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H. B. Barron
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November 24, 1998

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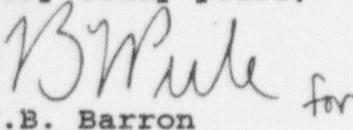
Subject: McGuire Nuclear Station, Unit 1 and 2
Docket No. 50-369 and 50-370
Special Report Number 98-02
Problem Investigation Process No. 0-M98-2923,
0-M98-4051, and 0-M98-4052

Pursuant to the provisions of McGuire Facility Operating License Conditions G {Unit 1} and F {Unit 2}, attached is Revision 0 of Special Report 98-02 describing a failure to implement the requirements of License Conditions C.(4) {Unit 1} and C.(7) {Unit 2}. These conditions require that McGuire Nuclear Station implement and maintain in effect all provisions of the plant Fire Protection Program. Contrary to these requirements, the station failed to comply with the Remedial Action of Selected Licensee Commitment 16.9-5, Fire Rated Assemblies. Specifically, fire watches were not implemented in rooms containing inoperable fire barrier penetrations as required by this remedial action. Upon discovery of this condition, continuous fire watches were implemented. Repair of the affected fire barriers is in progress. The NRC was notified of this violation of the McGuire Facility Operating License Conditions via phone and facsimile on November 12, 1998 (Event Report 35026). An update to this event was submitted on November 13, 1998.

Note that the plant remained within its design basis during this occurrence since the McGuire Nuclear Station Safe Shutdown Facility remained available to place the plant in a safe shutdown condition if required.

The planned corrective actions identified in this report are regulatory commitments.

Very truly yours,

 for

H.B. Barron

Attachment

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bxc: B.L. Walsh (EC11C)
L.A. Keller (EC050)
J.I. Glenn (MG02ME)
B.L. Peele (MG01VP)
J.E. Burchfield (ON01RC)
G.H. Savage (EC06E)
G.B. Swindlehurst (EC11-0842)
C.M. Misenheimer (EC08I)
R.F. Cole (EC05N)
R.J. Freudenberger (EC05N)
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R.B. White (MG01VP)
R.T. Bond (ON03SR)
R.L. Bain (CN05SR)
K.L. Crane (MG01RC)
G.D. Gilbert (EC05N)
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EC050-ELL

Duke Energy Corporation
McGuire Nuclear Station
Regulatory Compliance Group Special Report 98-02

Background

McGuire Nuclear Station Facility Operating License (FOL) Conditions C.(4) {Unit 1} and C.(7) {Unit 2} require that the station implement and maintain in effect all provisions of the plant Fire Protection Program as described in the Final Safety Analysis Report. License Conditions G {Unit 1} and F {Unit 2} directs Duke Energy to report any violations of the requirements contained in License Conditions C.(4) {Unit 1} and C.(7) {Unit 2} within 24 hours by telephone and confirm by facsimile no later than the first working day following the violation. A follow up written report is required to be submitted within 14 days.

Selected Licensee Commitment (SLC) 16.9-5 is part of the plant Fire Protection Program. This SLC requires that all fire rated assemblies separating:

- redundant analyzed post fire safe shutdown equipment or,
- control complex (i.e. Control Room, Cable Rooms, and Battery Rooms) from the remainder of the plant or,
- containment from non-containment areas or,
- safety from non-safety related areas

and all sealing devices (fire doors, fire windows, fire dampers, cable, piping and ventilation duct penetration seals) in fire rated assembly penetrations shall be operable. This commitment is applicable at all times. The remedial action associated with SLC 16.9-5 states that with one or more of the above fire rated assemblies and/or sealing devices inoperable, within 1 hour either establish a continuous fire watch on at least one side of the affected assembly, or verify the operability of fire detectors on at least one side of the inoperable assembly and establish an hourly fire watch patrol.

Description of Occurrence

Unit Status: Unit 1 and Unit 2 were in Mode 1 (Power Operation) at 100% Rated Thermal Power at the time this occurrence was discovered.

During an intrusive inspection of a representative sample of fire barrier penetration seals in the McGuire Nuclear Station Auxiliary Building, gaps and voids were observed in the foam sealant in five of the seven wall penetration fire barrier seals that were inspected. The gaps are located at the top portion of the penetration seals and range in size from $\frac{1}{2}$ to $\frac{3}{4}$ inches. These gaps resulted from inadequate installation techniques, which caused settling of the foam after the penetrations were sealed.

The voids exist at random locations in the foam sealant and are either "V-shaped" or circular in appearance. The "V-shaped" voids were most likely caused by using insufficient quantities of foam and inadequate spacing of the sealant fill holes during installation, which did not allow the foam to completely flow across the width of the penetration opening. These voids measure approximately 5 to 8 inches across the top of the "V" and around 3 inches high. Their depth ranges from approximately 50% to 100% of the total length of the wall penetration seal. The circular voids were most likely formed during the foam sealant curing process when gases could not escape before additional foam was installed. These voids have a circumference of around 3 to 4 inches and are approximately 3 inches deep.

An evaluation of the affected wall penetration fire barrier seals determined that they did not meet the applicable acceptance criteria and they were declared inoperable at 1730 hours on November 12, 1998. At the same time, given that five of the seven inspected wall seals had gaps and voids, all remaining wall penetration fire barrier seals of a design similar to the inspected seals were declared inoperable. Since these inoperable wall seals perform functions described in SLC 16.9-5, the site implemented the remedial action of that SLC. These actions satisfied the requirements of SLC 16.9-5 and the McGuire Nuclear Station FOL.

No intrusive inspections of the affected wall penetration fire barrier seals gaps have been performed since initial installation of the seals. It is assumed that the gaps and voids have existed since the wall seals were installed and that the seals have been inoperable for their service life. Since the remedial action required by SLC 16.9-5 for inoperable fire barrier assemblies was not implemented at all times prior to discovery of the inoperable wall seals on 12 November 1998, this represents a failure to implement the requirements of License Conditions G {Unit 1} and F {Unit 2} of the McGuire Nuclear Station FOL. The NRC was notified of this failure to implement the requirements of the McGuire FOL via phone and facsimile on November 12, 1998 (Event Report 35026). This notification occurred within 24 hours as required by the FOL. At 1300 hours on 13 November 1998, two additional wall penetration fire barrier seals were determined to be of similar design to those wall seals declared inoperable on 12 November 1998. These seals were overlooked during the initial review of affected wall seals on 12 November 1998. Those two seals were immediately declared inoperable and the remedial action of SLC 16.9-5 was implemented. An update to Event Report 35026 was submitted to the NRC via phone and facsimile on 13 November 1998 describing this additional failure to implement the requirements of the McGuire FOL. This update occurred within 24 hours as required by the FOL.

Note that the McGuire Nuclear Station Safe Shutdown Facility remained available during the above occurrences. In addition, based upon mitigating factors discussed elsewhere in this report, equipment in the affected rooms would have also been available to perform their design function. Consequently, the plant was never

outside of its design basis or in an unanalyzed or degraded condition. No technical specification requirements were violated during this occurrence. Based upon the above, it was determined that the above occurrences do not meet the reportability requirements of 10CFR50.72 "Immediate Notification Requirements for Operating Nuclear Power Reactors" or 10CFR50.73 "Licensee Event Report System".

Safety Significance

The failure to implement the remedial action of SLC 16.9-5 prior to discovery of the inoperable wall penetration fire barrier seals represented a degradation of the McGuire Fire Protection Program. However, the safety significance of these occurrences was mitigated by:

- the relatively small size and numbers of the gaps and voids in the wall seals
- the presence of fire and smoke detection systems in the affected areas
- the availability of the Safe Shutdown Facility (SSF) with an independent diesel generator and control room for mitigating 10CFR50 Appendix R fire events
- other features of the plant Fire Protection Program such as control of combustible materials, hot work control, and the presence of an on-site Fire Brigade

The plant Fire Protection Program provides measures for controlling hot work activities and the amount and location of combustible materials in the plant. These features significantly reduce the probability of a fire in the areas affected by the inoperable wall penetration fire barrier seals. In the event of a fire, the relatively small size and numbers of the gaps and voids in the affected wall seals would not have prevented the seals from providing a significant degree of separation between the areas and equipment identified in SLC 16.9-5. In addition, the fire and smoke detection systems in the affected areas remained operable for most of the time that the wall seals were inoperable. This, as well as the significant amount of separation still provided by the wall seals, would have ensured that any fire in the affected areas would have been detected by plant personnel before significant damage occurred. Once detected, the on-site Fire Brigade would have been available to control the extent of the fire and limit the severity of any damage. Finally, although some of the affected rooms contained equipment associated with the McGuire Nuclear Station SSF, the mitigating factors described above would have ensured that the SSF remained unaffected during the above occurrences and would be available to place the plant in a safe shutdown condition if required.

Based on the above, there were no significant safety consequences associated with the inoperable wall penetration fire barrier seals and the failure to implement the remedial action of SLC 16.9-5.

McGuire's Response To Previous Information Notices

NRC Information Notice 88-56 alerted addressees of the possibility that some installed fire barrier penetration seals may contain nonconforming conditions such as splits, gaps, voids, and lack of fill in the sealing material. It stated that these conditions may not be detected during routine inspection because the surface of the seal material is typically covered by a fire-resistant dam material. IN 88-56 indicated that the extent of the problem appeared to be limited to fire barrier penetrations filled with silicon foam material. In response to IN 88-56, Duke Power Company reviewed the installation procedures for silicon foam fire barrier penetration seals as well as the controls and verification process that ensures proper installation. This review determined that these procedures and processes were adequate to ensure that the silicon foam seals were installed properly.

NRC Information Notice 94-28 alerted addressees to potential problems in installed fire-barrier penetration seals that may have gone undetected as a result of inadequate inspection procedures, inadequate acceptance criteria, and the use of damming material which conceals the silicon foam. In response to IN 94-28, a review determined that no changes were needed to Duke Power's existing fire barrier installation and inspection program and the fire barrier penetration seal program.

Note that the above Information Notices indicated that McGuire's use of damming materials in fire barrier seals could render it difficult to conduct adequate inspections and detect foam sealant problems. This concern could have been eliminated by implementing an intrusive inspection program at the McGuire Station. However, the internal reviews associated with these Information Notices did not recommend the implementation of such a program. Although this appeared to be a reasonable judgment based upon information available at that time, McGuire missed an opportunity to identify the voids and gaps in the affected wall penetration fire barrier seals.

Causes

The gaps and voids observed in the affected wall penetration fire barrier seals were the result of inadequate foam sealant installation procedures. These deficiencies have existed since the original installation of the seals and remained undetected due to inadequate inspection procedures following installation of the seals.

Corrective Actions

Immediate:

- The affected wall penetration fire barrier seals were declared inoperable and the remedial action of SLC 16.9-5 was implemented. This remedial action will remain in place for each affected wall seal until they are returned to an operable condition.

Subsequent:

- A plan was developed to identify and implement the necessary repairs to the affected wall penetration fire barrier seals.

Planned (The below planned actions represent NRC commitments):

- The affected wall penetration fire barrier seals will be repaired as needed to return them to an operable condition. These repairs will be implemented and tracked by the plant corrective action and work management programs.
- Fire barrier foam sealant installation and inspection procedures/processes will be reviewed and changes implemented as needed to help prevent the reoccurrence of the events described in this report. As part of this review, the need for implementing intrusive inspections will be evaluated.
- Bulletins and Information Notices related to Fire Barriers will be reviewed for applicability to McGuire and to identify any information that could be used to help ensure the requirements of the station Fire Protection Program are maintained.