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

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NOTE TO: F. Schroeder, Acting Director, Division of Systems Safety

FROM: J. P. Knight, Assistant Director for Engineering, DSS

SUBJECT: COMMENTS ON SEPTEMBER 21, 1979 MEMORANDUM FROM W. T. RUSSELL - LONG RANGE RESEARCH PLAN - WATER REACTOR SAFETY RESEARCH

We have the following comment on the programs in the Metallurgy and Materials Research Branch. We would characterize this comment as addressing a significant omission.

Several new NDE methods are proposed to be developed in the next few years. However, what is needed before these methods can successfully be implemented for field use is a means to define quantitatively the relative reliability of these methods under field simulated conditions.

The items that we believe necessary to assess these improved and current NDE methods and meet licensing needs have been identified by MTEB in our recently developed list of identified long term research items. (See items 5 and 8 of attached September 18, 1979 MTEB proposed long term research.)

J. P. Knight, Assistant Director
for Engineering
Division of Systems Safety

September 18, 1979

MATERIALS ENGINEERING BRANCH
PROPOSED LONG RANGE RESEARCH

1. Determine the effectiveness of the use of low cobalt materials or alternate materials of construction to reduce radioactive buildup in nuclear plants including effects of coolant chemistry on radioactive buildup.

2. Development of improved leak detection methods with increased sensitivity such as moisture detectors which will pinpoint incipient leaks.

3. New approaches to improved main condenser and other heat exchanger reliability using new materials and new fabrication methods and designs having compartment isolation features.

4. Effect of post-accident containment environment on metallic and nonmetallic materials and synergistic thermal and radiation effects on elastomers and polymers.

5. Develop additional test loop in a field like facility such as LOFT to provide means to develop cracks in pipes at different locations. This loop will be used to provide a standard to compare and verify various NDE methods under conditions approximating field inspection conditions in pipes having well characterized cracks. Results from these comparisons should be developed to provide quantitative estimates of the relative reliability of NDE methods as implemented or developed for field use.

6. Extend current elastic-plastic fracture mechanics methods to experimentally and anlytically define the limitations of these methods for real failure conditions and large crack extensions. This work should be directed toward real structures, such as piping and vessels.

7. Determine if fracture toughness tests for relatively thin weld qualification specimens that are used to qualify thicker structural welds adequately represents the fracture toughness of structural welds in very thick structures, such as containment penetration.

8. Develop a means to provide quantitative estimates of the relative reliability of NDE as implemented or developed for field use in the inspection of reactor vessels. This method should incorporate the use of real, well defined flaws as a standard in a structural shape, including the presence of welds, cladding and geometric discontinuities.