SRXB
HICB
OGCB
EMCB

Westinghouse Electric Corporation
Energy Systems
Box 355
Pittsburgh Pennsylvania 15230-0355

P21 93211

March 15, 1993

TVA-93-059

Mr. P. G. Trudel, Manager
Department of Nuclear Engineering
Tennessee Valley Authority
Sequoyah Nuclear Power Plant, DSC-A
P. O. Box 2000
Soddy Daisy, TN 37379

Tennessee Valley Authority
Sequoyah Units 1 and 2
Cold Overpressure Mitigation System (COMS) Nonconservatism

Dear Mr. Trudel:

The subject Nuclear Safety Advisory Letter is forwarded for your information and use. This letter provides the Westinghouse conclusion regarding 10CFR21 reportability, plant applicability, safety significance and recommended actions.

Westinghouse has determined that this issue is not reportable pursuant to the requirements of 10CFR21.

If you have any questions concerning this Advisory Letter, please let me know.

Very truly yours,

J. N. Steinmetz, Project Manager
TVA, Sequoyah Project
Domestic Customer Projects

L33
Nuclear Experience Review
MAR 25 '93

| SCRG MTG | EVAL | DUE | XO | INFO | ACTION | Routed To | NOTED |
|---|---|---|---|---|---|---|---|
| | | | | | | MJF | |
| | | | | | | DEK | |
| | | | | | | FCM | |
| | | | | | | CRS | |
| | | | | | | CLT | |
| | | | | | | ORW | |
| | | | | | | SJG | |
| | | | | | | FILES | |

Comments:

Attachment

93-130

0017GL.WPF-10

05/03/1993 12:56 SQN SITE UP/LIC 615 843 8750 P.02

cc: M. A. Cooper - Sequoyah Site
R. Fortenberry - Sequoyah Site
W SSM Office - Sequoyah Site
D. M. Lafever - Sequoyah Site
R. Beecken - Sequoyah Site
W. C. Ludwig - Sequoyah Site
D. F. Goetcheus - Chattanooga Office 1101 Market Street

WCL
SCREEN
3/23/93

Westinghouse Energy Systems Business Unit

ESBU

# NUCLEAR SAFETY ADVISORY LETTER

THIS IS A NOTIFICATION OF A RECENTLY IDENTIFIED POTENTIAL SAFETY ISSUE PERTAINING TO BASIC COMPONENTS SUPPLIED BY WESTINGHOUSE. THIS INFORMATION IS BEING PROVIDED TO YOU SO THAT A REVIEW OF THIS ISSUE CAN BE CONDUCTED BY YOU TO DETERMINE IF ANY ACTION IS REQUIRED.

P.O. Box 355, Pittsburgh, PA 15230-0355

Subject: Cold Overpressure Mitigation System (COMS) Nonconservatism — Number: NSAL-93-005A

Basic Component: COMS Setpoint — Date: 03-10-93

Plants: See attached

| | | |
|---|---|---|
| Substantial Safety Hazard or Failure to Comply Pursuant to 10 CFR 21.21(a) | Yes ☐ | No ☒ |
| Transfer of Information Pursuant to 10 CFR 21.21(b) | Yes ☐ | |
| Advisory Information Pursuant to 10 CFR 21.21(c)(2) | Yes ☐ | |

References:

## SUMMARY

The purpose of this letter is to inform licensees that Westinghouse has identified a potential issue regarding a nonconservatism in the Cold Overpressure Mitigation System (COMS) setpoint development.

Additional information, if required, may be obtained from the originator. Telephone 412-374-4557.

Originator(s):

L. R. Hardwick
Strategic Licensing Issues

H. A. Sepp, Manager
Strategic Licensing Issues



05/03/1993 12:57 SON SITE UP/LIC 615 843 8750 P.04

## PLANT APPLICABILITY

NSAL-93-005A (Westinghouse COMS Setpoint Analysis)

D. C. Cook Units 1 & 2
Byron Units 1 & 2
V. C. Summer
Zion Units 1 & 2
R. E. Ginna
Vogtle Units 1 & 2
Yonggwang Units 1 & 2
Millstone 3
Diablo Canyon Units 1 & 2
Napot Point
Callaway
Comanche Peak Units 1 & 2
Manshaan Units 1 & 2
Sizewell B
Tihange 3
Turkey Point Units 3 & 4
Braidwood Units 1 & 2
South Texas Units 1 & 2
Almaraz Units 1 & 2
Beaver Valley Units 1 & 2
Korea Units 3 & 4
Doel 4
Vandellos 2
Trojan
Wolf Creek
Beznau Units 1 & 2
Sequoyah Units 1 & 2
Asco Units 1 & 2
Watts Bar Units 1 & 2
Jose Cabrera (Zorita)

NSAL-93-005B (Non-Westinghouse COMS Setpoint Analysis)

J. M. Farley Units 1 & 2
Shearon Harris 1
W. B McGuire Units 1 & 2
Indian Point Units 2 & 3
Prairie Island Units 1 & 2
Millstone 2
Surry Units 1 & 2
Point Beach Units 1 & 2
Yankee Rowe
Davis-Besse 1
Oconee 1, 2, & 3
Fort Calhoun 1
Palo Verde 1, 2, & 3
Crystal River 3
Three Mile Island 1
Angra D. Reis 1
Trino
Ringhals 2, 3, & 4
C. N. des Ardennes
Kori 1 & 2
Shikoku
Ohi 1 & 2
Pilgrim 1
Perry 1
Quad Cities 1 & 2
Fermi 2
Oyster Creek
Clinton 1
H. B. Robinson 2
Haddam Neck
Catawba Units 1 & 2
Seabrook 1
Salem Units 1 & 2
San Onofre 1
North Anna Units 1 & 2
Kewaunee
Arkansas Nuclear 1 & 2
Calvert Cliffs 1 & 2
Rancho Seco
Palisades
Waterford 3
St. Lucie 1 & 2
Maine Yankee
Doel 1 & 2
Krsko
Tihange 1
C. N. BR3
Kyushu
Mihama 1 & 2
Takahama 1
Brunswick 1 & 2
Dresden 2 & 3
LaSalle 1 & 2
Hatch 1 & 2
River Bend 1

PLANT APPLICABILITY CONTINUED

Arnold 1
Cooper
Millstone 1
Susquehanna 1 & 2
Peach Bottom 2 & 3
Grand Gulf 1
Vermont Yankee
Chinshan 1 & 2

FitzPatrick
Nine Mile Pt. 1 & 2
Montecello
Limerick 1 & 2
Hope Creek 1
Browns Ferry 1, 2, & 3
WNP-2
Kuosheng 1 & 2

## ISSUE DESCRIPTION

Westinghouse has identified a potential issue regarding a nonconservatism in the Cold Overpressure Mitigation System (COMS) setpoint development. The pressure difference from the wide-range pressure transmitter to the reactor vessel (where the Appendix G Limit is defined) had not been considered in the Westinghouse analyses. This pressure difference effectively results in the pressure in the reactor vessel being greater than that seen by the wide range pressure transmitters (used to actuate the PORVs when in the cold overpressure mode), and therefore, potentially resulting in violation of the Appendix G Limit. As a result, the following nonconservatisms were identified:

1) For the design basis mass injection transient under normal full flow circumstances, the pressure at the reactor vessel core midplane elevation (used for Appendix G pressure limit) is anticipated to be less than 100 psi above that measured at the wide-range pressure instrument.

2) The design basis heat input transient for COMS is defined as the plant is initially operating with all reactor coolant pumps (RCPs) off and is cooling down on the Residual Heat Removal System (RHRS). This creates a secondary-to-primary temperature difference. One RCP is then started, which results in reverse heat transfer from the steam generator into the RCS and causes a pressurization transient. If the RCP is started in the same loop that the wide-range pressure transmitter is used to control one of the PORVs, the transmitter will be seeing a lower pressure than the reactor vessel by approximately 25 psi.

## TECHNICAL EVALUATION

The plant safety criteria for maintenance of reactor vessel integrity is provided by the COMS analysis at relatively cold RCS temperatures. The reactor vessel integrity limits for which COMS provides protection are defined by the Appendix G curves generated for each plant. To compensate for the identified nonconservatism in the COMS analysis provided by Westinghouse, Westinghouse has calculated the $\Delta P$ associated with the elevation difference of the wide-range pressure transmitter and the mid-plane of the reactor vessel. The $\Delta P$ values have been calculated based upon a conservative set of assumptions for possible plant conditions. These assumptions include RCS temperature at 70°F, no pressurizer steam bubble and all reactor coolant pumps in operation with best estimate flow plus 2%. Further, it has been assumed that the pressure transmitter used for cold overpressure protection is zeroed out to at least the hot leg elevation if the actual elevation of the transmitter is above the hot leg. The applicable $\Delta P$ values for 2, 3 and 4 loop plants have been calculated as:

| | Applicable $\Delta P$ |
|---|---|
| 2 loop plants | 63 psi |
| 3 loop plants | 69 psi |
| 4 loop plants (12 ft. core) | 74 psi |
| Plants with 14 ft. cores | 87 psi |

This additional pressure drop is equivalent to the increase in pressure at the critical location for reactor vessel integrity of the core midplane as opposed to the location of the wide range pressure transmitter in the RCS hot leg which controls operation of the relief valves during a COMS event. This is the pressure increase which needs to be compensated for in the operation of COMS.

## SAFETY SIGNIFICANCE

Nonconservative COMS setpoints have the potential to result in violation of the Appendix G temperature/pressure limits should a cold overpressure event occur. Exceeding the Appendix G criteria requires additional evaluation in order to confirm continued structural integrity of the reactor vessel. Until such time as the appropriate compensation can be factored into the COMS response, reasonable assurance of safe plant operation is provided by the results of post-event stress analyses of reactor vessels that have been subjected to cold overpressure events with significant excursions above the Appendix G limits. Upon completion of these stress analyses, in no case has a problem been noted in regards to vessel integrity. Westinghouse has estimated the amount of pressure to have exceeded the Appendix G limit due to the COMS nonconservatism to be less than 100 psi. This issue is not a substanial safety hazard because the pressure increase, calculated for the four groups of plants, is bounded by the previous post-event stress analyses and as a result, the integrity of the vessel has not been impacted in regards to public health and safety.

## RECOMMENDATIONS

Several potential methods to compensate for this pressure increase are:

1) Reduce the maximum allowable relief valve setpoint (throughout the entire temperature range for which COMS is enabled) by an amount equivalent to the applicable $\Delta P$ defined above for your plant, or

2) Maintain RCS pressure below the Appendix G heatup/cooldown curves during a COMS event by an amount equivalent to the applicable $\Delta P$ when the reactor coolant pumps are in operation, or

3) Restrict the number of reactor coolant pumps which can be in operation below a defined temperature without drawing a steam bubble in the pressurizer. Dependent upon the number of reactor coolant pumps that are operable, this configuration may reduce or alleviate the issues associated with the additional $\Delta P$.

4) The heatup/cooldown curves in the technical specifications may include a pressure allowance for instrumentation uncertainty. This uncertainty is not a Westinghouse requirement for COMS overpressure criteria since it has been established that the conservatism inherent in calculation of the heatup/cooldown curves per Appendix G provides sufficient margin. If your plant's COMS setpoints were based on curves which included instrumentation uncertainty, this may be available to offset the applicable $\Delta P$.