



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

October 20, 1981

MEMORANDUM FOR: William J. Dircks, Executive Director for Operations
FROM: Raymond F. Fraley, Executive Director *Raymond F. Fraley*
SUBJECT: BOLT FAILURES IN NUCLEAR POWER PLANTS

In the last few years there has been a significant number of incidents of failed or severely degraded bolts in systems essential to cope with design basis accidents or in closures to the primary pressure boundary. Examples are: pressure vessel supports (Midland), steam generator supports (Haddam Neck), primary pump bolts (Calvert Cliffs and Fort Calhoun), steam generator primary manway closures (Oconee), and core internals (Oconee). These clearly represent a deterioration of essential lines of defense in protecting against accidents and thus are safety issues meriting consideration.

Some of these failures have occurred in steels believed to have been specified in conformance with good practice, with respect to composition and strength. Other failures may have been associated with an unconventional use of ultrahigh-strength material.

Of the various phenomena involved here, the one of most concern is the stress corrosion cracking of high-strength bolts since these can break without warning.

We believe it is essential that the Staff begin an active program to establish:

- (1) Whether ultrahigh-strength bolts with high-pretension are necessary in the nuclear applications where they have been used.
- (2) Which plants may be using such bolts and the conditions under which their use should be allowed.
- (3) What conditions may have led to failure in bolts believed to have been specified to conventional good practice.
- (4) What regulatory actions are needed to avoid challenges to primary system integrity from bolt failures.