

January 10, 2002

James F. Mallay  
Standards Steering Committee  
American Nuclear Society  
Framatome ANP  
3315 Old Forest Road  
Lynchburg, VA 24506

Dear Mr. Mallay:

I wish to inform you about questions that have been raised about the uncertainty evaluation in the most recent decay heat standard, ANSI/ANS-5.1-1994. A review by Dr. Michael Brady Raap (current chairman of the ANS5.1 Decay Heat Working Group) and her colleagues and NRC statisticians indicates that some of the uncertainty equations may require further review. In particular:

1. Equation 5b is a straight summation of uncertainties for each fissionable isotope. A statistical review suggests the use of an RMS summation, e.g.:

$$(\Delta P'_d)^2 = \sum_{i=1,4} (\Delta P'_{di})^2$$

2. It is also suggested that the summation symbol in the last term in Equation 9 should probably be outside the brackets so that it too is converted to an RMS summation, e.g.:

$$\sum_{\alpha=1,N} [P_{ia} \Delta F_i(t_\alpha, T_\alpha) / (Q_i P'_{di})]^2$$

3. For Equation 10 to be in RMS form, it should be:

$$\Delta F_i(t, T)^2 = \Delta F_i(t, \infty)^2 + \Delta F_i(t+T, \infty)^2$$

4. Several reviewers have suggested that the denominator in the last term in Equation 13 should not be  $Q^2$ , but should be:

$$(F_{\max} - F_{\min})^2$$

If you have any questions please contact Mr. Lauben (301-415-6762) or myself (301-415-7499).

Sincerely,

**/RA/**

Farouk Eltawila, Director  
Division of Systems Analysis and Regulatory Effectiveness  
Office of Nuclear Regulatory Research

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Letter to James Mallay

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