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Edwin I. Hatch Nuclear Plant – Units 1 and 2
License Amendment Request to Correct Non-Conservative Technical Specification Allowable Values for the Condensate Storage Tank Low Level Transfer Function
SNC Response to NRC Request for Additional Information

Ladies and Gentlemen:

By letter dated June 29, 2018 (NRC Agencywide Documents Access and Management System Accession No. ML18180A396), Southern Nuclear Operating Company (SNC) submitted a License Amendment Request (LAR) for Hatch Nuclear Plant (HNP) Units 1 and Unit 2. The LAR requested changes to three allowable values (AVs) in the HNP technical specifications (TSs) associated with the condensate storage tank (CST) low-level transfer function to correct non-conservative values. By electronic mail dated April 30, 2019, the NRC staff notified SNC that additional information is needed for the staff to complete their review (NRC ADAMS Accession No. ML19142A201).

The enclosure to this letter provides the SNC response to the NRC request for additional information (RAI).

The conclusions of the no significant hazards consideration analysis and environmental consideration assessment contained in the original LAR have been reviewed and are unaffected by this RAI response.

This letter contains no NRC commitments. If you have any questions, please contact Jamie Coleman at 205.992.6611.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12th day of June 2019.

Respectfully submitted,

C. A. Gayheart
Regulatory Affairs Director
CAG/RMJ/sm

Enclosure: SNC Response to NRC Request for Additional Information (RAIs)

Cc: Regional Administrator, Region II
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Edwin I. Hatch Nuclear Plant – Units 1 and 2

License Amendment Request to Correct Non-Conservative Technical Specification Allowable Values for the Condensate Storage Tank Low Level Transfer Function SNC Response to NRC Request for Additional Information

Enclosure

SNC Response to NRC Request for Additional Information (RAIs)

RAI EICB-1:

Setpoint Calculation Methodology: Please provide documentation (including sample calculations) of the methodology used for establishing the limiting setpoint (or nominal setpoint (NSP)) and the limiting acceptable values for the As-Found and As-Left setpoints as measured in periodic surveillance testing as described below. Indicate the related Analytical Limits (AL) and other limiting design values (and the sources of these values) for each setpoint.

Note: The licensee can provide a setpoint methodology summary and calculation summary in lieu of a sample calculation, which must start from AL and address total loop uncertainty (TLU), nominal trip setpoint (NTSP), actual trip setpoint if different from NTSP, AV and margins.

SNC Response to RAI

The following provides a summary of the Hatch Nuclear Plant (HNP) setpoint methodology and a summary of the calculation associated with the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems condensate storage tank (CST) low level transfer instrument functions.

The HNP setpoint methodology is described in Southern Nuclear Operating Company (SNC) procedure, NMP-ES-033, "Setpoint Control Program," and implemented in SNC procedure NMP-ES-033-005, "Setpoint Control Program Hatch Setpoint Uncertainty Methodology and Scaling Instructions." (References 1 and 2). The SNC setpoint control program establishes three groups with Group 1 requiring the greatest rigor. Group 1 calculations are consistent with the calculation methodology of ISA-S67.04.01, "Setpoints for Nuclear Safety-Related Instrumentation," (Reference 3).

CST instrumentation calculations associated with the HPCI and RCIC CST low level instrument functions utilize Group 1 setpoint methodology. The CST low level setpoints are derived from the design basis analysis values (i.e., analytical limit), are corrected for sources of uncertainty in the entire instrument loop as defined in the SNC Setpoint Control Program implementing procedure (Reference 2), and meet the 95/95 tolerance limit as identified in NRC Regulatory Guide (RG) 1.105, "Setpoints for Safety-Related Instrumentation," (Reference 4).

Consistent with the NRC approved HNP setpoint methodology and ISA Standard 67.04 (References 1 and 3); there are two required setpoint margins. These are also the margins specified in RG 1.105 (Reference 4). The first setpoint margin is between the analytical limit and the allowable value (AV). This margin is dependent on the process measurement uncertainties, the inherent instrument accuracies and the calibration errors, but does not include error due to instrument drift. The analytical limit to AV margin corresponds to the required margin just after the instrument has been calibrated, and has no allowance for additional measurement errors that may occur during the time period between calibrations. The second setpoint margin is that between the analytical limit and the NTSP (or LTSP). This margin includes errors used to determine the AV margin and adds an additional margin for instrument drift. The AV and NTSP margin represent the minimum margin required by the instrument setpoint methodology to meet the minimum probability demonstration margin.

An additional calculation is performed to assure an acceptable margin between the AV and the NTSP that there is at least a 95% probability that during calibration the setpoint does not exceed the AV. The maximum NTSP represents the "limiting" value of the setpoint with no tolerance (LTSP) for parameters that decrease to actuate the instrument. This means that if, during calibration, the instrument setting was observed to be beyond this value, the loop would need to be re-calibrated for the next cycle. To avoid this condition, potential instrument setpoints require a leave alone tolerance (LAT) within which instrument re-calibration is not required. The NTSP is adjusted to provide margin for the LAT. For the purposes of this RAI response, the terms LAT and ALT are synonymous.

In summary, the setpoint calculation process provides margins to assure there is at least a 95% probability with high confidence that, due to measurement uncertainties, the analytical limit is not exceeded during operation, and that the AV is not exceeded between calibrations.

The setpoint methodology calculates the accuracy or uncertainty of the measurement for each device in the measurement channel including the trip unit, which gives the final trip signal. This includes, as applicable:

- Channel accuracy with trip environment conditions (AT)
- Calibration error (C)
- Channel drift (D)
- Process measurement accuracy (PMA)
- Primary element accuracy (PEA)
- Environmental allowances (EA)

The methodology used for combining uncertainties for CST level instrumentation setpoints utilizes the square root sum of the squares (SRSS) taken at 2 sigma (σ) confidence level for random uncertainties. Margins are obtained by combining the relevant channel random errors using SRSS, and adding bias errors, as follows:

$$\text{AV Margin} = (1.645/2) \times (AT^2 + C^2 + PMA^2 + PEA^2)^{1/2} + \text{Bias errors}$$

$$\text{NTSP Margin} = (1.645/2) \times (AT^2 + C^2 + D^2 + PMA^2 + PEA^2)^{1/2} + \text{Bias errors}$$

Random error values represent 2σ values, and the 1.645/2 factor is a statistical factor that converts a 2σ value to 1.645σ. Because setpoints are approached from one side (high to low for a decreasing setpoint), 1.645σ corresponds to 95% probability for one-sided approaches for normal distributions. EA for environmentally qualified (EQ) components are obtained from the EQ datasheets and treated as a bias error.

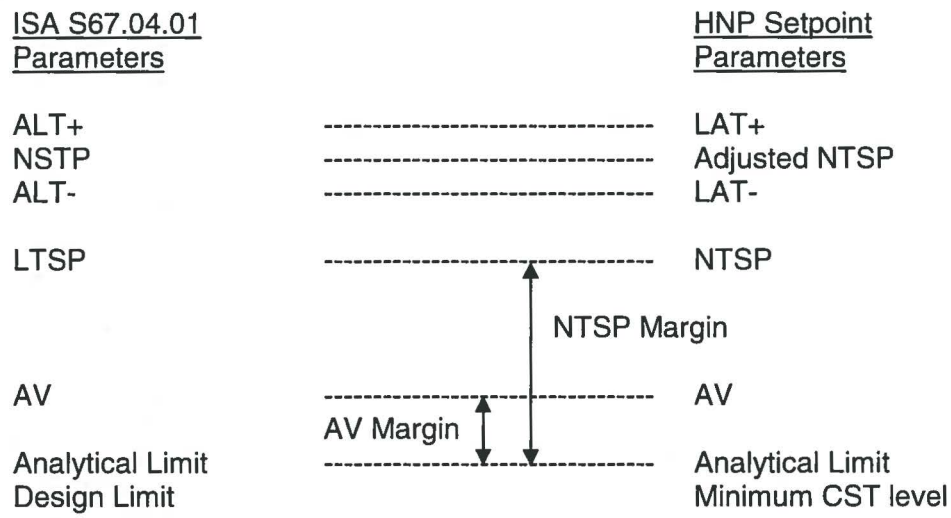
For variables that decrease to the setpoint, the AV and NTSP are obtained by adding the margin from the analytical limit. Thus:

- AV = AL + AV Margin (for decreasing setpoint).
- NTSP = AL + NTSP Margin (for decreasing setpoint).

The AV is the limiting value at which an instrument trip setting may be found, when tested periodically, beyond which appropriate action must be taken. The AV is determined by the instrument calculations considering the maximum possible value for process measurement at

which the analytical limit is protected. Maintaining the instrument channel within the AV ensures the analytical limit and associated design limits are protected.

The following provides a simplified visual presentation of the above terms similar to the guidance of RG 1.105 (Reference 4):



Units 1 and 2 HPCI System CST Low Level Switch Instrument Calculation Assumptions

1. Pressure unit (psi) is converted to inches of water column (IWC) using the conversion factor 27.7076 IWC = 1 psi

2. The CST level NTSP and AV are referenced to plant elevation 130 ft. based on the plant elevation at the bottom of the CST.

3. Calculations determined the critical CST water elevation to commence swap-over of the HPCI pump suction from CST to suppression pool (i.e., torus) without ingestion of air into the pump suction piping due to potential vortex formation. This plant elevation level is used as the AL.

4. Calculated reference accuracy is based on 1% of instrument span.

5. Drift is 5% of instrument span and based on a maximum annual instrument drift of 2.5% of instrument span.

6. The calibration accuracy is assumed to be equal to ±1.39 IWC. This value is conservative based on the type of instrument used, the calibration process, and observation of calibration data for similar plant instruments.

7. The fluid density effect of the CST condensate as a result of variation in condensate temperature is considered for changes between 38°F and 110°F, which represent the expected bounds of ambient conditions.

8. Radiation effect is assumed to be zero due to the negligible dose rate at the outdoor location of the level instrument.

9. Effects on accuracy due to ambient temperature changes, humidity changes, and normal vibration are assumed equal to zero due to the mechanical nature of the device.

10. Seismic effects are set equal to zero. Any post-seismic residual setpoint shift is included within the calculated reference accuracy.

Unit 1 RCIC System CST Low Level Float Switch Instrument Calculation Assumptions

1. The CST level NTSP and AV are referenced to plant elevation 130 ft. based on the plant elevation at the bottom of the CST.

2. Calculations determined the critical CST water elevation to commence swap-over of the RCIC pump suction from CST to suppression pool (i.e., torus) without ingestion of air into the pump suction piping due to potential vortex formation. This plant elevation level is used as the AL.

3. The CST float switch is checked periodically against an established scribe mark on a beam external to the CST. To bound the possibility for fixed measurement errors due to tolerances during installation of the instrument and establishment of the scribe mark, an installation uncertainty has been applied as a bi-directional bias and is set equal to a value of 0.25 in.

4. Calibration accuracy is assumed to be equal to ±0.25 in. from the established scribe mark on a beam external to the CST.

5. Drift is assumed equal to zero as this device is mechanically operated and cannot be calibrated once installed in place on a tank. Installation error is included as float switch bias error.

6. The fluid density effect of the CST condensate as a result of variation in condensate temperature is considered for changes between 38°F and 110°F, which represent the expected bounds of ambient conditions.

7. Radiation effect is assumed to be zero due to the negligible dose rate at the outdoor location of the level instrument.

8. Effects on accuracy due to ambient temperature changes, humidity changes, and normal vibration are assumed equal to zero due to the mechanical nature of the device.

9. Seismic effects are set equal to zero. Any post-seismic residual setpoint shift is included within the calculated reference accuracy.

Units 1 and 2 HPCI System and Unit 1 RCIC System CST Low Level Instrument Calculation Results

The calculated analytical limit, AV, NTSP, adjusted NTSP, and LAT for the CST low level instrumentation loops associated with the Unit 1 and 2 HPCI and Unit 1 RCIC systems are shown in the table herein. Note that the shaded rows are in measurement units of inches.

Table –Allowable Values and Nominal Setpoints (CST Level Low Function)

CST Level Low Trip	Unit 1		Unit 2
	HPCI	RCIC	HPCI
Adj. NTSP (ft.)	134.07	131.25	133.80
NTSP (ft.)	133.92	131.00	133.65
LAT (in.)	± 0.25	± 0.25	± 0.25
NTSP Margin (in.)	6.493	0.547	6.493
TS AV (ft.)	**3.52**	**1.00**	**3.25**
AV (ft. elev.)	133.52	131.00	133.25
AV Margin (in.)	1.695	0.547	1.695
Analytical Limit (ft.)	133.37	130.94	133.10
CST Bottom (ft. elev.)	130.00	130.00	130.00

RAI EICB-2:

The NRC issued RIS 2006-17 to summarize its concerns and describe one acceptable approach to meeting regulatory requirements associated with instrument setpoints. In short, the guidance in that document states that As-Found and As-Left values can be used to confirm that an instrument is operating in accordance with assumptions in the setpoint calculation methodology.

In response to NRC concerns, industry developed, and the NRC approved TSTF-493, Revision 4, "Clarify Application of Setpoint Methodology for LSSS Functions". The Hatch LAR is requesting a change to one of those specific variables identified in TSTF-493.

Please provide a summary to describe your approach to addressing the specific concerns expressed in the RIS, as they relate to the proposed changes in this LAR.

SNC Response to RAI

Chapter 14.0 of HNP Unit 1 FSAR refers to Chapter 15 of the HNP Unit 2 FSAR and Table 15C-11, "Limiting Safety Systems Settings [LSSS]," of the HNP Unit 2 FSAR lists the LSSS functions for both HNP Units 1 and 2. The CST low level instrument functions for the HPCI and RCIC systems are not considered LSSS functions for HNP Unit 1 or 2, and are therefore not

considered to be within the scope of NRC Regulatory Issue Summary (RIS) 2006-17 (Reference 5).

The following summarizes the SNC monitoring and trending process of the HNP setpoint control program. As documented in the NRC safety evaluation for HNP Units 1 Amendment 232 and Unit 2 Amendment 174 (Reference 6), SNC has incorporated a program to monitor and trend HNP safety related instrument setpoints as follows:

- Instruments with TS calibration surveillance frequencies are monitored and trended.
- As-found and as-left calibration data are recorded for each calibration activity. This activity identifies occurrences of instruments found outside of their AV, or instruments whose performance is not as assumed in the drift or setpoint analysis.
- When as-found conditions are outside the AV, an evaluation is performed to determine if the assumptions made to extend the calibration frequency are still valid, to evaluate the effect on plant safety.

The HNP trending program requires that any time a setpoint value is found outside the ALT, an additional evaluation be performed to ensure that the instrument's performance is still enveloped by the assumptions in the drift or setpoint analysis. The trending program also plots setpoint or transmitter as-found /as-left values to verify that the performance of the instruments is within expected boundaries and that adverse trends (i.e., repeated directional changes in as-found /as-left data of smaller magnitudes) are detected and evaluated.

This process ensures excessive changes to LSSS trip setpoints will not go undetected and false detections will not result.

The CST low level instrument functions for Units 1 and 2 HPCI and Unit 1 RCIC are demonstrated operable by applying the following guidance during instrument channel functional tests:

If the instrument setting is found within the ALT, the results are recorded in the surveillance procedure and no further action is required for the instrument surveillance. If the instrument setting is found outside the ALT but conservative with respect to the TS AV, the channel is operable. The instrument setting must be calibrated to the adjusted NTSP (within the ALT) and the instrument performance must be evaluated in accordance with the plant's corrective action program per the SNC setpoint control program drift monitoring procedure (Reference 7). If the instrument setting is found non-conservative with respect to the TS AV, the channel is inoperable until the instrument setting is calibrated to the adjusted NTSP (within the ALT) and any evaluations necessary to return the channel to service are completed. The instrument setting may be more conservative than the NTSP provided the ALT is applied to the actual instrument setting.

RAI SRXB-1:

> On page E-3, Section 2.1 of the LAR, SNC states, "The RCIC [reactor core isolation cooling] system is not an Engineered Safety Feature (ESF) System and is not credited in the safety analysis for any design basis accident."

Contrary to the above statement in the LAR, the NRC staff has noted in the Hatch Final Safety Analysis Report (FSAR) that the RCIC system is credited in the loss of feedwater flow (LOFW) event. In Section 15.2.8.4 of the FSAR, it is stated that decay and stored heat continue to create steam and the [reactor pressure vessel water] level continues to drop, and that at the low-low level setpoint, the RCIC system is actuated. In addition, in Table 15.2-5 of the FSAR, RCIC initiation is identified as a key analysis assumption for the LOFW event.

According to the FSAR, although RCIC is not an ESF system, it is credited to mitigate the LOFW event for Hatch. Please clarify the above-mentioned discrepancy between the LAR and FSAR statements regarding whether RCIC is credited for any design-basis event.

SNC Response to RAI

Section 15.1.3 of the Hatch FSAR discusses anticipated operational occurrences (AOOs) and design basis accidents (DBAs). As stated in Subsection 15.1.3.2, the four accidents that pose the most limiting challenge to plant design and radiological exposure limits are control rod drop accident, loss of coolant accident, fuel-handling accident, and main steam line break accident and that these accidents are referred to as DBAs. None of these DBAs credit the RCIC system in accident mitigation. The LOFW event is listed as a decrease in reactor coolant inventory AOO in Subsection 15.1.3.1. Subsection 15.2.8.4 states the LOFW event is a non-limiting AOO. Thus, there is no discrepancy between the statement in the license amendment request that RCIC is not credited in the safety analysis for DBAs and the statement in the FSAR that RCIC is credited in the non-limiting LOFW AOO.

REFERENCES:

1. SNC procedure NMP-ES-033, "Setpoint Control Program," Version 7.0.

2. SNC procedure NMP-ES-033-005, "Setpoint Control Program Hatch Setpoint Uncertainty Methodology and Scaling Instructions," Version 6.1.

3. ISA-S67.04.01, "Setpoints for Nuclear Safety-Related Instrumentation," 2000.

4. NRC Regulatory Guide 1.105, "Setpoints for Safety-Related Instrumentation," Revision 3, December 1999 (NRC ADAMS Accession No. ML993560062).

5. NRC Regulatory Issue Summary 2006-17, "NRC Staff Position on the Requirements of 10 CFR 50.36, 'Technical Specifications,' Regarding Limiting Safety System Settings During Periodic Testing and Calibration of Instrument Channels," August 24, 2006.

6. Letter from L. N. Olshan (NRC) to H. L. Sumner, Jr. (SNC), "Edwin I. Hatch Nuclear Plant, Units 1 and 2 Re: Issuance of Amendments (TAC Nos. MB2965 and MB2967)," dated July 12, 2002 (NRC ADAMS Accession No. ML022040085).

7. SNC procedure NMP-ES-033-003, "Setpoint Control Program Drift Monitoring," Version 4.0.