

November 3, 2003

Mr. Alexander Marion
Director of Engineering
Nuclear Energy Institute
1776 I St., N.W., Suite 400
Washington, DC 20006-3708

Mr. David Lochbaum
Union of Concerned Scientists
1707 H Street, NW., Suite 600
Washington, DC 20006-3919

SUBJECT: ADDITION OF AGING MANAGEMENT PROGRAM (AMP) FOR FUSE
HOLDERS

Dear Messrs. Marion and Lochbaum:

The purpose of this letter is to provide you with an opportunity to comment on the addition of the AMP, XI.E5 "Aging Management Program for Fuse Holders," proposed by the U.S. Nuclear Regulatory Commission (NRC) staff for license renewal. By our letter dated March 10, 2003, the staff finalized interim staff guidance (ISG)-5, "Identification and treatment of electrical fuse holders for license renewal" (See ADAMS Accession No. ML030690492). In the transmittal letter, the staff indicated that they were developing an appropriate AMP for fuse holders that needed to be incorporated into the generic aging lessons learned (GALL) report. With the development of the proposed AMP for fuse holders, the staff also identified that additional changes are needed in the GALL report and in the standard review plan to review license renewal applications for nuclear power plants (SRP-LR) which will reflect the proposed AMP.

The staff is enclosing a copy of the proposed AMP XI.E5 as Enclosure 1. For timely implementation of this AMP in the above license renewal guidance documents, your comments are requested within 30 days of the date of this letter.

Once the above AMP is finalized, the staff will incorporate it into the next revision of GALL and SRP-LR and it is also possible that comparable changes might be needed for future revisions to NEI 95-10, "Industry Guidance for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule." If you have any questions regarding this matter, please contact Peter Kang at 301-415-2779.

Sincerely,

/RA/

Pao-Tsin Kuo, Program Director
License Renewal and Environmental Impacts Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project No. 690
Enclosures: As stated

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OFFICE	RLEP:DRIP:GE	RLEP:DRIP	RLEP:DRIP:SC	BC:DE:EEIB
NAME	P.Kang*	M. Jenkins*	S. West*	JCalvo*
DATE	8/18/03	11/3/03	8/28/03	9/02/03
OFFICE	OGC	RLEP:DRIP:PD		
NAME	JMoore*	PTkuo		
DATE	10/31/03	11/3/03		

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XI.E5 Aging Management Program for Fuse Holders

Program Description

Fuse holders/blocks are classified as a specialized type of terminal block because of the similarity in design and construction. The fuse holders are typically constructed of blocks of rigid insulating material, such as phenolic resins. Metallic clamps are attached to the blocks to hold each end of the fuse. The clamps can be spring-loaded clips that allow the fuse ferrules or blades to slip in, or they can be bolt lugs, to which the fuse ends are bolted. The clamps are typically made of copper.

GALL XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements," will manage the aging of insulating material but not the metallic clamps of the fuse holders. The aging management program for fuse holders (metallic clamps) needs to include the following aging stressors: fatigue, mechanical stress, vibration, chemical contamination, and corrosion. GALL XI.E1 is based on only a visual inspection of accessible cables and connections. Visual inspection is not sufficient to detect the aging effects from fatigue, mechanical stress, vibration, or corrosion on the metallic clamps of the fuse holder.

In-scope fuse holders should be tested to provide an indication of the condition of the metallic clamps of the fuse holders. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of metallic clamps of the fuse holders, such as thermograph, contact resistance testing, or other appropriate testing.

As stated in NUREG-1760, "Aging Assessment of Safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants," fuse holders experience a number of age-related failures. The major concern is that failures of a deteriorated cable system (cables, connections including fuse holders, and penetrations) might be induced during accident conditions. Since they are not subject to the environmental qualification requirements of 10 CFR 50.49, an aging management program is required to manage the aging effects. This program will ensure that fuse holders will perform their intended function for the period of extended operation.

Evaluation and Technical Basis

Scope of Program: This program applies to fuse holders located outside of active devices that have been identified for being susceptible to aging effects. Fuse holders inside an active device (e.g., switchgears, power supplies, power inverters, battery chargers, and circuit boards) are not within the scope of this program.

Preventive Actions: No actions are taken as part of this program to prevent or mitigate aging degradation.

Parameters Monitored/Inspected: This program will focus on the metallic clamp (or clip) portion of the fuse holder. The monitoring includes thermal fatigue in the form of high resistance caused by ohmic heating, thermal cycling or electrical transients, mechanical fatigue caused by frequent manipulation of the fuse itself or vibration, chemical contamination, corrosion, and oxidation.

Detection of Aging Effects: Fuse holders within the scope of license renewal will be tested at least once every 10 years. Testing may include thermograph, contact resistance testing, or other appropriate testing methods. This is an adequate period to preclude failures of the fuse holders since experience has shown that aging degradation is a slow process. A 10-year inspection frequency will provide two data points during a 20-year period, which can be used to characterize the degradation rate. The first tests for license renewal are to be completed before the period of extended operation.

Monitoring and Trending: Trending actions are not included as part of this program because the ability to trend test results is dependent on the specific type of test chosen. Although not a requirement, test results that are trendable provide additional information on the rate of degradation.

Acceptance Criteria: The acceptance criteria for each test are defined by the specific type of test performed and the specific fuse holder tested.

Corrective Action: An engineering evaluation is performed when the test acceptance criteria are not met in order to ensure that the intended functions of the fuse holders can be maintained consistent with the current licensing basis. Such an evaluation is to consider the significance of the test results, the operability of the component, the reportability of the event, the extent of the concern, the potential root causes for not meeting the test acceptance criteria, the corrective action required, and the likelihood of recurrence. When an unacceptable condition or situation is identified, a determination is made on whether the same condition or situation is applicable to other inaccessible, in-scope, fuse holders. As discussed in the appendix to the GALL report (NUREG 1801, Volume 2), the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address corrective actions.

Confirmation Process: As discussed in the appendix to the GALL report (NUREG 1801, Volume 2), the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the confirmation process.

Administrative Controls: As discussed in the appendix to the GALL report (NUREG 1801, Volume 2), the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address administrative controls.

Operating Experience: Operating experience has shown that the loosening of fuse holders is an aging mechanism that, if left unmanaged, has led to a loss of electrical continuity function.

References

NUREG-1760, "Aging Assessment of Safety-Related Fuses Used in Low- and Medium-Voltage Applications in Nuclear Power Plants."

IEEE standard 1205-2000, "IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations."

NRC Information Notice 91-78, "Status Indication of Control Power for Circuit Breakers Used in Safety-Related application."

NRC Information Notice 87-42, "Diesel Generator Fuse Contacts."

NRC Information Notice 86-87, "Loss of Offsite Power Upon an Automatic Bus Transfer."

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RLEP RF

P. Kang

E-MAIL:

PUBLIC

J. Craig

D. Matthews

F. Gillespie

C. Grimes

RidsNrrDe

E. Imbro

G. Bagchi

K. Manoly

W. Bateman

J. Calvo

R. Jenkins

P. Shemanski

H. Nieh

J. Fair

S. Black

B. Boger

D. Thatcher

R. Pettis

G. Galletti

C. Li

J. Moore

R. Weisman

M. Mayfield

A. Murphy

S. Smith (srs3)

S. Duraiswamy

C. Munson

RLEP Staff

A. Thadani

C. Julian

R. Gardner

M. Farber

M. Modes

J. Vora

L. Kozak

A. Pal

NUCLEAR ENERGY INSTITUTE

Project No. 690

cc:

Mr. Joe Bartell
U.S. Department of Energy
NE-42
Washington, DC 20585

Ms. Christine S. Salembier
Commissioner
State Liaison Officer
Department of Public Service
112 State St., Drawer 20
Montpelier, VT 05620-2601

Mr. Fred Emerson
Nuclear Energy Institute
1776 I St., N.W., Suite 400
Washington, DC 20006-3708

Mr. Stephen T. Hale
Florida Power & Light Company
9760 S.W. 344 St.
Florida City, FL 33035

Mr. William Corbin
Virginia Electric & Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, VA 23060

Mr. Frederick W. Polaski
Manager License Renewal
Exelon Corporation
200 Exelon Way
Kennett Square, PA 19348

George Wrobel
Manager, License Renewal
R.E. Ginna Nuclear Power Plant
1503 Lake Rd.
Ontario, NY 14519

Mr. David Lochbaum
Union of Concerned Scientists
1707 H St., NW, Suite 600
Washington, DC 20006-3919

Ronald B. Clary
Manager, Plant Life Extension
V.C. Summer Nuclear Station
Bradham Blvd.
P.O. Box 88
Jenkinsville, SC 29065

Mr. John B. Herman
Manager - Nuclear Licensing
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
Post Office Box 550
Fort Calhoun, NE 68023-0550

Mr. Paul Gunter
Director of the Reactor Watchdog Project
Nuclear Information & Resource Service
1424 16th St., NW, Suite 404
Washington, DC 20036

Mr. Hugh Jackson
Public Citizen's Critical Mass Energy &
Environment Program
215 Pennsylvania Ave., SE
Washington, DC 20003

Mary Olson
Nuclear Information & Resource Service
Southeast Office
P.O. Box 7586
Asheville, NC 28802

Talmage B. Clements
Manager - License Renewal
Nuclear Engineering Services
CP&L
410 South Wilmington St.
Raleigh, NC 27602

Mr. Charles R. Pierce
Manager - License Renewal
Southern Nuclear Operating Company
P. O. Box 1295
Birmingham, AL 35201

Mr. Garry G. Young
Manager, License Renewal Services
1448 SR 333, N-GSB-45
Russellville, AR 72802