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Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: NRC Operations Center

INITIAL NOTIFICATION OF THE
POTENTIAL EXISTENCE OF A FAILURE TO COMPLY PURSUANT TO
10 CFR 21.21

Westinghouse previously communicated via Interim Report 91-046 (References 1 and 2) that an evaluation pursuant to 10 CFR 21 was underway regarding the potential for boron precipitation in the reactor core in the long term cooling mode following a postulated Loss of Coolant Accident (LOCA). This evaluation has been completed and has been found to not be reportable under 10 CFR Part 21. The basis for this conclusion is described below.

During the evaluation of the boron precipitation issue, another issue related to supplying adequate flow to the reactor coolant system to maintain long term core cooling was identified and has been determined to be a potential for a failure to comply with the criteria of 10 CFR 50.46.

SUMMARY

The potential for inadequate core cooling flow as a result of isolation of the Residual Heat Removal/Low Head Safety Injection (RHR/LHSI) pumps from the Reactor Coolant System (RCS) when attempting to align them to the RCS hot legs has been identified. A single failure of a valve has been postulated which can prevent RHR/LHSI alignment to the RCS hot legs, in the hot leg recirculation mode of core cooling, typically required to begin between 8 and 24 hours following a postulated LOCA. However, plant specific Emergency Operating Procedures (EOPs) or operator training may or may not advise the operator to realign the RHR/LHSI back to the RCS cold legs and thus mitigate the event. Additionally, a subset of Westinghouse designed plants which may not have the capability to align the RHR/LHSI to the RCS hot legs have been identified since these plants may be using the RHR/LHSI for containment spray. This condition could result in exceeding the criteria of 10 CFR 50.46 for Loss of Coolant Accidents analyzed as part of the licensing basis. All domestic utilities operating a Westinghouse designed NSSS are receiving a similar report.

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BACKGROUND

Westinghouse has provided the NRC two interim 10 CFR 21 reports (References 1 & 2) describing an issue related to hot leg switchover and Emergency Core Cooling System (ECCS) hot leg recirculation. Westinghouse has continued to evaluate this issue and has determined that alignment of high pressure ECCS to the RCS hot legs will prevent boron precipitation given that the high pressure ECCS exceeds decay heat boiloff at the prescribed switchover time by 30% (1.3 times decay heat boiloff). Westinghouse has confidence that Westinghouse designed reactors are capable of supplying the required ECCS flow to the RCS hot legs to prevent boron precipitation and has, therefore, concluded that the boron precipitation issue is not reportable pursuant to 10 CFR 21 requirements.

The concern for providing adequate ECCS flow to the Reactor Coolant System (RCS) as a result of a potential single failure associated with the Residual Heat Removal/Low Head Safety Injection (RHR/LHSI) hot leg header isolation Motor Operated Valve (MOV) was identified in Reference 2. However, the development of plant specific EOPs are not within Westinghouse scope and Westinghouse cannot determine what actions the operator would take following an unsuccessful attempt to align the RHR/LHSI to the RCS hot legs. Westinghouse has determined that there may be a potential, depending upon the content of plant specific EOPs, that the operator may leave the RHR/LHSI isolated from the RCS while attempting to correct the situation which resulted in the unsuccessful attempt to align the RHR/LHSI to the RCS hot legs.

SAFETY SIGNIFICANCE

10 CFR 50.46 requires "Each boiling and pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical Zircaloy cladding must be provided with an emergency core cooling system (ECCS) that must be designed such that its calculated cooling performance following postulated loss-of-coolant accidents conforms to the criteria set forth in paragraph (b) of this section." The Westinghouse ECCS design requires that the operator align the ECCS to the RCS hot legs to prevent boron precipitation, assuring a coolable geometry as required by 10 CFR 50.46. Further, sufficient ECCS flow must be provided in the long term to keep calculated core temperatures at acceptably low values. Since it is possible that the operator may keep the RHR/LHSI isolated from the RCS while attempting to diagnose and resolve any difficulties in the alignment of the RHR/LHSI to the RCS hot legs, the potential for inadequate core cooling flow may exist.

IDENTIFICATION OF AFFECTED PLANTS

The attached Table 1 identifies plants which are known to have an RHR/LHSI valve arrangement susceptible to a single failure such that alignment to the RCS hot legs may not be possible. Plausible single failure scenarios are the loss of the diesel generator which provides power to the hot leg header isolation valve, or a mechanical failure of the valve. The diesel generator single failure will result in one train of ECCS available for the traditional Westinghouse ECCS design utilizing two ECCS trains operating from two electrical trains. For the mechanical single failure case, all ECCS trains would be operating. However, in the mechanical single failure case, both RHR/LHSI pumps would still be isolated from the RCS while the operator attempted to diagnose and resolve the failure which resulted in the unsuccessful attempt to align the RHR/LHSI to the RCS hot legs. The additional high pressure ECCS, available when the single failure is related directly to the valve, may make it easier to meet the minimum required ECCS flows, but the potential for inadequate core cooling should still be assumed to exist until the required verification has been completed.

Some Westinghouse designed plants cannot align RHR/LHSI to the RCS hot legs and may be using RHR/LHSI either directly for containment spray or to provide suction pressure to the containment spray pumps in which case the RHR/LHSI may be isolated from the RCS during hot leg recirculation. These plants are listed on Table-1 and are considered to be potentially affected by this issue, due to a single failure which may prevent alignment of the single active RHR/LHSI pump to the RCS cold legs during the recirculation periods.

Other Westinghouse designed plants not shown on Table 1 have an ECCS arrangement for which a single failure will not prevent RHR/LHSI flow from being provided to the RCS hot legs.

WESTINGHOUSE RECOMMENDATION

Utilities should review plant specific EOPs to determine if there is a possibility that the operator would leave the RHR/LHSI isolated. If so, the EOPs should be revised to include appropriate cautions or warnings to require alignment of the RHR/LHSI back to the RCS cold legs. Further, alignment of the high pressure ECCS to the RCS hot legs should proceed without delay during this period regardless of the RHR/LHSI alignment.

Some Westinghouse designed PWRs use the RHR/LHSI pumps as containment spray pumps during cold leg recirculation. If the plant uses RHR/LHSI for containment spray, the EOPs should be revised to ensure that the operator would align the RHR/LHSI to the RCS cold legs in the event that alignment to the RCS hot legs is unsuccessful. Additionally, alignment of the high pressure ECCS to the RCS hot legs should proceed without delay regardless of the RHR/LHSI alignment.

If it is not possible to implement the recommended EOP changes but the plant can meet the minimum ECCS flow, then Westinghouse recommends that design controls be placed on the high pressure ECCS to assure that ECCS flows are not degraded below the recommended minimum requirement as a result of future plant changes or potential pump degradation.

CONCLUSION

As part of the evaluation performed by Westinghouse on the issue identified in References (1) & (2) the potential exists that certain information provided by Westinghouse may have been used by utilities to develop EOPs which do not provide the operator with enough guidance should alignment of the RHR/LHSI pump(s) to the RCS hot legs be unsuccessful. In these instances, the operator may leave the RHR/LHSI isolated from the RCS for a period of time, and depending upon plant design, sufficient ECCS flow may not be provided to keep cladding temperature below the criteria of 10 CFR 50.46. This concern for a potential failure to comply with the regulations was deemed reportable to the NRC. All Westinghouse designed NSSSs are being provided with this information so that each affected licensee can take appropriate action(s) to assure operation within the regulations.

Very truly yours,

N. J. Liparulo

N. J. Liparulo, Manager
Nuclear Safety and Regulatory Activities

CMT/p

Attachments

TABLE 1

PLANTS AFFECTED BY
A SINGLE FAILURE PREVENTING
RHR/LHSI ALIGNMENT TO RCS HOT LEGS

D. C. COOK UNITS 1 & 2

CATAWBA UNITS 1 & 2

VOGTLE UNITS 1 & 2

TROJAN

WOLF CREEK

COMANCHE PEAK UNITS 1 & 2

WATTS BAR UNITS 1 & 2

BYRON UNITS 1 & 2

V. C. SUMMER

ZION STATIONS UNITS 1 & 2

McGUIRE UNITS 1 & 2

BEAVER VALLEY UNITS 1 & 2

MILLSTONE UNIT 3

SALEM UNITS 1 & 2

CALLAWAY

SEQUOYAH UNITS 1 & 2

J. M. FARLEY UNITS 1 & 2

BRAIDWOOD UNITS 1 & 2

SHEARON HARRIS

DIABLO CANYON UNITS 1 & 2

AFFECTED PLANTS WHICH
CANNOT ALIGN RHR/LHSI TO THE RCS HOT LEGS
AND USE RHR/LHSI FOR SPRAY

<u>AFFECTED PLANTS</u>

INDIAN POINT UNIT 2

INDIAN POINT UNIT 3

TURKEY POINT UNIT 3 & 4

H. B. ROBINSON UNIT 2

REFERENCES

1. Letter ET-NRC-92-3659, "Interim Report of Evaluation of a Deviation for Failure to Comply Pursuant to 10 CFR 21.21(a)(2)", January 27, 1992.

2. Letter ET-NRC-92-3712, "Interim Report of Evaluation of a Deviation for Failure to Comply Pursuant to 10 CFR 21.21(a)(2)", June 23, 1992.