BI-WEEKLY NOTICE → MLO106701 62

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January 25, 2001

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Grand Gulf Nuclear Station
Docket No. 50-416
License No. NPF-29
Control Rod Scram Time Testing Frequency
Proposed Amendment to the Operating License, LDC 2001-001

GNRO-2001/00002

Gentlemen:

Attached for your review and approval are proposed changes to the Grand Gulf Nuclear Station (GGNS) Technical Specifications (TS). This proposed amendment requests an increase in the control rod scram time testing interval from 120 days to 200 days of full power operation. Entergy considers this change to be a cost beneficial burden reduction item.

The discussion and justification for the change in testing interval is provided in the attachment to this letter. This amendment request has been reviewed and accepted by the Plant Safety Review Committee and the Safety Review Committee.

The proposed change has been evaluated in accordance with 10CFR50.91(a)(1) using criteria in 10CFR50.92(c) and it has been determined that this change involves no significant hazards considerations. The bases for these determinations are included in the attached submittal.

The proposed change introduces no new commitments.

Entergy Operations requests that the effective date for this TS change to be within 60 days of approval. Although this request is neither exigent nor emergency, your prompt review is requested.

A001

Pursuant to 28 U. S. C. A. Section 1746, I declare under penalty of perjury that the foregoing is true and correct. Executed on January 25, 2001.

Very truly yours,

William A Eaton

/abs
Attachments: 1. Proposed Technical Specification Change
2. Markup Of Current Technical Specifications
3. Markup of Technical Specifications Bases

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ATTACHMENT 1

TO

GNRO-2001/00002

PROPOSED TECHNICAL SPECIFICATION CHANGE

AND

RESPECTIVE SAFETY ANALYSES

IN THE MATTER OF AMENDING

LICENSE NO. NPF-29

ENTERGY OPERATIONS, INC.

GRAND GULF NUCLEAR STATION

DOCKET NO. 50-416

DESCRIPTION OF PROPOSED CHANGES

1. The following Technical Specification is affected by the proposed change:

   SR 3.1.4.2 Control Rod Scram Times Surveillance Requirement

   The proposed change revises the frequency for performing sample tests of control rod insertion time from 120 days cumulative operation in MODE1 to 200 days cumulative operation in MODE 1.

2. The following Technical Specification Bases are affected by the proposed change. Since the Technical Specification Bases are controlled under the 10CFR50.59 Program, the markup of the Bases Sections are provided for information only:

   B SR 3.1.4.2

   The proposed change revises the frequency for performing sample tests of control rod insertion time from 120 days to 200 days. No text change is required other than this numerical change.

BACKGROUND

GGNS Technical Specifications are written to assure proper function of control rod insertion through the use of surveillance testing. Following each refueling outage and each reactor shutdown of 120 days or more, all control rods are tested. In addition, for long periods of continuous operation, Technical Specification SR 3.1.4.2 requires a representative sampling as follows:

> Surveillance: Verify, for a representative sample, each tested control rod scram time is within the limits of Table 3.1.4-1 with the reactor steam dome pressure ≥ 950 psig.
>
> Frequency: 120 days cumulative operation in Mode 1.

The basis to TS SR 3.1.4.2 defines a representative sample as "at least 10% of the control rods." There are 193 rods, so the minimum number of rod tests performed is 20. A successful test requires that less than 20% of the rods fail the scram time criteria, e.g., no more than 3 rods in 20 tested can be "slow" when compared to the scram time limits listed in TS Table 3.1.4-1. Otherwise the test sample is increased until less than 20% of the rods fail the time criteria. The Limiting Condition for Operation (LCO) allows up to 14 (7.5%) to be "slow" in the entire core and prevents two OPERABLE "slow" rods occupying adjacent locations.

BWR control rod positions are measured by "notch" positions with notch 48 fully withdrawn and notch 00 fully inserted. Technical Specification Table 3.1.4-1 specifies allowable scram times as a function of notch position and steam pressure. In practice,

the critical criteria has been to insert the control rod from notch 48 to notch 43 in less than 0.3 seconds if the reactor steam dome pressure is 950 psig, in less than 0.31 seconds if the pressure is 1050 psig, and an interpolated time is used if the pressure is between 950 and 1050 psig. There are also notch time requirements for notches 29 and 13, but in practice, all tests which failed to meet the notch 29 and 13 requirements, had first failed to meet the notch 43 requirement.

The 120-day testing interval currently required by TS SR 3.1.4.2 imposes an undue burden on plant operation. Due to fuel operating restrictions, each test requires a power reduction to perform this evolution. GGNS would like to extend the period between testing to up to 200 days. This would allow more efficient overlap of the rod insertion timing test with the control rod sequence exchanges. Sequence exchanges are necessary approximately every 12 – 14 weeks (84 – 98 days). The extended test interval would allow insertion tests to be performed every other time the control rod-sequence exchange is performed since these exchanges also require a power reduction. In general, scram time testing complicates the sequence exchange maneuver, increases the amount of off-rated operating time, and increases the total number of rod movements during the sequence exchange. The complications of scram time testing result in increased opportunity for reactivity related personnel errors or equipment malfunctions.

BASIS FOR PROPOSED CHANGE

Grand Gulf rod insertion time test results show an extremely high success rate. Of the one hundred ninety three (193) control rod drive mechanisms installed in the reactor at GGNS, one hundred thirty two (132) have been in operation since Cycle 1. Excluding a period early in Cycle 7 that is discussed below, 7,660 rod insertion tests have been performed with only 12 resulting in an insertion time slower than the Table 3.1.4-1 allowable time. Since this testing is a sampling process, it is recognized that probability of detection is the critical factor used in the initial requirement of 10% sampling every 120 days. Now that extensive historical data has been collected, the extreme reliability demonstrated by the rod insertion system justifies a relaxation in the sampling frequency.

Extending the allowable surveillance time between the 10% sampling from 120 days to 200 days decreases the number of sampled rods. Specifically, in a long operation run of between 480 and 540 days, a 200-day surveillance schedule will typically lead to two (2) fewer performances of the rod insertion tests as compared to a 120-day schedule. With the proposed 200-day frequency, some 40 fewer rods will be tested each operating cycle (20 tests per surveillance performance). Potentially fewer "slow" rods could be detected, implying more "slow" rods may unknowingly be left in service. Per the LCO, only 14 "slow" rods in the entire core with no two "slow" OPERABLE rods occupying adjacent locations are acceptable for plant operation.

A calculation was performed to calculate the historic probability of "slow" rods and to draw conclusions for the proposed surveillance frequency of 200 days. An evaluation of the historic average times and standard deviation in time lead to the conclusion that future tests will show successful rod insertion times 99.865% of the time. This value is

the Student-t result based on the standard deviation of insertion times of all valid tests performed. The calculation also documents that for all rod insertion tests performed, excluding test data from the early part of Cycle 7, 99.84% of rods have inserted into the core faster than the TS Table 3.1.4-1 time requirements. These numbers are in reasonable agreement. However, use of the 99.84% value is more conservative and was used as the success probability in subsequent calculations in the analysis.

As noted, the relaxed rod insertion test schedule (proposed) reduces the number of rod tests by 40 each operating cycle when compared to the current test schedule. Using a value of 99.84% as a success probability, the probability of zero "slow" rods being in that batch of 40 is 0.9984^{40} =0.938. That is, it is 93.8% probable that the identical number of "slow" rods would be detected by either test frequency even for the longest uninterrupted operating cycle.

The probability of 1 "slow" rod which would have been detected by the current test frequency but not by the proposed frequency is $0.0016*.9984^{39} * 40 = 0.060$ or 6%. Only if more than 14 rods are actually "slow" or two "slow" rods are adjacent is there a potential impact on hazard significance due to reduction of scram reactivity. Thus, having one undetected slow rod as part of a SR 3.1.4.2 sampling test would have a negligible impact on hazard significance. The probability of two adjacent "slow" rods which would have been detected by the current test frequency but not by the proposed frequency is even smaller than for a single "slow" rod missing detection.

Using historical testing data, the probability of detecting more than 1 "slow" rods in 40 tests is given by the binomial formula $(.0016^{N} * 0.9984^{(40-N)})*40!/((40-N)!*N!$ where N is the number of "slow" rods. The table below gives the probabilities for several values of N:

Number of Slow Rods detected by 40 tests	Probability
0	0.937956924
1	0.060125444
2	0.00187892
3	3.81405E-05
4	5.65384E-07

The above is the probability of testing and finding a specific number of slow rods within the 40 tests that would not be performed using the new interval. Since the probability of a slow rod even existing is so low, it is very unlikely that decreasing the frequency will have a significant impact. For example, at the 120-day frequency, 80 rods would be tested during the longest credible operating run of 540 days. At the 200-day frequency, only 40 rods would be tested. The data examined in the calculation shows that only 1 "slow" rod has been detected in the last 726 tests. This provides support for the calculation conclusion that it is highly unlikely the difference of 40 rod tests will result in the discovery of additional slow rods. All control rods are tested prior to startup after each refueling; most control rods are also testing during the refueling outage. This provides additional assurance that individual problem rods would be detected.

There is no impact on plant operation or safety hazards if the technical specification LCO of 14 slow rods is not exceeded. The calculation addressed the probability that more than 4 slow rods (well below the LCO) are detected by testing. Due to the very low probability of a slow rod, the change in testing frequency has negligible impact on this likelihood. The results are:

	Startup Following Refueling	Current TS Frequency (120 days)	Proposed TS Frequency (200 days)
Number of tests over normal cycle	1	4	2
Number of rods tested over normal cycle	193	80	40
Probability of detecting more than 4 slow rods in test	1.72976E-5	2.28107E-7	6.58512E-09
Cumulative Probability of finding more than 4 slow rods over cycle (startup to next refueling)	NA	1.75257E-5	1.73042E-5

Therefore, it can be confidently stated that increasing the surveillance test frequency from 120-days to 200-days has no significant hazard impact.

The above justification notes that data for this analysis excludes the period early in Cycle 7, specifically from 11/93 to 6/3/94. In the sixth refueling outage (October to December 1993), a number of SCRAM solenoid pilot valve (SSPV) tophead assemblies were replaced. The replacement tophead assemblies were later proven to be from a limited number that were exceptionally susceptible to slow operation. All SSPV tophead assemblies that were within this group were replaced or rebuilt in a manner that eradicated the problem for the 2,344 tests that have been made since that time. This period of data was therefore excluded as being misrepresentative of what is currently installed in the plant, and misrepresentative of all future SSPV tophead assemblies. A key assumption of this justification is that the Cycle 7 event was a one-time occurrence that does not have significance for future operation. Further, the 100% rod scram test done after each refueling outage would detect any type of new generic problem in the unlikely event one were to arise. Also, any maintenance performed on the control rod drive system which could affect scram times, must be followed by post-maintenance scram time testing before declaring the control rod operable.

Due to the extremely good test data for rod insertion times collected over the last 15 years, the initial technical specification frequency of 10% sampling every 120 days can be revised. Assuming the rod insertion system functions consistent with past data – excluding one anomalous period where poor SSPV tophead assemblies were installed – extending the test interval from 120 to 200 days has no significant impact.

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Energy Operations, Inc. is proposing that the Grand Gulf Nuclear Station Operating License be amended to increase the Control Rod Scram Time Testing frequency from 120 days of full power operation to 200 days of full power operation. This will reduce the need to schedule special downpowers for control rod scram time testing or the need to perform control rod scram time testing for each control rod sequence exchange. In general, the scram time testing process complicates the sequence exchange maneuver and adds to the probability of a reactivity related event taking place.

The Commission has provided standards for determining whether no significant hazards considerations exist as stated in 10 CFR 50.92. A proposed amendment to an operating license involves no significant hazards if operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

An evaluation of the proposed change has been performed in accordance with 10CFR50.91(a)(1) regarding no significant hazards considerations using the standards in 10CFR50.92(c). A discussion of these standards as they relate to this amendment request follows:

1. **Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   The proposed change will not adversely impact plant operation. There will be no change in the method of performing the tests. The extended test frequency will provide some positive safety benefits by reducing the complexity of half of the control rod sequence exchange maneuvers, reducing the likelihood of a reactivity or fuel related event.

   The actual rod insertion times and control rod reliability are not impacted by this proposed change; only the probability of detecting slow rods is impacted. The potential consequence of the proposed change is that one or more slow rods that would have been detected under the current 120-day frequency, may not be detected due to a reduced number of tests under the 200-day frequency.

   Historical data shows that the GGNS control rod insertion function is highly reliable and rod insertion tests meet the scram time limits 99.84% of the time. Statistical analysis also demonstrates that the extended frequency would have little impact on the ability to detect slow rods in the sampling tests.

   There is no safety consequence resulting from "slow" rods so long as the plant does not exceed the Technical Specification 3.1.4 Limiting Condition of Operation requirement of no more than 14 slow rods in the entire core or no two OPERABLE "slow" rods occupying adjacent positions. It is highly unlikely that a combination of missed detections and known "slow" rods would lead to the

requirement to take action in accordance with TS 3.1.4. Therefore, it is highly unlikely that the reduction in test frequency would have any impact on plant operation or safety.

The analysis assumes that all 14 slow rods take 7 seconds to reach notch position 13 which is very conservative base on actual rod performance. Control rod data shows that rods that have failed the time requirements are usually only a fraction of a second slower. In the unlikely event that, due to the reduction of test frequency, the plant is unknowingly operating with one or two more slow rods than the 14 slow control rods permitted by the LCO, the consequences would still be insignificant. The low probability of MODE 1 operation with excess slow rods combined with the low consequence of a few excess slow rods, leads to the conclusion that the probability or consequences of accidents previously evaluated are not significantly increased.

Therefore, this change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. **Will operation of the facility in accordance with this proposedchange create the possibility of a new or different kind of accident from any accident previously evaluated?**

   The proposed change will make no change to plant configuration or test procedures. The proposed change does not impact the operation of the plant except to reduce the number of required tests and slightly increase the probability of failing to detect a slow control rod. Operating with possibly one or two undetected slow rods does not create the possibility of an accident, since sudden control rod insertion by scram only occurs during the mitigation of accidents.

   Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Will operation of the facility in accordance with this proposed change involve a significant reduction in a margin of safety?**

   The GGNS accident analyses assume a certain negative reactivity time function associated with scrams. So long as the LCO of Technical Specification 3.1.4 is met, that is, there are no more than 14 slow control rods in the entire core or two OPERABLE "slow" rods occupying adjacent locations, all accident analysis assumptions are met and there is no reduction in any margin of safety. The proposed change does not impact the Technical Specification LCO, or any other allowable operating condition. The potential for an increase in the probability of being outside acceptable operating conditions due to this proposed change is insignificant. Calculations have demonstrated that the likelihood of detecting four slow rods with proposed testing frequency over a fuel cycle is lower than that with the current testing frequency by a negligible amount (~2E-07). The difference is even smaller for detecting greater number of slow rods over a cycle. Therefore, since there is no impact on allowable operating parameters and the

likelihood of detecting significant numbers of slow rods is only negligibly affected, there is no significant reduction in a margin of safety.

Therefore, this change does not involve a significant reduction in the margin of safety.

Therefore, based on the reasoning presented above and the previous discussion of the amendment request, Entergy Operations has determined that the requested change does not involve a significant hazards consideration.

ENVIRONMENTAL IMPACT EVALUATION

Pursuant to 10CFR51.22(b), an evaluation of the proposed amendment has been performed to determine whether or not it meets the criteria for categorical exclusion set forth in 10CFR 51.22 (c) (9) of the regulations. The basis for this determination is as follows:

1. The proposed license amendment does not involve a significant hazards consideration as described previously in the evaluation.

2. As discussed in the significant hazards evaluation, this change does not result in a significant change or significant increase in the radiological doses for any Design Basis Accident. The proposed license amendment does not result in a significant change in the types or a significant increase in the amounts of any effluents that may be released off-site.

3. The proposed license amendment does not result in a significant increase to the individual or cumulative occupational radiation exposure because this change does not require any change to current plant equipment or testing method. The test will be performed less frequently using the current test methodology.

ATTACHEMENT 2

TO GNRO-2001/00002

MARKUP OF CURRENT TECHNICAL SPECIFICATIONS

SURVEILLANCE REQUIREMENTS

----------NOTE----------
During single control rod scram time Surveillances, the control rod drive (CRD) pumps shall be isolated from the associated scram accumulator.

	SURVEILLANCE	FREQUENCY
SR 3.1.4.1	Verify each control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	Prior to exceeding 40% RTP after fuel movement within the reactor pressure vessel AND Prior to exceeding 40% RTP after each reactor shutdown ≥ 120 days
SR 3.1.4.2	Verify, for a representative sample, each tested control rod scram time is within the limits of Table 3.1.4-1 with reactor steam dome pressure ≥ 950 psig.	200 ~~120~~ days cumulative operation in MODE 1
SR 3.1.4.3	Verify each affected control rod scram time is within the limits of Table 3.1.4-1 with any reactor steam dome pressure.	Prior to declaring control rod OPERABLE after work on control rod or CRD System that could affect scram time

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ATTACHMENT 3

TO GNRO-2001/00002

MARKUP OF TECHNICAL SPECIFICATION BASES

FOR INFORMATION ONLY

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.4.2 (continued)

the tested sample are determined to be "slow." If more than 20% of the sample is declared to be "slow" per the criteria in Table 3.1.4-1, additional control rods are tested until this 20% criterion (e.g., 20% of the entire sample size) is satisfied, or until the total number of "slow" control rods (throughout the core, from all surveillances) exceeds the LCO limit. For planned testing, the control rods selected for the sample should be different for each test. Data from inadvertent scrams should be used whenever possible to avoid unnecessary testing at power, even if the control rods with data were previously tested in a sample. The ~~120~~ 200 day Frequency is based on operating experience that has shown control rod scram times do not significantly change over an operating cycle. This Frequency is also reasonable, based on the additional Surveillances done on the CRDs at more frequent intervals in accordance with LCO 3.1.3 and LCO 3.1.5, "Control Rod Scram Accumulators."

SR 3.1.4.3

When work that could affect the scram insertion time is performed on a control rod or the CRD System, testing must be done to demonstrate that each affected control rod retains adequate scram performance over the range of applicable reactor pressures from zero to the maximum permissible pressure. The scram testing must be performed once before declaring the control rod OPERABLE. The required scram time testing must demonstrate that the affected control rod is still within acceptable limits. The limits for reactor pressures < 950 psig are established based on a high probability of meeting the acceptance criteria at reactor pressures ≥ 950 psig. Limits for ≥ 950 psig are found in Table 3.1.4-1. If testing demonstrates the affected control rod does not meet these limits, but is within the 7 second limit of Table 3.1.4-1 Note 2, the control rod can be declared OPERABLE and "slow."

Specific examples of work that could affect the scram times include (but are not limited to) the following: removal of any CRD for maintenance or modification; replacement of a control rod; and maintenance or modification of a scram solenoid pilot valve, scram valve, accumulator isolation valve, or check valves in the piping required for scram.

(continued)