Progress Energy

10 CFR 50.90

Serial: RNP-RA/12-0115

DEC 0 7 2012

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION FOR REVIEW REGARDING DELETION OF THE REACTOR TRIP ON STEAM GENERATOR WATER LEVEL LOW COINCIDENT WITH STEAM FLOW/FEEDWATER FLOW MISMATCH FROM THE TECHNICAL SPECIFICATIONS

By letter to the U. S. Nuclear Regulatory Commission (NRC) dated September 6, 2012, (Agencywide Documents Access and Management System Accession No. ML12263A424), Carolina Power and Light Company, now doing business as Progress Energy, proposed to delete Function 14 from H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, Technical Specification (TS) Table 3.3.1-1. Function 14 is the reactor trip on steam generator (SG) water level low concurrent with steam flow/feedwater flow mismatch.

By letter dated November 8, 2012, (ADAMS Accession No. ML12311A106) the NRC staff requested additional information needed to continue its review of the proposed license amendment.

Progress Energy's response to the request for additional information is provided in the enclosure to this letter.

This letter contains no new Regulatory Commitments.

If you have any questions concerning this matter, please contact Mr. Richard Hightower, Supervisor – Licensing/Regulatory Programs at (843) 857-1329.

I declare under penalty of perjury that the foregoing is true and correct. Executed On:

DECEMBER 7, 2012

Sincerely,

W. R. Hightower for

Sharon A. Wheeler
Manager - Support Services - Nuclear

A001
NRR

Progress Energy Carolinas, Inc.
Robinson Nuclear Plant
3581 West Entrance Road
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SAW/sjg

Enclosure: Response to Request for Additional Information Regarding H. B. Robinson Steam Electric Plant, Unit 2 License Amendment Request Regarding Deletion of the Reactor Trip on Steam Generator Water Level Low Concurrent with Steam Flow/Feedwater Flow Mismatch from the Technical Specifications

cc: Mr. V. M. McCree, NRC, Region II
Ms. A. T. Billoch-Colon, NRC Project Manager, NRR
NRC Resident Inspector, HBRSEP Unit No. 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING H.B. ROBINSON STEAM ELECTRIC PLANT UNIT 2 LICENSE AMENDMENT REQUEST REGARDING DELETION OF THE REACTOR TRIP ON STEAM GENERATOR WATER LEVEL LOW CONCURRENT WITH STEAM FLOW/FEEDWATER FLOW MISMATCH FROM THE TECHNICAL SPECIFICATIONS
DOCKET NO. 50-261

NRC REQUEST FOR ADDITIONAL INFORMATION (RAI)

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated September 6, 2012 (Agencywide Documents Access and Management System Accession No. ML12263A424), Carolina Power & Light Company (the licensee), doing business as Progress Energy Carolinas, submitted a license amendment request (LAR) for H.B. Robinson Steam Electric Plant, Unit 2 (HBRSEP). The LAR requests approval to delete Function 14, Steam Generator (SG) Water Level – Low Coincident with Steam Flow/Feedwater Flow Mismatch, from Technical Specifications (TS) Table 3.3.1-1, Reactor Protection System Instrumentation. The NRC staff has been reviewing the submittal and has determined that additional information is needed to complete its review.

NRC RAI #1

1. Reference 1 of Section 6.0 of the LAR refers to the Westinghouse Nuclear Safety Advisory Letter NSAL-96-004 "Control and Protection System Interactions," dated August 14, 1996 (ADAMS Accession No. ML052570651). ADAMS search indicates ML052570651 is for a non-proprietary version of Enclosure 1A of Supplemental Licensing Input L-2005-171, dated July 2005.

   Provide the correct reference for the proprietary version of the document that the staff should use for the LAR review.

PROGRESS ENERGY RESPONSE TO RAI #1

A copy of Westinghouse Nuclear Safety Advisory Letter NSAL-96-004 as transmitted to HBRSEP in 1996 is presented in Attachment 1. Westinghouse NSAL-96-004 was not transmitted to HBRSEP as a proprietary document. ADAMS Accession No. ML052570651 contains portions of documentation submitted in support of a license amendment request for Turkey Point Units 3 and 4. Pages 13-16 of the 18 pages in ADAMS Accession No. ML052570651 contain a copy of Westinghouse Nuclear Safety Advisory Letter NSAL-96-004.

NRC RAI #2

2. It is stated in the last paragraph of page 3 of the enclosure to the LAR, that each reactor protective system (RPS) level signal is provided to the median selector via an isolation device to separate the qualified and non-qualified portions of the system.

   Provide schematic diagrams and relevant documents and/or explanations on the RPS and control loops involved, indicating where the isolation devices are located, how the isolation devices are qualified and how the RPS and the control loops will comply to the requirements of the Institute of Electrical and Electronics Engineers (IEEE) Standard 279-1971, especially Clause 4.7.2.

   In addition, confirm that the proposed modification does not negatively impact the licensee's compliance with IEEE Standard 279-1971, Clause 4.9, with respect to checking the steam generator levels sensors.

PROGRESS ENERGY RESPONSE TO RAI #2

Isolation was required and provided in the original design between control and protection circuits for compliance with IEEE Standard 279-1971, Clause 4.7.2. Additional actions were required by IEEE Standard 279-1971, Clause 4.7.3, for the original design to protect against a postulated second random failure within the steam generator level controls and ensure that the protection system would still provide the required protective action. This additional action was the inclusion of the Low Steam Generator Level coincident with a Steam Flow/Feed Flow Mismatch Reactor Protection System (RPS) trip. The addition of the Median Selector Switch (MSS) within the control portion of the Steam Generator Level circuits eliminates the need for the additional actions in order to provide compliance with IEEE Standard 279-1971, Clause 4.7.3.

The isolation devices used in the Hagan system were originally, and are still, qualified for 1E safety to non-safety isolation by the manufacturer. Specific feedwater control for each loop was originally, and is still, supplied from the isolation device to the respective control loop to meet the requirements of IEEE 279-1971, Clause 4.7.2. The installation of the MSS utilized three existing and redundant isolated signals on the control side of the circuit within the Steam Generator Level System. With the MSS installed, a valid level signal is provided to the control system in the event a single failure causes any one of the level signals to become invalid. No interaction with the protection system will occur. The configuration and qualification of the isolation devices has not been affected by the addition of MSS. The configuration of control, protection, and isolation post modification is depicted in Attachment 2.

There is no negative impact on the ability to check the steam generator level sensor inputs with respect to IEEE 279-1971, Clause 4.9. Calibration procedures are in place and can be used to calibrate all modules used for the MSS both online and during shutdown. Calibration procedures provide for injecting analog signals and verification of the correct translation of the control outputs while bypassing a channel. In addition there are computer points for each signal

provided to the MSS which can be used to verify each signal through cross checking. These methods provide sensor checks which meet the criteria of IEEE-279-1971, Clause 4.9.

NRC RAI #3

3. Provide information on what is contemplated to be done with the devices currently used in the SG Water Level – Low, Coincident with Steam Flow/Feedwater Flow Mismatch trip function in TS Table 3.3.1-1 after the proposed elimination of this function from reactor trip, especially considering that this instrument loop can be used to provide useful information and alert on the SG water Level and Steam Flow/Feedwater Flow mismatch.

PROGRESS ENERGY RESPONSE TO RAI #3

Upon implementation of the requested Technical Specifications change the Low Steam Generator Level coincident with a Steam Flow/Feed Flow Mismatch Reactor Protection System (RPS) trip function will be deleted from the RPS and the associated trip indication will be deleted from the Annunciator First Out Panel. This will be accomplished through the removal of all relays which actuate the contacts that feed the trip relays, annunciators and computer points within the RPS. All RPS circuitry associated with the mismatch trip will be deleted. Modules within the Hagan racks associated only with the trip function will be deleted. Modules that provide indication of a mismatch will be maintained and these indications will continue to be supplied to the Steam Generator Annunciator Panel in the control room.

NRC RAI #4

4. Page 5 of the enclosure to the LAR, indicates that the proposed reactor trip to be deleted from the TS was not credited in the HBRSEP safety analyses presented in Chapter 15 of the Updated Final Safety Analysis Report (UFSAR).

   Provide a table listing the reactor trip(s) credited in the analyses for each of the events presented in the HBRSEP UFSAR Chapter 15, and show that the reactor trip on SG water level low concurrent with steam flow/feedwater flow mismatch is not one of the reactor trips credited in the Chapter 15 analyses.

PROGRESS ENERGY RESPONSE TO RAI #4

The mismatch trip is not credited in the analyses summarized in the descriptions presented in Chapter 15 of the UFSAR. The following table lists the reactor trips credited with mitigating Chapter 15 events. The Chapter 15 events not listed are bounded by an analysis listed in the table or do not result in actuation of a reactor trip function and are not explicitly analyzed using a Nuclear Steam Supply System transient response computer code.

Reactor Protection System Trip Functions Credited
in HBRSEP UFSAR Chapter 15 Analyses

UFSAR Chapter	Event	Credited Reactor Trip Function
15.1.3	Increase in Steam Flow (Excess Load)	No trip
15.1.5	Main Steamline Break Event	SI on low steam pressure/high steam flow(5)
15.2.2	Loss of External Electric Load	High pressurizer pressure or OTΔT (depending on case)
15.2.7	Loss of Normal Feedwater Flow	High pressurizer pressure(3)
15.3.1	Loss of Forced Reactor Coolant Flow	Low reactor coolant flow
15.3.2	Reactor Coolant Pump Shaft Seizure (Locked Rotor)	Low reactor coolant flow
15.4.1	Uncontrolled Rod Cluster Control Assembly (RCCA) Bank Withdrawal From Subcritical or Low Power	High flux (low setting), source range(1)
15.4.2	Uncontrolled Control Rod Assembly Bank Withdrawal at Power	High flux (high setting) or OTΔT (depending on case)(2)
15.4.3.1	Withdrawal of a Single Full-Length RCCA	High flux (high setting) or OTΔT (depending on case)
15.4.3.3	Dropped RCCA and RCCA Bank	No trip
15.4.8	Spectrum of RCCA Ejection Accidents	High flux (high setting) and high flux (low setting)
15.6.1	Inadvertent Opening of a Pressurizer Safety or Power Operated Relief Valve	Low pressurizer pressure
15.6.2	Small Break Loss of Coolant Accidents	Low pressurizer pressure
15.6.5	Loss of Coolant Accidents	None credited(4)

Footnotes:

(1) In Modes 3, 4, and 5, power range – low reactor trip is not required to be operable in Modes 3, 4, and 5. Thus, the source range neutron flux trip is credited for mitigating the rod withdrawal from subcritical accident (UFSAR 15.4.1) in these Modes. AREVA has analyzed the event conservatively assuming the reactor trips on the power range high flux – low reactor trip.

(2) The OPΔT trip does not cause a reactor scram, but does provide protection during slow transients not characterized by localized radial power redistribution.

(3) The steam generator low-low level trip is also modeled in the analysis, however it is not the first reactor scram signal.

(4) The low pressurizer pressure trip would occur, but this is not credited in the analysis.

(5) Reactor trip on low pressurizer pressure occurs in some cases. However, this only happens in the Hot Zero Power cases in which the rods are already inserted.

United States Nuclear Regulatory Commission
Attachment 1 of Enclosure to Serial: RNP-RA/12-0115
4 Pages (including cover page)

Westinghouse Nuclear Safety Advisory Letter NSAL-96-004 "Control and Protection System Interactions," dated August 14, 1996 3 pages

Westinghouse Energy Systems Business Unit

ESBU

NUCLEAR SAFETY ADVISORY LETTER

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 15230-0355

Suoject: Control and Protection Interaction	Number: NSAL-96-004
Basic Component: Instrumentation Tap/Impulse Line	Date: 8/14/96
Plants: Westinghouse NSSS Plants per "Summary" Below	
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(c)(2)	Yes ☐

Reference:

SUMMARY

This NSAL is only applicable to those plants with three narrow range steam generator water level channels that have removed the low feedwater flow trip function on the basis that a median signal selector (MSS) on the level control signal input precluded the need for this back-up protection for a control/protection interaction scenario. This design did not address the failure of a common tap for steam flow and narrow range steam generator level for which the low feedwater flow also provided back-up protection to satisfy IEEE-279 requirements.

Westinghouse has determined that this issue is not reportable pursuant to 10 CFR Part 21. Recommended actions are provided for plants using either an analog MSS or the Advanced Digital Feedwater Control System.

Additional information, if required, may be obtained from the originator. Telephone 412-374-5953.

Originator(s): J. T. Crane for
R. B. Miller
Regulatory & Licensing Initiatives

J. S. Galembush, Acting Manager
Regulatory & Licensing Initiatives

ISSUE DESCRIPTION

Some plants with three narrow range steam generator level channels have installed a median signal selector (MSS) on the control side and deleted the low feedwater flow trip function. This trip function was necessary to provide a back-up to prevent a control and protection interaction scenario involving level channel failures. The MSS precluded an inadvertent control action from a postulated level channel failure and, therefore, it was determined that the back-up trip was not required. This design did not address a failure of the common tap for a steam flow channel and a narrow range steam generator level channel for which the low feedwater flow trip was also a backup. If this tap or impulse line were to sever, a low steam flow signal would begin to close the feedwater control valve and the level channel would fail high. The level control demand signal would not have a significant impact on the rapid transient and there is a high probability that a low-low steam generator level trip would be required. IEEE-279 Section 4.7.3 states that a second random failure be considered in this situation. Since only three level channels are provided, the second postulated failure of a level channel would not satisfy the trip logic. Plants with four level channels (using separate taps) providing the low-low steam generator level trip are not impacted by the scenario.

TECHNICAL EVALUATION

Westinghouse provided guidance in the early 1970s on the installation of impulse lines for the steam flow and steam generator level channels via I&C Standards. Later plants utilize Level Systems Installation Schematics. The common tap connection is shown on these drawings. Two steam flow channels are provided for each loop, only one of which shares a tap connection with a narrow range steam generator level channel in a three level channel system.

The original design that eliminated the low feedwater flow trip could be accomplished with either an analog or digital MSS. The digital MSS is part of the Advanced Digital Feedwater Control System, which also provides either a MSS or an Arbitrator for the steam flow inputs. Although the same certification was not performed on the Arbitrator function as was done for the MSS for the steam generator level signal, redundant signal validation on steam flow provides confidence that the failure of a steam flow channel will not perturb the control system. Plants with an analog MSS on the level channels also have a selector switch for the steam flow control signal. Selecting the steam flow transmitter that is not connected to steam generator narrow range level will also preclude the problem.

ASSESSMENT OF SAFETY SIGNIFICANCE

To determine the significance of this issue, a search of INPO records was performed and no instances of tap or impulse line severance had been reported. The probability of a tap/impulse line failure coupled with another level channel of the same redundant set failing high is extremely low. Therefore, this issue is not considered to be a substantial safety hazard and will not be reported pursuant to 10 CFR Part 21. However, as stated in 10 CFR 50.55a(h), the design must meet IEEE-279 and certain actions are required to comply with the control/protection interaction section of that standard.

RECOMMENDED ACTIONS

These actions apply only to plants with a three channel low-low steam generator water level trip function that have incorporated a MSS for the control signal from these level channels and removed the low feedwater flow trip function.

The plants with an analog MSS, must either, 1) remove the steam flow control signal selector switch and connect directly to the steam flow transmitter that does not share a tap, or 2) include a statement in the Technical Specification Bases section for the Steam Generator Water Level Low-Low function to the effect that: "The steam flow selector switch must normally select the steam flow transmitter that does not share a tap connection with a narrow range steam generator water level transmitter."

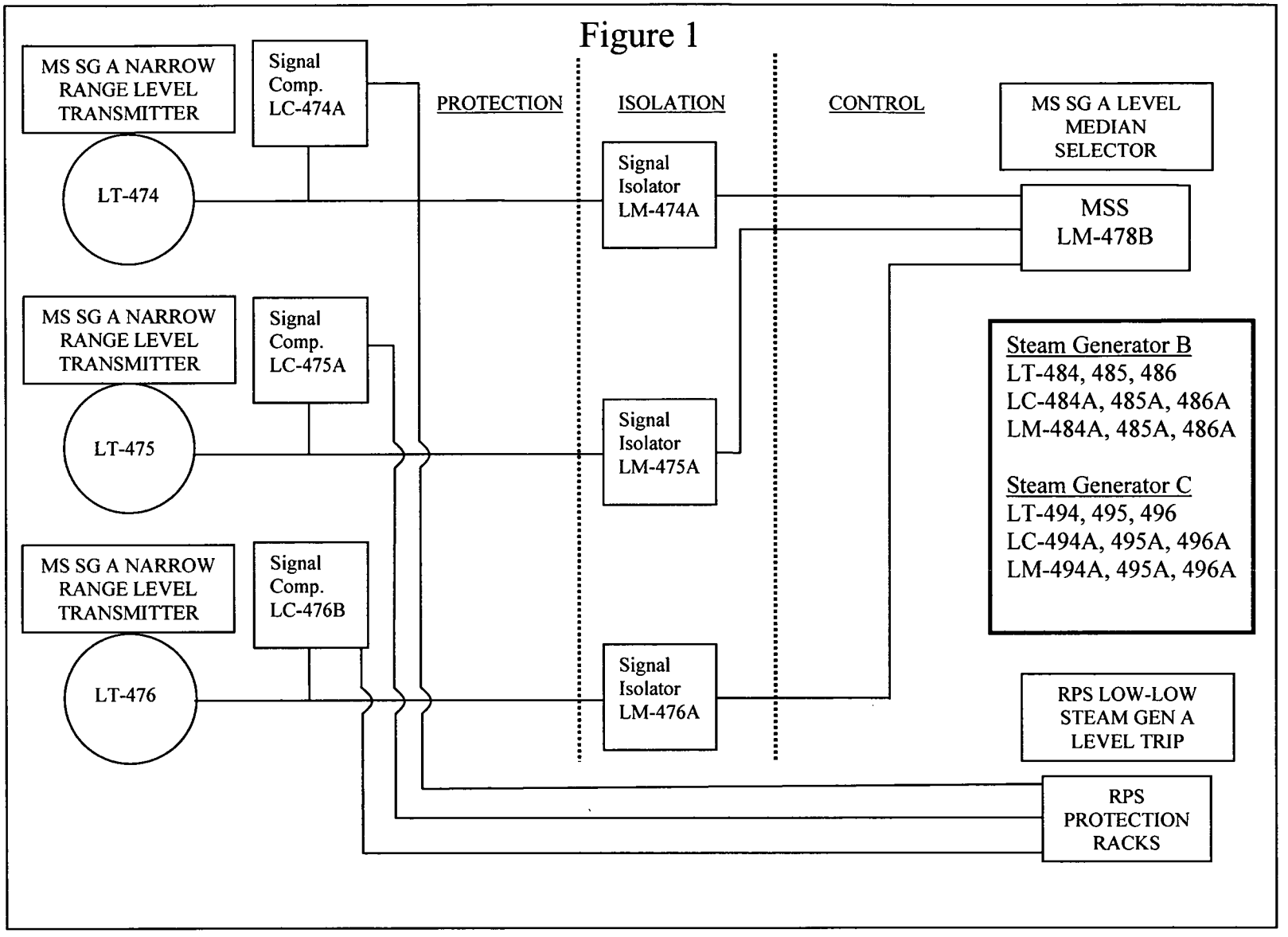
For plants with the Advanced Digital Feedwater Control Systems, Westinghouse will supplement the original licensing documentation to include the MSS/Arbitrator for the steam flow signals. There is no plant action required except a review of this documentation against their licensing bases for removal of the low feedwater flow protection function.

United States Nuclear Regulatory Commission
Attachment 2 of Enclosure to Serial: RNP-RA/12-0115
2 Pages (including cover page)

Figure 1 from EC89614R0 depicting configuration of control, protection, and isolation.

1 page

Figure 1


MS SG A NARROW RANGE LEVEL TRANSMITTER
LT-474
Signal Comp. LC-474A
MS SG A NARROW RANGE LEVEL TRANSMITTER
LT-475
Signal Comp. LC-475A
MS SG A NARROW RANGE LEVEL TRANSMITTER
LT-476
Signal Comp. LC-476B
PROTECTION
ISOLATION
CONTROL
Signal Isolator LM-474A
Signal Isolator LM-475A
Signal Isolator LM-476A
MS SG A LEVEL MEDIAN SELECTOR
MSS LM-478B
Steam Generator B
LT-484, 485, 486
LC-484A, 485A, 486A
LM-484A, 485A, 486A
Steam Generator C
LT-494, 495, 496
LC-494A, 495A, 496A
LM-494A, 495A, 496A
RPS LOW-LOW STEAM GEN A LEVEL TRIP
RPS PROTECTION RACKS