



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

March 30, 2021

Mr. Tom Ray  
Site Vice President  
Duke Energy Carolinas, LLC  
McGuire Nuclear Station  
12700 Hagers Ferry Road  
Huntersville, NC 28078-8985

SUBJECT: WILLIAM B. MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 – COMPLETION  
OF LICENSE RENEWAL COMMITMENT NO. 11, AGING MANAGEMENT OF  
ENVIRONMENTALLY-ASSISTED FATIGUE (EPID L-2020-LRO-0085)

Dear Mr. Ray:

By letter dated May 17, 2020 (Agency Documents Access and Management System (ADAMS) Accession No. ML20157A077), Duke Energy Carolinas, LLC (the licensee, Duke Energy), submitted a document to the U.S. Nuclear Regulatory Commission (NRC) which proposed Duke Energy's inspection plan for License Renewal Commitment (LRC) No. 11 (ADAMS Accession No. ML030850237, NUREG-1772, Appendix D). Specifically, the letter documents Duke Energy's proposed use of flaw tolerance evaluations and inspections of the pressurizer surge line nozzles and safety injection nozzle welds for McGuire Nuclear Station, Units 1 and 2 to address LRC No. 11 and environmentally-assisted fatigue (EAF) aging management program.

The NRC staff reviewed the submittal and finds that the licensee's EAF aging management program, for LRC No. 11 is acceptable.

The NRC staff's review is found in the enclosure of this letter.

If you have any questions, please contact me at (301) 415-3867 or via email at [John.Klos@nrc.gov](mailto:John.Klos@nrc.gov).

Sincerely,

/RA/

John Klos, Project Manager  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

cc: Listserv

NRC STAFF TECHNICAL REVIEW  
LICENSE RENEWAL COMMITMENT NO. 11,  
ENVIRONMENTALLY-ASSISTED FATIGUE AGING MANAGEMENT PROGRAM  
DUKE ENERGY CAROLINAS, LLC  
MCGUIRE NUCLEAR STATION, UNITS 1 AND 2  
DOCKET NOS. 50-369 AND 50-370

By letter dated May 17, 2020(Agency Documents Access and Management System (ADAMS), Accession No. ML20157A077), Duke Energy submitted a letter, which documented Duke Energy's proposal to meet License Renewal Commitment (LRC) No. 11, by providing an environmentally-assisted fatigue (EAF) aging management program for the pressurizer surge line and safety injection nozzle welds.

Duke Energy's submittal stated that the licensee is committed to addressing EAF effects on several fatigue-sensitive locations during the McGuire Nuclear Station (MNS) period of extended operation (PEO). Duke Energy also stated that it determined that the critical locations of concern for fatigue environmentally-adjusted cumulative usage factor ( $CUF_{en}$ ) for the MNS, during the PEO are the Hot Leg Surge Nozzle, and Safety Injection Nozzle welds. The licensee also stated that the calculated  $CUF_{en}$  values for these locations were determined to exceed the American Society of Mechanical Engineers Boiler & Pressure Vessel (ASME) Code, Section III allowable cumulative usage factor (CUF) of 1.0 during the PEO and would, therefore, be subject to future inspection.

Flow Tolerance Evaluation and Staff Finding

The licensee's letter detailed plant-specific, fatigue flaw tolerance evaluation results for the pressurizer surge line and safety injection nozzle welds. The staff finds the flaw tolerance evaluation the licensee used as the basis for the inspection interval acceptable, because the licensee performed the evaluations for the subject welds using the 2013 Edition of ASME Code, Section XI, Appendix L, "Operating Plant Fatigue Assessment." For reference purposes it is noted that the 2013 Edition of ASME Code, Section XI is endorsed by reference in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, and includes Nonmandatory Appendix L without any conditions. Additionally, Appendix L, Subarticle L-1100 states that this Appendix is applicable only in the absence of any flaw at the location of concern, which is larger than allowed by the applicable acceptance standard referenced in ASME Code, Section XI, Table IWB-3410-1.

Pressurizer surge line inspections

The licensee's flow tolerance evaluation stated that for the pressurizer surge line, the most bounding location was the hot leg nozzle weld where a postulated flaw reached the allowable flaw depth in approximately 11 years of service. The licensee also stated that the plant-specific, pressurizer surge line inspection program will consist of periodic volumetric examinations that will be performed once per interval (not to exceed 10 years) for pressurizer nozzle-to-pipe welds and the hot leg surge nozzle welds for MNS (total of two welds per unit).

### Safety injection line inspections

The results of the flaw tolerance evaluations indicate that for the safety injection line -- with a postulated surface-connected flaw -- both axial and circumferential flaws remained acceptable for 60 years of operation. The licensee also stated that the plant-specific, safety injection nozzle weld inspection program will consist of periodic volumetric examinations that will be performed once per interval (not to exceed 10 years) for each of the injection line cold leg nozzle welds for MNS (total of four welds per unit).

### Staff finding on inspection program

For the applicable pressure surge and safety injection line welds, the staff reviewed the proposed inspection program and independently confirmed that it includes volumetric examinations which provide;

- (a) an effective method of inspection for the detection of flaws due to fatigue, and
- (b) reasonable assurance of adequate safety, because when unacceptable flaws are detected, replacement, or repair can be implemented such that the intended function and structural integrity of the piping system will be maintained for MNS during its PEO.

Therefore, the staff finds that the licensee's proposed EAF aging management inspection program is acceptable.

The NRC staff also noted that the subject welds for MNS were most recently examined using volumetric examinations with satisfactory results in 2017 and 2018.

### EAF aging management program

Lastly, the staff also noted that the proposed inspection program implements the ten elements criteria for a comprehensive aging management program which is was found acceptable to the staff per NUREG-1801, "Generic Aging Lessons Learned (GALL) Report."

Based on the above review, the staff finds that the licensee's proposed EAF aging management program and LRC No. 11 is acceptable.

Docket Nos.: 50-369 and 50-370

Primary reviewer: Roger Kalikian

SUBJECT: WILLIAM B. MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 – COMPLETION  
OF LICENSE RENEWAL NO. 11 ENVIRONMENTALLY-ASSISTED FATIGUE  
(EPID L-2020-LRO-0085) DATED MARCH 30, 2021

**DISTRIBUTION:**

PUBLIC

LPL2-1 File Copy

RidsAcrs\_MailCTR Resource

RidsNrrDorLpl2-1 Resource

RidsNrrLAKGoldstein Resource

RidsNrrPMMcGuire Resource

RidsRgn2MailCenter Resource

RKalikian, NRR

**ADAMS Accession No. ML21082A433**

OFFICE	NRR/DORL/LPL2-1/PM	NRR/DORL/LPL2-1/LA	NRR/DORL/LPL2-1/BC	NRR/DORL/LPL2-1/PM
NAME	JKlos	KGoldstein	MMarkley (EMiller for)	JKlos
DATE	03/22/2021	03/24/2021	03/25/2021	03/29/2021

**OFFICIAL RECORD COPY**