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October 3, 2002

U. S. Nuclear Regulatory Commission
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ULNRC-04743

Ladies and Gentlemen:

DOCKET NUMBER 50-483
UNION ELECTRIC COMPANY
CALLAWAY PLANT
REVISION TO SG WATER LEVEL LOW-LOW
LCO APPLICABILITY AND ALLOWABLE VALUES IN
TECHNICAL SPECIFICATIONS 3.3.1 AND 3.3.2

AmerenUE herewith transmits an application for amendment to Facility Operating License No. NPF-30 for the Callaway Plant.

The proposed amendment would revise the Allowable Values associated with the Steam Generator (SG) Water Level Low-Low trip functions in Technical Specification (TS) 3.3.1, "Reactor Trip System (RTS) Instrumentation," and in TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation." In addition, the "Applicable MODES or Other Specified Conditions" columns in TS Tables 3.3.1-1 and 3.3.2-1 for the Steam Generator Water Level Low-Low (Normal Containment Environment) channels would be revised to recognize those situations where these channels are bypassed per plant design.

In accordance with NRC Administrative Letter 98-10, administrative controls were implemented soon after the discovery of the issue involving the inadequate SG water level low-low setpoints.

The Callaway Plant Onsite Review Committee and the Nuclear Safety Review Board have reviewed this amendment application. Attachments 1 through 4 provide the Evaluation, Markup of Technical Specifications, Retyped Technical Specifications, and Proposed Technical Specification Bases Changes, respectively, in support of this amendment request. Attachment 4 is provided for information only. Final Bases changes will be implemented pursuant to TS 5.5.14, Technical Specifications Bases Control Program, at the time the amendment is implemented. Attachment 5 provides an informational copy of the Westinghouse correspondence that raised the setpoint issue.

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Attachment 6 is a schematic of the Callaway Model F steam generators. No other commitments are contained in this amendment application.

It has been determined that this amendment application does not involve a significant hazard consideration as determined per 10CFR50.92. Pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of this amendment. This amendment will be implemented within 60 days after NRC approval. In accordance with 10CFR50.91, a copy of this amendment application is being provided to the designated Missouri State official. If you have any questions on this amendment application, please contact us.

Very truly yours,

David Shafer

for John D. Blosser
Manager-Regulatory Affairs

GGY/jdg

Attachments

1 – Evaluation
2 – Markup of Technical Specifications
3 – Retyped Technical Specifications
4 – Proposed Technical Specification Bases Changes (for information only)
5 – Westinghouse Nuclear Safety Advisory Letter 02-03
6 – Steam Generator Schematic

STATE OF MISSOURI)
)   S S
CITY OF ST. LOUIS)

David Shafer, of lawful age, being first duly sworn upon oath says that he is Superintendent Licensing, Regulatory Affairs, for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By David Shafer

David Shafer
Superintendent Licensing
Regulatory Affairs

SUBSCRIBED and sworn to before me this 3rd day of October, 2002.

Melissa L. Orr

MELISSA L. ORR
Notary Public - Notary Seal
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My Commission Expires: June 23, 2003

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EVALUATION

EVALUATION

1.0 DESCRIPTION

The proposed amendment would revise the Allowable Values associated with the Steam Generator (SG) Water Level Low-Low trip functions in Technical Specification (TS) 3.3.1, "Reactor Trip System (RTS) Instrumentation," and in TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation." These changes to TS Tables 3.3.1-1 and 3.3.2-1 are required to respond to the issue raised in References 1 and 2 (see the reference listing in Section 7.0 herein). Reference 1 has also been included with this amendment application as Attachment 5. In addition, the "Applicable MODES or Other Specified Conditions" columns in TS Tables 3.3.1-1 and 3.3.2-1 for the Steam Generator Water Level Low-Low (Normal Containment Environment) channels would be revised to recognize those situations where these channels are bypassed per plant design.

2.0 PROPOSED CHANGE

The proposed amendment would increase the Allowable Values associated with the SG Water Level Low-Low trip functions in TS Tables 3.3.1-1 and 3.3.2-1 by 6.8% of narrow range instrument span (NRIS).

The Allowable Value for the following trip functions would be increased from $\geq$ 18.4% of NRIS to $\geq$ 25.2% of NRIS:

1. TS Table 3.3.1-1, RTS Function 14.a, Steam Generator Water Level Low-Low (Adverse Containment Environment);

2. TS Table 3.3.2-1, ESFAS Feedwater Isolation Function 5.e.(1), Steam Generator Water Level Low-Low (Adverse Containment Environment); and

3. TS Table 3.3.2-1, ESFAS Auxiliary Feedwater Function 6.d.(1), Steam Generator Water Level Low-Low (Adverse Containment Environment).

The Allowable Value for the following trip functions would be increased from $\geq$ 13.0% of NRIS to $\geq$ 19.8% of NRIS:

4. TS Table 3.3.1-1, RTS Function 14.b, Steam Generator Water Level Low-Low (Normal Containment Environment);

5. TS Table 3.3.2-1, ESFAS Feedwater Isolation Function 5.e.(2), Steam Generator Water Level Low-Low (Normal Containment Environment); and

6. TS Table 3.3.2-1, ESFAS Auxiliary Feedwater Function 6.d.(2), Steam Generator Water Level Low-Low (Normal Containment Environment).

In addition, the "Applicable MODES or Other Specified Conditions" columns in TS Tables 3.3.1-1 and 3.3.2-1 for RTS Function 14.b, Steam Generator Water Level Low-Low (Normal Containment Environment), ESFAS Feedwater Isolation Function 5.e.(2), Steam Generator Water Level Low-Low (Normal Containment Environment), and ESFAS Auxiliary Feedwater (AFW) Function 6.d.(2), Steam Generator Water Level Low-Low (Normal Containment Environment) would be revised to add the following footnote:

> "Except when the Containment Pressure - Environmental Allowance Modifier channels in the same protection sets are tripped."

This would be new footnote (p) in TS Table 3.3.1-1 and new footnote (r) in TS Table 3.3.2-1.

TS Bases and FSAR changes associated with the corresponding, nominal Trip Setpoint changes have already been implemented, and bistable setpoints have been reset in the field, under our 10CFR50.59 program. The nominal Trip Setpoints associated with the above trip functions in TS Bases Tables B 3.3.1-1 and B 3.3.2-1 have already been increased by 6.8% of NRIS under the provisions of TS 5.5.14, Technical Specifications Bases Control Program. The nominal Trip Setpoint for the Anticipated Transients Without Scram (ATWS) Mitigation System Actuation Circuitry, commonly referred to as AMSAC, has also been increased in the field and FSAR Section 7.7.1.11.1 has been revised.

Attachments 2 and 3 provide the TS markups and the retyped TS. Attachment 4 provides an information-only copy of the associated TS Bases changes. Upon NRC approval of this amendment application, the interim changes discussed in the Background sections of the TS 3.3.1 and TS 3.3.2 Bases will be deleted, as indicated in the Attachment 4 mark-ups, since that text will no longer apply after amendment approval. The nominal Trip Setpoint changes in Bases Tables B 3.3.1-1 and B 3.3.2-1 will be retained.

3.0 BACKGROUND

Mid-deck Plate Bias

Westinghouse-designed steam generators incorporate a mid-deck plate at the top of the primary separator assembly. When some of the steam flows through the separator downcomer instead of the separator orifice, this steam with some entrained moisture will eventually flow upwards through the flow area in the mid-deck plate. This steam flow through the mid-deck plate will in most cases result in a measurable pressure drop. Based on test data taken on the Wolf Creek Model F steam generators in the 1986-1987 time frame, and documented in WCAP-11276-FNP (Reference 3), Westinghouse indicates that this pressure drop at full load (100% of rated thermal power) would be 0.22 psi for Callaway. Westinghouse has recently informed its customers of the ramifications of this data on the associated setpoint calculations via Reference 1 (copied as Attachment 5 hereto).

The mid-deck plate is located between the upper and lower taps used for steam generator water level measurements. This pressure drop impacts the low level setpoints for steam generators when the lower narrow range level tap is above the lower deck plate. A schematic diagram of the Callaway Model F steam generators is included as Attachment 6. This error source has not been accounted for and adversely affects steam generator low level setpoint uncertainty calculations as an algebraic bias that must be accounted for in the high direction.

SG Water Level Low-Low (Normal Containment Environment) Applicability

During the Improved Technical Specification (ITS) conversion effort, AmerenUE originally proposed the inclusion of TS 3.3.1 Condition X and TS 3.3.2 Condition N. Entry into those proposed Conditions, for one or more inoperable normal environment SG level channels, would have required that 1) either the normal environment SG level channels would be tripped within 6 hours or 2) the same protection set Environmental Allowance Modifier (EAM) channels would be tripped within 6 hours. Those proposed ITS Conditions were based, in part, on the Current (at the time) Technical Specification (CTS) 3.3.1 Action 13 and CTS 3.3.2 Action 36, which both required the tripping of the associated protection set EAM channels whenever the normal environment level channels were inoperable. In the interests of expediting the issuance of the ITS conversion amendment, we agreed to reduce the number of issues to be addressed and treat all the inoperable SG level channels in the same fashion, whether they involved the adverse or normal environment bistables (see Reference 4 in Section 7.0). Therefore, it was agreed that Condition E of TS 3.3.1 and Condition D of TS 3.3.2 would cover both sets of level channels and provide only the option of tripping the inoperable level channels within 6 hours. This was categorized as a more restrictive change, documented as Description of Change (DOC) 1-46-M in Reference 4.

However, the TS 3.3.1 and 3.3.2 Bases retain the following discussion. When the EAM channels are tripped, the SG Water Level Low-Low (Normal Containment Environment) channels are in a functional state of bypass. In the event of a transient leading to low SG water levels while the EAM channels are tripped, the reactor would trip, normal feedwater would isolate, and the AFW system would start on the higher SG water level trip setpoint associated with the SG Water Level Low-Low (Adverse Containment Environment) channels. TS Bases pages B 3.3.1-22 (bottom), B 3.3.2-26 (middle), and B 3.3.2-29 (top) discuss this design feature. The plant design provides that one or more EAM channels can be tripped and plant operation can continue with the SG Water Level Low-Low (Adverse Containment Environment) channels enabled. In this situation, the SG Water Level Low-Low (Normal Containment Environment) channels have no safety function since the trip will occur at a higher level setpoint (the adverse environment trip setpoint is +5.4% of NRIS higher than the normal environment trip setpoint). When an RTS or ESFAS channel provides no safety function, it should have no OPERABILITY requirements. Therefore, footnotes are proposed for TS Tables 3.3.1-1 and 3.3.2-1 that would provide an exception to the LCO Applicability requirements for the SG Water Level Low-Low (Normal Containment Environment) channels whenever the Containment Pressure - EAM channels in the same protection sets are tripped.

4.0 TECHNICAL ANALYSIS

<u>Design Basis of SG Water Level Low-Low Trip Functions</u>

The SG Water Level Low-Low trip functions trip the reactor and provide protection against a loss of heat sink by assuring the isolation of normal feedwater and delivery of auxiliary feedwater to the steam generators. The AMSAC provides a diverse method of tripping the turbine and initiating AFW at a slightly lower SG water level, as discussed in FSAR Section 7.7.1.11. Given the location of the feedwater line check valves inside containment downstream of the point where AFW connects to the main feedwater piping, closure of the main feedwater isolation valves (MFIVs) is required to assure AFW flow is not diverted. A feedwater line break or a loss of main feedwater would result in a loss of SG water level. Two-out-of-four low level signals in any SG initiates a reactor trip, feedwater isolation, and AFW actuation (motor-driven AFW pumps). Two-out-of-four low level signals in two or more SGs initiates the turbine-driven AFW pump. As discussed in Reference 5, the SG Water Level Low-Low trip functions were previously modified to allow a lower trip setpoint under normal containment environmental conditions and a delayed trip when THERMAL POWER is less than or equal to 22.41% rated thermal power (RTP), as shown on Figure 1 of WCAP-11883 (submitted in Reference 5) and FSAR Figure 7.2-1 sheet 7A.

The EAM and Trip Time Delay (TTD) circuitry reduces the potential for inadvertent trips via the EAM, enabled on containment pressure exceeding its setpoint, and the TTD, enabling time delays dependent on vessel ΔT. Because the SG water level transmitters (d/p cells) are located inside containment, they may experience adverse environmental conditions due to a feedwater line break. The EAM function is used to monitor the presence of adverse containment conditions (elevated pressure) and enables the Steam Generator Water Level Low-Low (Adverse Containment Environment) trip setpoint to reflect the increased transmitter uncertainties due to this harsh environment. When the EAM channels are not tripped, the design provides for a lower Steam Generator Water Level Low-Low (Normal Containment Environment) trip setpoint when adverse containment environment conditions are not present, thus allowing more margin to trip for normal operating conditions. The TTD delays reactor trip, feedwater isolation, and AFW actuation on SG Water Level Low-Low, thereby providing additional operating margin during early power ascension by allowing the operator time to recover level when the primary side load is sufficiently small to not require an earlier isolation. The TTD continuously monitors primary side power using vessel ΔT. Two time delays are provided, based on the primary side power levels; the magnitude of the trip delay decreases with increasing power. If the EAM or TTD trip functions have inoperable channels, the plant design provides for placing the inoperable channels in the tripped condition and continuing plant operation. Placing the inoperable EAM or TTD channels in the tripped condition enables the Steam Generator Water Level Low-Low (Adverse Containment Environment) Function, for the EAM, or removes the trip delay for the TTD.

Setpoint Considerations

For Callaway, the 0.22 psi pressure drop equates to 6.8% of NRIS as follows. The calibrated span for the SG level transmitters is 89.6 inches of water column (inwc). Converting the 0.22 psi pressure drop to inwc (1 inwc = 0.03609 psi), the resulting 6.094 inwc pressure drop is equal to 6.8% of NRIS. Therefore, resolution of this issue requires either reanalysis using a 6.8% of NRIS decrease in the safety analysis limit (SAL), or a 6.8% of NRIS increase in the nominal Trip Setpoints, for the three FSAR Chapter 15 events that credit the SG Water Level Low-Low trip functions. The nominal Trip Setpoint for the SG Water Level Low-Low (Normal Containment Environment) channels in Bases Tables B 3.3.1-1 and B 3.3.2-1 include an algebraic bias term of 9.17% of NRIS for environmental allowance (EA) terms. Since the Loss of Normal Feedwater (LONF) transient and the Loss of Offsite Power (LOOP) transient are not characterized by the generation of an adverse environment inside containment, there was sufficient margin between the 0% of NRIS SAL for these events and the previous Steam Generator Water Level Low-Low (Normal Containment Environment) nominal Trip Setpoint to accommodate the new mid-deck plate bias since these two events don't exhibit any EA terms. However, the Channel Statistical Allowance (CSA) for a Feedwater Line Break (FLB) accident inside containment must include the EA terms for transmitter error, reference leg heatup, and instrument cable errors. Since the FLB inside containment, also analyzed with a SAL of 0% of NRIS, would be characterized by a large EA algebraic bias term in the CSA, there was insufficient margin to accommodate the new mid-deck plate pressure drop bias. Since this issue could not be accommodated by a reduction of the SAL (already assumed to be 0% of NRIS), the nominal Trip Setpoints were increased. The proposed amendment reflects the corresponding increases to the Allowable Values in the Technical Specifications.

The magnitude of this mid-deck plate pressure drop bias is dependent on power level, increasing as power increases due to the higher volumetric flow rate through the separators despite a reduction in the fluid mean density. Based on the test data taken across the mid-deck plate for the Wolf Creek Model F steam generators, this bias is eliminated for Callaway below 27% RTP. This value was derived by converting the available setpoint margin (in this case, available setpoint margin = nominal Trip Setpoint - CSA =1.57% of NRIS) to psi using the span range and conversion factor cited above (i.e., 1.57% of NRIS = 0.05 psi) and linearly interpolating between Wolf Creek pressure drop data points for 23.38% RTP and 36.07% RTP. Callaway has addressed this issue by raising the nominal Trip Setpoints associated with all SG level bistables that trip on a low level indication. TS LCO 3.0.3 was entered on February 28, 2002 and power level was reduced to 27% RTP where the bias effect was no longer present. The SG low level bistables were reset, raised by an amount that accounts for the 100% RTP effect of this bias (6.8% of NRIS). The nominal Trip Setpoints in TS Bases Tables B 3.3.1-1 and B 3.3.2-1 were increased by 6.8% of NRIS in conjunction with changing the trip setpoints in the field. However, the Allowable Values in TS Tables 3.3.1-1 and 3.3.2-1 must also be increased to provide valid acceptance criteria for determining channel OPERABILITY, based on the setpoint methodology criteria for rack drift, bistable accuracy, and rack calibration accuracy. This amendment application is being submitted pursuant to the guidance presented in NRC Administrative Letter 98-10 for inadequate Technical Specifications. In conjunction with changing the nominal Trip Setpoints in the field, an increase of 6.8% of NRIS was added to the Allowable Values for determining channel OPERABILITY.

Safety Significance

The function of the reactor protection and ESFAS circuits, as well as AMSAC, associated with low steam generator water level is to preserve the steam generator heat sink for removal of long term residual heat. A reactor trip on Overtemperature ΔT or high pressurizer pressure would also trip the unit after a FLB inside containment before there would be any damage to the core or the reactor coolant system. Residual heat would cause thermal expansion after trip and subsequent discharge of the reactor coolant to the pressurizer relief tank through the pressurizer safety valves. This could result in a substantial loss of water from the reactor coolant system. However, the consequences of this event would be bounded by a small break LOCA. Auxiliary feedwater would be initiated by the LOCA sequencer portion of the load shedder and emergency load sequencer (LSELS) after a safety injection signal (SIS) is generated by containment pressure High-1 following a FLB inside containment.

Probabilistic Risk Assessment (PRA) Evaluation

There is no impact on the Callaway PRA since that study is concerned mainly with time-averaged equipment functionality, not the specific values assigned to any trip setpoints or to LCO Applicability exceptions that merely represent the as-installed plant design. The PRA assumes the trip setpoints are properly set to provide the required protective actions. Increasing the trip setpoints to provide earlier reactor trips, AFW actuations, feedwater isolation, and AMSAC actuations are conservative actions, but are not modeled in the PRA as such. The functional capabilities of the instrumentation will continue to be demonstrated by the surveillance requirements listed in TS Tables 3.3.1-1 and 3.3.2-1 for the affected trip functions.

This issue does not impact the plant's Emergency Operating Procedures (EOPs) since procedure E-0 is entered following a reactor trip or safety injection signal and the mid-deck plate pressure drop bias is eliminated below 27% RTP.

Summary/Conclusion

The analyses presented above assess the potential impact of these changes on the safety analyses that explicitly credit these trip functions. These assessments demonstrate that the changes will not adversely affect the design basis, safety analyses, or the safe operation of the plant.

5.0 REGULATORY SAFETY ANALYSIS

This section addresses the standards of 10CFR50.92 as well as the applicable regulatory requirements and acceptance criteria.

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC)

The proposed amendment would revise the Allowable Values associated with the Steam Generator (SG) Water Level Low-Low trip functions in Technical Specification (TS) 3.3.1, "Reactor Trip System (RTS) Instrumentation," and in TS 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation." In addition, the "Applicable MODES or Other Specified Conditions" columns in TS Tables 3.3.1-1 and 3.3.2-1 for the Steam Generator Water Level Low-Low (Normal Containment Environment) channels would be revised to recognize those situations where these channels are bypassed per plant design. The proposed changes do not involve a significant hazards consideration for Callaway Plant based on the three standards set forth in 10CFR50.92(c) as discussed below:

(1) Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

Overall protection system performance will remain within the bounds of the previously performed accident analyses since there are no hardware changes. The design of the SG water level sensing equipment and the coincidence logic in the Solid State Protection System will be unaffected. The only physical change to the RTS and ESFAS instrumentation is the increased actuation setpoints in the NAL bistable comparator cards in the 7300 Process Protection System. These changes have already been implemented in the field and are in the conservative direction, i.e., a trip actuation signal will be generated sooner for an event that challenges the ability of the steam generators to provide a heat sink. In all other regards, the design of the RTS and ESFAS instrumentation will be unaffected. These protection systems will continue to function in a manner consistent with the plant design basis. All design, material, and construction standards that were applicable prior to this amendment request are maintained.

The probability and consequences of accidents previously evaluated in the FSAR are not adversely affected because the changes to the RTS and ESFAS trip setpoints assure the conservative response of the affected trip functions, consistent with the safety analysis and licensing basis.

The proposed changes will not affect the probability of any event initiators. There will be no degradation in the performance of, or an increase in the number of challenges imposed on, safety-related equipment assumed to function during an accident situation. There will be no change to normal plant operating parameters or accident mitigation performance.

The proposed changes will not alter any assumptions or change any mitigation actions in the radiological consequence evaluations in the FSAR.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

(2) Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

There are no hardware changes, other than increased bistable setpoints in the adjustable bistable comparator cards that have already been implemented, nor are there any changes in the method by which any safety-related plant system performs its safety function. This amendment will not affect the normal method of plant operation or change any operating parameters. The LCO Applicability exception for the SG Water Level Low-Low (Normal Containment Environment) channels recognizes the functional design of the system that enables the SG Water Level Low-Low (Adverse Containment Environment) channels with a higher water level trip setpoint whenever the Containment Pressure - Environmental Allowance Modifier channels in the same protection sets are tripped. No performance requirements or response time limits will be affected.

No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures are introduced as a result of this amendment. There will be no adverse effect or challenges imposed on any safety-related system as a result of this amendment.

This amendment does not alter the performance of the 7300 Process Protection System, Nuclear Instrumentation System, or Solid State Protection System used in the plant protection systems.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

(3) Do the proposed changes involve a significant reduction in a margin of safety?

Response: No

The proposed changes do not eliminate any RTS surveillances or alter the frequency of surveillances required by the Technical Specifications. The nominal Trip Setpoints specified in the Technical Specification Bases have already been increased in the conservative direction. The safety analysis limits assumed in the transient and accident analyses are unchanged. None of the acceptance criteria for any accident analysis are changed.

There will be no effect on the manner in which safety limits or limiting safety system settings are determined nor will there be any effect on those plant systems necessary to assure the accomplishment of protection functions. There will be no impact on the overpower limit, departure from nucleate boiling ratio (DNBR) limits, heat flux hot channel factor (F_Q), nuclear enthalpy rise hot channel factor ($F_{\Delta H}$), loss of coolant accident peak cladding temperature (LOCA PCT), peak local power density, or any other margin of safety. The radiological dose consequence acceptance criteria listed in the Standard Review Plan will continue to be met.

Therefore, the proposed changes do not involve a significant reduction in a margin of safety.

Conclusion:

Based on the above, AmerenUE concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 APPLICABLE REGULATORY REQUIREMENTS/CRITERIA

The regulatory bases and guidance documents associated with the systems discussed in this amendment application include:

GDC-13 requires that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems.

GDC-20 requires that the protection system(s) shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

GDC-21 requires that the protection system(s) shall be designed for high functional reliability and testability.

GDC-22 through GDC-25 and GDC-29 require various design attributes for the protection system(s), including independence, safe failure modes, separation from control systems, requirements for reactivity control malfunctions, and protection against anticipated operational occurrences.

10CFR50.55a(h) requires that the protection systems meet IEEE 279-1971. Section 4.1 of IEEE 279-1971 discusses the general functional requirement for protection systems that they automatically initiate appropriate protective action whenever a condition monitored by the system reaches a preset level, i.e., the nominal Trip Setpoint.

NRC Regulatory Guide (RG) 1.105 discusses accepted practices for the treatment of instrument setpoints. We describe the extent of our compliance with RG 1.105 in FSAR Appendix 3A. In addition, the references cited in the Background Bases for LCOs 3.3.1 and 3.3.2 discuss setpoint methodology, with Reference 6 in Section 7.0 of this Evaluation providing the most recent summary discussion of our setpoint methodology.

There have been no changes to the RTS or ESFAS instrumentation design such that compliance with any of the regulatory requirements and commitments above would come into question. The proposed amendment would revise the Allowable Values, and would provide LCO Applicability exception footnotes, used to determine the OPERABILITY of RTS and ESFAS trip functions associated with SG Water Level Low-Low, and is consistent with the above requirements and commitments. The evaluations performed by AmerenUE confirm that Callaway Plant will continue to comply with all applicable regulatory requirements.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

AmerenUE has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10CFR20, or would change an inspection or surveillance requirement. However, AmerenUE has evaluated the proposed amendment and has determined that the amendment does not involve

(i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10CFR51.22 (c)(9). Therefore, pursuant to 10CFR51.22 (b), an environmental assessment of the proposed amendment is not required.

7.0 REFERENCES

1. Westinghouse Nuclear Safety Advisory Letter (NSAL) 02-03, "Steam Generator Mid-Deck Plate Pressure Loss Issue," February 15, 2002 (copy provided as Attachment 5).

2. NRC Information Notice 2002-10 dated March 7, 2002, and its Supplement 1 dated June 28, 2002.

3. WCAP-11276-FNP, "Final Report Model F Steam Generator Field Instrumentation Program," March 1987.

4. ULNRC-03979 dated 3/9/99 (supplemental response to NRC RAI Q 3.3-04).

5. Callaway License Amendment 43 dated April 14, 1989 and associated licensee submittals (ULNRC-1822 dated August 30, 1988, ULNRC-1884 dated December 28, 1988, and ULNRC-1913 dated February 15, 1989).

6. ULNRC-03748 dated February 27, 1998 in support of Callaway License Amendment 125 dated April 13, 1998.

ATTACHMENT TWO

MARKUP OF TECHNICAL SPECIFICATIONS

Table 3 3.1-1 (page 3 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
9. Pressurizer Water Level - High	1[g]	3	M	SR 3.3.1.1 SR 3.3.1.7 SR 3 3.1.10	≤ 93.8% of instrument span
10. Reactor Coolant Flow - Low	1[g]	3 per loop	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 88 8%[m]
11. Not Used					
12. Undervoltage RCPs	1[g]	2/bus	M	SR 3.3.1.9 SR 3.3.1.10 SR 3.3.1.16	≥ 10105 Vac
13. Underfrequency RCPs	1[g]	2/bus	M	SR 3 3.1.9 SR 3.3.1.10 SR 3 3.1.16	≥ 57.1 Hz
14. Steam Generator (SG) Water Level Low-Low[l]					
a Steam Generator Water Level Low-Low (Adverse Containment Environment)	1, 2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ ~~18.4%~~ 25.2% of Narrow Range Instrument Span
b. Steam Generator Water Level Low-Low (Normal Containment Environment)	~~1, 2~~ 1(p), 2(p)	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3 3.1.16	≥ ~~13.0%~~ 19.8% of Narrow Range Instrument Span

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(g) Above the P-7 (Low Power Reactor Trips Block) interlock.
(l) The applicable MODES for these channels in Table 3.3.2-1 are more restrictive.
(m) % of loop minimum measured flow (MMF = 95,660 gpm).
(p) INSERT 3.3-19

INSERT 3.3-19

Except when the Containment Pressure - Environmental Allowance Modifier channels in the same protection sets are tripped.

Table 3.3 2-1 (page 4 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
5. Turbine Trip and Feedwater Isolation					
a. Automatic Actuation Logic and Actuation Relays (SSPS)	1,2[j], 3[j]	2 trains	G	SR 3.3.2.2 SR 3.3 2.4 SR 3.3.2.6 SR 3.3 2.14	NA
b. Automatic Actuation Logic and Actuation Relays (MSFIS)	1, 2[j], 3[j]	2 trains[o]	G	SR 3.3 2.2	NA
c SG Water Level - High High (P-14)	1,2[j]	4 per SG	I	SR 3.3.2.1 SR 3.3.2.5 SR 3 3 2.9 SR 3.3.2.10	≤ 79.8% of Narrow Range Instrument Span
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
e. Steam Generator Water Level Low-Low[q]					
(1) Steam Generator Water Level Low-Low (Adverse Containment Environment)	1, 2[j], 3[j]	4 per SG	D	SR 3 3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	25.2% ≥ ~~10.4%~~ of Narrow Range Instrument Span

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(j) Except when all MFIVs are closed.
(o) Each train requires a minimum of two programmable logic controllers to be OPERABLE.
(q) Feedwater isolation only.

Table 3 3.2-1 (page 5 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[(a)]
5. Turbine Trip and Feedwater Isolation					
e. Steam Generator Water Level Low-Low[(q)] (continued)					
(2) Steam Generator Water Level Low-Low (Normal Containment Environment)	~~1, 2[(j)], 3[(j)]~~ 1[(r)], 2[(j,r)], 3[(j,r)]	4 per SG	D	SR 3.3.2.1 SR 3.3 2.5 SR 3.3.2.9 SR 3.3.2.10	≥ ~~13.0%~~ 19.8% of Narrow Range Instrument Span
(3) Vessel ΔT Equivalent including delay timers - Trip Time Delay					
(a) Vessel ΔT (Power-1)	1, 2[(j)]	4	M	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ Vessel ΔT Equivalent to 13.9% RTP[(k)]
(b) Vessel ΔT (Power-2)	1, 2[(j)]	4	M	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ Vessel ΔT Equivalent to 23.9% RTP[(l)]
(4) Containment Pressure - Environmental Allowance Modifier	1, 2[(j)], 3[(j)]	4	N	SR 3 3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 2.0 psig

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(j) Except when all MFIVs are closed.
(k) With a time delay ≤ 240 seconds.
(l) With a time delay ≤ 130 seconds.
(q) Feedwater isolation only.
(r) INSERT 3.3-41

INSERT 3.3-41

Except when the Containment Pressure - Environmental Allowance Modifier channels in the same protection sets are tripped.

Table 3 3 2-1 (page 6 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
6. Auxiliary Feedwater					
a Manual Initiation	1, 2, 3	1/pump	P	SR 3.3.2.8	NA
b. Automatic Actuation Logic and Actuation Relays (SSPS)	1,2,3	2 trains	G	SR 3 3.2.2 SR 3.3.2.4 SR 3.3.2.6	NA
c. Automatic Actuation Logic and Actuation Relays (BOP ESFAS)	1,2,3	2 trains	Q	SR 3.3.2.3	NA
d. SG Water Level Low-Low					
(1) Steam Generator Water Level Low-Low (Adverse Containment Environment)	1, 2, 3	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2 9 SR 3.3.2.10	≥ ~~10.4%~~ 25.2% of Narrow Range Instrument Span
(2) Steam Generator Water Level Low-Low (Normal Containment Environment)	~~1, 2, 3~~ 1[r], 2[r], 3[r]	4 per SG	D	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≥ ~~13.0%~~ 19.8% of Narrow Range Instrument Span

(continued)

(a) The Allowable Value defines the limiting safety system setting See the Bases for the Trip Setpoints.

(r) INSERT 3.3-42

INSERT 3.3-42

Except when the Containment Pressure - Environmental Allowance Modifier channels in the same protection sets are tripped.

ATTACHMENT THREE

RETYPED TECHNICAL SPECIFICATIONS

Table 3 3.1-1 (page 3 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE(a)
9. Pressurizer Water Level - High	1(g)	3	M	SR 3 3.1.1 SR 3.3.1.7 SR 3 3.1.10	≤ 93 8% of instrument span
10. Reactor Coolant Flow - Low	1(g)	3 per loop	M	SR 3 3.1.1 SR 3 3.1.7 SR 3 3.1.10 SR 3 3.1.16	≥ 88 8%(m)
11. Not Used					
12. Undervoltage RCPs	1(g)	2/bus	M	SR 3 3 1 9 SR 3 3 1.10 SR 3 3 1.16	≥ 10105 Vac
13. Underfrequency RCPs	1	2/bus	M	SR 3.3.1.9 SR 3 3 1.10 SR 3 3.1.16	≥ 57.1 Hz
14. Steam Generator (SG) Water Level Low-Low(l)					
a. Steam Generator Water Level Low-Low (Adverse Containment Environment)	1, 2	4 per SG	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 25 2% of Narrow Range Instrument Span
b. Steam Generator Water Level Low-Low (Normal Containment Environment)	1(p), 2(p)	4 per SG	E	SR 3 3.1.1 SR 3.3.1.7 SR 3 3.1.10 SR 3 3 1.16	≥ 19.8% of Narrow Range Instrument Span

(continued)

(a) The Allowable Value defines the limiting safety system setting See the Bases for the Trip Setpoints.
(g) Above the P-7 (Low Power Reactor Trips Block) interlock.
(l) The applicable MODES for these channels in Table 3 3 2-1 are more restrictive.
(m) % of loop minimum measured flow (MMF = 95,660 gpm).
(p) Except when the Containment Pressure – Environmental Allowance Modifier channels in the same protection sets are tripped.

Table 3 3 2-1 (page 4 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
5. Turbine Trip and Feedwater Isolation					
a. Automatic Actuation Logic and Actuation Relays (SSPS)	1,2[j], 3[j]	2 trains	G	SR 3.3.2 2 SR 3.3.2.4 SR 3 3 2.6 SR 3 3 2.14	NA
b. Automatic Actuation Logic and Actuation Relays (MSFIS)	1, 2[j], 3[j]	2 trains[o]	G	SR 3 3.2.2	NA
c. SG Water Level - High High (P-14)	1,2[j]	4 per SG	I	SR 3.3.2.1 SR 3.3.2.5 SR 3.3.2.9 SR 3.3.2.10	≤ 79.8% of Narrow Range Instrument Span
d. Safety Injection	Refer to Function 1 (Safety Injection) for all initiation functions and requirements.				
e. Steam Generator Water Level Low-Low[q]					
(1) Steam Generator Water Level Low-Low (Adverse Containment Environment)	1, 2[j], 3[j]	4 per SG	D	SR 3 3.2.1 SR 3.3 2.5 SR 3 3 2 9 SR 3 3 2.10	≥ 25.2% of Narrow Range Instrument Span

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(j) Except when all MFIVs are closed.
(o) Each train requires a minimum of two programmable logic controllers to be OPERABLE.
(q) Feedwater isolation only

Table 3 3 2-1 (page 5 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
5. Turbine Trip and Feedwater Isolation					
e. Steam Generator Water Level Low-Low[q] (continued)					
(2) Steam Generator Water Level Low-Low (Normal Containment Environment)	1[r], 2[j,r], 3[j,r]	4 per SG	D	SR 3.3.2.1 SR 3 3.2.5 SR 3.3 2.9 SR 3.3.2 10	≥ 19.8% of Narrow Range Instrument Span
(3) Vessel ΔT Equivalent including delay timers - Trip Time Delay					
(a) Vessel ΔT (Power-1)	1, 2[j]	4	M	SR 3 3.2.1 SR 3.3.2.5 SR 3 3 2.9 SR 3 3 2.10	≤ Vessel ΔT Equivalent to 13.9% RTP[k]
(b) Vessel ΔT (Power-2)	1, 2[j]	4	M	SR 3.3 2.1 SR 3 3 2 5 SR 3 3 2.9 SR 3.3 2.10	≤ Vessel ΔT Equivalent to 23.9% RTP[l]
(4) Containment Pressure - Environmental Allowance Modifier	1, 2[j], 3[j]	4	N	SR 3 3 2.1 SR 3 3.2.5 SR 3 3.2.9 SR 3.3.2.10	≤ 2 0 psig

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(j) Except when all MFIVs are closed.
(k) With a time delay ≤ 240 seconds.
(l) With a time delay ≤ 130 seconds.
(q) Feedwater isolation only.
(r) Except when the Containment Pressure – Environmental Allowance Modifier channels in the same protection sets are tripped.

Table 3.3 2-1 (page 6 of 8)
Engineered Safety Feature Actuation System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE[a]
6 Auxiliary Feedwater					
a. Manual Initiation	1, 2, 3	1/pump	P	SR 3 3 2 8	NA
b. Automatic Actuation Logic and Actuation Relays (SSPS)	1,2,3	2 trains	G	SR 3 3.2.2 SR 3.3.2.4 SR 3 3.2.6	NA
c. Automatic Actuation Logic and Actuation Relays (BOP ESFAS)	1,2,3	2 trains	Q	SR 3.3.2.3	NA
d SG Water Level Low-Low					
(1) Steam Generator Water Level Low-Low (Adverse Containment Environment)	1, 2, 3	4 per SG	D	SR 3.3.2.1 SR 3 3 2.5 SR 3.3 2.9 SR 3.3.2.10	≥ 25.2% of Narrow Range Instrument Span
(2) Steam Generator Water Level Low-Low (Normal Containment Environment)	1[r], 2[r], 3[r]	4 per SG	D	SR 3 3 2.1 SR 3 3.2.5 SR 3 3.2.9 SR 3.3.2.10	≥ 19 8% of Narrow Range Instrument Span

(continued)

(a) The Allowable Value defines the limiting safety system setting. See the Bases for the Trip Setpoints.
(r) Except when the Containment Pressure – Environmental Allowance Modifier channels in the same protection sets are tripped.

ATTACHMENT FOUR

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES
(for information only)

BASES

BACKGROUND (continued)

Trip Setpoints and Allowable Values

The Trip Setpoints are the nominal values at which the bistables are set. Any bistable is considered to be properly adjusted when the "as left" value is within the two-sided tolerance band for calibration accuracy (typically ± 15 mV).

The Trip Setpoints listed in Table B 3.3.1-1 and used in the bistables are based on the analytical limits stated in Reference 2. The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those RTS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 4), the Allowable Values specified in Table 3.3.1-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodology used to calculate the Trip Setpoints, including their explicit uncertainties, is provided in Reference 6. The actual nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

Setpoints in accordance with the Allowable Value ensure that design limits are not violated during AOOs (and that the consequences of DBAs will be acceptable, providing the unit is operated from within the LCOs at the onset of the AOO or DBA and the equipment functions as designed). Note that in the accompanying LCO 3.3.1, the Allowable Values of Table 3.3.1-1 are the LSSS.

6

~~Until such time as the issues raised by OL#1230 are reviewed and approved by the NRC, the typical relationship discussed above (consistent with the setpoint methodology discussed in Reference 6) between the nominal Trip Setpoint in Table B 3.3.1-1 and the Allowable Value in Table 3.3.1-1 for Functions 14.a and 14.b, SG Water Level Low-Low (Adverse Containment Environment, Normal Containment Environment), will not be met. The nominal Trip Setpoint in Table B 3.3.1-1 has been increased by 6.8% of narrow range instrument span to address the SG mid-deck plate algebraic bias raised by Westinghouse NSAL-02-03. The affected bistables have been readjusted to the nominal Trip Setpoints listed in Table B 3.3.1-1 and have been "as left" within the two-sided band for calibration accuracy discussed above. Under a corresponding administrative change, an increase of 6.8% of narrow range instrument span has been added to the Allowable Values (see~~

(continued)

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

6 Table 3.3.1-1) in the associated procedures for determining channel OPERABILITY. This administrative control will remain in place until OL#1230 is approved and implemented.

Each channel of the process control equipment can be tested on line to verify that the signal or setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SRs section.

The Allowable Values listed in Table 3.3.1-1 are based on the methodology described in Reference 6, and reviewed in support of Amendments 15, 43, 57, 84, 102, and 125, which incorporates all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide reactor trip and/or ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements. The system has been designed to trip in the event of a loss of power, directing the unit to a safe shutdown condition.

The SSPS performs the decision logic for actuating a reactor trip or ESF actuation, generates the electrical output signal that will initiate the required trip or actuation, and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various unit upset and accident transients. If a required logic matrix combination is completed, the system will initiate a

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

14. Steam Generator Water Level – Low Low (continued)

level in any SG is indicative of a loss of heat sink for the reactor. The level transmitters also provide input to the SG Level Control System. Therefore, the actuation logic must be able to withstand an input failure to the control system, which may then require the protection function actuation, and a single failure in the other channels providing the protection function actuation. This Function also performs the ESFAS function of starting the AFW pumps on low low SG level. As discussed in Reference 7, the SG Water Level - Low Low trip function has been modified to allow a lower Trip Setpoint under normal containment environmental conditions and a delayed trip when THERMAL POWER is less than or equal to 22.41% RTP. The EAM/TTD circuitry reduces the potential for inadvertent trips via the Environmental Allowance Modifier (EAM), enabled on containment pressure exceeding its setpoint, and the Trip Time Delay (TTD), enabling time delays dependent on vessel ΔT as listed in Table B 3.3.1-1. Because the SG Water Level transmitters (d/p cells) are located inside containment, they may experience adverse environmental conditions due to a feedline break. The EAM function is used to monitor the presence of adverse containment conditions (elevated pressure) and enables the Steam Generator Water Level - Low-Low (Adverse) trip setpoint to reflect the increased transmitter uncertainties due to this harsh environment. The EAM enables a lower Steam Generator Water Level - Low-Low (Normal) trip setpoint when these conditions are not present, thus allowing more margin to trip for normal operating conditions. The TTD delays reactor trip on SG Water Level Low-Low, thereby providing additional operational margin during early power ascension by allowing the operator time to recover level when the primary side load is sufficiently small to not require an earlier trip. The TTD continuously monitors primary side power using Vessel ΔT. Scaling of the Vessel ΔT channels is dependent on the loop-specific values for ΔT_0, discussed under the OTΔT and OPΔT trips. Two time delays are provided, based on the primary side power level; the magnitude of the trip delay decreases with increasing power. If the EAM or TTD trip functions have inoperable required channels, it is acceptable to place the inoperable channels in the tripped condition and continue operation. Placing the inoperable channels in the trip mode enables the Steam Generator Water Level - Low-Low (Adverse) function, for the EAM; or removes the trip delay for the TTD. If the Steam Generator Water Level - Low-Low (Normal) trip function has an inoperable required channel, the inoperable channel must be tripped, subject to the LCO Applicability footnote.

(continued)

21.6%

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

14. Steam Generator Water Level - Low Low (continued)

The LCO requires four channels of SG Water Level - Low Low per SG to be OPERABLE because these channels are shared between protection and control. All SG Water Level-Low Low reactor trip Functions use two-out-of-four logic. As with other protection functions, the single failure criterion applies. The Trip Setpoints for the SG Water Level Low-Low (Adverse Containment Environment) and (Normal Containment Environment) bistables are ≥ ~~20.2%~~ and ≥ ~~14.8%~~ of narrow range span, respectively. The Trip Setpoints for the Vessel ΔT (Power-1) and (Power-2) bistables are ≤ Vessel ΔT Equivalent to 12.41% RTP and ≤ Vessel ΔT Equivalent to 22.41% RTP, respectively, with corresponding trip time delays of ≤ 232 seconds and ≤ 122 seconds. The Trip Setpoint for the Containment Pressure - Environmental Allowance Modifier bistables is ≤ 1.5 psig.

27.0%

INSERT B 3.3.1-23

In MODE 1 or 2, when the reactor requires a heat sink, the SG Water Level - Low Low trip must be OPERABLE. The normal source of water for the SGs is provided by the Main Feedwater (MFW) Pumps (not safety related). The MFW Pumps are only in operation in MODE 1 or 2. The AFW System is the safety-related source of water to ensure that the SGs remain the heat sink for the reactor. During normal startups and shutdowns the MFW System or AFW System provides feedwater to maintain SG level. In MODE 3, 4, 5, or 6, the SG Water Level - Low Low Reactor Trip Function does not have to be OPERABLE because the reactor is not operating or even critical (see LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," for Applicability of SG Water Level - Low Low ESFAS Functions).

15. Not used.

16. Turbine Trip

a. Turbine Trip – Low Fluid Oil Pressure

The Turbine Trip - Low Fluid Oil Pressure trip Function anticipates the loss of heat removal capabilities of the secondary system following a turbine trip. This trip Function acts to minimize the pressure/temperature transient on the reactor. Any turbine trip from a power level below the P-9 setpoint, 50% power, will not actuate a reactor trip. Three pressure switches monitor the control oil pressure in the Turbine Electrohydraulic Control

(continued)

INSERT B 3.3.1-23

The SG Water Level Low-Low (Normal Containment Environment) channels do not provide protection when the Containment Pressure - Environmental Allowance Modifier (EAM) channels in the same protection sets are tripped since that enables the SG Water Level Low-Low (Adverse Containment Environment) channels with a higher water level trip setpoint. As such, the SG Water Level Low-Low (Normal Containment Environment) channels need not be OPERABLE when the Containment Pressure - EAM channels in the same protection sets are tripped, as discussed in a footnote to Table 3.3.1-1.

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

The Trip Setpoints listed in Table B 3.3.2-1 and used in the bistables are based on the analytical limits stated in Reference 3. The selection of these Trip Setpoints is such that adequate protection is provided when all sensor and processing time delays are taken into account. To allow for calibration tolerances, instrumentation uncertainties, instrument drift, and severe environment errors for those ESFAS channels that must function in harsh environments as defined by 10 CFR 50.49 (Ref. 5), the Allowable Values specified in Table 3.3.2-1 in the accompanying LCO are conservatively adjusted with respect to the analytical limits. A detailed description of the methodologies used to calculate the Trip Setpoints, including their explicit uncertainties, is provided in Reference 6. The BOP methodology used for Function 6.h is a similar square-root-sum-of-squares (SRSS) methodology as used for the RTS setpoints. The actual nominal Trip Setpoint entered into the bistable is more conservative than that specified by the Allowable Value to account for changes in random measurement errors detectable by a COT. One example of such a change in measurement error is drift during the surveillance interval. If the measured setpoint does not exceed the Allowable Value, the bistable is considered OPERABLE.

Setpoints in accordance with the Allowable Value ensure that the consequences of Design Basis Accidents (DBAs) will be acceptable, providing the unit is operated from within the LCOs at the onset of the DBA and the equipment functions as designed.

~~Until such time as the issues raised by OL#1230 are reviewed and approved by the NRC, the typical relationship discussed above (consistent with the setpoint methodology discussed in Reference 6) between the nominal Trip Setpoint in Table B 3.3.2-1 and the Allowable Value in Table 3.3.2-1 for Functions 5.e.(1), 5.e.(2), 6.d.(1), and 6.d.(2), SG Water Level Low-Low (Adverse Containment Environment, Normal Containment Environment), will not be met. The nominal Trip Setpoint in Table B 3.3.2-1 has been increased by 6.8% of narrow range instrument span to address the SG mid-deck plate algebraic bias raised by Westinghouse NSAL-02-03. The affected bistables have been readjusted to the nominal Trip Setpoints listed in Table B 3.3.2-1 and have been "as left" within the two-sided band for calibration accuracy discussed above. Under a corresponding administrative change, an increase of 6.8% of narrow range instrument span has been added to the Allowable Values~~

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(continued)

BASES

BACKGROUND

Trip Setpoints and Allowable Values (continued)

~~(see Table 3.3.2-1)~~ in the associated ~~procedures for determining~~ channel OPERABILITY. ~~This administrative control will~~ remain in place until ~~OL#1230~~ is approved and implemented.

Each channel can be tested on line to verify that the signal processing equipment and setpoint accuracy is within the specified allowance requirements. Once a designated channel is taken out of service for testing, a simulated signal is injected in place of the field instrument signal. The process equipment for the channel in test is then tested, verified, and calibrated. SRs for the channels are specified in the SR section.

The Allowable Values listed in Table 3.3.2-1 are based on the methodologies described in Reference 6, which incorporate all of the known uncertainties applicable for each channel. The magnitudes of these uncertainties are factored into the determination of each Trip Setpoint. All field sensors and signal processing equipment for these channels are assumed to operate within the allowances of these uncertainty magnitudes.

Solid State Protection System

The SSPS equipment is used for the decision logic processing of outputs from the signal processing equipment bistables. To meet the redundancy requirements, two trains of SSPS, each performing the same functions, are provided. If one train is taken out of service for maintenance or test purposes, the second train will provide ESF actuation for the unit. If both trains are taken out of service or placed in test, a reactor trip will result. Each train is packaged in its own cabinet for physical and electrical separation to satisfy separation and independence requirements.

The SSPS performs the decision logic for most ESF equipment actuation; generates the electrical output signals that initiate the required actuation; and provides the status, permissive, and annunciator output signals to the main control room of the unit.

The bistable outputs from the signal processing equipment are sensed by the SSPS equipment and combined into logic matrices that represent combinations indicative of various transients. If a required logic matrix combination is completed, the system will send actuation signals via master and slave relays to those components whose aggregate Function best serves to alleviate the condition and restore the unit to a safe condition. Examples are given in the Applicable Safety Analyses, LCO, and Applicability sections of this Bases.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

e. Feedwater Isolation - Steam Generator Water Level - Low Low (continued)

pressure exceeding its setpoint, and the TTD, enabling time delays dependent on vessel ΔT as listed in Table B 3.3.2-1. Because the SG Water Level transmitters (d/p cells) are located inside containment, they may experience adverse environmental conditions due to a feedline break. The EAM function is used to monitor the presence of adverse containment conditions (elevated pressure) and enables the Steam Generator Water Level - Low Low (Adverse) trip setpoint to reflect the increased transmitter uncertainties due to this harsh environment. The EAM enables a lower Steam Generator Water Level - Low Low (Normal) trip setpoint when these conditions are not present, thus allowing more margin to trip for normal operating conditions. The TTD delays feedwater isolation on SG Water Level - Low Low, thereby providing additional operating margin during early power ascension by allowing the operator time to recover level when the primary side load is sufficiently small to not require an earlier isolation. The TTD continuously monitors primary side power using Vessel ΔT. Scaling of the Vessel ΔT channels is dependent on the loop-specific values for ΔT_o, discussed under the OTΔT and OPΔT trips. Two time delays are provided, based on the primary side power levels; the magnitude of the trip delay decreases with increasing power. If the EAM or TTD trip functions have inoperable required channels, it is acceptable to place the inoperable channels in the tripped condition and continue operation. Placing the inoperable channels in the trip mode enables the Steam Generator Water Level - Low Low (Adverse) Function, for the EAM, or removes the trip delay for the TTD. If the Steam Generator Water Level - Low Low (Normal) trip Function has an inoperable required channel, the inoperable channel must be tripped, subject to the LCO Applicability footnote.

The SG Water Level - Low Low Trip Setpoints are chosen to reflect both steady state and adverse environment instrument behavior. The Trip Setpoints for the Steam Generator Water Level - Low Low (Adverse Containment Environment) and (Normal Containment Environment) bistables are $\geq$ ~~20.2%~~ 27.0% and $\geq$ ~~14.8%~~ 21.6% of narrow range span, respectively. The Trip Setpoints for the Vessel ΔT (Power-1) and (Power-2) bistables are $\leq$ Vessel ΔT Equivalent to 12.41% RTP and $\leq$ Vessel ΔT Equivalent to

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

e. Feedwater Isolation - Steam Generator Water Level - Low Low (continued)

22.41% RTP, respectively, with corresponding trip time delays of ≤ 232 seconds and ≤ 122 seconds. The Trip Setpoint for the Containment Pressure - Environmental Allowance Modifier bistables is ≤ 1.5 psig.

Turbine Trip and Feedwater Isolation Function 5.c, SG Water Level - High High, and Feedwater Isolation Function 5.e.(3), SG Water Level Low-Low Vessel ΔT Equivalent, must be OPERABLE in MODES 1 and 2 except when all MFIVs are closed. In MODES 3, 4, 5, and 6, Functions 5.c and 5.e.(3) are not required to be OPERABLE. All other Turbine Trip and Feedwater Isolation Functions must be OPERABLE in MODE 1, MODE 2 (except when all MFIVs are closed), and MODE 3 (except when all MFIVs are closed). INSERT B 3.3.2-27

6. Auxiliary Feedwater

The AFW System is designed to provide a secondary side heat sink for the reactor in the event that the MFW System is not available. The system has two motor driven pumps and a turbine driven pump, making it available during normal unit operation, during a loss of AC power, a loss of MFW, and during a Feedwater System pipe break. The normal source of water for the AFW System is the condensate storage tank (CST). A loss of suction pressure, coincident with an auxiliary feedwater actuation signal (AFAS), will automatically realign the pump suctions to the safety related Essential Service Water (ESW) System. The AFW System is aligned so that upon a pump start, flow is initiated to the respective SGs immediately.

a. Auxiliary Feedwater - Manual Initiation

Manual initiation of Auxiliary Feedwater can be accomplished from the control room. Each of the three AFW pumps has a pushbutton for manual AFAS initiation. The LCO requires three channels to be OPERABLE.

b. Auxiliary Feedwater - Automatic Actuation Logic and Actuation Relays (SSPS)

Automatic actuation logic and actuation relays consist of the same features and operate in the same manner as described for ESFAS Function 1.b.

(continued)

INSERT B 3.3.2-27

The SG Water Level Low-Low (Normal Containment Environment) channels do not provide protection when the Containment Pressure - Environmental Allowance Modifier (EAM) channels in the same protection sets are tripped since that enables the SG Water Level Low-Low (Adverse Containment Environment) channels with a higher water level trip setpoint. As such, the SG Water Level Low-Low (Normal Containment Environment) channels need not be OPERABLE when the Containment Pressure - EAM channels in the same protection sets are tripped, as discussed in a footnote to Table 3.3.2-1.

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY

d. Auxiliary Feedwater - Steam Generator Water Level - Low Low (continued)

operating conditions. The TTD delays AFW actuation on SG Water Level - Low Low, thereby providing additional operational margin during early power ascension by allowing the operator time to recover level when the primary side load is sufficiently small to not require an earlier actuation. The TTD continuously monitors primary side power using Vessel ΔT. Scaling of the Vessel ΔT channels is dependent on the loop-specific values for ΔT_0, discussed under the OTΔT and OPΔT trips. Two time delays are provided, based on the primary side power level; the magnitude of the trip delay decreases with increasing power. If the EAM or TTD trip functions have inoperable required channels, it is acceptable to place the inoperable channels in the tripped condition and continue operation. Placing the inoperable channels in the trip mode enables the Steam Generator Water Level - Low Low (Adverse) Function, for the EAM, or removes the trip delay for the TTD. If the Steam Generator Water Level - Low Low (Normal) trip Function has an inoperable required channel, the inoperable channel must be tripped, subject to the LCO Applicability footnote.

The Trip Setpoint reflects the inclusion of both steady state and adverse environment instrument uncertainties. The Trip Setpoints for the SG Water Level - Low Low (Adverse Containment Environment) and (Normal Containment Environment) bistables are $\geq$ ~~20.2%~~ 27.0% and $\geq$ ~~14.8%~~ 21.6% of narrow range span, respectively. The Trip Setpoints for the Vessel ΔT (Power-1) and (Power-2) bistables are $\leq$ Vessel ΔT Equivalent to 12.41% RTP and $\leq$ Vessel ΔT Equivalent to 22.41% RTP, respectively, with corresponding trip time delays of $\leq$ 232 seconds and $\leq$ 122 seconds. The Trip Setpoint for the Containment Pressure - Environmental Allowance Modifier bistables is $\leq$ 1.5 psig.

e. Auxiliary Feedwater - Safety Injection

An SI signal starts the motor driven AFW pumps. The AFW initiation functions are the same as the requirements for their SI function. Therefore, the requirements are not repeated in Table 3.3.2-1. Instead, Function 1, SI, is referenced for all initiating functions and requirements.

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY (continued)

f. Auxiliary Feedwater - Loss of Offsite Power

The loss of offsite power (LOP) is detected by a voltage drop on each ESF bus. The LOP is sensed and processed by the circuitry for LOP DG Start (Load Shedder and Emergency Load Sequencer) and fed to BOP ESFAS by relay actuation. Loss of power to either ESF bus will start the turbine driven AFW pump, to ensure that at least one SG contains enough water to serve as the heat sink for reactor decay heat and sensible heat removal following the reactor trip, and automatically isolate the SG blowdown and sample lines. In addition, once the diesel generators are started and up to speed, the motor driven AFW pumps will be sequentially loaded onto the diesel generator buses.

and

Functions 6.a through 6.f must be OPERABLE in MODES 1, 2, and 3 to ensure that the SGs remain the heat sink for the reactor, except Function 6.d.(3) which must be OPERABLE in only MODES 1 and 2. Vessel ΔT is used to limit the allowed trip time delay only when greater than 12.41% RTP. Below 12.41% RTP the maximum time delay is permitted; therefore, no OPERABILITY requirements should be imposed on the Vessel ΔT channels in MODE 3. SG Water Level - Low Low in any operating SG will cause the motor driven AFW pumps to start. The system is aligned so that upon a start of the pump, water immediately begins to flow to the SGs. SG Water Level - LowLow in any two operating SGs will cause the turbine driven pump to start. These Functions do not have to be OPERABLE in MODES 5 and 6 because there is not enough heat being generated in the reactor to require the SGs as a heat sink. In MODE 4, AFW actuation does not need to be OPERABLE because either AFW or residual heat removal (RHR) will be available to remove decay heat or sufficient time is available to manually place either system in operation.

INSERT B 3.3.2-30

g. Auxiliary Feedwater - Trip of All Main Feedwater Pumps

A Trip of all MFW pumps is an indication of a loss of MFW and the subsequent need for some method of decay heat and sensible heat removal to bring the reactor back to no load temperature and pressure. Each turbine driven MFW pump is equipped with two pressure switches (one in separation group 1 and one in separation group 4) on the oil line for the speed control system. A low pressure signal from either of these pressure switches indicates a trip of

(continued)

INSERT B 3.3.2-30

The SG Water Level Low-Low (Normal Containment Environment) channels do not provide protection when the Containment Pressure - Environmental Allowance Modifier (EAM) channels in the same protection sets are tripped since that enables the SG Water Level Low-Low (Adverse Containment Environment) channels with a higher water level trip setpoint. As such, the SG Water Level Low-Low (Normal Containment Environment) channels need not be OPERABLE when the Containment Pressure - EAM channels in the same protection sets are tripped, as discussed in a footnote to Table 3.3.2-1.

ATTACHMENT FIVE

WESTINGHOUSE NUCLEAR SAFETY ADVISORY LETTER
NSAL-02-03

Nuclear Safety Advisory Letter

Westinghouse Electric Company

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

Subject: Steam Generator Mid-deck Plate Pressure Loss Issue	**Number: NSAL-02-3**
Basic Component: SG Water Level Setpoint Analysis	**Date: February 15, 2002**
Plants: All Plants with Westinghouse Designed Steam Generators; See Attachment 1	

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(d)(2)	Yes ☐	

References:

SUMMARY

Westinghouse-designed steam generators incorporate a mid-deck plate at the top of the primary separator assembly. When some of the steam flows through the separator downcomer instead of the separator orifice, this steam with some entrained moisture, will eventually flow upwards through the flow area in the mid-deck plate. This steam flow through the mid-deck plate will in most cases result in a measurable pressure drop. Recent test result evaluations and predictions for the replacement steam generators showed pressure drops at full load of up to 0.52 psi.

The mid-deck plate is located between the upper and lower taps used for steam generator water level measurements. This pressure drop potentially impacts the low-low setpoint margins for steam generators when the narrow range level tap is above the lower deck plate. This error source has not been accounted for and potentially adversely affects steam generator level low-low uncertainty calculations as a bias in the indicated high direction. For plants where Westinghouse maintains the calculation of record, this pressure drop effect may require up to an approximate 9% decrease (in % narrow range span) in the safety analysis limit (SAL) for establishing the low-low steam generator water level reactor trip for the Loss of Normal Feedwater (LONF) transient or the Loss of Offsite Power (LOOP) transient to compensate for this bias.

Addressing the safety significance of this issue, reactor trips on temperature and pressurizer pressure will trip the unit before there is any damage to the core or the reactor coolant system. Residual heat would cause thermal expansion after trip and subsequent discharge of the reactor coolant to the pressurizer relief tank through the pressurizer safety valves. This could result in a substantial loss of water from the reactor coolant system. However, the consequences of this event would be bounded by a small break LOCA. Concerning component integrity, each steam generator is analyzed for one occurrence of steam generator dry out. Therefore, this issue is not considered to be reportable pursuant to 10CFR Part 21 as the consequences of this event do not represent a substantial safety hazard.

Additional information, if required, may be obtained from the originator. Telephone 412-374-5175.

Originator(s): G.W. Whiteman
Regulatory & Licensing Engineering

H. A. Sepp, Manager
Regulatory & Licensing Engineering

Official record electronically approved in EDMS 2000

ISSUE DESCRIPTION

Westinghouse-designed steam generators incorporate a mid-deck plate at the top of the primary separator assembly. When some of the steam flows through the separator downcomer instead of the separator orifice, this steam with some entrained moisture, will eventually flow upwards through the flow area in the mid-deck plate. This steam flow through the mid-deck plate will in most cases result in a measurable pressure drop. Test result evaluations and predictions for the replacement steam generators showed pressure drops at full load of up to 0.52 psi.

The mid-deck plate is located between the upper and lower taps used for steam generator water level measurements. This pressure drop potentially impacts the low-low setpoint margins for steam generators when the narrow range level tap is above the lower deck plate. This error source has not been accounted for and potentially adversely affects steam generator level low-low uncertainty calculations as a bias in the indicated high direction. For plants where Westinghouse maintains the calculation of record, this pressure drop effect may require up to an approximate 9% decrease (in % narrow range span) in the SAL for establishing the low-low steam generator water level reactor trip for the LONF transient or the LOOP transient to compensate for this bias.

TECHNICAL EVALUATION

It has been determined that for a steam generator affected by a feedwater line break that reverse flow through the feedring out of the steam generator nozzle and eventually out the break results in a reversal in sign of the mid-deck plate differential pressure effect (from: indicated higher than actual, to: indicated lower than actual) and this can be ignored for that event. For a preheat steam generator, with the feedwater nozzle down at the bottom of the tube bundle, a similar effect would occur. The feedline break would cause a low pressure area around the feedwater nozzle, which would cause a decrease in pressure in the lower tap. However, for LONF and LOOP, there are no postulated breaks and thus no reverse flow; therefore, the direction of the effect is nonconservative and must be accounted for. Uncertainty calculations have been performed by Westinghouse based on scaling and setpoint information for a limited set of plants, i.e., those plants with either original steam generators or replacement steam generators by Westinghouse and for which Westinghouse performed uncertainty calculations. For plants which Westinghouse maintains the current calculation of record, calculations have been performed to determine the effect of including a mid-deck plate differential pressure allowance on the steam generator level – Low-Low reactor trip function (See Attachment 1).

The results can be divided into 4 categories: 1) sufficient margin exists such that the current Nominal Trip Setpoint (NTS) and SAL are adequate – no modifications are necessary, 2) insufficient margin exists currently, however, margin can be generated by a reduction of the SAL and subsequent evaluation/reanalysis of the LONF/LOOP, 3) insufficient information is available to complete a sensitivity analysis to determine the feasibility of a reduction in the SAL limit and 4) insufficient margin exists currently and no margin can be generated by reduction of the SAL thus, the NTS must be increased, with a corresponding change to the plant Technical Specifications. A Category 5 has been added to Attachment 1 to address those plants with Westinghouse designed steam generators where Westinghouse does not maintain current information and thus the basis for the low-low setpoint is not known.

For plants falling into categories 2 and 3 above, the following criteria have been used by Westinghouse to determine the feasibility of reductions in the SAL limits:

1. If substantial margin to pressurizer fill exists, the change was judged to be feasible

2. If little margin to pressurizer fill exists, a sensitivity reanalysis of the limiting cases was completed to determine the effect. If the pressurizer clearly filled, the proposed change in SAL was judged not to be feasible.

3. If little margin to pressurizer fill exists, but there was insufficient information to complete the sensitivity analysis, the feasibility of the change is indeterminate. This also applies if the sensitivity analysis yielded inconclusive results (resulting peak pressurizer volume was slightly above or below the limit).

ASSESSMENT OF SAFETY SIGNIFICANCE

The function of the reactor protection circuits associated with low steam generator water level and low feedwater flow for all plants is to preserve the steam generator heat sink for removal of long term residual heat. Reactor trips on temperature and pressurizer pressure will trip the unit before there is any damage to the core or the reactor coolant system. Residual heat would cause thermal expansion after trip and subsequent discharge of the reactor coolant to the pressurizer relief tank through the pressurizer safety valves. This could result in a substantial loss of water from the reactor coolant system. However, the consequences of this event would be bounded by a small break LOCA. Concerning component integrity, each steam generator is analyzed for one occurrence of steam generator dryout.

Finally, this issue does not impact the generic Emergency Response Guidelines (ERGs) since the ERGs are entered following a reactor trip or safety injection signal and the mid-deck plate pressure drop would be minimal. However, some of the ERG footnote values utilize the steam generator low-low level NTS to direct operator actions if steam generator level approaches or exceeds the NTS (such as maintaining level margin above the NTS or verifying the associated automatic actions if the NTS is exceeded). The generic ERG footnote definition would still be valid since it specifies using the plant specific NTS in determining the plant specific Emergency Operating Procedure (EOP) footnote value.

This issue is not applicable to units with CE-designed steam generators.

RECOMMENDED ACTIONS

Based on the above, it is recommended that the steam generator low-low level nominal trip setpoint (NTS) should account for the presence of the mid-deck plate between the upper and lower taps used for SG water level measurements. This may involve:

1. The need to reduce the existing SAL and subsequent reanalysis/evaluation of the LONF and the LOOP transient.

2. If no margin can be generated by reduction of the SAL, the NTS for low-low water level must be increased, with a corresponding change to the plant Technical Specifications.

Any plant that must change the NTS as a result of this Nuclear Safety Advisory Letter would also have to change the respective plant specific EOP footnote values to reflect the new NTS.

Attachment 1

PLANT APPLICABILITY
(Full Load Mid-deck Pressure Differential included in Parenthesis, in psi)

Category 1 – Adequate Margin – No Modifications to SAL or NTS are necessary.

Farley Units 1 and 2	(0.22 psi)
Shearon Harris	(0.13 psi)
Watts Bar Unit 1	(0.15 psi)
Turkey Point Units 3 and 4	(0.00 psi)
Kori 2	(0.22 psi)
Indian Point 2	(0.00, psi)

Category 2 – Insufficient Margin – Modifications to SAL are Feasible***

Vogtle Units 1 and 2	(0.31 psi)
Beaver Valley Unit 1	(0.16 psi)
Beaver Valley Unit 2	(0.16 psi)
South Texas Unit 2	(0.52 psi)
Seabrook	(0.30 psi)

Category 3 – Insufficient Margin – Feasibility of Reducing SAL is Indeterminate w/o Further Analysis***

V.C. Summer	(0.13 psi)
Millstone 3	(0.30 psi)
South Texas Unit 1	(0.22 psi)
Vandellos 2	(0.23 psi)

Category 4 – Insufficient Margin – Modifications to the NTS are necessary

Diablo Canyon Units 1 and 2	(0.25 psi)

Category 5 – All remaining plants with Westinghouse-designed SGs where Westinghouse does not maintain current information and thus the basis for the low-low setpoint is not known

D.C. Cook Unit 2	(0.17 psi)
Angra	(0.16 psi)
Byron 2	(0.28 psi, 0.29 with additional uprate)
Braidwood 2	(0.28 psi)
Catawba Unit 2	(0.28 psi)
H.B. Robinson	(0.17 psi)
Sizewell B	(0.22 psi)
Prairie Island Units 1 and 2	(0.24 psi)
Ringhals 4	(0.16 psi)
Point Beach Units 1 and 2	(0.00 psi)
Zorita	(0.57 psi)
Salem Units 1 and 2	(0.30 psi – U1, 0.26 psi - U2)
Kori 1, 3, 4	(0.22 psi - U1, .32 psi -U3, 0.32 psi - U4
Surry Units 1 and 2	(0.24 psi)
Yongwang Units 1 and 2	(0.23 psi)
North Anna Units 1 and 2	(0.18 psi, 0.17 psi with additional 2% uprate)
Mihama 1	(0.13 psi)
Kewaunee	(0.16 psi)

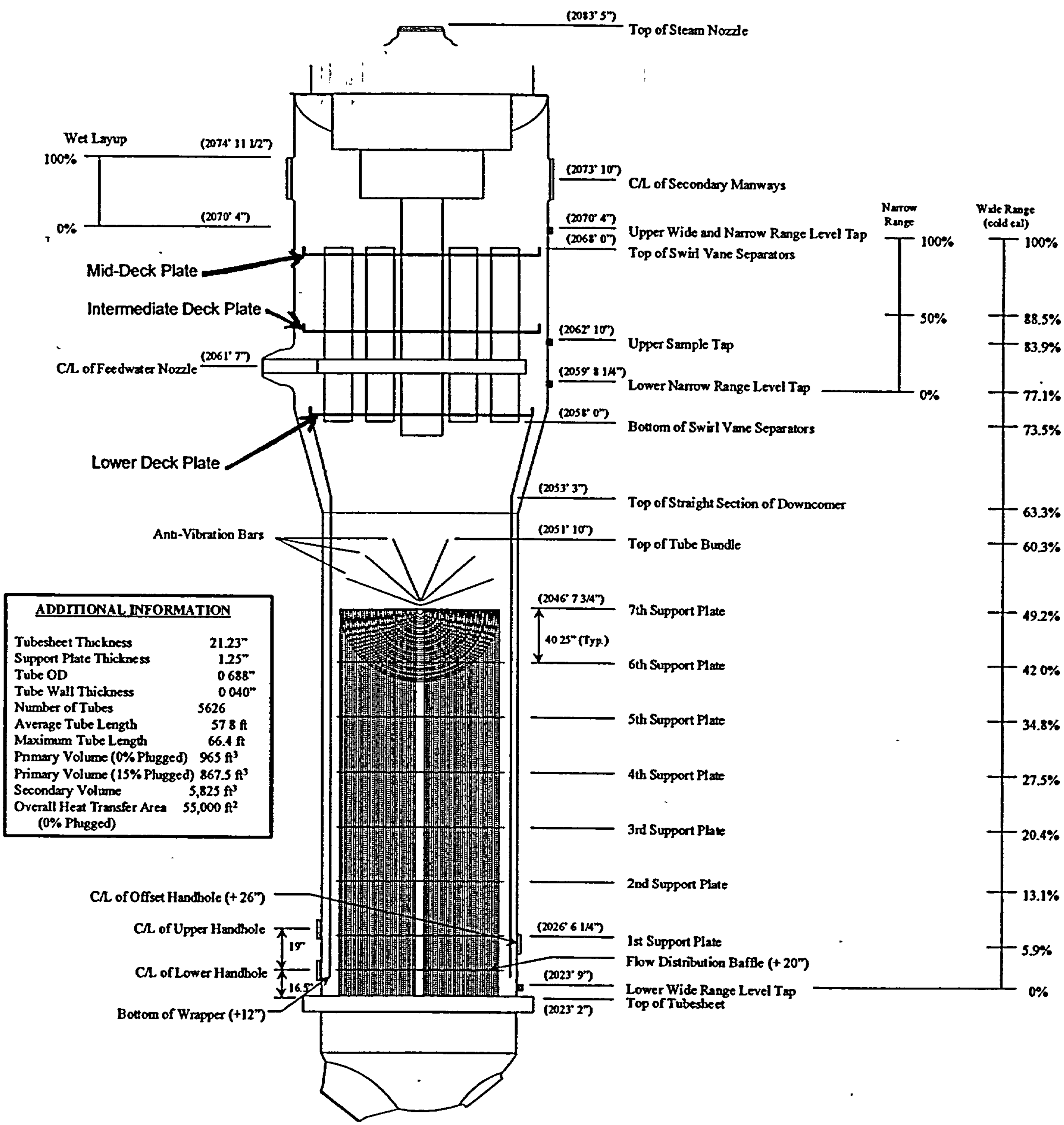
Maanshan Units 1 and 2	(0.23 psi)
Wolf Creek	(0.22 psi)
Callaway	(0.22 psi)
Sequoyah Units 1 and 2	(0.25 psi)
Comanche Peak Units 1 and 2	(0.15 psi U1, 0.28 psi U2)
Arkansas Nuclear One Unit 2	(0.17 psi Cycle 15, 0.19 psi Cycle 16)
Indian Point Unit 3	(0.00 psi)
Ohi Units 1 and 2	(Not Available – Non-W SG with Mid-deck plate)
Takahama 1	(Not Available – Non-W SG with Mid-deck plate)
Mihama 2	(Not Available - Non-W SG with Mid-deck plate)

The CE-designed steam generators are not affected by this issue.

*** Formal reanalyses of the LONF/LOOP event should be completed to support a change in the SAL value for low-low steam generator water level reactor trip.

ATTACHMENT SIX

STEAM GENERATOR SCHEMATIC



CALLAWAY MODEL F STEAM GENERATOR
Figure B.1