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Accessions Unit
(016)
PDR

Generic Task Nos. A-11
A-12

MEMORANDUM FOR: Darrell G. Eisenhut, Acting Director
Division of Operating Reactors, NRR

Stephen H. Hanauer, Director
Unresolved Safety Issues Program

FROM: R. E. Johnson, Task Manager A-11

R. P. Snaider, Task Manager A-12

SUBJECT: RADIATION EFFECTS TO REACTOR VESSEL SUPPORT STRUCTURES

Attached is the October 22, 1979 report from the Naval Research Laboratory (NRL) regarding the above subject. The report deals with the prediction of damage to reactor external support structures resulting from neutron irradiation. It specifically addresses the influence of the <1 Mev neutron energy spectrum on the steel ductile-brittle fracture transition. Present NRC practice (on pressure vessel steels), according to Appendix G to 10 CFR 50, specifies that only neutrons of energy >1Mev be included in damage calculations and determinations of Nil Ductility Temperature (NDT) shift over the lifetime of the reactor vessel.

The NRL confirmatory study, commissioned by the NRC, resulted from the notification (in accordance with 10 CFR 21) by Virginia Electric & Power Co. (VEPCO) regarding the predicted NDT shift in the shield tank materials for North Anna Units 3 and 4. The predicted NDT shift exceeded the operating temperature of the support structure, thus raising questions regarding material fracture resistance under accident conditions.

The neutron fluence and spectrum conditions reported by VEPCO were validated by the Brookhaven National Laboratory, which in turn provided the data to NRL for use in the subject analyses.

Conclusions taken from the attached report are simply that:

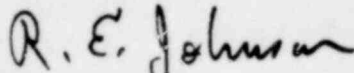
- (1) NRL concurs with VEPCO that analyses predict an excessive NDT shift for the North Anna materials; and
- (2) NRL believes, based on a survey of other materials and other plants, that an expanded investigation is necessary.

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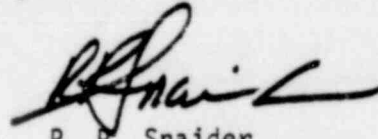
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We concur in the NRL conclusions and recommend that a generic program be established. The determination of the timing of, and resource dedication to, such a program should include the fact that three of the oldest operating reactors (Haddam Neck, San Onofre 1, and Yankee Rowe) are among those identified as being susceptible to the low fracture toughness problem.

This program was originally part of the A-12 generic study, but was removed when its longer-term nature became apparent. Its resolution, particularly with regard to the influence of <1 Mev neutrons, will have an impact on the A-11 long-term generic study.



R. E. Johnson
Task Manager A-11



R. P. Snaider
Task Manager A-12

Attachment:
As stated

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