ANS Issues Clarification on ANSI/ANS-6.1.1-1991, "Neutron and Gamma-Ray Fluence-to-Dose Factors."
(*Nuclear News,* October 2004)

Inquiry:

I am on a committee of the American Association of Physicists in Medicine that is developing a standard for radiation shielding of positron emission tomography facilities. First, I would like an explanation of the "historical" designation given to ANSI/ANS-6.1.1.

Second, I need to know the proper way to determine the gamma-ray dose constant for F-18. One source for this constant is ORNL/RSIC-45/R1, dated 1982. The value from this document differs from that which I calculate from the basic scientific data using standard medical physics conventions. The discrepancy may arise because the ORNL document used an early version of the standard.

Since the two values differ by about 25 percent, I need to understand the source of the difference and whether the ANS standard is still considered to be valid.

Response:

ANSI/ANS-6.1.1-1991, which is the latest version of the standard, is designated as a "historical" standard because it was officially withdrawn by ANSI as an American National Standard in 2001. ANS was unable to develop a revision to the standard within the ten-year period specified by ANSI for all standards, but intends to issue a revision in the future. The information contained in this historical standard is believed to be correct, but a formal review to determine its accuracy has not been performed.

The ORNL document cited in the inquiry was apparently based on an earlier version of the standard, specifically, ANSI/ANS-6.1.1-1977. The dose equivalents in the two versions of the standard (i.e., 1977 and 1991) are based on different data. The 1977 standard ceased to be recognized as authoritative in 1991 with the issuance of the later version.

The 1977 version of the standard was based on the maximum dose equivalent in a 30-cm (diameter) x 60-cm tall, tissue-equivalent cylinder. The 1991 version was based on the quantity recommended in ICRP Publication 26 for the effective dose equivalent. This latter source bases the effective dose equivalent on the sum of weighted organ dose equivalents for an anthropomorphic representation of the human body.

The ANS working group responsible for this standard is not familiar with the "standard medical physics conventions" used by the inquirer, so cannot comment further on the differences obtained using the two methods. Caution must be exercised in taking specific gamma-ray constants from the literature because they can be in exposure units rather than in tissue-dose units. Also, doses computed for low-energy photons can be quite different when the conversion coefficients from the two versions of the standard are used.