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U.S. Nuclear Regulatory Commission
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Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324
Report of 10 CFR 50.59 Evaluations, 10 CFR 72.48 Evaluations, and
Commitment Changes

Reference: Letter from Annette H. Pope (Duke Energy) to the U.S. Nuclear Regulatory
Commission Document Control Desk, *Report of 10 CFR 50.59 Evaluations, 10
CFR 72.48 Evaluations, and Commitment Changes*, dated August 10, 2016,
ADAMS Accession Number ML16238A150.

Ladies and Gentlemen:

In accordance with 10 CFR 50.59(d)(2) and 10 CFR 72.48(d)(2), Duke Energy Progress, LLC. (Duke Energy), is providing a report summarizing the 10 CFR 50.59 and 10 CFR 72.48 evaluations of changes, tests, and experiments implemented during the period from August 1, 2016, to July 31, 2018. The 10 CFR 50.59 report is provided in Enclosure 1 and the 10 CFR 72.48 report is provided in Enclosure 2. In addition, a summary of commitment changes since July 31, 2016 (i.e., the previous report of 10 CFR 50.59 Evaluations and Commitment Changes), made in accordance with Duke Energy's commitment management program (i.e., AD-LS-ALL-0010, *Commitment Management*), is provided in Enclosure 3.

No new regulatory commitments are contained in this submittal.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Manager - Regulatory Affairs, at (910) 832-2487.

Sincerely,

Bryan B. Wooten
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Brunswick Steam Electric Plant

TMS/tms

Enclosures:

1. Summary of Changes, Tests, and Experiments Requiring 10 CFR 50.59 Evaluations
2. Summary of Changes, Tests, and Experiments Requiring 10 CFR 72.48 Evaluations
3. Regulatory Commitment Change Summary Report

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Summary of Changes, Tests, and Experiments Requiring 10 CFR 50.59 Evaluations

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Title: Replacement of the Unit 2 Fuel Zone Level Digital Recorder

Evaluation Identification Number: Action Request (AR) 2070882

Brief Description:

Pressure-compensated Fuel Zone Water Level (FZWL) indications were installed under this change. The FZWL project replaced the uncompensated FZWL level recorder (LR) with a configurable Yokogawa DX1012N digital recorder, and added, in parallel with the level indicator (LI), a configurable Thermo Scientific SV10AC digital recorder. The recorders utilize analog reactor pressure inputs to establish density-compensated values for the reactor water level indications.

Summary of 10 CFR 50.59 Evaluation:

This evaluation (i.e., AR 2070882) corrected a typographical error on page 2 of the original evaluation, AR 2031186: the incorrect Engineering Change (EC) number was entered in the Technical Specification Review section.

The reactor vessel water level and reactor vessel pressure instrumentation used for Post-Accident Monitoring cannot initiate any plant transients or Updated Final Safety Analysis Report (UFSAR) described accidents. A Failure Modes and Effects Analysis (FMEA) was performed for the instrumentation loops with the new recorders. This analysis concludes that no single failure within the instrumentation loops will prevent operators from being presented with the information required for them to determine the safety status of the plant and to maintain it in a safe condition during and following an accident. The affected instruments provide indication only and cannot cause a malfunction of any Structures, Systems, or Components (SSCs) with a different result than previously evaluated. System level failures of the new instrumentation do not produce any effects different than the old system; the failure results are bounded by what was previously evaluated in the UFSAR.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07 and NEI 01-01. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 300785

Title: Upgrade of the Unit 1 Feedwater Heater Controls

Evaluation Identification Number: Action Request 1971453

Brief Description:

This activity (i.e., EC 298746) upgraded the Brunswick Unit 1 feedwater heater (FWH) drain level control valves and instrumentation on the shell side of FWHs 3A/3B, 4A/4B and 5A/5B.

Summary of 10 CFR 50.59 Evaluation:

The electrical and mechanical properties of the FWH drain level control system will not be changed in such a way that would affect the operational capabilities of the FWH drain system. The response time of the FWH drain level control system is not adversely affected by the proposed activity. The new system will not increase burdens or place constraints on an operator's ability to adequately respond to an accident. The initial accident assessments contained in the UFSAR remain unchanged. The proposed activity cannot result in more than a minimal increase in the consequences of an accident previously evaluated in the UFSAR since the FWH drain level control system does not perform any accident mitigation functions. The new equipment has been evaluated to verify compliance with its environment including temperature, humidity, seismic, and electromagnetic interference, and the new equipment will have no adverse impact on its installed environment or another plant SSC.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07 and NEI 01-01. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 298746

Title: Control Room Emergency Ventilation Compensatory Measures

Evaluation Identification Number: Action Request 2099588

Brief Description:

The required scope for this 10 CFR 50.59 evaluation was the Prompt Determination of Operability (PDO) compensatory measure of reducing the limit for Main Steam Isolation Valve (MSIV) leakage. During performance of the Control Room inleakage tracer gas test, the preliminary inleakage test results did not meet the procedural acceptance criteria. This change affects the use of different inputs for Control Room unfiltered inleakage and for MSIV leakage in the calculated Control Room dose for a Design Basis (DB) Loss of Coolant Accident (LOCA).

Summary of 10 CFR 50.59 Evaluation:

The Control Room and associated emergency ventilation equipment were evaluated for adverse impact. The threat of concern is habitability in the Control Room due to inleakage of airborne activity while the control room ventilation system is operating in radiation mode following a postulated DB LOCA.

A design calculation was generated to document no increase in calculated Control Room dose for a DB LOCA with selected values for reduced MSIV leakage along with an increased allowance for Control Room unfiltered inleakage. These evaluations were performed using the same methodology as was used for the Analysis of Record. The adjustments made to the inputs are not considered a change to an "element of a method of evaluation" based on review of NEI 96-07; each input is simply a reflection of a potential plant configuration and can be considered simple "inputs".

This activity is not a change to the basic configuration of the plant nor does it make any changes to how the plant is operated. The assumed sequence of events for a DB LOCA will continue to rely on MSIV closure and accident mode operation of Control Room ventilation equipment. There are no changes being proposed that affect the probability of a malfunction of the equipment assumed to mitigate the DB LOCA.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

AR 2097378

Title: Upgrade of the Unit 1 Turbine Control System

Evaluation Identification Number: Action Request 2115358

Brief Description:

This activity (i.e., EC 287401) installed a new Turbine Control System (TCS) replacing the existing turbine controls, in most instances providing the same control functions as the previous controls. The EC included upgrades to input sensors and output actuators to provide a digital Electro-Hydraulic Control (DEHC) system design that eliminates single-point vulnerabilities. The new TCS is designed such that no single component failure, including field devices, will result in a turbine trip or significant transient loss of control of more than a single valve, except for one-out-of-one trip inputs from Reactor Water High Level, Generator Primary Lockout Relays, Generator Backup Lockout Relays, and Generator Differential Lockout Relays. Also, a single failure will not prevent the TCS from being able to take protective actions. The new TCS is designed using a modern fault-tolerant digital control system.

Summary of 10 CFR 50.59 Evaluation:

Design and development of replacement turbine controls equipment analysis, review, and testing in accordance with Duke Energy procedures that address standards discussed in NEI 96-07, guidelines for 10 CFR 50.59 implementation; and standards authorized for development of software systems discussed in EPRI TR-102348 R1 / NEI 01-01, guidelines for digital upgrades was completed.

This evaluation addresses Turbine Control System (TCS) changes from analog to triple modular redundant (TMR) digital control, changes from a diverse mechanical and electrical overspeed turbine trip function to a redundant and diverse electrical overspeed turbine trip function, increase in trip time, Power Load Unbalance (PLU) and Reactor Water Level (RWL) response times, automating some manual functions, changing approach to pressure regulation function and conversion from hard controls to soft controls. Results of this evaluation conclude that malfunctions of the equipment do not introduce new failure modes, that replacement turbine controls equipment meet existing seismic requirements, Heating Ventilation Air Conditioning (HVAC) capacity, and electrical load margins, and that design features added to the replacement turbine controls equipment enhance the ability of the controls to perform the design functions discussed in UFSAR Sections 7.7.1.4 and 10.2.

The system response to accidents described in UFSAR Sections 15.1.4, 15.2.2, and 15.2.8 are not adversely affected. This evaluation concludes no new accidents, failure modes, or malfunctions are created by implementing this modification.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07 and NEI 01-01. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 287401

Title: Replacement of the Unit 1 Fuel Zone Level Digital Recorder

Evaluation Identification Number: Action Request 2044953

Brief Description:

Pressure-compensated Fuel Zone Water Level (FZWL) indications were installed under this change. The FZWL project replaced the uncompensated FZWL level recorder (LR) with a configurable Yokogawa DX1012N digital recorder, and added, in parallel with the level indicator (LI), a configurable Thermo Scientific SV10AC digital recorder. The recorders utilize analog reactor pressure inputs to establish density-compensated values for the reactor water level indications.

Summary of 10 CFR 50.59 Evaluation:

The reactor vessel water level and reactor vessel pressure instrumentation used for Post-Accident Monitoring cannot initiate any plant transients or UFSAR-described accidents. A Failure Modes and Effects Analysis (FMEA) was performed for the instrumentation loops with the new recorders. This analysis concludes that no single failure within the instrumentation loops will prevent operators from being presented with the information required for them to determine the safety status of the plant and to maintain it in a safe condition during and following an accident. The affected instruments provide indication only and cannot cause a malfunction of any SSCs with a different result than previously evaluated. System level failures of the new instrumentation do not produce any effects different than the old system; the failure results are bounded by what was previously evaluated in the UFSAR.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07 and NEI 01-01. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 300782

Title: Replacement of the Emergency Diesel Generator Exciter/Voltage Regulator

Evaluation Identification Number: Action Request 2144947

Brief Description:

This 10 CFR 50.59 evaluation supersedes the original 10 CFR 50.59 evaluation documented in AR 1970919 for EC 270989. The original 10 CFR 50.59 evaluation referenced the incorrect 10 CFR 50.59 Screen A/R number. This revision represents an editorial change only and does not alter the conclusion reached in the original 10 CFR 50.59 evaluation. Replacement of the motor operated potentiometer (MOP) with the RA-70 digital reference adjuster is intended to increase Emergency Diesel Generator (EDG) system reliability.

Summary of 10 CFR 50.59 Evaluation:

The RA-70 was evaluated and qualified to perform its intended function based on industry and regulatory accepted practices. The device has been fully qualified to operate in nuclear safety related applications. The software is relatively simple and has been thoroughly vetted per the requirements of EPRI TR-106439 and IEEE 7-4.3.2. The RA-70 has been environmentally qualified to operate in the EDG environment during normal and accident conditions. The failure modes and results of the RA-70 are equivalent to the failure modes and results of the MOP and the overall effect at the system level is the same.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07 and NEI 01-01. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 270989

Title: UFSAR Tornado Basis Update

Evaluation Identification Number: Action Request 1966822

Brief Description:

This 10 CFR 50.59 evaluation supports UFSAR change package 15FSAR-025. The UFSAR was revised to use tornado parameters from Regulatory Guide (RG) 1.76, Revision 1, and to more accurately describe the original BSEP tornado strike probability and tornado parameters.

Summary of 10 CFR 50.59 Evaluation:

Use of RG 1.76, Revision 1, was limited to reducing tornado parameters total speed and pressure drop. Reducing assumed design basis tornado parameters is an adverse change to an element of a method of evaluation. The change can be made without a license amendment since RG 1.76, Revision 1, based tornado parameters have been approved by the NRC for the intended application. To avoid concerns about mixing methods, the reduced parameters were only used for evaluation of items that do not also provide missile protection.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

UFSAR Change Package 15FSAR-025
AR 727102

Title: Traversing In-Core Probe Temporary Jumper

Evaluation Identification Number: Action Request 2194691

Brief Description:

Pin #24 of cable NF4-QA7 that terminates at outboard drywell electrical penetration 1-X-104A was loose and continuity to the Traversing In-Core Probe (TIP) Index Mechanism 1-C51-J002C Limit Switch S2 was unreliable. The loose connection mimicked the effect of an open contact, preventing operation of the indexer even when the probe is fully withdrawn. Temporary EC 411912 installed a jumper around both Limit Switch S2 and the loose connection providing a method to continue TIP traces on TIP C if the faulty connection on the Indexer Limit Switch continued to inhibit indexer movement to other guide tubes.

Summary of 10 CFR 50.59 Evaluation:

The Primary Containment Isolation System (PCIS) isolation function was not impacted by this change. Administrative controls are used to prevent operation of the indexer while the probe is inserted until the loose pin can be repaired. The administrative procedural controls do not increase the likelihood of a malfunction. Therefore, EC 411912 did not result in a more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the UFSAR.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 411912
Work Order 13374284

Title: Upgrade of the Unit 1 Turbine Control System – Revision

Evaluation Identification Number: Action Request 2196957

Brief Description:

This evaluation was performed for EC 287401, Revision 16. This is a revision to the evaluation of EC 287401 originally performed under AR 2115358.

This activity (i.e., EC 287401) installed a new Turbine Control System (TCS) replacing the existing turbine controls, in most instances providing the same control functions as the previous controls. EC 287401, Revision 16, identified some turbine trip instruments that could have plant conditions that would over range them in a direction for which trip protection is not required. Software logic was modified to remove risk that this modification could cause spurious trips as a result of acceptable plant conditions over ranging the trip instruments.

Summary of 10 CFR 50.59 Evaluation:

Design and development of replacement turbine controls equipment analysis, review, and testing in accordance with Duke Energy procedures that address standards discussed in NEI 96-07, guidelines for 10 CFR 50.59 implementation; and standards authorized for development of software systems discussed in EPRI TR-102348 R1 / NEI 01-01, guidelines for digital upgrades was completed.

This evaluation addresses Turbine Control System (TCS) changes from analog to triple modular redundant (TMR) digital control, changes from a diverse mechanical and electrical overspeed turbine trip function to a redundant and diverse electrical overspeed turbine trip function, increase in trip time, Power Load Unbalance (PLU) and Reactor Water Level (RWL) response times, automating some manual functions, changing approach to pressure regulation function and conversion from hard controls to soft controls. Results of this evaluation conclude that malfunctions of the equipment do not introduce new failure modes, that replacement turbine controls equipment meet existing seismic requirements, Heating Ventilation Air Conditioning (HVAC) capacity, and electrical load margins, and that design features added to the replacement turbine controls equipment enhance the ability of the controls to perform the design functions discussed in UFSAR Sections 7.7.1.4 and 10.2.

The system response to accidents described in UFSAR Sections 15.1.4, 15.2.2, and 15.2.8 are not adversely affected. This evaluation concludes no new accidents, failure modes, or malfunctions are created by implementing this modification.

The activity was evaluated per 10 CFR 50.59, and the guidance provided in NEI 96-07 and NEI 01-01. The conclusion of the evaluation was that the proposed activity could be implemented under 10 CFR 50.59 without requiring prior NRC review or approval.

Plant References:

EC 287401

Summary of Changes, Tests, and Experiments Requiring 10 CFR 72.48 Evaluations

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There were no 10 CFR 72.48 evaluations during the reporting period.	
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There were no regulatory commitment changes during the reporting period.	
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