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

July 11, 2012

Mr. Barry S. Allen, Vice President
Davis-Besse Nuclear Power Station
FirstEnergy Nuclear Operating Company
5501 North State Route 2
Oak Harbor, OH 43449

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE DAVIS-BESSE NUCLEAR POWER STATION LICENSE RENEWAL APPLICATION RELATED TO SHIELD BUILDING CRACKING (TAC NO. ME4640)

Dear Mr. Allen:

By letter dated August 27, 2010, FirstEnergy Nuclear Operating Company submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 for renewal of operating license NPF-3 for the Davis-Besse Nuclear Power Station. The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing this application in accordance with the guidance in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants." During its review, the staff has identified areas where additional information is needed to complete the review. The staff's requests for additional information are included in the enclosure. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Steven Dort, of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me by telephone at 301-415-2277 or by e-mail at brian.harris2@nrc.gov.

Sincerely,

Brian K. Harris, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:
As stated

cc w/encl: Listserv

DAVIS-BESSE NUCLEAR POWER STATION
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION
RELATED TO SHIELD BUILDING CRACKING

RAI B.2.43-1

Background:

By letter dated April 5, 2012, the applicant responded to a request for additional information (RAI) regarding cracking in the shield building. The RAI response summarized the degradation and the root cause, the impact on the current licensing basis, and the applicant's plans to monitor the degradation in the future and during the period of extended operation. The response stated that the degradation was the result of water ingress and freeze-thaw cycles due to a lack of waterproofing coating on the shield building concrete. To address this issue, the applicant plans to apply a coating to the shield building and to monitor the coating and the shield building cracking. The response provided a new plant-specific aging management program (AMP), "Shield Building Monitoring Program," to monitor the protective coating during the period of extended operation.

Issue:

1. The RAI response indicates that the new shield building coating will be relied upon to manage aging; however, the coating is not called out in the scope of the new plant-specific Shield Building Monitoring Program, nor is it identified in any revised or new aging management review (AMR) line items. The response also does not discuss when the coating will be applied.
2. An analysis determined that the root cause of the degradation was a lack of an exterior sealant to preclude moisture penetration into the Shield Building wall. One of the corrective actions discussed in the response is applying a protective coating to prevent moisture from penetrating the Shield Building concrete; however, no discussion is provided that demonstrates a protective coating would be capable of preventing moisture ingress during an extreme weather event, such as the 1978 blizzard.
3. The "preventive actions" program element notes that "the Shield Building sealant or coating will be inspected or tested to verify its continuing effectiveness during the period of extended operation." The "parameters monitored or inspected" and "detection of aging effects" program elements contain similar wording and the "acceptance criteria" element states that "the acceptance criteria for the sealant will be based on the ability of the sealant or coating to continue to be effective." Additional information regarding how the coating will actually be inspected, what the inspection frequency will be, or how it will be determined the coating remains acceptable is necessary.

Request:

1. Include the coating within the scope of the Shield Building Monitoring program and include AMR line items to address the coating, or explain why it is not necessary. If the coating is being added to the scope of license renewal, outline a schedule for completing the coating application.

ENCLOSURE

2. Provide information that demonstrates the selected coating would be capable of preventing moisture ingress during an extreme weather event, similar to the blizzard of 1978. This should include test data that demonstrates that moisture will not ingress into the concrete if it is exposed to blizzard conditions with wind speed of 100 MPH followed by a rapid temperature drop to zero degrees Fahrenheit.

3. Provide detailed information on how the coating will be inspected, when the coating will be inspected, and the acceptance criteria that will be used for the inspections. Explain what criteria will be used to determine if/when recoating is necessary. Provide qualification requirements of the engineering personnel who will inspect and evaluate the coating.

RAI B.2.43-2

Background:

By letter dated April 5, 2012, the applicant responded to an RAI regarding cracking in the shield building. The RAI response summarized the degradation and the root cause, the impact on the current licensing basis, and the applicant's plans to monitor the degradation in the future and during the period of extended operation. The response stated that the degradation was the result of water ingress and freeze-thaw cycles due to a lack of waterproofing coating on the shield building concrete. To address this issue, the applicant plans to apply a coating to the shield building and to monitor the coating and the shield building cracking. The response provided a new plant-specific AMP, "Shield Building Monitoring Program," to monitor the shield building cracking.

Issue:

1. License renewal application (LRA) Commitment 40 states that the Shield Building Monitoring Program will be implemented prior to April 22, 2017. However, the RAI response states that periodic monitoring of the Shield Building is to begin with an annual inspection cycle starting in 2012, with a second inspection in 2013. If the inspection results remain unchanged after the first two cycles, the inspection cycle may be changed to two-years.

2. The "detection of aging effects" program element in the Shield Building Monitoring Program states:

   > "The initial frequency of visual inspection of core bores and core bore samples will be based on the results of inspections conducted before the period of extended operation. If no aging effects were identified by these visual inspections, then visual inspections will continue to be conducted at least once every two years during the period of extended operation. If no aging effects are identified by the two-year interval visual inspections (defined as no discernable change in crack width or the confirmation that no visible cracks have developed in core bores that previously had no visible cracks), then the frequency of visual inspections may be changed to at least once every five years."

The program does not clearly explain how many times the two-year interval inspections must be repeated during the period of extended operation before the interval can be extended to five years. In addition, the program does not provide technical justification for extending the inspection interval to five years.

3. The "parameters monitored or inspected," program element of the AMP states that concrete cracking will be monitored by examining the core bores and core bore samples, and change in crack condition by visual examination. The number and locations of the cores are not identified in the AMP. The RAI response states that a minimum of six existing core bores of each type (cracked and un-cracked) will be inspected during each inspection cycle. The minimum planned distribution of the inspections is three in the shoulder regions, one in a steam line penetration area, and two in the top region of the building outside of the shoulder regions. The RAI response does not provide a technical justification for the described sample size, or the adequacy of the distribution of the samples. Also, it is not clear to the staff how core bore samples removed from the concrete will identify the crack condition, and how the concrete at existing core drill locations will be protected from the environment. The RAI response and the AMP do not discuss why additional nondestructive examinations such as the impulse response (IR) method are not planned to be used to confirm and supplement the core drill inspection, as was the case during initial investigation.

4. The "parameters monitored or inspected," program element of the AMP states that loss of material in rebar due to corrosion will be monitored by surface examination of rebar, when exposed. However, the current plans do not include core drills of sufficient depth to expose rebar in the Shield Building concrete.

5. The "monitoring and trending," program element of the AMP states that inspection will be performed by qualified personnel as defined in plant procedures. The AMP further states that inspection findings will be evaluated by assigned engineering personnel. The applicant has not identified qualification requirements for engineering personnel who will inspect and evaluate core drills and cracks in the AMP.

6. The RAI response states that two new core bores will be taken every other inspection cycle for chloride and carbonation testing; however, no discussion is provided about the location of these samples and why the frequency and number of samples is adequate.

7. The "acceptance criteria," program element of the AMP states that indications of relevant conditions of degradation detected will be evaluated and compared to pre-determined criteria. However, the applicant has not identified the criteria in the AMP.

Request:

1. Explain why the periodic monitoring of the Shield Building starting in 2012 is not included as a part of the plant-specific Shield Building Monitoring Program.

2. Identify in the Shield Building Monitoring AMP how long the two-year interval inspections will be conducted during the period of extended operation. Provide techriical justification for changing to a five year interval after the given time period.

3. Provide a technical justification for the described sample size of the core bore hole inspections, as well as a justification for the adequacy of the distribution of the samples.

   The response should also include the reasons for not using nondestructive methods to confirm the extent of cracking monitored by a limited number of core drill openings created during 2011. Also explain how the existing core drill openings will be protected from the environment during the period of extended operation

4. Explain how the rebar will be inspected for potential corrosion and loss of material during the period of extended operation.

5. Provide qualification requirements of the engineering personnel who will inspect and evaluate the core drills, openings, and cracks.

6. Provide a technical justification for the frequency and location of the samples for chloride and carbonation testing.

7. Describe in detail the acceptance criteria that will be used to evaluate indications of relevant conditions of degradation of Shield Building concrete and rebar.

RAI B.2.43-3

Background:

By letter dated April 5, 2012, the applicant responded to an RAI regarding cracking in the shield building. The RAI response summarized the degradation and the root cause, the impact on the current licensing basis, and the applicant's plans to monitor the degradation in the future and during the period of extended operation. The response stated that the degradation was the result of water ingress and freeze-thaw cycles during a blizzard due to a lack of waterproofing coating on the shield building concrete. To address this issue, the applicant plans to apply a coating to the shield building and to monitor the coating and the shield building cracking. The response provided a new plant-specific AMP, "Shield Building Monitoring Program," to monitor the protective coating during the period of extended operation.

Issue:

1. The root cause was tied to a blizzard that affected structures throughout the site; however, the response did not clearly explain why similar degradation did not occur in other structures throughout the site.

2. The response provides an AMP to address aging of a new waterproof coating for the Shield Building, but does not discuss the necessity of a coating for other structures, or how other coatings would be managed for aging during the period of extended operation.

Request:

1. Explain how it was concluded that this degradation mechanism has not affected any other structures throughout the site.

2. Explain how this degradation mechanism will be prevented during the period of extended operation for all structures within the scope of license renewal. If a waterproof coating will be relied upon, explain how the coating will be managed for aging. An adequate response should address the requests identified in RAI B.2.43-1, included in this RAI letter.

Letter to Barry S. Allen from Brian K. Harris dated July XX, 2012

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE DAVIS-BESSE NUCLEAR POWER STATION RELATED TO SHIELD BUILDING CRACKING (TAC NO. ME4640)

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P. Cooper
B. Harris (OGC)
M. Mahoney

July 11, 2012

Mr. Barry S. Allen, Vice President
Davis-Besse Nuclear Power Station
FirstEnergy Nuclear Operating Company
5501 North State Route 2
Oak Harbor, OH 43449

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/RA/
Brian K. Harris, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:
As stated

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NAME	IKing	BHarris	DMorey	BHarris
DATE	7/10/12	07/11/12	07/11/12	07/11/12

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