, she is immediately provided with weekly monitoring by the institution's radiation safety office. In addition, she is provided with an audible monitor, after her work and exposure history are reviewed and aspects of radiation protection are discussed with her. (It is important to stress that these monitors are extremely sensitive to radiation and are not quantitative. Only the weekly and monthly film badge reports should be used for quantitative purposes.)

Quality control technologists and radiologic physicists carry the monitors with them at all times. This has resulted in locating several potential radiation safety problems. For example, a poorly designed Bucky slot cover was discovered on a new fluoroscopic table during acceptance testing as a result of the increased chirping rate of the audible monitor.

In addition to some personnel using the monitors on an ongoing basis audible monitors are provided to individuals receiving exposures in excess of normal levels as determined from their film badge reports. (These normal levels are chosen as 200 mrem/month for technologists and 500 mrem/month for residents, radiologists, and cardiologists.) Each individual is asked, after wearing the audible monitor for 1 month, if they can indicate why they believe that they may be receiving exposures higher than normal. Such information can then be used to determine if the work habits of the individual should be modified, or if additional shielding is required on a particular piece of equipment. (This resulted in locating a fluoroscopic unit in a special procedures room that was operating at three times its normal exposure level, and an old fluoroscopic table with no Bucky slot protection.)

Liscussion

Audible radiation monitors provide an immediate nonquantitative feedback concerning levels of ionizing radiation in the clinical setting. Their use and early radiation safety training has resulted in an exposure reduction to residents during their first 3 months of training. In addition, several potential radiation safety problems have been discovered as a result of the use of personal audible radiation monitors by other members of the department. Audible radiation monitors can provide a significant benefit in a radiation awareness and exposure reduction program.