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August 5, 1988

William G. Counsil
Executive Vice President

Mr. Samuel J. Chilk,
Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555
Attn: Docketing and Service Branch

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
COMMENTS ON ADDITIONAL APPLICATIONS OF
LEAK-BEFORE-BREAK TECHNOLOGY
(53 FED. REG. 11311, APRIL 6, 1988)

Dear Mr. Chilk:

In the subject Federal Register publication, the NRC stated that it is proposing to investigate the safety benefits associated with using leak-before-break technology to modify functional and performance requirements for emergency core cooling systems (ECCS) and environmental qualification (EQ) of safety-related electrical and mechanical equipment. The publication requested comments on this proposal, with particular emphasis on "documented evidence describing safety degradations and safety enhancements due to postulated pipe rupture requirements on EQ and ECCS...". It indicated that the priority which it "assigns to modifying functional and performance requirements for EQ and ECCS will be determined in large measure from the balance between accrued safety benefits and detriments believed to result (including impacts on severe accident performance)."

In response to this NRC request for comments, TU Electric strongly endorses the proposal to investigate the safety benefits associated with using leak-before-break (LBB) technology to modify functional and performance requirements for ECCS and EQ and urges the NRC to initiate a proposed rulemaking to implement such benefits.

The following comments describe the substantial safety benefits that would be derived from such additional applications of LBB technology. Although TU Electric cannot at this time provide documented data in support of such benefits it believes that the arguments are sufficiently convincing that the NRC should assign high priority to a proposed rulemaking in this area.

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EQ Related Comments

(a) The current interpretation of accident criteria develops calculated radiation exposures of 10^8 to 10^9 rads gamma plus beta for areas inside containment. Instruments and electrical penetrations in common usage meet the requirements of 10^7 to 10^8 rads gamma. The application of leak-before-break (LBB) technology would reduce the level of calculated radiation exposures inside containment under accident criteria and thus provide the following significant safety benefits:

(1) Elimination of Additional Qualification Testing

Reduction in the qualification testing will make more types of instrumentation available to the designer at reasonable cost. The system safety will be improved by the introduction of diverse safety equipment. For example, the AMSAC equipment utilized by CPSES has taken advantage of the availability of an alternative manufacturer (FSAR Section 7.8.1.9).

(2) Utilization of Proven Equipment

Standard equipment models represent the bulk of manufacturer operational experience and, in general, perform the best. If special adaptations are made to meet excessive radiation requirements, then the new material selection or design feature may not perform equivalently. This has many actual examples. A common one is the substitution of a more radiation resistant but harder gasket material resulting in more repeated maintenance than a resilient material would require.

(3) Improved Quality, Availability and Cost of Replacement Parts

The discussion with respect to instrumentation availability as given in (1) is equally applicable to replacement parts. The discussion with respect to the use of proven equipment as given in (2) is equally applicable to the quality and capability of replacement parts.

(4) Elimination of Unnecessary Shielding

If the equipment radiation resistance cannot be improved, the designer may elect to shield the equipment from the hypothetical radiation. This case is analogous to the additional supports eliminated by the original LBB interpretation. Elimination of the unnecessary shielding improves access for maintenance and testing of the ECCS instruments.

(5) Elimination of Unnecessary Surveillance and Maintenance in Radiation Areas

Elimination of an unnecessarily high "reserve life" to accommodate an accident will allow a longer qualified life, thus reducing maintenance and replacement activity. This more realistic approach will reduce the overall radiation exposure to plant workers. Less frequent maintenance activity will also improve plant availability. INPO 87-022 "Operational Performance of Reactor Protection Systems In U.S. Pressurized Water Reactors: 1981-1985" identifies trips while one channel is out for maintenance or surveillance, as a major cause of unplanned automatic scrams.

(b) Application of LBB technology in determining the environmental requirements within containment will reduce the temperature and pressure parameters (as well as the radiation). This reduction would:

(1) Eliminate some additional qualification testing as in (a)(1) above.

(2) Enable more standard equipment to be applied as in (a)(2) above.

(3) Improve availability as in (a)(3) above.

(4) Extend qualified life and reduce surveillance and maintenance as in (a)(5) above.

(c) The nature of a large bore guillotine pipe break outside containment, e.g. main steam line break (MSLB), is to create harsh environmental conditions not only in the vicinity of the break, but in rooms far removed. The application of LBB technology would:

(1) Reduce EQ Requirements for Rooms Which Do Not Contain High Energy Piping

Correspondingly, leak detection provisions outside containment will need to be supplemented and improved. The designer would be required to show that the leak detection capabilities are consistent with the reduction in the propagation of the environmental effects. Provision of radiation monitors for leak detection outside containment may have limited application. However, area temperature and humidity monitors located in compartments where high energy piping failures are postulated should improve leak detection capability.

(2) Improved Knowledge of Plant Condition

An increased number of leak detection instruments distributed strategically throughout the plant would provide Control Room personnel with improved knowledge of pressure boundary performance. For the same expenditure, the capability of the defense-in-depth is improved by investment in leak detection rather than by investment in qualifying equipment located in compartments that are remote from the postulated break area.

Use of various and appropriate leak detection devices would represent a diversification of safeguards as compared to the environmental qualification of existing equipment.

Equipment as presently specified is over-designed for the environment that it is likely to see throughout its lifetime. The reduction of EQ requirements represents a more cost effective selection of equipment. An additional benefit of the extensive leak detection system will be better plant availability since operators will be able to respond earlier to a leak rather than to the break that might ensue. Among the benefits of early response would be a reduction of drainage and wastes to treat.

(d) Similarly to item (c), a postulated break in the letdown line creates an area of harsh chemical, temperature and dynamic effects. Under application of LBB technology:

If the harsh chemical environment has ruled out the use of some equipment, benefits to diversity as described in (a)(1) will be possible; and

If the harsh chemical environment has necessitated modifications to equipment, benefits to the quality of equipment as described in (a)(2) will be possible.

ECCS Related Comments

(a) The designer can use LBB methodology to define a new "Design Maximum Leak" as justified by the system components and piping employed. Defining a new "Design Maximum Leakage" may allow reduced capacity requirements for the ECCS pumps. With a reduced capacity requirement, the designer could improve pump reliability by lowering motor starting torque, reducing required Net Positive Suction Head (NPSH), and improving the NPSH available to the pumps. These factors would improve seal wear ring, and bearing wear and enhance equipment performance during testing and actual operation.

With reduced ECCS pump motor sizes, operational benefits will be accrued when loading the Emergency Diesel Generator (EDG). Assuming loss of offsite power, these pump motors will sequence onto the safeguards bus more reliably because the load step with transient instability will be lower. Mitigation of this transient may also be achieved by expanding the timing allowed for the EDG loading sequence.

(b) The designer can use the removal of the sudden large break case to revise the instrument setpoints for ECCS actuation. This would create a larger margin to the normal operating range. This application of LBB technology would reduce the occurrences of inadvertent actuations of the ECCS systems due to the widening of margins for normal instrumentation readings. The occurrence of spurious scrams amounted to 17% of the cases as reported in INPO 87-022.

Once again, TU Electric strongly endorses the initiation of a proposed rulemaking to bring practical realism to modify functional and performance requirements for ECCS and EQ.

Very truly yours,

W. G. Counsil

HAM/grr

c - Mr. R. D. Martin, Region IV
Resident Inspectors, CPSES (3)