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10 CFR 50.59(d)(2)

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

SUBJECT:
Davis-Besse Nuclear Power Station, Unit No. 1
Docket No. 50-346, License No. NPF-3
Report of Facility Changes, Tests, and Experiments

In accordance with 10 CFR 50.59(d)(2), FirstEnergy Nuclear Operating Company (FENOC) hereby submits the Report of Facility Changes, Tests, and Experiments for the Davis-Besse Nuclear Power Station, Unit No. 1. The attached report covers the period of May 27, 2014 through May 23, 2016.

There are no regulatory commitments contained in this submittal. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing at (330) 315-6810.

Sincerely,

Brian D. Boles

Attachment:
Davis-Besse Nuclear Power Station, Unit No. 1 Report of Facility Changes, Tests, and Experiments

cc: Nuclear Regulatory Commission (NRC) Region III Administrator
NRC Resident Inspector
NRC Project Manager
Utility Radiological Safety Board

IE47
NRR

Title:
Installation of Digital Control Rod Drive Control System

Activity Description:
The control rod drive (CRD) system was replaced with a digital control rod drive control system (DCRDCS). The new DCRDCS is functionally similar to the original system with the exception that the new system has an improved design with two single rod power supply (SRPS) modules for each CRD motor. This eliminates the need for the auxiliary power supply and the rod transfer function, simplifying rod control operations. Each SRPS has independent fusing and breakers for each phase and is modular for easy on-line maintenance. Each half of the power supply pair is powered from one of two different AC power inputs, thus providing reliable redundant power.

The replacement DCRDCS changes the analog controls that were utilized in the original system to the digital controls of the replacement system. Digital controls are accomplished through the use of triple modular redundant (TMR) digital controllers and software. The new system has a more reliable design in that there are two SRPS modules for each control rod drive mechanism (CRDM) motor, which eliminates the need for the auxiliary power supply and rod transfer functions, simplifying rod control operations.

Summary of Evaluation:
The use of redundant TMR controllers and reliable SRPSs was reviewed under a reliability study as well as being assessed through the completion of extensive system testing, which showed that this change does not result in an adverse effect on the frequency of occurrence of misaligned CRDMs or the frequency of occurrence of uncontrolled control rod assembly withdrawal.

No increase in any accident frequency or malfunction likelihood of a system, structure, or component (SSC) important to safety was found based on DCRDCS reliability studies and failure modes and effects analyses (FMEA) associated with the TMR design, single rod power supply design, and position indication panel design.

No increase in the radiological consequences of an accident or malfunction was found. The CRD system trip response, which is relied on in the accident analysis, is not altered. Additionally, the worst-case accident of all control rod assemblies being withdrawn at once is evaluated and thus bounds the change since the number of control rods and their travel rates are not being altered.

The possibility for an accident of a different type is not created by this change. The worst-case rod withdrawal accidents are bounded by any rod withdrawal accidents that could result from the change, since uncontrolled withdrawal of all control rods is already analyzed. Additionally, the reactor trip breaker functions are not altered by this change, and therefore the control rod trip function is unaffected.

Based on results of the DCRDCS FMEA and the system acceptance testing where the system was placed in unusual configurations, the change results in failure modes and malfunctions that are equivalent to those of the original system, and the credible malfunction results are bounded by those of the existing system. Therefore, the DCRDCS does not create a possibility for a malfunction of an SSC important to safety with a different result.

The change does not result in a design basis limit for a fission product barrier being exceeded or altered. The change replaces the existing CRD system hardware and does not alter any fission product barrier, barrier analysis result, or revise any design basis limits. The CRDMs and related pressure boundary were not altered by this change.

It was determined that this change does not involve revising or replacing a UFSAR-described evaluation methodology used in establishing the design basis or in the safety analysis. The proposed activity does not involve altering any plant parameters or environmental conditions such that any SSC is operated in other than its normal analyzed mode nor are any reference bounds, analyses, or descriptions adversely affected by this change.

The installation and use of the DCRDCS does not adversely affect any UFSAR-described design functions. The ability of the DCRDCS to provide for the controlled withdrawal, controlled insertion, and holding of the control rod assemblies as stated in UFSAR Sections 1.2.4.2.4, 4.2.3.2 and 4.2.3.5.1 is not adversely affected by the change. The control rod trip function is not adversely altered by this change. The modification does not adversely affect the ability of the DCRDCS to provide continuous rod position indication, as well as indicate when each rod is fully withdrawn, fully inserted, enabled and whether a rod position asymmetry alarm condition is present for each CRD as required in UFSAR Sections 4.2.3.2, 4.3.5.3, and 7.7.1.3.2. The replacement DCRDCS is a functional equivalent to the existing system providing all required information and controls to the operator using the same functional priorities as the original system to manage core reactivity as stated in the UFSAR.