

June XX, 2004

Henry D. Royal, M.D.
President
Society of Nuclear Medicine
1850 Samuel Morse Drive
Reston, Virginia 20190-5316

Dear Dr. Royal:

In my letter to you dated January 12, 2004, concerning the St. Joseph Mercy Hospital dose reconstruction, I had indicated that the Nuclear Regulatory Commission (NRC) staff will review the reconstruction prepared by Drs. Carol Marcus and Jeffrey Siegel. I had also indicated that the Advisory Committee on the Medical Use of Isotopes (ACMUI) will also be asked to review that reconstruction, as well as NRC's dose assessments, and to perform its own calculations as necessary. These reviews have been completed, and this letter is to inform you of our conclusions.

Based on careful review and input from the ACMUI, as well as our staff's extensive calculations, NRC has concluded that the original dose estimate of 15 cSv (15 rem) obtained by NRC's Region III staff is the estimate that appears best supported by available data and, based on that data, does not appear to be overly conservative and is probably closest to the true dose. We have come to this conclusion because our reviews showed that Region III used an appropriate method to calculate the dose, obtained the necessary data by direct and detailed interviews with the exposed member of the public and the hospital staff on duty at the time of the exposures, and confirmed that the information provided separately by the exposed person and by the hospital staff was consistent.

It has not proven possible to resolve the differences between NRC's and the licensee's dose estimates. Both estimates used identical methods of dose assessment, based on the daily dose rate surveys made by the licensee at the patient's bedside. The difference between the two is due to differences in estimated exposure durations for the family member. This difference, in turn, arose from differences in the recollection of the details of the event by the family member during separate interviews with the NRC and the licensee. The details differed in some respects in the different interviews, and were not entirely consistent. This is not surprising considering the difficult circumstances for the family member during which the exposures occurred, and also the fact that the interviews took place as much as 3 months after the incident.

The dose reconstructions performed by Drs. Marcus and Siegel relied on a calculated dose rate to the family member considering the 285 curie source term, instead of using the survey data more directly. NRC has concluded based on its own detailed calculations that this approach carries a larger uncertainty than that based on the radiation surveys. The reason is that there is

little numerical data available in this case on which to base an accurate dose rate calculation, and assumptions therefore were necessary to substitute for the missing data. These assumptions were based on what was considered reasonable behavior on the part of the family member, as opposed to information collected from the people involved. Available evidence strongly indicates that the assumptions made do not represent the pattern of exposure that actually occurred. Furthermore, our own calculations show that the radiation fields around the patient were such that relatively small changes in such assumptions could have a large impact on the assessed dose rate.

The present case suggests that licensees need to be reminded that they have the prime responsibility for promptly recognizing that an event occurred, understanding the types of information that will likely be needed to perform accurate dose reconstructions, and promptly gathering this information. In the present case, the event was recognized some time after it happened, and interviews were delayed in some cases for several months. Not surprisingly, details could not be accurately remembered, and inconsistencies and disagreements were the result. We are also considering actions to ensure that more detail than is normally deemed necessary be included in future NRC reports on similar cases.

I would like to thank you for providing us with this opportunity to improve our procedures and documentation in situations such as this one. Details of the analysis performed by the staff of the various reconstructions may be found in the staff's report to the Commission, available on NRC's Agency-wide Documents Access and Management System(ADAMS), accession number ML041450268.

Nils J. Diaz

cc: Simin Dadparvar, M.D.
President
American College of Nuclear Physicians