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Regulatory File Cy

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Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTN: Mr. Karl Kniel, Chief
Light Water Reactors
Branch No. 2
Division of Project Management

Gentlemen:

REF: Docket 50-272
License DPR-70
Reactor Vessel Overpressurization

Public Service was requested by your letter of August 27, 1976 to evaluate system designs to determine susceptibility to overpressurization events, analyze the possible events and propose interim plus permanent modifications to systems and procedures to reduce the likelihood and consequences of such events. On September 15, 1976, we transmitted a letter stating that a task group of utilities with Westinghouse plants had been formed to evaluate this problem and that we would review our operating procedures to minimize the likelihood of overpressurization events. We also stated that at the end of the 60-day period addressed in your letter of August 27, a report of progress in this evaluation and review would be provided. This letter provides that report.

A meeting was held by the utility group of September 23, 1976, to review and discuss actions performed by the utilities and Westinghouse. The following presents major items reviewed and the conclusions of that meeting:

A. The overpressurization events which have occurred on Westinghouse designed plants were discussed and the cause of each of the events was noted. In addition, effectiveness of assumed mitigating systems, such as a relief valve, was considered. The review of these occurrences indicated that single equipment failure or operator error caused each event and some form of pressure relief would reduce the consequences of such events.

B. The grouping of various plants was considered as a means to reduce the amount of analysis necessary to evaluate the effectiveness of using the pressurizer power operated relief valves. The review of parameters which would affect analysis results

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indicated that plant grouping was not necessary because Westinghouse plants are sufficiently similar to envelope the plants by use of a bounding analysis.

C. The pressurizer power operated relief valves were found to have significant water relief capability and relatively quick opening valves, i.e., approximately 2-second opening time.

D. The preliminary simplistic evaluation of mass injection induced transients from all possible dynamic sources indicates that the pressurizer power operated relief valves are of the proper mass flow characteristics to limit the pressure surges of such events.

E. The preliminary simplistic evaluation of component temperature difference induced transients following a reactor coolant pump start indicates that the pressurizer power operated relief valve may be capable of mitigating the pressure surge of such an event. The equipment temperature difference in conjunction with a pump start induced pressure transient will require a detailed transient analysis to assure acceptability of the system modification selected.

F. Due to the preliminary indications that the pressurizer power operated relief valves may be capable of providing overpressure protection during solid system operation, the overpressurization transients will be analyzed assuming a mitigating system employing the pressurizer power operated relief valves.

G. A working subcommittee was formed to evaluate the possible overpressurization events for the purpose of defining the conditions and parameters to be included in the transient analysis. This subcommittee was directed to meet with Westinghouse and reach concurrence as to the number of events and conditions of each event to be analyzed. This meeting was held on September 28,1976.

H. A second working subcommittee was also formed to review operating parameters such as chemistry requirements and temperature difference limits which affect implementing procedures to minimize solid system operation by use of a steam bubble at low reactor system average temperatures. This second working subcommittee also was directed to consider an action plan should Appendix G limits be exceeded. This committee met on September 29, 1976.

The meetings which have been held by the utilities and the working subcommittees have resulted in agreement as to a decisive course of action to resolve this overpressurization problem. This course of action includes transient analysis. The transient analysis will include consideration of mass input induced overpressurization and heat input induced overpressurization. The range of system and component physical parameters, performance characteristics and operating limits applicable to Westinghouse designed plants will be used to bound the analysis. Conservative assumptions will be employed to characterize the relief valve performance.

The single failure criteria presented in your letter of August 27, 1976, will be applied. That is, no single event, whether equipment failure or operator error, will result in Appendix G limitations being exceeded. If the overpressurization transient is caused by an equipment failure or operator error, that failure or error will be considered the single failure event and all resulting subsequent actions resulting from the failure or error which could reduce the effectiveness of the mitigating system will be considered and included in the analysis.

The preliminary evaluations performed indicate that protection of a solid reactor coolant system by use of a relief system from an inadvertently opened safety injection accumulator, which is charged to its design pressure, is not practical. It is our opinion that administrative controls similar to the controls employed for assuring that the accumulator valves are open during normal operation, which satisfy the single failure criteria, will provide adequate protection against overpressurization during solid system operation. Our procedures incorporate such controls.

It should be noted that with the administrative controls and "single failure" criteria applied, 100% assurance of remaining within Appendix G limits cannot be provided. However, with whatever modifications are installed as a result of the analysis addressed above, the consequences of overpressurization transient will be significantly less severe. Since the remote possibility of exceeding Appendix G limits by a small amount will still exist following installation of any mitigating system, the action plan following such an event should also be presented. It is our position that following an overpressurization transient where Appendix G limits are exceeded an analysis of the event is required to determine the long term consequences of the event and the impact upon plant safety. Such an analysis would include reasonably sized flaw assumptions and the detailed information applicable to the specific reactor vessel at the fluence accumulated at the time of the event. The analysis would be similar to the analysis performed by Virginia Electric Power Company in Abnormal Occurrence Report AO-S1-73-01-10 dated February 13, 1973, following the overpressurization due to opening an accumulator isolation valve with a solid reactor coolant system. Following completion of such analysis and assurance that continued operation would not compromise health and safety of the public, we would proceed with normal operations and provide a detailed report of the incident and analysis to the Commission.

The analysis of the overpressurization transients will be a major activity with an estimated duration of six months. Following completion of the analysis modification to the Salem plant will be initiated consistent with analysis results. The schedule for the modification activity will be provided following completion of the analysis and detailed identification of the modification performance requirements.

We have reviewed and modified our operating instruction I-3.6 "Hot Standby to Cold Shutdown" and II-1.3.4, "Filling and Venting" to minimize the time the system is operated in a water solid condition. In addition, the operators have been made aware of the potential of an overpressurization transient when the plant is in a water solid condition.

To verify compliance with Appendix G pressure-temperature limits while starting up, shutting down or during periods of cold shutdown four (4) 0°F to 700°F temperature recorders are installed in the Control Room. The recorders monitor the hot and cold leg temperatures on each of the four loops. A pressure recorder and two pressure indicators are also installed in the Control Room to monitor the hot leg pressure. These instruments are kept inservice during all modes of operation.

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