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10 CFR 50.59(d)(2)

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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

REPORT OF CHANGES PURSUANT TO 10 CFR 50.59(d)(2)

Ladies and Gentlemen:

Duke Energy Progress, LLC hereby submits the attached report in accordance with 10 CFR 50.59(d)(2), "Changes, Tests, and Experiments," for H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2). The report provides a list of changes that were evaluated pursuant to 10 CFR 50.59 between April 1, 2016 and April 1, 2018. A brief summary of the evaluation for each activity is also included in the attached report. Should you have any questions regarding this matter, please contact Mr. Kevin Ellis, Manager, Nuclear Regulatory Affairs at (843) 951-1329.

This document contains no new regulatory commitments.

Sincerely,

A handwritten signature in black ink that reads 'Charles E. Sherman'. The signature is fluid and cursive, with a large loop at the end.

Charles E. Sherman
Director – Nuc Org Effectiveness

CES/jmw

Attachment

c: NRC Regional Administrator, Region II
Mr. Dennis Galvin, NRC
NRC Resident Inspector, HBRSEP2

SUMMARY OF CHANGES, TESTS, AND EXPERIMENTS FOR THE H. B. ROBINSON STEAM ELECTRIC PLANT (HBRSEP), UNIT NO. 2

Evaluations performed for changes made in accordance with 10 CFR 50.59 during the time period of April 1, 2016, to April 1, 2018:

Title: Turbine Control System (TCS) Base - System Integration

Evaluation Identification Number: 2007178

Brief Description:

The existing controls for the Westinghouse Electro-Hydraulic Control (EHC) system for the turbine-generator will be replaced with a modern Invensys Triconex Digital Turbine Control System (TCS) utilizing Triple Modular Redundant (TMR) digital controllers, input sensors and output actuators where appropriate to control and protect the turbine. This Activity will also include the installation of a new Honeywell Experion Distributed Control System (DCS). The DCS will drive new Human-System Interface (HSI) screens that will be installed on the Reactor-Turbine Gauge Board and Turbine Supervisory Panel in the Main Control Room.

Summary of 10 CFR 50.59 Evaluation:

The changes associated with this activity was evaluated because there is either a potential increase in the likelihood of failure due to introduction of software, or the activity adversely affects a design function, because each was judged to alter the existing means of performing or controlling design functions, including conversion to a digital controls upgrade. The digital controls upgrade results in a fundamental change from a diverse mechanical and electrical overspeed turbine trip function to a redundant and diverse electrical overspeed turbine trip function which is treated as adverse. All other aspects have been screened as not adverse.

Plant References:

Engineering Change 287742

Title: MSLB Break Unanalyzed Condition - PDO 2012658 Compensatory Actions

Evaluation Identification Number: 2037218

Brief Description:

An unanalyzed condition was identified related to failure of the feedwater bypass valves (FCV-479, FCV-489 and FCV-499) to close in the faulted steam generator feedline during a Main Steamline Break (MSLB) event. The Prompt Determination of Operability (PDO) completed for this condition established that containment is operable but non-conforming while the plant is in modes 1, 2, and 3; and that the feedwater bypass valves (FCV-479, FCV-489 and FCV-499) are required to be maintained closed and/or isolated. The PDO shall be revised to implement compensatory measures as an interim action until final corrective action to resolve the condition is completed. The intent of the compensatory measures are to limit the internal containment pressure to less than 42 PSIG and thereby maintain the containment's capability to perform its specified safety functions. Additionally, to prevent the fuel from failing via Departure from Nucleate Boiling for Fuel Centerline Melt.

Summary of 10 CFR 50.59 Evaluation:

The activity was evaluated to determine whether the temporary change or compensatory action itself (not the Degraded or Nonconforming Condition) impacts other aspects of the facility or procedures as described in the UFSAR in such a way that prior NRC approval is required. The scope of this activity is limited to the compensatory measures implemented per procedure alterations.

Plant References:

NCR 2012658

Title: HELB Results - Non-Regenerative Heat Exchanger Room

Evaluation Identification Number: 2048601

Brief Description:

A compensatory measure is required to operate more than one letdown orifice during plant Modes 1, 2, 3 and 4 in order to support a Prompt Determination of Operability (NCR 2044679). The scope of this change will include addition of a compensatory measure to instruct operators to detect and isolate CVCS letdown within seven minutes of a postulated High Energy Line Break (HELB) in the letdown line located inside the Non Regenerative Heat Exchanger room. Additionally, to administratively limit the number of letdown orifices to two or 120 GPM during plant Modes 1, 2, 3 and 4.

Summary of 10 CFR 50.59 Evaluation:

A prompt determination of operability was issued on 07-13-2016 which identified several safety related systems as being operable but non-conforming.

In order to ensure operability of the affected SSCs, the PDO recommended that no more than one let down orifice be in service during Plant Modes 1, 2, 3 and 4. This enabled continued plant operation at power but additional letdown orifices would need to be in service during plant shutdown and startup. It was determined that a compensatory action was needed to allow operators to isolate the CVCS letdown line upon identification that a HELB had occurred within the Non-Regenerative Heat Exchanger Room. The most practical method to implement this compensatory measure to mitigate a high energy line break in the non-regenerative heat exchanger room is to be able to quickly diagnosis the break in the room in order to take operator action to close LCV-460A/B from the Control Room.

Plant References:

NCR/PDO 2044679

RNP-M/MECH-1913, "Chemical Volume Control System High Energy Line Break – Non-Regenerative Heat Exchanger Room"

Title: Evaluate Revision of RNP Source Term to Support 24 Month Fuel Cycles

Evaluation Identification Number: 2051542

Brief Description:

Update the source term for RNP to cover 24 month fuel cycles. The updated Source Term also covers the removal of Part Length Shield Assemblies (PLSA) and the use of a fat pellet design.

Summary of 10 CFR 50.59 Evaluation:

This activity was evaluated due to:

- deviations from existing methodology with respect to gap fraction calculations, and a number of changes that adversely affects the design function of an SSC described in the UFSAR.
- a new design basis rod ejection accident dose analysis is developed with an assumption of 10% of rods in the core experiencing Departure from Nucleate Boiling (DNB).
- changes related to the 24 month core design and associated dose consequences analyses considered to adversely affect the design function of an SSC described in the UFSAR
- change related to the 24 month core design and associated dose consequences analyses is considered to be a change in the evaluation methodology use in the safety analyses of the dose consequences of the Fuel Handling Accident

Plant References:

EC 404890

Title: RNP Cycle 31 Reload Core

Evaluation Identification Number: 2083434

Brief Description:

Predicted changes to Robinson Unit 2 Cycle 31 (R2C31) reload core

Summary of 10 CFR 50.59 Evaluation:

This activity was evaluated to determine if prior NRC approval is required as a result of changes predicted for the Robinson Unit 2 Cycle 31 (R2C31) reload core. Core design changes that impact reactor physics parameters are addressed by this evaluation. These changes are presented in the reload changes document (RCD) and the R2C31 Loading Pattern (LP). The RCD identifies changes in key physics parameters, operating limits, and design parameters between Cycle 30 and 31 for the purpose of identifying possible impacts to reactivity management, technical specifications, and operations.

Plant References:

1. CAS AR 1959641 "R2C31 Reload NTM", Assignment 40 "RCD (Reload Change Document) Development and SRIT Review"
2. Robinson calculation RNP-F/NFSA-0253 Revision 0, RNP Cycle 31 Loading Pattern and Core Models

Title: RNP Adoption of GL 87-11 (SGBD)

Evaluation Identification Number: 2145212

Brief Description:

Engineering Change (EC) 403230 Rev. 0 adopts Generic Letter (GL) 87-11 for the steam generator blowdown (SGBD) line within the bounds of the reactor auxiliary building. High energy line breaks are defined in chapter 3 of the UFSAR, including break locations. EC 403230 consolidates design basis information and provides clarification to the required events with potential to cause environmental changes. Calculations are developed to define break locations, resultant flow rates at each location, and subsequent maximum environmental parameters that are to be expected. The UFSAR will be updated to reflect the new analysis criteria and conclusions of the break analysis. No physical modifications are being implemented as a result of EC 403230 Revision 0.

Summary of 10 CFR 50.59 Evaluation:

This activity was evaluated as a change in methodology for line break locations. EC 403230 revises a method of evaluation for line break locations described within section 3.6 of the RNP UFSAR. As such, this is considered a change in the UFSAR-described evaluation methodology and was further evaluated under 10 CFR 50.59(c)(2)(viii).

Plant References:

Engineering Change 403230
RNP Calculation RNP-M/MECH-1910
NCR 712316

Title: PDO 2155152 - Compensatory measures

Evaluation Identification Number: 2156036

Brief Description:

Compensatory measures are evaluated as described by PDO 2155152.

Summary of 10 CFR 50.59 Evaluation:

The activities evaluated are the following compensatory measures:

1. A requirement to maintain HVE-2A or HVE-2B in service during MODES 1, 2, 3, and 4 to remove the mass energy release of a high energy line crack in the chemical drain tank room transferred to the MDAFW pump room is to be added.
2. A compensatory measure is required to block open fire/security door (FDR-5, "FP Fire Door AFW pump room to Turb Bldg.(SD-33") into the auxiliary feedwater pump room in the event that both reactor auxiliary building exhaust fans (HVE-2A and HVE-2B) are out of operation during plant modes 1, 2, 3, and 4. The scope of this change will include the addition of a compensatory measure to instruct operators to block open FDR-5 upon removal of both fans or once indications are received that both fans are no longer open to provide adequate security of the area is maintained. A fire watch will be required.

Plant References:

NCR 2155152

NCR 712316

RNP Calculation RNP-M/MECH-1910

RNP Procedure, OP-906, "Heating, Ventilation, and Air Conditioning"

Title: RNP Open Phase Protection (OPP) System

Evaluation Identification Number: 2164438

Brief Description:

Robinson Unit 2 Engineering Change (EC) 409425 installs three (3) voltage unbalance relays for each 480-Volt Engineered Safety Features (ESF) Bus E1 and E2 to monitor the negative sequence voltages on the bus that can be indicative of open phase condition on the normal power source to the ESF busses. The new relays will be installed in safety related and seismically qualified cabinets in the Emergency Bus room. The voltage signal for the 60Q relays will be provided from bus potential transformers (PTs) located in 480V switchgear cubicles 17A (Bus E1) and 27A (Bus E2) to the new cabinets. Test switches, a key operated trip bypass switch, and a trip indicating light will also be installed in each cabinet.

Summary of 10 CFR 50.59 Evaluation:

The proposed activity was evaluated because it involves installation of voltage unbalance protective relays for 480 Volt ESF busses E1 and E2. The relay schemes function to identify an open phase condition on the normal incoming sources to the ESF busses as well as other abnormal conditions that result in negative sequence currents on the bus. A protective actuation of the voltage unbalance relaying trips the incoming breaker for the associated 480 Volt ESF bus.

Plant References:

Engineering Change 409425
AR 2157071 (SCREEN)

Title: EC 409565 - Replacement of Motor Control Center (MCC) - 9 Feeder Breaker

Evaluation Identification Number: 2164614

Brief Description:

The proposed activity (EC 409565) will replace a molded case circuit breaker (MCCB) located in Motor Control Center (MCC) MCC-6 compartment 2BL with a new breaker.

Summary of 10 CFR 50.59 Evaluation:

A 10CFR50.59 Evaluation was conservatively performed for the proposed activity due to introduction of a digital device containing software in a safety related SSC and the potential for different failure mechanisms of the digital device when compared to the existing analog device.

Plant References:

Engineering Change 409565

Title: Installation of 60Q Unbalance Voltage Relays (EC 409425)

***NOTE:** This evaluation supersedes the evaluation documented under AR 164438 and reflects comments from the Challenge Board meeting held 11/15/17.*

Evaluation Identification Number: 2166035

Brief Description:

Measures to address vulnerability to open phase condition on transformers connected to offsite power circuits that are credited for powering safety related equipment. Robinson Unit 2 Engineering Change (EC) 409425 installs three (3) voltage unbalance relays for each 480-Volt Engineered Safety Features (ESF) Bus E1 and E2 to monitor the negative sequence voltages on the bus that can be indicative of open phase condition on the normal power source to the ESF busses. The protection scheme for the three (3) voltage unbalance relays will be configured in a 2-of-3 logic to trip the normal incoming circuit breaker to the associated ESF bus. Upon opening the incoming breaker, the existing loss-of-voltage relays will, as is the existing design, detect the voltage loss, shed loads from the bus, start the associated emergency diesel generator and close the diesel generator output breaker. Main Control Room alarms will be added for each bus indicating actuation of the open phase protection (OPP) system or if the system is in the bypass mode. OPP system alarm conditions will also be sent to the ERFIS computer.

Summary of 10 CFR 50.59 Evaluation:

The proposed activity was evaluated because it involves installation of voltage unbalance protective relays for 480 Volt ESF busses E1 and E2. The relay schemes function to identify an open phase condition on the normal incoming sources to the ESF busses as well as other abnormal conditions that result in negative sequence currents on the bus. A protective actuation of the voltage unbalance relaying trips the incoming breaker for the associated 480 Volt ESF bus.

Plant References:

Engineering Change 409425
AR 2157071 (SCREEN)

Title: Adoption of Generic Letter (GL) 87-11 (CVCS)

Evaluation Identification Number: 2170944

Brief Description:

Revision 1 of EC 403230 adopts Generic Letter (GL) 87-11 for the chemical volume control system (CVCS) line within the bounds of the reactor auxiliary building (RAB). High energy line breaks (HELB) are defined in chapter 3 of the UFSAR, including break locations, plant operability following postulated pipe rupture, and results of HELBs outside containment. Additionally, the EC moves the pressure boundary of the CVCS system. Currently, the boundary is maintained at valve CVC-205B located within the Residual Heat Removal (RHR) Heat Exchanger Room. A new valve, CVC-620 is being added, and functions of CVC-205B are being transferred to this new valve. Moving this boundary allows for elimination of HELBs as a result of the decrease in operating pressure. No component functions are being added or modified, but rather existing functions transferred from one location to another. This change decreases the length of pressurized piping to be considered for High Energy Line Breaks.

Summary of 10 CFR 50.59 Evaluation:

This activity was evaluated as a change in methodology for line break locations. EC 403230 revises a method of evaluation for line break locations described within section 3.6 of the RNP UFSAR. As such, this is considered a change in the UFSAR-described evaluation methodology and was further evaluated under 10 CFR 50.59(c)(2)(viii).

Plant References:

Engineering Change 403230

Title: MSLB Break Unanalyzed Condition - PDO 2012658 Compensatory Actions (REVISED)

Evaluation Identification Number: 2178254

Brief Description:

Revised Evaluation completed under 2037218. The revision includes updated radiological consequences based on changes implemented for alternate source term calculations due to twenty-four month fuel cycle.

Summary of 10 CFR 50.59 Evaluation:

The activity was evaluated to determine whether the temporary change or compensatory action itself (not the Degraded or Nonconforming Condition) impacts other aspects of the facility or procedures as described in the UFSAR in such a way that prior NRC approval is required. The scope of this activity is limited to the compensatory measures implemented per procedure alterations.

Plant References:

PDO 2012658