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U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Comments on Additional Application of Leak-Before-Break Technology

Gentlemen:

On April 6, 1988, the Commission requested comments concerning additional applications of leak-before-break technology. We are providing comments on the safety and operational benefits which could be gained by applying leak-before-break technology to modify Emergency Core Cooling System (ECCS) and Environmental Qualification (EQ) requirements.

The attachment discusses the safety and operational benefits which Calvert Cliffs Units 1 and 2 might see if additional applications of leak-before-break are allowed. We urge the Commission to allow other applications of leak-before-break technology. Also, we support the comments on this issue provided by the Nuclear Utility Group on Equipment Qualification.

Should you have any further questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

Charles H. Cruse

CHC/PSF/dlm

Attachment

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ATTACHMENT

COMMENTS ON ADDITIONAL APPLICATION OF LEAK-BEFORE-BREAK TECHNOLOGY

The following are a summary of some of the benefits we believe could be gained by applying leak-before-break technology to Emergency Core Cooling System (ECCS) and Equipment Qualification (EQ) requirements. The data provided is approximate; we have not performed extensive analyses to determine the exact benefits. Our determination of benefits is based on the assumption that the CEOG will provide an acceptable analysis which eliminates a double-ended large pipe rupture (Loss of Coolant Accident [LOCA] and Main Steam Line Break [MSLB]) from consideration in ECCS and EQ requirements.

ECCS DESIGN

ECCS operating conditions would be less severe. The requirements for starting and reaching rated flow could be relaxed, which reduces stress on the pump motors. Time between maintenance cycles could be reduced and the equipment lifetimes may be extended. The probability of component failure would be reduced.

Some of the equipment used during normal operations would also be available for use during a plant transient. The environmental conditions may be reduced to the point where this equipment would be considered operable for most severe transients. The operators could then use more familiar equipment and procedures to mitigate these transients. This would increase the reliability and diversity of the equipment used for transients and ensures an even higher level of safety than presently exists.

EMERGENCY DIESEL GENERATORS (EDG)

If ECCS is not required as soon, because the primary system doesn't experience a rapid loss of coolant, then the EDG is not required to start as soon either. Slower EDG starting and loading would have several benefits. These are:

- A decreased potential for bearing degradation
- A decreased potential for EDG power transmission and gear degradation
- An increased margin on instrumentation time delay responses
- Safety-related motor loads could be spaced out. This would reduce the chance that we would exceed the capabilities of the voltage regulator/generator.
- Fast starts exercise the governor to its maximum capability. We may be able to eliminate the air start booster for the governor. This eliminates a potential governor failure, which increases reliability.

Maintenance testing will also benefit from slower diesel generator starts. Currently, the automatic start relays and switches must be bypassed to do the slow diesel start required by post-maintenance testing. If the normal starting mode for the EDG were slower, the switches might not have to be changed during testing.

The above benefits would increase EDG reliability and reduce EDG failures to start by at least 25%.

EQUIPMENT QUALIFICATION

We assume that the equipment qualification temperature, pressure and radiation profiles will change significantly if LOCA and MSLB are eliminated as EQ design basis events. This would allow credit for the use of presently unqualified equipment during severe transients.

Under the present environmental conditions assumed, instrument uncertainties increase significantly during a LOCA or MSLB. Pressure transmitters provide an example of this.

	NORMAL CONDITIONS	ACCIDENT CONDITIONS
Temperature	-40°F to 200°F	318°F for 8 hours
Humidity	0 to 100%	Steam Environment
Radiation	Location Dependent	2.2×10^7 rads
* Accuracy	0.25%	4.5% (temperature) 8% (radiation) 5% (after accident)

* Accuracy is one component of instrument uncertainty. Other components are drift, normal environmental effects, power supply effects, accident environmental effects and safe shutdown earthquake effects.

The uncertainty associated with a primary system pressure transmitter doubles under accident conditions. The Reactor Coolant Pump trip setpoint has been changed to account for this additional uncertainty. Also, the steam generator secondary side pressure trip setpoint has been set much closer to the normal operating pressure to account for instrument uncertainty. We have been unable to find evidence that a specific plant trip has been caused by this change in trip setpoints. However, plant transients have challenged the reactor system because of the conservative trip point settings.

Instrument lifetimes could be extended if they didn't have to be designed to operate under severe environmental conditions. It may be possible to reduce the number of instrument replacements due to instrument age by two or three over the life of the plant. For a pressure transmitter this could save upwards of $10,000 for each replacement. With the large number of qualified transmitters in the two units, this is a significant savings.

Also, a number of presently unqualified components could be qualified under less severe environmental conditions. A reduction in peak temperature and source term would have the greatest impact. Our procedures could then be changed to allow the use of equipment normally used during operation.

REDUCTION IN RADIATION EXPOSURE

Maintenance is typically more frequent and more complicated on qualified equipment than on commercial grade equipment. Maintenance time and the resulting radiation exposure would be reduced if the equipment was not designed to withstand such extreme environments. We believe that EQ maintenance-related exposure could be reduced by at least five to ten percent overall, and up to twenty to fifty percent in some cases. This could result in a manrem savings of at least 14 manrem per unit for each outage. With approximately 27 outages remaining for both units, we could realize at least a 378 manrem savings. Due to the limited scope of the review, this number could be much higher.

A specific example of a potential dose reduction involves replacement of the primary system RTDs. We recently used about four manrem for RTD replacement. Prior to 10 CFR 50.49 requirements, we used approximately one manrem for the same task. Another example involves servicing transmitters which now require "Raychem" splices. By eliminating the use of "Raychem" splices in favor of terminal blocks, we could reduce the time spent on this job by 20%. Dose savings are dependent on the location of the transmitters.

OPERATIONS

The application of leak-before-break technology to large pipe break requirements will have a significant impact on the operations of the units. Operators will be affected in two major ways.

- Normal plant equipment could be used during severe plant transients.
- Trip setpoints may be relaxed because of a reduction in instrument uncertainty, therefore, the operating band would be widened.

These changes will ensure a higher level of safety than presently exists.

Changes would be made in the Emergency Operating Procedures to allow the use of plant equipment used for normal operation during an accident. Operators are much more familiar with the equipment they use daily. It is probable that transients would be less severe because operators could respond using everyday equipment and actions.

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COMMENTS ON ADDITIONAL APPLICATION OF LEAK-BEFORE-BREAK TECHNOLOGY

The reduction of instrument uncertainties would have a major impact on plant operations. If the instrument uncertainties stayed the same under accident conditions as under normal operations, operators would not have to know that the uncertainties would change or by how much. Operators would also have more confidence that the data from the instruments is as accurate as under normal conditions. Also, trip setpoints could be set less conservatively because they would no longer have to account for the larger instrument uncertainties during an accident. This would allow more flexibility because the plant would be capable of handling transients which would now cause a trip. An example of this is the steam generator pressure transmitters. The margin between the normal operating pressure and the trip pressure was cut in half because of instrument uncertainties associated with equipment qualification requirements. This will have a significant impact on the safe operation of the plant.

CONCLUSION

We urge the Commission to allow additional applications of the leak-before-break technology. We feel these would be a significant net benefit to Calvert Cliffs Units 1 and 2. A quick review has provided the above approximate data which shows significant net benefits. Further evaluations would uncover additional quantitative and qualitative benefits. Also, we endorse the comments made by the Nuclear Utility Group on Equipment Qualification.