ATTACHMENT 3B

Markup of Proposed Technical Specifications Bases and Technical Requirements Manual Pages

Byron Station, Units 1 and 2

Facility Operating License Nos. NPF-37 and NPF-66

REVISED TECHNICAL SPECIFICATIONS BASES PAGES

B 3.3.1-21
B 3.4.1-2
B 3.6.5-2
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NEW/REVISED TECHNICAL REQUIREMENTS MANUAL PAGES

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3.3.k-1
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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

In MODE 1, when there is a potential for overfilling the pressurizer, the Pressurizer Water Level-High trip must be OPERABLE. This trip Function is automatically enabled on increasing power by the P-7 interlock. On decreasing power, this trip Function is automatically blocked below P-7. Below the P-7 setpoint, transients that could raise the pressurizer water level will be slow and the operator will have sufficient time to evaluate unit conditions and take corrective actions.

10. <u>Reactor Coolant Flow-Low</u>

The Reactor Coolant Flow-Low Function ensures that protection is provided against violating the DNBR limit due to low flow in the RCS loops, while avoiding reactor trips due to normal variations in loop flow. Each RCS loop has three flow detectors to monitor flow. The flow signals are not used for any control system input.

The LCO requires three Reactor Coolant Flow-Low channels per loop to be OPERABLE in MODE 1 above P-7. Each loop is considered a separate Function. The channel Allowable Values are specified in percent of loop minimum measured flow. The minimum measured flow is ~~95,225 gpm~~.

total

specified in the COLR

The Reactor Coolant Flow-Low Function encompasses a single loop and a two loop trip logic. In MODE 1 above the P-7 setpoint and below the P-8 setpoint, a loss of flow in two or more loops will initiate a reactor trip. Above the P-8 setpoint, which is approximately 30% RTP, a loss of flow in any one RCS loop will actuate a reactor trip because of the higher power level and the reduced margin to the design limit DNBR. Below the P-7 setpoint, all reactor trips on low flow are automatically blocked since no conceivable power distributions could occur that would cause a DNB concern at this low power level.

BASES

APPLICABLE SAFETY ANALYSES

The requirements of this LCO represent the initial conditions for DNB limited transients analyzed in the plant safety analyses (Ref. 1). The safety analyses have shown that transients initiated from the limits of this LCO will result in meeting the DNBR criterion. This is the acceptance limit for the RCS DNB parameters. Changes to the unit that could impact these parameters must be assessed for their impact on the DNB criteria. The transients analyzed for include loss of coolant flow events and dropped or stuck rod events. A key assumption for the analysis of these events is that the core power distribution is within the limits of LCO 3.1.6, "Control Bank Insertion Limits;" LCO 3.2.3, "AXIAL FLUX DIFFERENCE (AFD);" and LCO 3.2.4, "QUADRANT POWER TILT RATIO (QPTR)."

Safety Analyses assumed a value of 2250 psia (2235.3 psig). The pressurizer pressure control uncertainty value assumed in the Revised Thermal Design Procedure (RTDP) is 43 psi. The Safety Analyses assumptions are bounded by the limit specified in the COLR with allowance for indication uncertainty.

Safety Analyses assumed a value of 588.0°F for the vessel average temperature.

Safety Analyses assumed a total RCS flow rate of ~~368,000~~ 386,000 gpm that includes 3.5% margin for flow measurement uncertainty. This value is bounded by the LCO value of ~~380,900~~ 386,000 gpm and the limit specified in the COLR ~~assuming~~ which also assumes a flow measurement uncertainty of 3.5%. This 3.5% flow measurement uncertainty assumed in the analyses included errors from known sources.

The RCS DNB parameters satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

BASES

APPLICABLE SAFETY ANALYSES (continued)

The limiting DBAs considered relative to containment OPERABILITY are the LOCA and SLB. The DBA LOCA and SLB are analyzed using computer codes designed to predict the resultant containment pressure transients. No two DBAs are assumed to occur simultaneously or consecutively. The postulated DBAs are analyzed with regard to Engineered Safety Feature (ESF) Systems, assuming the loss of one ESF bus, which is the worst case single active failure, resulting in one train each of the Containment Spray System, Residual Heat Removal System, and Containment Cooling System being rendered inoperable.

333.6°F for Unit 1 and 330.8°F for Unit 2

The limiting DBA for the maximum peak containment air temperature is an SLB. The initial containment average air temperature assumed in the design basis analyses (Ref. 1) is 120°F. This resulted in a maximum containment air temperature of ~~333°F~~. The design temperature of the containment structure is 280°F. The maximum peak containment air temperature was calculated to exceed the containment design temperature for only a few seconds during the transient. Thermal analyses showed that the time interval during which the containment air temperature exceeded the containment design temperature was short enough that the containment temperatures remained below the design temperature. The basis of the containment design temperature, however, is to ensure the performance of safety related equipment inside containment (Ref. 2). Therefore, it is concluded that the calculated transient containment air temperature is acceptable for the DBA SLB.

The containment average air temperature limit is also used to establish the environmental qualification operating envelope for containment. The temperature limit is also used in the depressurization analyses to ensure that the minimum pressure limit is maintained following an inadvertent actuation of the Containment Spray System (Ref. 1).

BASES

APPLICABLE SAFETY ANALYSES (continued)

The analysis and evaluation show that under the worst case scenario, the highest peak containment pressure is 42.8 psig for Unit 1 and 38.4 psig for Unit 2 (experienced during a LOCA). The analysis shows that the peak containment temperature ~~is 333°F~~ 333.6°F for Unit 1 and ~~331°F for Unit 2~~ 330.8°F (experienced during an SLB). Both results meet the intent of the design basis. (See the Bases for LCO 3.6.4, "Containment Pressure," and LCO 3.6.5 for a detailed discussion.) The analyses and evaluations assume a unit specific power level of 3672.6 MWt, one containment spray train and one containment cooling train operating, and initial (pre-accident) containment conditions of 120°F and 1.0 psig. The analyses also assume a response time delayed initiation to provide conservative peak calculated containment pressure and temperature responses.

For certain aspects of transient accident analyses, maximizing the calculated containment pressure is not conservative. In particular, the effectiveness of the Emergency Core Cooling System during the core reflood phase of a LOCA analysis increases with increasing containment backpressure. For these calculations, the containment backpressure is calculated in a manner designed to conservatively minimize, rather than maximize, the calculated transient containment pressures in accordance with 10 CFR 50, Appendix K (Ref. 4).

The effect of an inadvertent containment spray actuation has been analyzed. An inadvertent spray actuation results in a -3.48 psig containment pressure and is associated with the sudden cooling effect in the interior of the leak tight containment. Additional discussion is provided in the Bases for LCO 3.6.4.

The modeled Containment Spray System actuation from the LOCA containment analysis is based on a response time associated with exceeding the containment High-3 pressure setpoint to achieving full flow through the containment spray nozzles. The Containment Spray System total response time of ~~88.1~~ 110.2 seconds (for the limiting case) includes Diesel Generator (DG) startup (for loss of offsite power), sequencing of equipment, containment spray pump startup, and spray line filling (Ref. 5).

BASES

ACTIONS (continued)

The maximum THERMAL POWER corresponding to the heat removal capacity of the remaining OPERABLE MSSVs is determined by a simple heat balance calculation as described in the attachment to Reference 4, with an appropriate allowance for Nuclear Instrumentation System trip channel uncertainties. The following equation is used to determine the maximum allowable power level for continued operation with inoperable MSSV(s):

$$\textit{Maximum Allowable Power} = \frac{100}{Q}\left(\frac{w_S\, h_{fg}\, N}{K}\right)$$

Where:

Q = Nominal NSSS power rating of the plant (including reactor coolant pump heat), in Mwt (= ~~3600.6 Mwt~~). 3659

K = Conversion factor = 947.82 (BTU/sec)/Mwt.

w_s = minimum total steam flow rate capability of the OPERABLE MSSVs on any one steam generator at the highest OPERABLE MSSV opening pressure including tolerance and accumulation, as appropriate, in lbm/sec.

h_{fg} = Heat of vaporization for steam at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, in BTU/lbm.

N = Number of loops in the plant (= 4).

7.4%

The maximum allowable power level determined by this simple heat balance calculation was adjusted lower by ~~9.0%~~ RTP to account for Nuclear Instrumentation System trip channel uncertainties. Plant specific sensitivity studies demonstrate that use of this simple heat balance calculation is sufficiently conservative at all power levels if an allowance of 7.4% of Nuclear Instrumentation System trip channel uncertainty and a MSSV setpoint tolerance of ~~4%~~ are assumed in plant specific analyses. The Nuclear

3% for Unit 1 (4% for Unit 2)

1.1 Definitions

PROCESS CONTROL PROGRAM (PCP)	The PCP shall contain the current formulas, sampling, analyses, tests, and determinations to be made to ensure that processing and packaging of solid radioactive wastes based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure compliance with 10 CFR Parts 20, 61, and 71, State regulations, burial ground requirements, and other requirements governing the disposal of solid radioactive waste.
PURGE - PURGING	PURGE or PURGING shall be any controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.
QUADRANT POWER TILT RATIO (QPTR)	QPTR shall be the ratio of the maximum upper excore detector calibrated output to the average of the upper excore detector calibrated outputs, or the ratio of the maximum lower excore detector calibrated output to the average of the lower excore detector calibrated outputs, whichever is greater.
RATED THERMAL POWER (RTP)	RTP shall be a total reactor core heat transfer rate to the reactor coolant of ~~3586.6~~ 3645 MWt.
SINGLE-FAILURE PROOF LOAD HANDLING SYSTEM	Cranes meeting requirements of ASME NOG-1-2004, NUREG-0554 and NUREG-0612, as applicable. Special Lifting Devices meeting requirements of NUREG-0612, Section 5.1.6(1)(a). Lifting devices that are not specially designed that meet the requirements of NUREG-0612, Section 5.1.6(1)(b). Interfacing lift points such as lifting lugs or cask trunions meet the requirements of NUREG-0612, Section 5.1.6(3).

3.3 INSTRUMENTATION

3.3.k Feedwater Flow

TLCO 3.3.k The Leading Edge Flow Meter system shall be OPERABLE.

APPLICABILITY: MODE 1, with THERMAL POWER > 98.3% RTP.

ACTIONS

------------------------------------ NOTE ------------------------------------
TLCO 3.0.d.2 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. LEFM system inoperable.	A.1	Restore LEFM system to OPERABLE status.	72 hours
B. REQUIRED ACTION and associated COMPLETION TIME of CONDITION A not met.	B.1	Reduce power to ≤ 98.3 RTP.	Immediately

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
TSR 3.3.k.1 Perform CHANNEL CHECK.	Prior to exceeding 98.3% RTP AND Once per 24 hours thereafter
TSR 3.3.k.2 Perform CHANNEL CALIBRATION.	Once per 18 months