Attachment 1

Evaluation of the Proposed Change

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1.0 SUMMARY DESCRIPTION

This evaluation supports a request by R.E. Ginna Nuclear Power Plant, LLC (Ginna LLC) to amend Operating License DPR-18 for the R.E. Ginna Nuclear Power Plant (Ginna).

The proposed change would revise Technical Specification (TS) 3.1.7, “Rod Position Indication”. In the event that a single rod position indicator is inoperable, Action A.1 of TS 3.1.7 requires the verification of rod position by use of the movable incore detectors every 8 hours. This amendment request proposes a revision to allow the position of the rod to be monitored by a means other than movable incore detectors. Specifically, monitoring of the control rod drive gripper coil current will confirm rod position has not changed once verified by the movable incore detectors. This change would minimize excessive use and wear on the movable incore detector system. The alternate monitoring would be effective until repair of the indication system can be completed, but not longer than one operating cycle.

2.0 DETAILED DESCRIPTION

The proposed change to TS 3.1.7 will add new actions that allow the use of an alternative rod position monitoring method. Action A.3.1 and A.3.2 will be incorporated to provide for the alternative monitoring. The new requirements are as follows:

> Action A.3.1
>
> Verify the position of the non-indicating rod indirectly by using the movable incore detectors.
>
> A.3.1 Completion Time:
>
> Once within 8 hours of condition entry (or rod control system indication of potential rod movement) and every 31 days thereafter
>
> Action A.3.2
>
> Review the parameters of the rod control system for indications of rod movement for the rod with an inoperable position indicator.
>
> A.3.2 Completion Time
>
> Once within 16 hours and every 8 hours thereafter

A Note is added that will apply to the new Actions A.3.1 and A.3.2. This note describes the limitations for use of these new provisions. The following is the wording of the note:

Rod position monitoring by Actions A.3.1 and A.3.2 may be applied to only one inoperable rod position indicator and shall only be allowed until an entry into MODE 5

This ensures that the alternate monitoring may be in place for one inoperable indicator at most one refueling cycle or when the plant enters Mode 5 for a forced outage, whichever comes first.

The proposed change will provide an alternative to the use of the movable incore detectors every 8 hours for an extended period of time until repairs can be completed. Continued implementation of TS 3.1.7 Action A.1 would result in at least 90 operations of the incore detector system per month and may result in excessive wear on the system. Although wear of the incore detector system does not pose a significant reduction in the margin of safety, excessive wear could result in a loss of system functionality. This could lead to the inability to complete required surveillances, which could lead to a required plant power reduction and/or shutdown. This vulnerability has been recognized at Ginna based on actual Rod Position Indication concerns and alternate solutions have been reviewed based on prior industry efforts.

The marked up copy of the Technical Specification is provided in Attachment 2 and a re-typed version is provided in Attachment 3.

3.0 TECHNICAL EVALUATION

TS 3.1.7 ensures the rod position indicators are capable of determining the position of the control or shutdown rods. Mechanical or electrical failures may cause a control rod to become inoperable or to become misaligned from its group. Control rod inoperability or misalignment may cause increased power peaking due to the asymmetric reactivity distribution and a reduction in the total available rod worth for reactor shutdown. Therefore, control rod alignment and operability are related to core operation in design power peaking limits and the core design requirement of a minimum shutdown margin (SDM). Limits on control rod alignment and operability have been established, and all rod positions are monitored and controlled during power operation to ensure that the power distribution and reactivity limits defined by the design power peaking and SDM limits are preserved.

The axial position of control or shutdown rods is indicated by two separate and independent systems: the Bank Demand Position Indication System (commonly called group step counters) and the Microprocessor Rod Position Indication (MRPI) System. The Bank Demand Position Indication System counts the pulses

from the Rod Control System that move the rods. There is one step counter for each group of rods. Individual rods in a group all receive the same signal to move and should all be at the same position indicated by the group step counter for that group. The Bank Demand Position Indication System is considered highly precise (± 1 step or ± 5/8 inch).

The MRPI System provides a highly accurate indication of actual control rod position, but at a lower precision than the step counters. The MRPI system consists of one digital detector assembly per rod. All the detector assemblies consist of one coil stack which is multiplexed and becomes input to two redundant MRPI signal processors. Each signal processor independently monitors all rods and senses a rod bottom for any rod. The MRPI system directly senses rod position in intervals of 12 steps for each rod. The digital detector assemblies consist of 20 discrete coil pairs spaced at 12-step intervals. The true rod position is always within ± 8 steps of the indicated position (± 6 steps due to the 12-step interval and ± 2 steps transition uncertainty due to processing and coil sensitivity). With an indicated deviation of 12 steps between the group step counter and MRPI, the maximum deviation between actual rod position and the demand position would be 20 steps, or 12.5 inches.

Operators use the MRPI system to monitor the position of the rods to establish that the plant is operating within the bounds of the accident analysis. Power peaking, ejected rod worth, or SDM limits may be violated in the event of a Design Basis Accident with control or shutdown rods operating outside their limits undetected. Design, Limitations, and Operation of the Rod Position Indication System are discussed in the following sections of the Updated Final Safety Analysis Report (UFSAR)

4.3, "Reload Core Nuclear Design"
7.7, "Control Systems Not Required for Safety"
15.0, "Accident Analysis"

Should a technical problem arise with MRPI components inside containment, limited actions can be taken while the unit is operating. This is due to the adverse radiological and temperature environment that exists near the reactor head area. Repairs to the MRPI coils requires removal of the shroud and shield assembly that provides a duct system for the control rod drive mechanism cooling air flow. Inspection access doors are provided, however repair of the MRPI coil cannot be performed with the head assembly package in place. Repairs cannot be performed safely until the unit is in cold shutdown conditions (MODE 5). While troubleshooting and limited repairs can be performed in MODES 1 – 4, these are not encompassing of all credible failure modes.

Ginna considers the proposed monitoring of the status of the stationary gripper coil to be a valid means of monitoring the position of a rod once the position is confirmed through the use of the moveable incore detectors. Ginna plans to

monitor the coil until the unit enters Mode 5 and repairs to the system can be safety implemented. The monitoring of the position in this manner also has an added benefit that it will alleviate a concern regarding the potential for excessive wear of the incore monitoring system due to the use of the incore detectors every 8 hours to comply with Action A.1 of TS 3.1.7.

In evaluating the requested change, the following operational events impacted by rod drop or rod misalignment were considered:

- Rod Drop or Rod Misalignment During Power Operations
- Rod Drop or Rod Misalignment During Reactor Startup
- Reactor Trip
- Shutdown Margin

Rod Drop or Rod Misalignment During Power Operation

A full rod drop of a control or shutdown rod will be immediately detectable by means other than the position indication system. Independent indication of a dropped rod is obtained by using the excore power range signals. This rod drop detection circuit is actuated when a rapid decrease in the local neutron flux is sensed in any of the four channels. The circuitry is designed to accommodate normal load variations in order to avoid spurious actuation. Furthermore, a negative reactivity insertion corresponding to the reactivity worth of a full rod drop will cause a noticeable change in core parameters including core power and core average temperature.

A rod misalignment may also be detectable by other measure such as axial flux difference, channel deviation, and rod control stationary regulation failure detection alarms. Based on these factors, operator actions will be initiated which are not dependent on the status of the individual rod position indication system. For the infrequent instances when control rod bank movement is required during power operation, a determination of rod position will be made by using the movable incore detector system in accordance with plant procedures.

Considering the available indications and alarms, the increase in the likelihood of an undetected rod drop or misalignment is considered to be negligible while the alternate monitoring is used in conjunction with the other available rod drop and misalignment parameter indications.

Rod Drop or Rod Misalignment During Reactor Startup

For a situation where there is an unplanned outage that does not result in an entry into Mode 5 and repairs are not possible in a higher Mode, Ginna plans to use the alternate monitoring. Since the movable incore detectors cannot be used to determine rod position until sometime after entry into Mode 2 when neutron flux becomes adequate, the alternate method may be used to verify that the rod is fully withdrawn, by monitoring CRDM traces. Rod position verification using this method will permit startup and entry into Mode 2. As a second diverse check, the movable incore detectors will be used to verify rod position when neutron flux becomes adequate. Following verification that the rod is withdrawn, a rod misalignment would be detectable by means other than the MRPI system (CRDM trace monitoring, axial flux difference, channel deviation, and rod control stationary regulation failure alarms). The required operator actions would not be dependent on the status of the individual rod position indication from MRPI. Therefore, the increase in the likelihood of an undetected rod drop or misalignment during reactor startup is considered to be negligible.

Reactor Trip

Following a reactor trip, the position indication system is used to verify that all rods have fully inserted. Boration is required if one or more rods fails to fully insert. If it cannot be verified with MRPI indication that all rods are on the bottom, then procedure ES-0.1, “Reactor Trip Response”, currently requires boration to account for each rod not fully inserted.

Shutdown Margin

Shutdown Margin in Modes 1 and 2 with Keff ≥ 1.0 is ensured by verifying that control bank and shutdown bank rods are within limits specified in the Core Operating Limits Report (COLR). The rod insertion limit circuit is designed to provide a continuously calculated insertion limit for each of the control banks that is variable with power. It provides alarms to ensure that the operator keeps the control rods located within the limits. The rod insertion limit circuit performs its function by receiving control bank position data from the rod control system. It compares this data to the calculated limit that is determined by reactor power as measured from the coolant loop average differential temperature (delta T). The rod insertion limits ensure that adequate shutdown margin exists to shut down the reactor at any time and condition in the life of the core. The rod insertion limit monitoring circuit is independent of the rod position indication circuit. Inoperability of the rod position indication has no impact on the rod insertion limit monitoring and therefore has no impact on the ability of operators to verify Shutdown Margin. The proposed alternate method to monitor the stationary gripper coil for a control rod with an inoperable rod position indicator will provide assurance that the position has not changed and remained within the allowed misalignment with

the group step counter demand position for the affected control rod and the control rod bank insertion limits of TS 3.1.5 and 3.1.6.

Shutdown Margin in Mode 2 with Keff < 1 and Modes 3, 4, and 5 is determined in accordance with TS 3.1.1 by comparing the RCS boron concentration to a shutdown margin requirement curve that was generated by taking into account estimated RCS boron concentrations, core power defect, control bank position, RCS average temperature, fuel burnup based on gross thermal energy generation, xenon concentration, samarium concentration, and isothermal temperature coefficient. While in these Modes, the MRPI system is relied upon to determine rod position. While a single rod position indicator remains out of service, rod position cannot be easily determined. Accordingly, the RCS boron concentration requirements will be increased to consider an allowance for the withdrawn worth of a control rod with an inoperable position indicator. Procedure ES-0.1 currently requires boration to account for any rod that cannot be verified to be fully inserted. Shutdown Margin Calculations performed in procedures O-3, “Hot Shutdown with Xenon Present” and O-3.1, “Boron Concentration for the Xenon Free All Rods In – Most Reactive Rod Stuck Out Shutdown Margin” will require revision to account for the rod with inoperable indication in addition to the most reactive rod assumed to be fully withdrawn.

Adequacy of the Proposed Monitoring

The parameter monitored for a control rod or shutdown rod with an inoperable position indicator will be the stationary gripper coil current. The control rods are held in place by energized stationary gripper coils. The control rod cannot be moved without de-energizing the stationary gripper coil. The rod control power cabinet uses a resistor to monitor coil current. The gripper coil current (measured as an equivalent voltage) will be monitored on a temporary digital recorder located next to the rod control cabinet. This will allow for trending and historical data retrieval. A deviation between the actual current and the reference current will result in an Urgent Alarm signal sent to the logic cabinet and the control room annunciator. The monitored points are the same as those currently monitored by the rod control drive regulation failure detector circuit.

Since the monitoring will be performed by Operations, Ginna proposed to continue the monitoring to determine if the coils have changed state on a once every 8 hour basis. Should the parameters of the coils of the monitored rod indicate movement, a determination of the position of the rod will be made using the movable incore detectors within 8 hours. This timeframe is consistent with existing TS 3.1.7 Action A.1. Since verification with incore detectors is performed within 8 hours, continued monitoring of rod control system parameters is not required until 16 hours after rod movement is identified. In practice, this would occur 8 hours after verification is performed with movable incore detectors.

To provide a verification of the reliability of the alternate monitoring, rod position is verified by moveable incore monitoring every 31 days. This frequency minimizes use of the movable incore monitoring system and can be performed concurrently with existing surveillance requirements for Hot Channel Factors.

A note has been added to TS 3.1.7 to ensure that the alternate monitoring requirements are not used as a long term means of verifying rod position. The intended use of this alternate is to allow for monitoring until the plant enters Mode 5 and repair of the MRPI indication can be safety performed. This ensures that at most, the alternate is used for 18 months or one operating cycle.

Compliance with either Action A.1 or the proposed Action A.3 will result in the verification of the position of the affected rod within 8 hours by use of the movable incore detectors. Based on available information, the monitoring of the stationary gripper coil of the CRDM on the non-indicating rod as defined in proposed action A.3 will be initiated.

Impact on Indication and Alarms

The following table provides a summary of the indications and alarms and how they are affected by the inoperable RPI for a control rod or shutdown rod.

Function	**Indication / Alarm**	**Normal Operation**	**Affected by Modified Operation**
Microprocessor Based Rod Position Indicator	MRPI Panel	Provides digital rod position reading for control rod or shutdown rod	This indication will be unavailable and considered out-of-service for the control rod or shutdown rod with the inoperable position indication
Rod Bottom Indication	MRPI Panel	Provides digital indication that all rods are on the bottom	This indication will be unavailable and considered out-of-service for the control rod or shutdown rod with the inoperable position indication
Rod Bottom / Rod Drop Annunciation	Annunciator Window C-14 – Rod Bottom	This annunciation is actuated when any shutdown bank rod is within 8 steps to the bottom of the core or when a control bank rod is within 8 steps of rod bottom while the remainder of the bank is greater than 31 steps above core bottom.	The ability of the control rod or shutdown rod to actuate this annunciation will be disabled. All other control rods or shutdown rods with operable indicators will actuate this annunciator.
Rod Deviation Annunciation	Annunciator C-5 – PPCS Rod Sequence or	This annunciation is actuated with a rod exceeds 12 steps from bank position or the	This indication is driven by the control rod drive system and is therefore unaffected by the inoperable rod

	Rod Deviation	rods are moving out of normal bank overlap sequence.	position indicator.
Rod Insertion Limit Monitor	Annunciator Windows: C-7, 8, 15, 16, 23, 24, 31, 21 – Low Limit and Low-low Limit	This annunciation is actuated for any control rod bank at or below the limits calculated by the rod insertion limit circuit.	This indication is driven by the control rod drive system and is therefore unaffected by the inoperable rod position indicator.
Rod Trouble Indication	Annunciator Window C-30	This annunciation is actuated for any condition that prevents proper rod motion or is indicative of potentially undesirable rod motion.	This indication is driven by the control rod drive system and is therefore unaffected by the inoperable rod position indicator. This annunciator is used in conjunction with the local alternate monitor to identify unintended rod motion. Any CRDM coil current that does not match demand will cause this alarm.

Compensatory Measures

To compensate for unavailable indication, the alternate monitoring system will record stationary gripper coil current. Since verification with the incore movable detector system is required within 8 hours of any rod motion, this provides a level of assurance greater than or equal to existing TS 3.1.7 action A.1.

Site procedures provide the option to also monitor lift coil current. While this option does not impact proposed Technical Specification Required Actions, this option provides additional information for verification of rod steps, which can be used during startup prior to use of the incore detectors.

Rod movement of > 24 steps since the last determination of rod position is a separate entry condition of TS 3.1.7. Required Action B.1 requires verification of position of rods with inoperable position indicators using movable incore detectors within 4 hours if rod movement of > 24 steps in one direction has been performed since the last determination of rod position. If this cannot be performed, then Required Action B.2 states that Thermal Power must be reduced to ≤ 50% Rated Thermal Power. This condition and required actions remain unaffected by the alternate indication.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements / Criteria

The objectives of the rod control system and rod position indication system are to ensure that control rod alignment and insertion limits are maintained. Operators use the MRPI system as well as Rod Control System indications to monitor the positions of the rods and to establish that the plant is operating within the bounds of the accident analysis assumptions. Maximum rod misalignment is an initial condition assumption in the accident analysis.

General Design Criterion (GDC) 13 in Title 10 of the Code of Federal Regulations Part 50, Appendix A, specifies that instrumentation shall be provided to monitor variables and systems over their operating ranges during normal operation, anticipated operation occurrences, and accident conditions. Ginna TS 3.1.7 requires operability of the shutdown and control rod Position Indication system and bank demand position indication systems, and thereby provides additional measures to ensure compliance with the control rod alignment and insertion limits. The proposed alternative monitoring maintains compliance with GDC 13.

4.2 Precedents

The proposed change is similar to changes approved for Sequoyah Units 1 and 2, and Turkey Point Units 3 and 4. Sequoyah submitted an amendment request on July 6, 2006 (Ref. 6.1) and was approved by the NRC on December 11, 2006 (Ref 6.2). Turkey Point submitted on November 12, 2007 (Ref. 6.3) and was approved by the NRC on January 28, 2008 (Ref. 6.4).

4.3 Significant Hazards Consideration

Ginna LLC has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change provides an alternative method for verifying rod position of one rod. The proposed change meets the intent of

the current specification in that it ensures verification of position of the rod once every 8 hours. The proposed change provides only an alternative method of monitoring rod position and does not change the assumptions or results of any previously evaluated accident. Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed change provides only an alternative method of determining the position of one rod. No new accident initiators are introduced by the proposed alternative manner of performing rod position verification. The proposed change does not affect the reactor protection system. Hence, no new failure modes are created that would cause a new or different kind of accidents from any accident previously evaluated. Therefore, operation of the facility in accordance with the proposed amendments would not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The basis of TS 3.1.7 states that the operability of the rod position indicators is required to determine control rod positions and thereby ensure compliance with the control rod alignment and insertion limits. The proposed change does not alter the requirement to determine rod position but provides an alternative method for determining the position of the affected rod. As a result, the initial conditions of the accident analysis are preserved and the consequences of previously analyzed accidents are unaffected. Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

Based on the above, Ginna 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.

4.4 Conclusions

Ginna LLC concludes, based on the considerations discussed above that (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) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed amendment changes requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The proposed amendment involves no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite, and no significant increase in individual or cumulative occupational radiation exposure. Ginna LLC review concluded that the proposed amendment involves no significant hazards consideration and meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

6.1 Sequoyah Nuclear Plant (SQN) Units 1 and 2 – Technical Specifications (TS) Change 06-04, Monitoring of Control or Shutdown Rod Position By An Alternate Means", July 6, 2006

6.2 Sequoyah Nuclear Plant, Units 1 and 2 – Issuance of Amendment Regarding Alternate Rod Position Monitoring Method, December 11, 2006, (TAC NOS. MD2514 AND MD2515) (TS-06-04)

6.3 Turkey Point Unit 4 Proposed License Amendment, "Inoperable Rod Position Indication", November 12, 2007

6.4 Turkey Point Units 3 and 4 – Issuance of Amendments Regarding Technical Specifications 3.1.3.2, "Position Indicating Systems – Operating" to allow for the use of an alternate method to monitor rod position for a rod with an inoperable analog rod position indication, January 28, 2008, (TAC No. MD7349 and MD7350)