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August 15, 2014

AEP-NRC-2014-68
10 CFR 50.90

Docket Nos.: 50-315
50-316

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

Donald C. Cook Nuclear Plant Units 1 and 2
Response to a Request for Additional Information Regarding the License Amendment Request Regarding Containment Divider Barrier Seal

References:

1. Letter from J. P. Gebbie, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC), "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, License Amendment Request Regarding Containment Divider Barrier Seal," AEP-NRC-2013-50, dated November 6, 2013, Agencywide Documents Access and Management System (ADAMS) Accession No. ML13312A006.

2. Letter from T. J. Wengert, NRC, to L. J. Weber, I&M, "Donald C. Cook Nuclear Plant, Units 1 and 2 – Request for Additional Information Concerning the Containment Divider Barrier Seal License Amendment Request (TAC Nos. MF3052 and MF3053)," dated May 15, 2014, ADAMS Accession No. ML14127A470.

3. Letter from J. P. Gebbie, I&M, to NRC, "Donald C. Cook Nuclear Plant Unit 1 and Unit 2, Response to a Request for Additional Information Regarding the License Amendment Request Regarding Containment Divider Barrier Seal," AEP-NRC-2014-31, dated June 13, 2014, ADAMS Accession No. ML14167A374.

4. Electronic Mail from M. L. Chawla, NRC, to H. L. Etheridge, I&M, "Request for Additional Information – D. C. Cook Unit 1 and 2 – LAR – Containment Divider Barrier Seal – MF3052/MF3053," dated July 31, 2014.

By Reference 1, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant Units 1 and 2, submitted a request to amend the Technical Specifications (TS) to Facility Operating Licenses DPR-58 and DPR-74. I&M proposes to change TS 3.6.13, Divider Barrier Integrity, Surveillance Requirement 3.6.13.5 for the divider barrier seal inspection. By Reference 2, the Nuclear Regulatory Commission (NRC) transmitted a request for additional information (RAI) regarding the proposed amendment. By Reference 3, I&M responded to Reference 2. By

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Reference 4, the NRC transmitted an additional RAI regarding the proposed amendment. This letter provides I&M's response to Reference 4. Enclosure 1 to this letter provides an affirmation statement. Enclosure 2 to this letter provides I&M's response to Reference 4.

Copies of this letter and its enclosures are being transmitted to the Michigan Public Service Commission and Michigan Department of Environmental Quality, in accordance with the requirements of 10 CFR 50.91. There are no new regulatory commitments associated with this response. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Manager, at (269) 466-2649.

Sincerely,

Joel P. Gebbie
Site Vice President

TLC/kmh

Enclosures:
1. Affirmation
2. Response to Request for Additional Information Regarding Containment Divider Barrier Seal License Amendment Request

c: M. L. Chawla, NRC Washington, D.C.
J. T. King, MPSC
MDEQ – RMD/RPS
NRC Resident Inspector
C. D. Pederson, NRC Region III
A. J. Williamson, AEP Ft. Wayne, w/o attachments

Enclosure 1 to AEP-NRC-2014-68

AFFIRMATION

I, Joel P. Gebbie, being duly sworn, state that I am Site Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request with the U. S. Nuclear Regulatory Commission on behalf of I&M, and that the statements made and the matters set forth herein pertaining to I&M are true and correct to the best of my knowledge, information, and belief.

Indiana Michigan Power Company

Joel P. Gebbie
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 15 DAY OF August, 2014

Notary Public

My Commission Expires 04-04-2018

DANIELLE BURGOYNE
Notary Public, State of Michigan
County of Berrien
My Commission Expires 04-04-2018
Acting in the County of Berrien

Enclosure 2 to AEP-NRC-2014-68

RESPONSES TO REQUEST FOR ADDITIONAL INFORMATION REGARDING CONTAINMENT DIVIDER BARRIER SEAL LICENSE AMENDMENT REQUEST

By letter dated November 6, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML13312A006), Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant Unit 1 and Unit 2, submitted a request to amend the Technical Specifications (TS) to Facility Operating Licenses DPR-58 and DPR-74. I&M proposes to change TS 3.6.13, Divider Barrier Integrity, Surveillance Requirement 3.6.13.5 for the divider barrier seal inspection. By letter dated June 13, 2014, I&M provided a response (ADAMS Accession Number ML14167A374) to the U. S. Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI), dated May 15, 2014 (ADAMS Accession Number ML14127A470). While reviewing I&M's RAI response, specifically, to Containment and Ventilations Systems Branch (SCVB) RAI-3, the NRC staff has additional questions.

SCVB RAI-3 from NRC letter dated May 15, 2014

Please provide the NRC approved methodology used to determine that the acceptance criteria for the bypass area have been met.

Response to SCVB RAI-3 from I&M's letter dated June 13, 2014

In case deficient connections are discovered, then the resulting divider barrier bypass would be determined, using an accepted standard, the American Institute of Steel Construction (AISC) Manual of Steel Construction, (tables for beam diagrams and formulas), as referenced in Updated Final Safety Analysis Report (UFSAR) Chapter 5, or using a simplified method that is more conservative, to determine the deflections of the as found configurations due to a postulated blowdown, and these deflections would be used to quantify the bypass area. The total bypass area for that unit is then compared against the Allowable Design Basis Bypass Area of seven square feet, per UFSAR 5.3.5.15.4. The assumed Analysis Value is 35 square feet, per UFSAR 14.3.4.1.3.1.1.e.

Additional RAI from NRC electronic mail dated July 31, 2014

The NRC staff has the following questions regarding the above response provided by the licensee:

a) *What is the "simplified method" and what standard is this based on?*
b) *How will it be determined that this simplified method is more conservative than the American Institute of Steel Construction (AISC) Manual of Steel Construction, as referenced in SCVB RAI-3 response?*

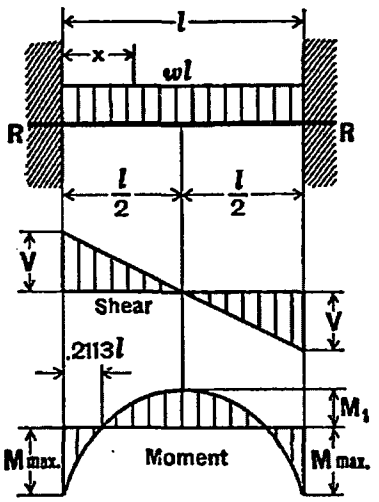
Response to Additional RAI from NRC electronic mail dated July 31, 2014

The simplified method is also based on the AISC standard. An example is provided below to demonstrate the conservative nature of a simplified method as it uses the area of two triangles instead of computing the integral of the actual curved deflection shape. A simplified method would be more conservative as it would use a model that produces a larger deflection and area.

In case deficient connections are discovered, then a structural analysis would be performed, via AISC Manual of Steel Construction (tables for beam diagrams and formulas), or using a more conservative method also based on the AISC standard, to determine the deflections of the deficient configurations due to a postulated blowdown, and these deflections would be used to compute the additional bypass area. The total bypass area for the affected unit is then updated and compared against the Allowable Design Basis Bypass Area of seven square feet, per UFSAR 5.3.5.15.4. The Minimum Analysis Value is 35 square feet, per UFSAR 14.3.4.1.3.1.1.e.

First example: For a model using a fixed beam, an exact structural analysis using an AISC formula is shown as follows:

15. BEAM FIXED AT BOTH ENDS—UNIFORMLY DISTRIBUTED LOADS



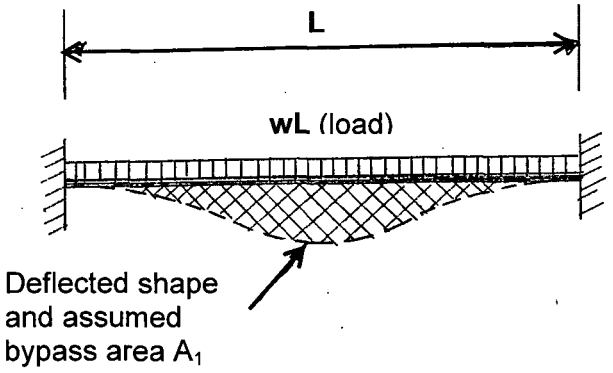
Equivalent Tabular Load	$= \frac{2wl}{3}$
$R = V$	$= \frac{wl}{2}$
V_x	$= w\left(\frac{l}{2} - x\right)$
M max. (at ends)	$= \frac{wl^2}{12}$
M_1 (at center)	$= \frac{wl^2}{24}$
M_x	$= \frac{w}{12}(6lx - l^2 - 6x^2)$
Δmax. (at center)	$= \frac{wl^4}{384EI}$
Δ_x	$= \frac{wx^2}{24EI}(l - x)^2$

(ref. AISC Manual of Steel Construction 7th edition)

As shown in the diagram #15 above, the deflection along any point of the beam is
$\Delta_x = wx^2(L - x)^2 / 24EI$

Where:
w = distributed load along the beam
x = variable distance from one of the beam supports
L = total length of the beam
E = modulus of elasticity of the beam
I = moment of inertia of the beam

The beam's deflected shape and assumed bypass area are shown in the following sketch:

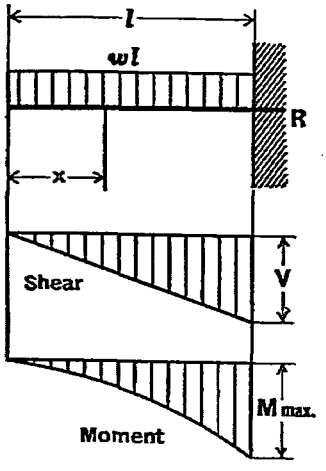


To determine the assumed area of the divider barrier bypass from diagram #15, this requires computing the integral of this formula with respect to "*x*," and this is shown as
$A_1 = \int [(wL^2x^2 - 2wLx^3 + wx^4) / 24EI] = (wL^2x^3 / 72EI) - (wLx^4 / 48EI) + (wx^5 / 120EI)$

Consequently, for the length of the beam from $x = 0$ to L, the total bypass would be computed as $\boldsymbol{A_1 = wL^5 / 720EI}$

Second example: Alternately, a simplified, conservative structural analysis using an AISC formula for two cantilever beams (end-to-end) is shown as follows:

19. CANTILEVER BEAM—UNIFORMLY DISTRIBUTED LOAD

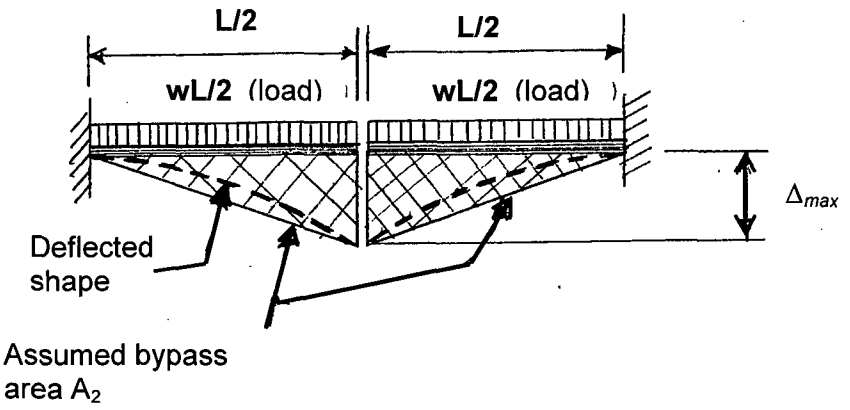


Equivalent Tabular Load	$= 4wl$
R = V	$= wl$
V_x	$= wx$
M max. (at fixed end)	$= \frac{wl^2}{2}$
M_x	$= \frac{wx^2}{2}$
Δmax. (at free end)	$= \frac{wl^4}{8EI}$
Δ_x	$= \frac{w}{24EI}(x^4 - 4l^3x + 3l^4)$

(ref. AISC Manual of Steel Construction 7th edition)

As shown in the diagram #19 above, the maximum deflection is $\Delta_{max} = wL^4 / 8EI$

The beam's deflected shape and assumed bypass area are shown in the following sketch:



To determine the assumed area of the divider barrier bypass from diagram #19, the area of two triangles along a beam with length *L* would be conservatively computed.

In this case, the maximum deflection would be located at point *L/2*, (midpoint of the beam), and the total bypass would be computed as $A_2 = (2)\ [w(L/2)^4 / 8EI]\ (L/2)\ (0.5) = \mathbf{wL^5 / 256EI}$

Therefore, the assumed bypass area derived by using the simplified method based upon diagram #19 (two cantilever beams) would be approximately three times larger than the bypass area calculated by the exact structural analysis method based upon diagram #15 (fixed beam) and thus would be more conservative.