



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

October 5, 2015

LICENSEE: Indiana Michigan Power Company, LLC

FACILITY: Donald C. Cook Nuclear Plant, Units 1 and 2

SUBJECT: SUMMARY OF SEPTEMBER 23, 2015, PUBLIC MEETING WITH INDIANA MICHIGAN POWER COMPANY REGARDING DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2 (TAC NOS. MF0050 and MF0051)

On September 23, 2015, a Category I public meeting was held between the U.S. Nuclear Regulatory Commission (NRC) and representatives of Indiana Michigan Power Company (I&M, the licensee). This meeting was open to members of the public.

The purpose of the meeting was to discuss the reactor vessel internals aging management program for Donald C. Cook Nuclear Plant (CNP), Units 1 and 2, which is currently under review by the NRC staff. The meeting notice and agenda, dated September 11, 2015, are available at Agencywide Documents Access and Management System (ADAMS) Accession No. ML15257A289. A list of attendees is provided as Enclosure 1 to this meeting summary. The handout used during the meeting is provided as Enclosure 2.

The NRC staff discussed a follow-up request for additional information (RAI)-2(b), which was sent to the licensee on May 5, 2015 (ADAMS Accession No. ML15119A339), and to which a response was received on August 6, 2015 (ADAMS Accession Nos. ML15223A435 and ML15223A436, respectively). The NRC staff discussed the licensee's response, the staff's evaluation of the response, and the supplemental information needed in order for the staff to complete its review of the CNP aging management program.

The NRC staff requested elaboration on four statements made by the licensee in its response to RAI-2(b). Those statements are related to the fracture toughness of thermally-embrittled cast austenitic stainless steel components, the redundancy of the control rod guide tube guide cards, the periodic monitoring of control rod functionality, and the ability of VT-3 inspections to detect cracking. The licensee stated that it will submit a supplement that provides amplification regarding these items.

No regulatory decisions were made during the meeting. Members of the public were in attendance via telephone and had no comments. Public Meeting Feedback forms were not received.

Please direct any inquiries to me at 301-415-2846, or Allison.Dietrich@nrc.gov.



Allison W. Dietrich, Project Manager  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosures:

1. List of Attendees
2. Handout

cc w/encl: Distribution via Listserv

LIST OF ATTENDEES

SEPTEMBER 23, 2015, PUBLIC MEETING WITH I&M, LLC

DONALD C. COOK NUCLEAR PLANT, UNITS 1 AND 2

REACTOR VESSEL INTERNALS AGING MANAGEMENT PROGRAM

<b>Name</b>	<b>Organization</b>
Allison Dietrich	NRC
Chris Sydnor	NRC
John J. McHale	NRC
Tom Wengert	NRC
Ganesh Cheruvenki	NRC
Jeffrey Poehler	NRC
David Dijamco	NRC
Q. Shane Lies*	I&M
Michael Scarpello*	I&M
Helen Kish*	I&M
Danielle Burgoyne*	I&M
Kevin Kalchik*	I&M
April Lloyd*	I&M
Cheryl Boggess*	Westinghouse
Josh McKinley*	Westinghouse
Randy Locks*	Westinghouse
Kyle Amberge*	Electric Power Research Institute
Rebecca Siegrist*	PSEG Nuclear
Krishan Garg*	PSEG Nuclear
Al Mason*	Robinson Nuclear Plant

\*Participated by telephone

September 23, 2015, Public Meeting with  
Indiana Michigan Power Company (I&M)  
Donald C. Cook Nuclear Plant, Units 1 and 2  
Reactor Vessel Internals Aging Management Program  
Cast Austenitic Stainless Steel (CASS) Control Rod Guide Tube (CRGT) Guide Cards  
Docket Nos. 50-315 and 50-316  
TAC Nos. MF0050 and MF0051

BACKGROUND

- MRP-191 Failure modes, effects, & criticality analysis (FMECA) are the basis for the MRP-227-A inspection guidelines.
  - The guide card metal is evaluated as wrought product - 304 stainless steel (SS) in MRP-191.
- As 304 SS, the guide cards screen in for Wear, Fatigue, and stress corrosion cracking of the welds. Accordingly, they are FMECA Group 3 and Category C, per MRP-191.
  - FMECA Group 3 – High Likelihood of Failure and Medium Likelihood of Core Damage If There Are Failures
  - Category C: "...components for which aging effects are above screening levels, which have moderate or high susceptibility to degradation, and have not yet been demonstrated to be sufficiently tolerant to remain functional relative to aging degradation significance..."
- MRP-227-A primary components' guidelines require VT-3 exams for Wear every 10 years of 20% of CRGT assemblies. All guide cards in each selected CRGT assembly are to be examined.
- Certified material test reports (CMTRs) or other records are not available for identifying the type of material for the CRGT guide cards at Donald C. Cook, Unit 1 (CNP-1).
- Design drawing for the CNP-1 guide cards states that the material is either 304 SS or CASS. Therefore licensee assumes the guide cards are CASS at CNP-1.
- For the assumed CASS CRGT guide cards at CNP-1, the licensee is assuming they are susceptible to thermal embrittlement (TE) given that Ferrite content is unknown (i.e., ferrite content is assumed to be > 20%).
- Thermally embrittled CASS material has lower fracture toughness and greater susceptibility to fracture than non-CASS (wrought) material.

## BACKGROUND (Cont.)

- May 2015 – NRC staff issued a follow-up RAI-2(b) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15119A339):
  - Evaluate the susceptibility of the guide cards to cracking given that these components are more likely to fail if cracks are present.
  - If guide cards are susceptible, propose plant-specific inspection criteria sufficient to detect cracking, or
  - Provide an evaluation to justify that no additional inspections, other MRP-227-A VT-3 exams, are necessary.
  
- August 2015 response to follow-up RAI-2(b) states that, as CASS, the guide cards screen in for Wear Fatigue, SCC of the Welds, and TE. (ADAMS Accession Nos. ML15223A435 and ML15223A436, respectively).
  
- The response to follow-up RAI-2(b) states that cracking would not be more of a concern for CASS guide cards than 304 SS guide cards because:
  - Stress, Function, and Geometry of the part are the same for 304 SS and CASS.
  - Welds on CASS are similar to welds on 304 SS.
  - TE of CASS doesn't result in total loss of fracture toughness.
  - Redundancy of guide cards; multiple failures are necessary for CR to slip out of place.
  - Periodic monitoring of CR functionality, per plant procedures.
  - VT-3 for wear would detect gross failures.
  
- Follow-up RAI-2(b) response indicates that the addition of TE for CASS does not increase susceptibility enough to justify changes to the current MRP-227-A inspection requirements – i.e., VT-3 exams for wear of 20% of CRGT assemblies are still adequate.

### STATUS OF NRC STAFF'S EVALUATION

- Thermally embrittled CASS guide card material is more susceptible to flaw propagation and fracture than 304 SS guide card material.
- NRC staff confirms that the guide card welds are already analyzed as susceptible to SCC in MRP-191 FMECA, and the welds are not any more susceptible to SCC if they are welded to CASS base metal.
- NRC staff also confirms that the susceptibility of the base metal to SCC is not a greater concern for CASS.
- CASS guide cards may be no more susceptible to the formation of new cracks via SCC and fatigue, compared to wrought guide cards.
  - However, due to the lower fracture toughness of embrittled CASS material, CASS guide cards would have less flaw tolerance than wrought guide cards.
- Therefore, even if the pre-existing flaw assumptions and flaw loading/crack driving force parameters are the same for CASS and wrought material, then the lower intrinsic fracture toughness of thermally-embrittled CASS material (compared to 304 SS) makes it more susceptible to the propagation of a pre-existing flaw.
- Currently, the NRC staff does not have the information needed to determine that there is adequate assurance that the VT-3 exams will detect cracking in time to prevent fracture of the guide cards.

Please direct any inquiries to me at 301-415-2846, or Allison.Dietrich@nrc.gov.

**/RA/**

Allison W. Dietrich, Project Manager  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-315 and 50-316

Enclosures:

1. List of Attendees
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**DISTRIBUTION**

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LPL3-1 Reading

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RidsNrrDeEvib Resource

C. Sydnor, NRR

**ADAMS Accession No.: ML15271A046**

OFFICE	DORL/LPL3-1/PM	DORL/LPL3-1/LA	DE/EVIB/BC	DORL/LPL3-1/BC	DORL/LPL3-1/PM
NAME	ADietrich	MHenderson	JMcHale	DPelton	ADietrich
DATE	09/28/15	9/30/15	10/4/15	10/5/15	10/5/15

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