SNUPPS
Standardized Nuclear Unit
Power Plant System

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SUBJ: Equipment Qualification Justifications for Interim Operation (JIO)

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

Docket Nos.: STN 50-482 and STN 50-483

Dear Mr. Denton:

Enclosed is additional Justification for Interim Operation (JIO) information related to equipment qualification programs. Its applicability to the SNUPPS plants, Callaway Plant Unit No. 1 and Wolf Creek Generating Station Unit No. 1, is explained in the following paragraphs.

On September 27, 1984, the NRC staff requested by telephone that the SNUPPS Utilities submit a JIO to address the issue of superheated steam following postulated high energy piping system breaks outside containment as it relates to environmental qualification of equipment. The issue of superheated steam releases, which is generic to many pressurized water reactors, has been under discussion between the NRC staff and Westinghouse Owner's Group (WOG) for some time. The attached JIO, which is applicable to both SNUPPS plants, is modelled after typical Justifications for Continued Operation (JCO) used by operating reactors.

At the Wolf Creek Generating Station, plans are being implemented to replace Barton transmitters with either Tobar or Rosemount pressure and differential pressure transmitters. The Barton transmitters have been qualified under Westinghouse qualification programs ESE-1, ESE-3 and ESE-4 which are discussed in the SNUPPS NUREG-0588 Submittal. Westinghouse has provided qualification documents for Tobar transmitters; however, these documents have not been reviewed by the Westinghouse User's Group and SNUPPS. The documented qualification parameters

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are appropriate for SNUPPS applications as replacements for ESE-1 and ESE-3 transmitters inside containment. The appropriate Westinghouse Equipment Qualification Data Packages (EQDPs) are enclosed. The EQDPs are considered to be JIOs in accordance with subparagraph (i)(2) of 10 CFR Part 50.49. A JIO for Rosemount transmitters is also enclosed. The JIO documents an acceptable interim qualification basis for the application of Rosemount Model 1153B and 1153D transmitters as replacements for ESE-4 transmitters and selected outside-containment ESE-1 transmitter applications where environmental conditions are appropriate. At the present time, no replacements of Barton transmitters with Tobar or Rosemount transmitters have occurred at Callaway Plant; however, such replacements may be performed at a later date at the option of Union Electric Company.

The Rosemount JIO contains information proprietary to Westinghouse Electric Corporation. The basis for the proprietary nature of this information is that it has been extracted from ongoing equipment qualification testing performed under the Westinghouse generic qualification program described in WCAP-8687 (Westinghouse Proprietary Class 2). The Westinghouse generic qualification program is under review by the NRC's Equipment Qualification Branch, and the proprietary nature of WCAP-8687 data has been previously recognized by the NRC staff. The enclosed proprietary information has been provided on an expedited basis to support the NRC staff review. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations.

Very truly yours,

Nicholas A. Petrick

MHF/nld12b27&28
Enclosures

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G. L. Koester — KGE
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SNUPPS

Justification Position for Environmental Qualification of Equipment for High Energy Line Breaks Outside Containment

Background

By letter dated June 13, 1984, Westinghouse Electric Corporation notified the SNUPPS Staff and Utilities of a potential safety issue concerning environmental qualification of equipment outside containment. Recent Westinghouse analyses had shown that steam generator tube bundle uncovery may occur during a High Energy Line Break (HELB) resulting in superheating of the steam exiting from the steam generator. This could result in an increase in the temperature of the steam and may impact the environmental qualification envelopes of safety-related equipment outside containment which may be required to function during a HELB.

Meetings were held with Westinghouse on July 24 and August 3, 1984 to assess the impact of this postulated safety issue on the SNUPPS plants. At these meetings, the Westinghouse modeling of the steam line break mass/energy release rate was discussed. Several questions were raised, and it was determined that the Westinghouse modeling did not include the effects of froth, entrainment and compressibility all of which should tend to decrease superheat. Although SNUPPS-specific mass/energy release data were not available, Westinghouse agreed to provide typical mass/energy release information for the purpose of performing scoping studies.

In Reference 1& 2, the Westinghouse Owners Group advised the NRC of actions being taken to evaluate the potential safety issue. These letters indicated that a program was being defined which would result in mass/energy information for different classes of plants for use in plant-specific evaluations. At present, SNUPPS-specific mass/energy release information has not been provided by Westinghouse using either the Westinghouse methodology or the consideration of the above-mentioned effects (compressibility, frothing, etc.) which should result in lower superheat temperatures.

Scope of Review

Because the superheat effect is caused by steam generator tube uncovery following a postulated HELB, high energy systems connected to the steam generators were reviewed to determine if a postulated HELB could lead to tube uncovery and superheated steam and affect safety-related equipment. Based on this review, it was determined that only a postulated Main Steam Line Break (MSLB) in the main steam tunnel could result in a potential safety concern. Therefore, an evaluation of this event was performed.

Evaluation

Section 3.6.2.1.1 of Reference 3 identifies the HELB locations for SNUPPS high energy piping systems. The main steam piping in the main steam tunnel is a "no break zone" as shown on Figure 3.6-1 of Reference 3. Nevertheless, a MSLB in this area was analyzed for environmental effects as discussed in Section 3B.4.2 of Reference 3. Figures 25 and 39 of Reference 4 show the calculated maximum pressure and temperature of 16.9 psia and 320°F for the analyzed MSLB based on saturated blowdown data provided to SNUPPS by Westinghouse.

The SNUPPS A/E, Bechtel Power Corporation, has performed a reanalysis of the MSLB effects in the steam tunnel using the methods described in Section 3B.4.2 of Reference 3 but using typical mass/energy release information, with superheat effects, provided by Westinghouse. The results of this reanalysis show that the temperature in the tunnel will peak at 435°F. Pressure peaks at approximately the same value as the Reference 4 analysis. The duration of the peak temperature condition was determined to be approximately 10 minutes based on the assumption that auxiliary feedwater flow to the faulted steam generator is terminated at 10 minutes. Westinghouse has stated that tube uncovery and subsequent superheated blowdown could occur as early as 1.5 minutes for a large MSLB.

As the analysis using superheat results in higher calculated steam tunnel temperature than previously used in SNUPPS environmental qualification programs, the safety-related equipment required to function following a postulated MSLB in the tunnel was evaluated to determine the effects on overall plant safety. Attachment 1 is a listing by type of safety-related equipment in the main steam tunnel at the SNUPPS plants. In the evaluation of plant safety, the availability of alternate equipment to perform necessary functions was considered. Based on this evaluation, the following were determined:

A. The main steam isolation valves and main feedwater isolation valves will close prior to the development of superheat conditions in the tunnel. This would isolate any MSLBs in the tunnel downstream of the main steam isolation valves. A failure modes and effects analysis (FMEA) has verified that the valves will not reopen provided the Steamline Isolation Signal and Feedline Isolation Signal is not reset.

B. The pressure transmitters supplied under specification W(ESE-1) are qualified to 420°F. Using surface temperature calculation techniques, as discussed in Reference 4, the surface temperature of the transmitters will not exceed 420°F during the 10 minute duration of the superheat conditions.

C. The qualification temperature of all electrical cables in the tunnel, with the exception of E-057A Anaconda control cable, is exceeded by the expected cable surface temperatures following the MSLB. However, it is judged that the cable will not experience any substantial degradation due to the short duration of the elevated temperature.

D. All valves supplied under specification J-601A, except the steam supply valves for the turbine-driven auxiliary feedwater pump (TDAFP), will close prior to experiencing superheat. An FMEA has concluded that the valves will not spuriously reopen if the isolation signals are not reset. This evaluation considered the terminal boxes in the valve power and control circuits listed under specification E-028. The steam supply valves for the TDAFP open on a low-low steam generator level in two of

four steam generators. This signal may not be developed prior to tube uncovery in the faulted steam generator. However, latest Westinghouse information has indicated that one motor driven auxiliary feedwater pump (MDAFP) supplying one intact steam generator is adequate to recover from an MSLB. In this case, the TDAFP would not be required to operate during or following the postulated MSLB, since there will be, as a minimum, one MDAFP supplying two steam generators. In addition, these valves fail to the open position on loss of air supply or electrical power so steam supply to the TDAFP would most likely be available in any event.

E. The SNUPPS mechanical equipment environmental qualification review has concluded that the safety-related mechanical equipment in the tunnel (specifications M-140, M-224A, M-224B, M-231C) are qualified for the temperatures resulting from MSLB superheat effects.

F. The effects of superheat temperatures for the assumed duration of the event would not result in loss of function of structural components of the steam tunnel (reinforced concrete and steel).

G. The atmospheric relief valves (specification J-601B) are controlled by a pneumatic controller mounted in the main steam tunnel. In the event of a MSLB which results in superheating in the tunnel, the controller is expected to fail in a mode which would keep the relief valves closed. Also, if the superheat caused the relief valve air diaphragm to fail, the valves would remain closed. In these cases, steam generator heat removal would be accomplished by the main steam safety valves (specification M-140). However, in the unlikely event that the relief valve controllers fail such that the valves open, then each of the three intact steam generators would blowdown via its atmospheric relief valve. Westinghouse has performed generic best-estimate analyses of MSLBs with multiple steam generator blowdown. These analyses indicate that a stabilized plant and safe cooldown can be achieved with only one motor driven auxiliary feedwater pump (MDAFP) providing flow to one intact steam generator. Based on the discussion of item D above, the SNUPPS plants (which have two MDAFPs and one TDAFP) would have at least one, accounting for single failure, and most likely two auxiliary feedwater pumps available following the postulated MSLB. Therefore, in the unlikely event that multiple steam generator blowdown were to occur, the SNUPPS plants can be stabilized and brought to a safe shutdown condition.

Conclusion

Based on the evaluation of the effects of a postulated MSLB in the main steam tunnel on required structures, systems and components, it has been concluded that sufficient basis exists to justify operation of the SNUPPS plants for the duration of planned activities which will result in a SNUPPS-specific analysis of the postulated MSLB superheat event. It is unlikely that the 435°F peak temperature in the steam tunnel will be exceeded in the SNUPPS-specific analysis. The evaluation presented above is sufficient for

the 40 year life of the SNUPPS plants if the peak temperature in the steam tunnel is less than 435°F. In the unlikely event that the calculated temperature in the steam tunnel exceeds 435°F as a result of the SNUPPS-specific analysis, a reevaluation of the effects will be performed.

References

1. Westinghouse Owner's Group letter (G. Goering, Northern States Power) to NRC (H. Denton), OG-128, dated July 26, 1984

2. Westinghouse Owner's Group Letter (G. Goering, Northern States Power) to NRC (H. Denton), OG-133, dated August 20, 1984.

3. SNUPPS Standard Final Safety Analysis Report

4. SNUPPS Report of Independent Review of Environmental Qualification Programs to NUREG-0588.

Attachment 1

Safety-Related Equipment in the Steam Tunnel

Specification	Description
M-628	Main Steam Isolation Valves
M-630	Main Feedwater Isolation Valves
J-601A	Control Valves
J-601B	Atmospheric Relief Valves
E-028	Local Control Stations/Terminal Boxes
E-057	600-V Control Cable
E-057A	600-V Control Cable
E-057B	600-V Control Cable
E-058	600-V Power Cable
E-062	600-V Instrumentation Cable
W-(ESE-1)	Pressure Transmitters (A) (Barton-OC)
M-140	Safety Valves
M-224A	Valves
M-224B	Valves
M-231C	Valves