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DENTON,H. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards re-evaluation of BWR scram sys,in response to NRC 801001 ltr.

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Iowa Electric Light and Power Company

January 14, 1981
LDR-81-28

LARRY D. ROOT
ASSISTANT VICE PRESIDENT
OF NUCLEAR DIVISION

Mr. Harold Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

Enclosed herewith is our reevaluation of the Duane Arnold Energy Center BWR Scram System, requested by the NRC letter of October 1, 1980. This reevaluation incorporates the terms of the NRC Safety Evaluation Report on this subject. Also included are our proposed modifications.

It should be noted that DAEC has been exempted from the "short-term" items (due to its Scram Discharge Volume design), which, therefore, are not addressed here.

The proposed modifications are deemed fully adequate to comply with the criteria, and it is our intention to implement the modifications by the end of the 1982 refueling outage.

Three signed and 37 additional copies of this letter are transmitted herewith. The foregoing letter and attachment are true and accurate to the best of my knowledge and belief.

IOWA ELECTRIC LIGHT AND POWER COMPANY

BY R W McDaughy for
Larry D. Root
Assistant Vice President
Nuclear Generation

Subscribed and Sworn to Before Me
on this 15th day of January
19 81.

Mary E Benfield
Notary Public In and For the
State of Iowa

MARY E. BENFIELD
My Commission Expires
SEPTEMBER 30, 1983

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Duane Arnold Energy Center
Long-Term
Scram Discharge Volume (SDV)
System Modifications

The following is a listing of the modifications proposed by Iowa Electric Light and Power Company to bring the DAEC SDV System into compliance with the BWR Owners' Sub-Group Criteria and the NRC Generic Safety Evaluation Report (SER). The items are presented by first repeating the criteria relevant to the necessary modification and then discussing the modification with comments regarding the SER when appropriate.

A) Criteria:

Safety Criterion 2 - No single active failure shall prevent uncontrolled loss of reactor coolant.

and

Design Criterion 10 - Vent and drain line valves shall be provided to contain the scram discharge water with a single active failure and to minimize operational exposure.

Response:

The DAEC SDV System presently contains a single vent line valve and a single drain line valve. For the condition of unreset scram, reactor coolant system pressure is maintained by each of these valves. A single active failure of either of these components would permit loss of reactor coolant. A second valve will be installed in series with each of the vent and drain valves to provide backup isolation capability.

The DAEC SDV System also contains a relief valve for system overpressure protection. This component was not addressed in the SER. Iowa Electric is, however, investigating, the possibility of replacing the relief valve with a blind flange to eliminate this possibility for single active failure.

B) Criteria:

Safety Criterion 3 - The scram discharge system instrumentation shall be designed to provide redundancy, to operate reliably under all conditions, and shall not be adversely affected by hydrodynamic forces or flow characteristics.

and

Design Criterion 4 - The scram instrumentation shall be capable of detecting water accumulation in the instrumented volume(s) assuming a single active failure in the instrumentation system or the plugging of an instrument line.

Response:

The DAEC SDV System contains level switches which will, when actuated by sufficient accumulation of water in the Instrument Volumes (IV's), cause an automatic scram of the reactor. There are four such switches arranged with "one-out-of-two, twice" logic which provide testability, redundancy, and protection from spurious signals, testability, and redundancy with a minimum of instrumentation. Two of these four switches are located on each of the IV's. The two IV's (on opposite sides of the reactor building) communicate with each other via a 2" drain line cross-tie and a 1" vent line cross-tie. Each cross-tie line is about 120 feet in length.

With the above design, water accumulation could occur in one IV with a delay in accumulation in the other IV. Given a single failure of an instrument on the IV in which water is first accumulating, the scram could be delayed sufficiently to jeopardize complete scram in 1/2 the core. This condition may be corrected by 1) providing additional (redundant) auto scram instrumentation on each IV, or 2) improving the hydraulic coupling between the two IV's (as it required by Design Criterion 1 between the SDV and IV) and thus assuring and auto scram with existing instrumentation prior to loss of the abailable volume for a SDV. By enlarging the vent and drain line cross-ties between the two IV's, the required coupling can be assured. Our analysis of this latter solution of improving hydraulic coupling between the two IV's is underway. When the analysis is completed, justification will be provided if this option is chosen.

The second portion of the safety criterion relates to the reliability/-environmental integrity of the instrument (float switch) itself. General Electric (Service Information Letter 331, Supplement 3, dated 9/26/80) is investigating the cause(s) of the "common-cause" failures discussed in the SER. As described below, we will make modifications to the sensing lines to reduce the likelihood of failure due to "hydrodynamic forces or flow characteristics." These modifications, coupled with the already-increased frequency of surveillance for the switches, we believe, provide adequate assurance of their integrity. Should any current or future investigations into the failures reveal that uncorrectable difficulties exist with the switches, appropriate and immediate action will be taken to provide alternate and/or diverse instrumentation. Iowa Electric is also awaiting better definition of ATWS concerns related to this subject of diversity.

Note that the above discussions regarding instrument redundancy and diversity provide solutions to the criterion different from the "acceptable compliance" solutions given in the SER.

The design criterion also requires consideration of the effects on scram instrumentation function resulting from the plugging of an instrument line. The independence of instrument line connections will be reviewed and modifications will be made to assure that the plugging of any one instrument line will not compromise the scram function.

C) Criterion:

Design Criterion 3 - Instrumentation taps shall be provided on the vertical instrument volume and not on the connected piping.

Response:

The DAEC SDV System's scram instrument sensing lines shall be modified to be connected to the IV's in accordance with the criterion and SER.

D) Criterion:

Surveillance Criterion 2 - Verifying and level detection instrumentation shall be periodically tested in place.

Response:

All DAEC SDV System level instrumentation is presently tested in place in accordance with IE Bulletin No. 80-17, Supplement 3, Item 2. Iowa Electric will institute this as a permanent procedure in support of the response in B) above.

Additionally, DAEC procedures will be modified to drain the test water from the instrument chambers through the sensing lines into the IV's.

E) Criterion:

Surveillance Criterion 3 - The operability of the entire system as an integrated whole shall be demonstrated periodically and during each operating cycle, by demonstrating scram instrument response and valve function at pressure and temperature at approximately 50% control rod density.

Response:

Iowa Electric will make the modifications necessary to provide for data logging of instrument and valve responses to the scrams and scram resets which occur at the DAEC. Periodic evaluation of these responses (by comparison with previous responses) will be made in order to identify possible abnormalities.