



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

File All

SEP 20 1979

Generic Task No. A-11

MEMORANDUM FOR: Peter Kapo
Reactor Safety Branch
Division of Operating Reactors

FROM: R. Johnson, TAP A-11 Manager
Engineering Branch
Division of Operating Reactors

SUBJECT: NEUTRON RADIATION SUBTASK SCOPE

The purpose of this memorandum is two-fold. First, to report to you the conclusions reached from talking to cognizant people about the dosimetry benchmark experiment at ANO-1. Second, to put down on paper my thoughts on what should go into the A-11 NUREG with respect to neutron radiation.

Your response to both is solicited.

1. Dosimetry Benchmark

Under RES/NRC sponsorship, dosimeters were irradiated in the ANO-1 cavity. The data now are all available from Bureau of Standards (Grundl), all traceable to a standard source and ready to be used to evaluate neutron population calculations. Everyone I have talked to agree that the data should be the most accurate to date and as good as the technology can provide.

Serpan (RES) met with me on September 11, 1979; that talk and previous conversations with him and others, especially Morris (DOR) led to the following conclusions.

- a. B&W is ready and able to perform a calculation for comparison with Grundl's data.
- b. The results of such a comparison would enhance the A-11 NUREG.
- c. If BNL were to perform the same calculation, the expected results would not be significantly different from those of B&W (C.E. and Westinghouse, given the core and dimensional data, also would be expected to produce about the same result).
- d. Some points made by Morris, not exactly concurred in by Serpan were:
(1) comparison of calculations to experiment at one place such as ANO-1 cannot provide a categorical evaluation of all vendors' accuracies (2) the results from the several benchmark experiment/calculation comparisons should be available before the NRC goes on record with a position (as in the A-11 NUREG).

1739 534

0001070 231

SEP 20 1979

Peter Kapo

-2-

B&W reported the following. Chuck Whitmarsh is working with Grundl and will provide calculations for comparison with the ANO-1 cavity dosimetry data. Because he must model the dosimetry capsule in some detail, the task is estimated at about 400 man-hours (about \$17K) and will not be complete until March, 1980. Art Lowe (B&W) also noted that the results for the ANO-1 rpv surveillance capsule location are available and the comparison of calculated and measured flux there showed agreement to within about 15%. Lowe will keep us informed of further B&W activities relative to the benchmark problem.

In my opinion, the A-11 NUREG should include a discussion of all the ongoing benchmark experiments (the makeup, schedule and goal of each), what they will supply, cumulatively, to the industry and why they are important to the vessel safety margin problem. If you agree with this, tell me who will write the discussion and provide a time-table (outline complete; draft complete; final text complete).

2. A-11 NUREG Input

In addition to the above dosimetry benchmark discussion, my suggestions on input to the A-11 NUREG include the following.

- a. The importance of knowing neutron radiation values in the evaluation of operating rpv mechanical properties must be noted.
- b. We need to address the accuracy of energy dependent neutron flux; how accurate are current results, what is underway to firm up our assessment of accuracy and what will improve it in the near term?
- c. Similar statements should be made with respect to the correlations between given fluence results and mechanical properties except that we must avoid unnecessary attention to vessel steel inhomogeneity or whatever else has contributed to scatter in past correlations.
- d. For the purposes of TAP A-11, we must be satisfied with state-of-the-art fluence determinations (both calculations and dosimetry) as will also be our attitude toward stress analysis.
- e. The ongoing efforts in the field should be catalogued to the extent of stating what each task is, when it is to be done and in what way it will improve neutron radiation evaluations.

Completion of the User Request letter, DOR to RES, addressing Serpan's neutron radiation programs, which was assigned you at the meeting in Hanauer's office on August 30, should provide a good foundation for the NUREG write-up. You might reconsider the outline of neutron radiation problem areas we came up with back on August 16 and go with it or modify it if you feel the urge. In case you did not retain it:

1739 535

SEP 20 1979

1. Flux Calculation Methods
 - 1a math models
 - 1b cross-sections
2. Dosimetry
 - 2a reference standards
 - 2b precision
 - 2c reliability
 - 2d accuracy
3. Dose Rate Effects
 - 3a concurrent annealing
 - 3b saturation(?)
4. Neutron Spectrum Effects

Richard E. Johnson

Richard E. Johnson, TAP A-11 Manager
Engineering Branch
Division of Operating Reactors

cc: S. Hanauer ✓
M. Aycock
D. Eisenhut
V. Noonan
L. Shao
J. Strosnider
R. Gamble
W. Morris
R. Klecker
W. Hazelton
J. Knight
P. Check
S. Pawlicki
W. Regan
J. Watt
S. Varga
P. Randall, OSD
C. Serpan, RES
P. Leech EP2/DSE

1739 336